A Hammond

Windlass.

No 3,291. Patented Oct. 6, 1843.

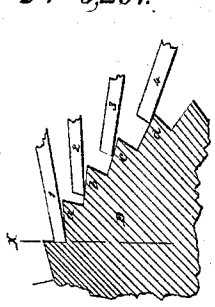

Fig. 6.

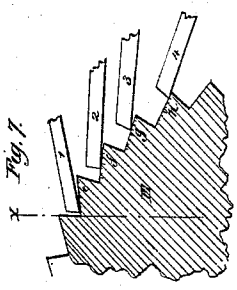

Fig. 7.

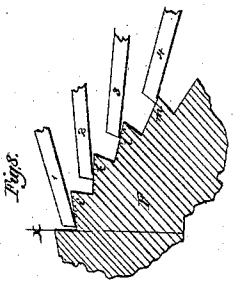

Fig. 8.

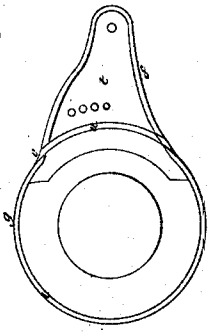

Fig. 5.

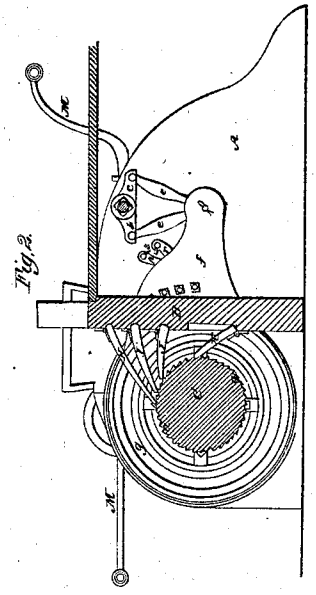

Fig. 2.

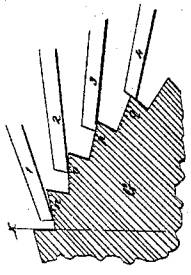

Fig. 9.

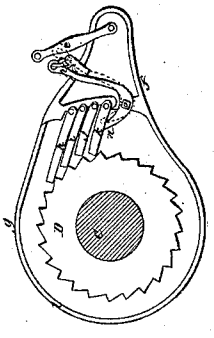

Fig. 4.

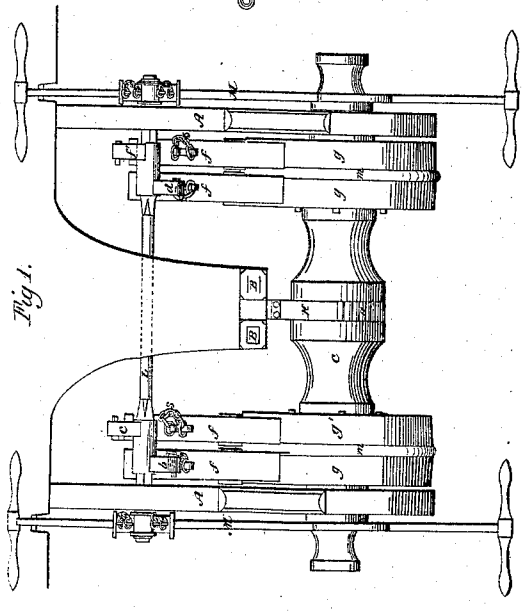

Fig. 1.

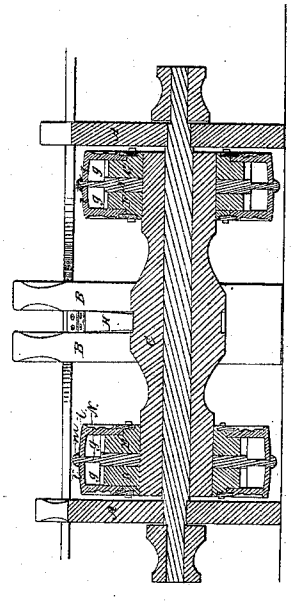

Fig. 3.

UNITED STATES PATENT OFFICE.

