J. M. O'Brien,

Windlass.

No. 1,003. Patented Nov. 9, 1838.

Fig. 1.

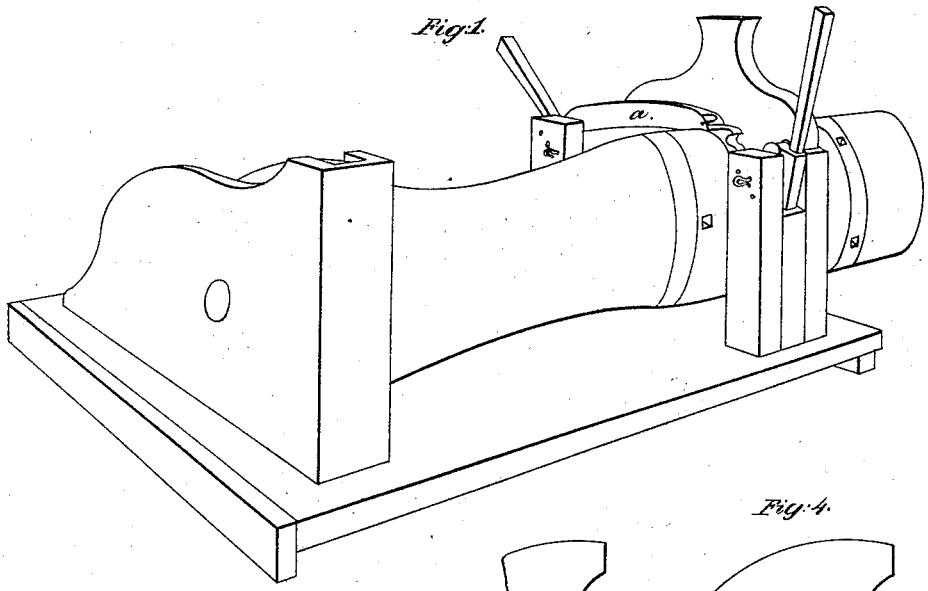

Fig. 4.

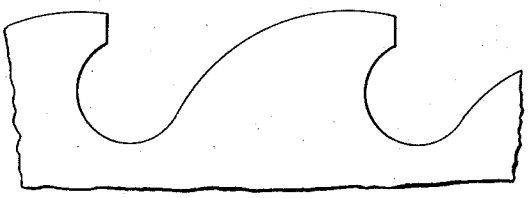

Fig. 5.

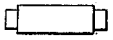

Fig. 6.

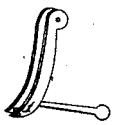

Fig. 2.

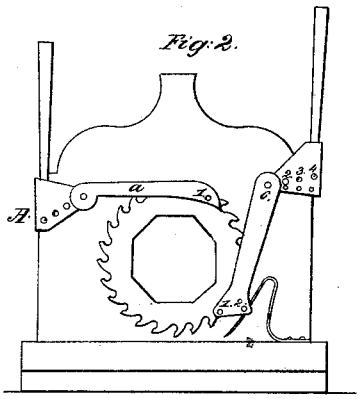

Fig. 3.

UNITED STATES PATENT OFFICE.

JOHN M. O'BRIEN, OF BRUNSWICK, MAINE.

WINDLASS FOR WEIGHING ANCHORS.

Specification of Letters Patent No. 1,003, dated November 9, 1838.

To all whom it may concern:

Be it known that I, JOHN M. O'BRIEN, of Brunswick, county of Cumberland, and State of Maine, have invented a new and useful Improvement in Windlasses for Weighing Anchors, Raising Weights, or Overcoming Resistances; and I hereby declare that the following is a full and exact description.