ARTEMUS HAMMOND, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO HIMSELF AND WM. ADAMS, OF SAME PLACE.

SHIP'S WINDLASS.

Specification of Letters Patent No. 3,291, dated October 6, 1843.

To all whom it may concern:

Be it known that I, ARTEMUS HAMMOND, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Ship's Windlasses, the same being represented in the accompanying drawings, which are to be taken in connection with the following description, wherein the nature and principles of my invention are fully set forth.

Figure 1, of the drawings above mentioned exhibits a top view of a windlass constructed according to my improved plan. Fig. 2, is a vertical section thereof, taken in a plane passing through the center of the windlass barrel and the pawl posts. Fig. 3, is a vertical section taken in the plane of the axis of the barrel. Fig. 4, is a vertical section taken across the axis of the barrel and at right angles thereto and through one of the toothed wheels on which the impelling pawls act.

The operative parts of the mechanism are sustained in the usual manner by what are termed the "bitts" A A, and the pawl posts B, B, Figs. 1, 2, the said bitts and pawl posts being firmly secured to the deck of the vessel. The main barrel C Figs. 1, 2, 3, 4, of the windlass has four ratchet or toothed wheels D, E, F, G firmly fixed thereon and in the positions with respect to each other as seen in Fig. 3, there being two of these toothed wheels, arranged in close proximity with each other on each side of the center of the barrel, and at equal distances from the center as represented in the drawing. The periphery of the middle part of the barrel has teeth or indentations *a*, *a*, formed around it in the ordinary manner, with which the retaining pawls H, I, J, K, Fig. 2, operate. These retaining pawls are hinged to the after side of the pawl posts, and play vertically as circumstances require.

A horizontal shaft L having brakes M, M, fixed on each end extends from one of the bitts to the opposite one its journals resting and moving in suitable bearings formed in the bitts. The said shaft is placed in a position forward of the pawl posts, and has near each of its ends and just within the bitts, two short arms *b* and *c*, *d* and *f'* extending at right angles to it and in opposite directions to each other as denoted in Figs. 1, 2. To the end of each arm one of a series of links or connecting bars *e*, *e*, is jointed, the opposite extremity of the said link being similarly jointed to the projecting ear or arm *f*, of one of the four impelling pawl cases *g*, *g*, *g*, *g*, which partially surround the ratchet wheels D, E, F, G, before mentioned, and carry the impelling pawls *h*, *i*, *j*, *k*.

As most machinery of this kind is constructed of iron, it becomes absolutely necessary to protect it as much as possible from the action of rain and sea water, the corroding effect of which is often so great as to cause such an adhesion of the pawls to the teeth of the wheels and other parts as to materially obstruct their movements and correct operation. In order to counteract this evil as much as possible, I have so arranged the pawl cases in connection with the ratchet wheels and pawls as to prevent the introduction of water within them.

The impelling ratchet or toothed wheels D and E are cast upon or joined to opposite sides of a circular plate N (see Fig. 3), somewhat larger in its diameter than that of the wheels. The wheels F and G are similarly connected to a similar circular plate N, and the upper rims *l*, *l*, of the pawl cases *g*, *g*, by which the wheels are covered, are arranged as closely in contact with the sides of the circular plate as they can be to permit the movements of these respective parts by each other. Each of the circular plates M, N, has a flange *m* formed around its periphery, and extending laterally on each of its sides a short distance and over the rim *l* of the pawl case, or so as to cover or lap over the vertical joint or thin space between the edge of the rim and the face of the circular plate. The upper surface of the flange *m* is curved semicircularly as seen in Fig. 3, and the circular rims *l*, *l*, of the adjacent pawl cases are declined therefrom, as seen in the drawing, so that when any water falls on the rims and flange it will immediately be turned off the same and be prevented from entering into the interior of the pawl cases. This peculiar combination of a circular flange plate with the two ratchet wheels contributes greatly to the strength of the latter thereby enabling the whole to be constructed much lighter in weight than would in other respects be prudent. The impelling pawls of each case *g* are arranged forward of the ratchet wheels as seen in Fig. 4, and are all lifted out of action with the

teeth of the wheel by means of a cam lever *n*, *p* which moves upon a pin or fulcrum at O. The end *n* of this lever bears against the side of the lower pawl, while the upper end *p* passes and extends through a slot *q*, suitably formed through the rim *f* of the arm *g*. In order to elevate the pawls, the end *p* of the lever is pressed forward into the position represented by the dotted lines, and is retained therein by means of a wedge *r*, which in this case is inserted in the slot on the after side of the lever. In Fig. 4 this wedge is shown on the forward side thereof, and is connected to the said lever by a chain *s*. The pawls thus situated are protected from the weather by a plate *t* (see Fig. 5, which is a representation of the rear side of one of the pawl cases), suitably fitted into the arm of the pawl case and extending aft a short distance into the interior of the circular part of the case or beyond the flange *m*, a curved groove *u* being formed in the plate *t*, for the lateral part of the flange to move in. By this arrangement of the plate, or extension of the same in rear of the flange and forming the plate with a groove, any water which may enter the rim of the pawl case, where it becomes necessary to cut away the said rim to admit the flange or at the point *u*, instead of finding its way into the interior of the case, and into the joints of the pawls, will be received into the groove *u*, and flow through the same and be discharged at its lower end.

On elevating the after brake handles, the arms *b* and *d* lift their respective pawl cases, while the other arms *c* and *f'* depress theirs at the same time. The corresponding pawls of the cases which are raised and which are pressed against the teeth of the ratchet wheels D and F, turn the barrel of the windlass around a short distance in its bearings. While this operation is going on the pawls of the other two cases are slipping or sliding over the teeth of their respective ratchet wheels, so that when the forward handles of the brakes are elevated certain corresponding ones of these latter act in their turn upon the teeth of the ratchet wheel, and revolve the barrel of the windlass a like distance in the same direction in which it was moved by the pawls first mentioned. Thus it will be seen, that at every elevation and depression of either the fore or aft handles of the brakes, a steady and continued rotary motion is imparted to the barrel, thus in a great measure relieving the barrel and shaft L from torsion strain.

The common or that generally known by the name of "the English windlass," is constructed with two pawl cases and ratchet wheels, there being one pawl case at each end of the main barrel. While one pawl case is raised the other is depressed. Thus the crank shaft thereof is subjected to a great torsion strain throughout its length and often breaks causing serious accident. Two pawls are generally used in each case, and while the pawl or pawls of one of the cases is in action, those of the other are sliding over the teeth of its ratchet wheel, in order to be ready in their turn to act when the case is raised. As the pawl of this latter series which is thus brought against one of the teeth of the wheel, often passes some distance beyond or forward of the front side of the tooth it will be evident that no movement of the barrel in the requisite direction to wind up the cable can be effected, until the end of the pawl reaches the front of the tooth, so that it is often the case that the moment the strain of the lifting pawl is removed and the men depress the opposite end of the brakes, the barrel will move back some distance until the depressed pawl or that before mentioned as having passed beyond the tooth is brought into contact with the tooth. This not only occasions a great loss of power and consequently time in raising an anchor, but often serious accident either to some of the men or to the machinery.

The peculiar object of my arrangement of four pawl cases and ratchets is to counteract these evils, or in other words to prevent almost if not entirely the torsion strain upon the crank shaft, and windlass barrel as well as the back action or retrogradation of the barrel, which I do to such an extent that I can generally raise an anchor in about one half the time that is consumed by operating with the "English windlass."

In my windlass four pawls in each case are used, making sixteen in all. Figs. 6, 7, 8 and 9 exhibit their arrangement with respect to each other and the teeth of the ratchet wheels, a portion comprising four or more teeth of each wheel being shown in these figures.