To the barrel of the windlass, such as are in common use or any to which the improvement is applicable, is attached a ratchet wheel of cast iron which may contain twenty four or thirty-two teeth, but I do not limit myself to any particular number. The fewer the number of the teeth, the stronger they can be made; and when the wheel is comparatively small and the resistance great, it may be expedient to have but twenty four teeth or even a less number. The wheel may be on the larboard or starboard side of the windlass, or one at each side, or the wheel may be at any part of the barrel, the fulcrum on which the lever block moves being properly sustained by posts or bitts. The wheel may be placed inside or outside the bitts, adjoining to or near the same, but as I prefer to have it inside, I shall describe it as so placed. When the wheel is in place on the barrel, the teeth incline from base to point toward the stern of the vessel. The diameter of the wheel should be greater than that of the barrel, if practicable and convenient, and about three inches thick, more or less as the amount of resistance may demand. The wheel should be set on to the barrel so far as to leave, on the side next the bitts, a small space between the wheel and the bitts for the plates or checks of one side of the hooks, hereafter described; and (provided the wheel should not project sufficiently from the barrel) the barrel on the other side of the wheel should be cut away circularly adjoining the wheel, so as to make a narrow groove allowing the plates of the other side of the hooks to fall down or enter in said groove far enough for the round bolt, hereafter described, to catch in the teeth of the wheel.

In the drawings which accompany and make part of this specification, the form of the wheel is shown at Figures 2 and 3, having an octagonal interior rim or hole to fit to the barrel of the windlass, the latter being cut into a proper shape to receive it.

At Fig. 4, is shown the outline of a tooth such as I have used in a wheel of thirty inches diameter with thirty two teeth. The bottom of the excavation between the teeth, is rounded, and the bolt has a rolling rather than a rubbing friction, said circular concave excavation being such as just to allow a free motion or revolution of the bolt and no more. The depth of excavation and the curvature of the teeth should be such as to give strength to the teeth, and retain the bolt, but any excess beyond this is injurious. Should this improvement be used in connection with the cast iron barrel of a windlass, the wheel may probably be cast at the same time with the barrel and be part of it; or the wheel may be separated and adjusted to the barrel.

Two posts are to be inserted in the deck of the vessel, one abaft and the other forward of the windlass, as shown in Fig. 1, at such distance from the bitts as to allow the lever blocks and hooks, hereafter described, to play freely between the posts and bitts; and the posts should be at such distance from the barrels as the length of the hooks, or the position of the lever blocks may require. Fig. 1, indicates a part of a windlass extending from one of the bitts to the pawl bitt, and also the holes in the posts through which pass the pins on which the lever blocks turn. The pins should enter the posts and bitts through metallic plates or boxes to prevent the wear of the bearings.

The lever blocks are of iron. The form of the aft lever block is shown at A, Fig. 2. The small open circles denote holes through which passes the fulcrum pin. The blocks are placed between the posts and the bitts. If the fulcrum pin passes through the upper hole the operator exerts more power than he would if the pin passed through the middle or lower hole. When more speed is required, the fulcrum pin is to be inserted at the middle or lower hole. When the number of teeth in the wheel is twenty four (which is the number intended to be indicated by the Figs. 2 and 3) and the fulcrum pin is so placed that a quarter revolution of the handspike causes an advance of but one tooth, the power of the operator is sixfold more than that of a man at the common windlass; and where the teeth are thirty two, a similar advance of but one tooth gives an eight fold power. The proportions I intend to use are in a wheel of twenty four teeth

on a two fold, three fold and six fold power compared with the power of a common windlass; and in a wheel of thirty two teeth, a two fold, four fold and eight fold power. The block is covered with a strong iron plate which is doubled or folded over it and extends over its surface and is fastened by rivets passing through the block and cover. The folded part of the cover extends beyond the included metal, forming a cavity or socket in which to insert a handspike for the purpose, as hereinafter described, of actuating the blocks, hooks and wheel. Instead of the above method, the blocks with their sockets may be of cast iron, cast in the proper form. It is intended to have the handspike vertical, or nearly so, at the beginning of the stroke, but any required direction may be given to it by altering the angle of the block. For instance, if the angle at A Fig. 2, were more obtuse the handspike instead of being vertical would incline aft. It is intended that the handspike shall traverse about a quarter of a circle. When the line of traction, by which I mean a line extending from the bolt to the pin connecting the hook and block, is tangential to the periphery of the wheel, and said line is also at right angles to the line of fulcrum holes, the stroke is considered as half accomplished. It is my opinion, however, that the strain on the teeth would be more favorable to their strength by an arrangement somewhat different. To illustrate my idea, suppose the aft handspike to be at the middle of the stroke, and the line of traction tangential to the wheel. Now, if the hook were longer, or the block were placed nearer the wheel, so that the bolt, at the middle of the stroke, should extend one tooth more on to the wheel, it is obvious that at the termination of the stroke, the traction would be more across the wheel than would otherwise be the case, and I think the strain on the tooth would be more favorable. Further experience, however, must determine which method will be the best in practice. At the beginning of the stroke the handspike is about one eighth of a circle, or 45 degrees, from its position at the middle of the stroke, and at the completion of the stroke it is, but in a different direction, another eighth from its middle position. The blocks are to have the line of fulcrum hole at such an angle to the line of traction, and the blocks must be at such distance from the wheel, that a quarter circle may be described by the handspike without the plates, at the end of the stroke, bearing against the fulcrum pin which passes through the posts, blocks and bitts.