The wheels D, E, F, G, being disposed upon the windlass barrel, so that a vertical plane passing through the axis of the barrel shall pass through the after extremity of one tooth of each wheel, or in other words shall pass through the same as shown by the dotted lines X, X, X, X, of Figs. 6, 7, 8, 9, we divide the upper surface of each tooth, from its forward to its rear end into eight equal parts as seen in the drawings. The pawls of each wheel are numbered 1, 2, 3, 4. The extremity of pawl 1, of wheel D being placed against the front face of the tooth immediately aft of tooth, *a*, the ends of the corresponding pawls 1, 1, of wheels E and F, should be placed over the first division forward of lines X, X, and that of pawl 1, wheel G over the second division forward of the line X. Next, place the rear end of pawl 2, of wheel D against the second division of tooth *b*—also that of pawls 2, of wheels E and F against the third division of

the teeth *f* and *k* also that of pawl 2, of wheel G against the fourth division of the teeth O of the wheel G. Next, pawl 3 of wheel D on fourth division of tooth *c*—pawl 3, of wheels E and F on fifth division of teeth *g* and *l*—pawl 3 of wheel G on sixth division of tooth *p*. And lastly pawl 4, of wheel D on sixth division of tooth *d*—pawls 4, of wheels E and F on seventh division of teeth *n* and *m*, and pawl 4 of wheel G, against the front end of tooth *q*.

By the above arrangement of the several pawls it will be seen that some one of those which may be in the act of descending or sliding over the teeth of the ratchet wheel will drop from one of the teeth down upon the succeeding tooth at every time one of the divisions of the teeth of the wheels meets and passes the vertical plane X and of the descending pawl cases, the pawls will drop alternately. When the pawl cases are raised, that pawl of the same which is in contact with the front of the teeth of one of the wheels will first receive the strain from the set of brakes which is nearest to the said case of the said pawl. The force which is exerted upon the opposite set of brakes, will, in consequence of the usual looseness of the joints of the mechanism, and the springing of the shaft L and other parts, also press one of the pawls of the opposing ascending cases against one of the teeth of its ratchet wheel, and in this manner one of each ascending case, although one is somewhat in advance of the other, will be brought into action during the time the said cases are turning the windlass barrel.

The length of the upper surface of each tooth of the wheel, may be about one inch and one half of an inch, so that at every retrogradation of the teeth a distance equal to three sixteenths of an inch one of the series of pawls of the descending wheels will drop from one of the teeth of their respective wheels upon that immediately succeeding it. Thus it will be seen that the back action of the windlass barrel hereinbefore mentioned is reduced to so trifling a quantity as to be almost inappreciable, and in consequence thereof the windlass barrel travels around with a regular progressive motion. As in the "English windlass," whatever back action occurs is so much loss to be afterwards made up, much time and power are wasted in operating therewith.

Instead of the four series of pawls being placed with respect to the ratchet wheels in the manner as above set forth, all of the series may be arranged in their cases precisely alike, that is to say the pawls 1, of each wheel may be of the same length and have the same position in each case and so on with other series of pawls 2, 3, and 4. When this arrangement of the pawls is adopted, the four ratchet wheels should be keyed or fastened upon the barrel of the windlass in such positions with respect to each other, that the vertical plane X Fig. 6, of the axis of the barrel shall at the same time pass through the rear extremity of the tooth *a*, of wheel D Fig. 6, also through the first divisions of the teeth *e* and *i* of wheels E and F Figs. 7 and 8, also through the second division of the tooth *n* of wheel G Fig. 9, or in other words the wheels should be so adjusted upon the barrel that the teeth of the wheels E and F shall be a distance equal to one of their divisions in rear of those of the wheel D, while those of the wheel G are placed a distance in rear of those of the wheel D equal to two of the divisions.

Having thus explained my invention I shall claim—

The method above set forth of relieving the crank shaft from the effect of a torsion strain, viz by arranging a supplementary pawl case, with its pawl, and ratchet wheel, at each end of the shaft and windlass and windlass barrel in the manner described so that at each elevation or depression of the brakes each end of the shaft or windlass shall be actuated or turned in one direction, the whole being substantially as before specified.

2. Also, extending the rear plate *t* of each of the pawl cases into the body of the case or beyond the flanch of the circular plate N and forming a curved groove *u* in said plate for the flanch to rest and move in; by which arrangement the access of water into the interior of the arm of the pawl case is prevented, the whole of the above mechanism being constructed and operating substantially as described.

In testimony that the above is a correct specification of improvements I have hereto set my signature this fourteenth day of September, A. D. 1843.

ARTEMUS HAMMOND.

Witnesses:

R. H. EDDY,

JOHN NOBLE.