The requisite obliquity of the line of fulcrum holes to the line of traction may be obtained either by boring said holes in the desired angular line in the block, at any given position of the hook on the wheel; or any given line of fulcrum holes may, at any given position of the hook and wheel, be rendered more oblique to the line of traction, by merely removing to a greater distance from the wheel the fulcrum pin passing through the ports, blocks and bitts; but the hook must be made longer in order to be adapted to the new position. I have sometimes caused the line of fulcrum holes to be in the direction indicated by 2, 3, 4, Fig. 2, by means of which the handspike at the commencement of the stroke, stands at a more oblique angle to the line of fulcrum holes, and consequently, as I suppose, requires the block to be at a less distance from the wheel than would otherwise be required.

The aft hook is shown at, *a*, Figs. 1 and 2. I have usually made it in length about three fourths of the diameter of the wheel, but do not limit myself to this proportion. The hook consists of two strong iron plates or cheeks through which passes a round iron or, which is better, steel bolt. The bolt is indicated by the small black circles marked, 1, in Figs. 2, 3 and 6. When great strength is required, the bolt may be an inch in diameter, but the size may be more or less as circumstances may require. The plates of the hook should be wide enough apart, to fall freely and loosely over the ratchet wheel. The bolts should have shoulders as shown in Fig. 5. The diminished parts near the shoulders pass through holes in the plates just large enough to receive them, and the projecting ends may be battered by hammering, or the extremities may be cut into screws and nuts screwed on the projecting ends. Care should be taken to cut away spaces in the bits to allow free action to the nuts and projecting shoulders when the wheel does not stand far enough off from the bitts to allow such action. The bolt is to be prevented from turning by a small steady pin locking it with the plates. The block being placed between the plates, which should be wide enough apart to permit it to move freely between them, a pin connects the hook and block by passing through the holes of the plates and block, and the ends of the pins may be battered or properly secured. The pins should be of steel or sufficiently strong material.

Fig. 2, shows a view of the blocks, hooks and wheel in connection, and the spring acting against the roller of the fore hook. When the fulcrum pin is inserted in the fulcrum hole of the post and block with reference to speed, it is called the long purchase, and the pin is inserted in the hole nearest the socket; when said pin is inserted with reference to power, it is called the short purchase, and the pin is inserted in the hole nearest the pin connecting the hook and block. The middle purchase is a medium between the others.

In Fig. 1, the pin is inserted at the long purchase in the aft post, and at the middle purchase in the fore post.

As the law requires the patentee to "explain the several modes in which he has contemplated the application of the principle" I will further state that the obliquity of the line of traction to the line of fulcrum holes may be made such that at the commencement of the stroke they may be nearly in a line. The result of such an arrangement, it is conceived, would be that there would be a great initial force to overcome the *vis inertia* at the beginning, and that at the completion of the stroke, the line traction would be but little past the point at which it would be tangential to the periphery of the wheel or at which it would be at right angles with the line of fulcrum holes.

The forward or fore block is composed of iron and an iron envelop, or of cast iron, similarly to the aft one, but is of a different shape, as may be seen in Fig. 2, where the handspike is inserted in its appropriate socket. The fulcrum pin which passes through the fore post, block and into the bitts, is to be inserted according to the purchase intended to be taken. The block and hook are connected by a pin as shown in Fig. 2.

The fore hook is composed, similarly to the aft one, of a bolt and of two plates wide enough apart to allow the block to move freely between them. The form of the fore hook is shown at Fig. 2, where the small black circle, 1, indicates the bolt, the small black circle, 3, the hook hole through which passes the pin connecting the hook and block. The small black circle, 2, indicates a roller which receives the action of the spring, the latter being made narrow enough to act between the plates of the hook. The spring may be of steel, wood, iron or other suitable material. The fore hook is pendent and is forced against the teeth of the wheel by the spring.

Fig. 2, shows the fore block with the handspike inserted and the position of one of the forms of the spring which is screwed or fastened to the deck; but I do not limit myself to any particular form of spring which obviously may be extensively varied. I have sometimes used a counter weight instead of a spring, as shown in Fig. 6, but a spring is preferable, especially at sea. The fore hook as above described, is pulled when in operation, but it may be made to act as a pusher, in which case the spring may be dispensed with. Fig. 3, shows how this may be effected, and it also shows how the aft hook may be made to act as a pusher by the aid of a spring; but as these arrangements are considered to be inferior to those already described, any further description of them is not deemed necessary or useful. Should they, however, be used, the pushers or ratchets should be of such length as not to interfere, should an aft pulling hook and a fore pusher be used.

Between the posts and the bitts may be short posts to limit the downward stroke of the handspike. It is desirable to have the short posts limit the stroke both at the long and short purchases, and this may be accomplished in the following manner. When the handspike has completed its stroke at the short purchase, and is resting on the short post, if the holes for the other purchases be then made through the post exactly opposite to the corresponding holes of the block as it will then be situated, one short post will answer for all the purchases.

Another, and perhaps a more accurate, arrangement, is to cause all the fulcrum post holes to be made when the stroke is half completed and to limit the downward strokes by movable pins inserted through the posts and bitts, the pin being adjusted as each purchase may require. The pins, as well as the short posts, limit the stroke by being placed under some part of the block and acting as a check or bar to its further motion. The posts and bitts should be wide or broad enough to allow pins to be inserted, extending from the post to the bitt (when pins are used) and if any should not be thus wide or broad, an additional vertical piece should be attached to the end of the bitt.

I rely on the ordinary pawls, as commonly used on a ship's windlass, to prevent a recoil.

The operation of the machine is as follows: The handspike, inserted in the socket of the block, being elevated from a depressed position, slides over the teeth of the wheel, and being again depressed, the bolt catches in the teeth and causes a partial revolution. Being again elevated it slides as before and being depressed, the wheel is again propelled, and so on. For the convenience of having a distinctive name, the machine is denominated the "Brunswick Purchase."

This machine may be used for other purposes than for ships' windlasses, by connecting the barrel by means of chains or cordage, with the object whose resistance is to be overcome, and in such cases the wheel should have a pawl or pawls. It may also serve as a press by causing a pinion on the same shaft with the wheel to mesh into a rack impelling a platen or pressing surface.

I claim as my invention and desire to secure by Letters Patent the following points:

1. I claim the mode of forming or constructing the ratchet wheel to be acted upon by a round bolt or pin, confined between cheeks, or standing at right angles from a

bar, as set forth, in combination with a windlass or other analogous machine for raising weights or overcoming resistances.

2. I claim the method, as above described of varying power and speed, as applied, to windlasses.

3. I claim the lever blocks as above described and all equivalent arrangements with mere circumstantial variations.

4. I claim the fore and aft hooks or ratchets, as pushers, as described, and combined with the other parts of the machine.

5. I do not claim generally the actuating of a ratchet wheel by hooks, hands, catches, ratches or ratchets other than those above described, nor do I claim except as above claimed, together with all such variations of the foregoing as are substantially the same in principle and operation.

Dated at Washington this fourteenth day of August A. D. 1838.

JOHN M. O'BRIEN.

Witnesses:
GEO. C. WHITING,
HUGH B. SWEENY.