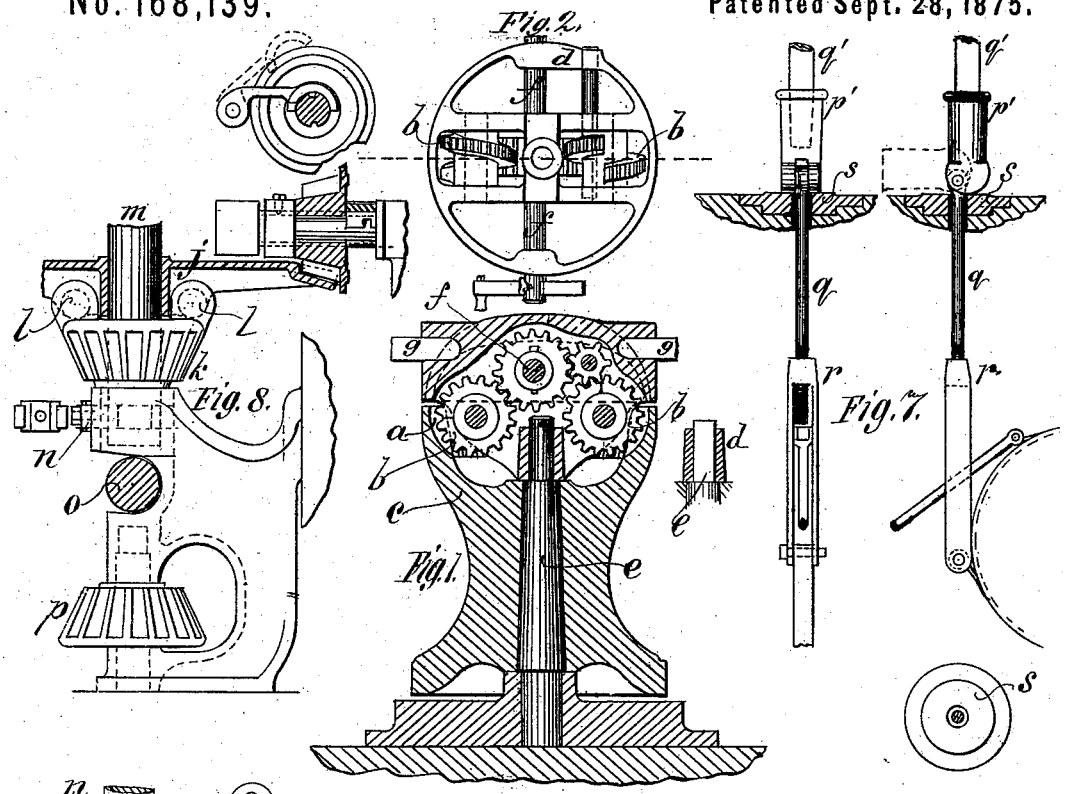
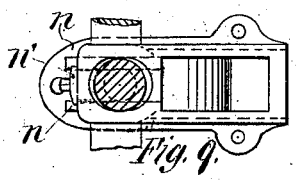
4 Sheets--Sheet 1.

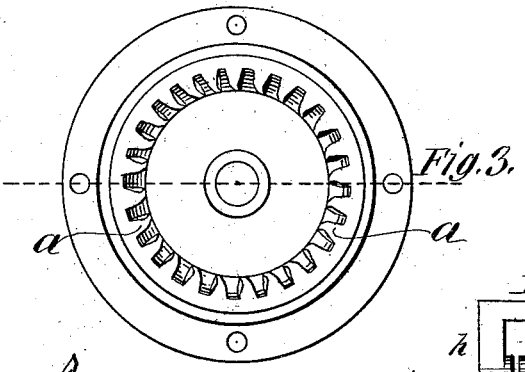
D. N. B. COFFIN, Jr.

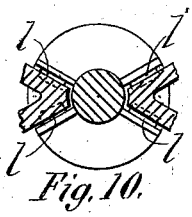
Windlass and Capstan.

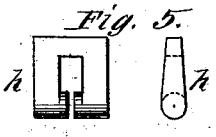
No. 168,139. Patented Sept. 28, 1875.

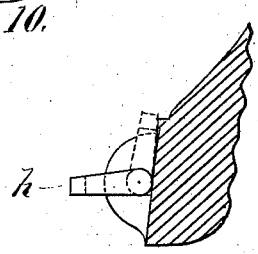


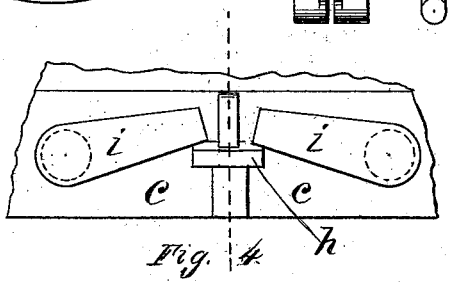












Witnesses.

Frank T. Rogers

Guilford White

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4 Sheets--Sheet 2.

D. N. B. COFFIN, Jr.

Windlass and Capstan.

No. 168,139. Patented Sept. 28, 1875.

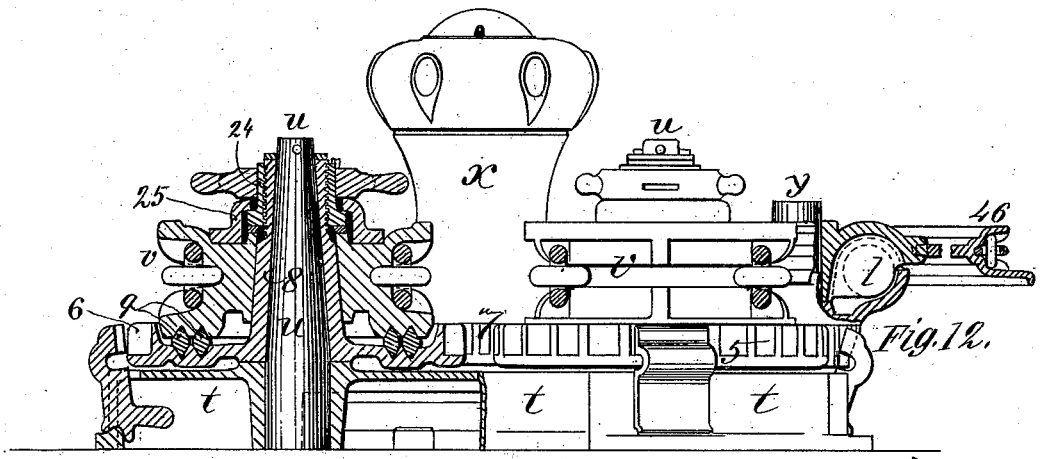

Fig. 12.

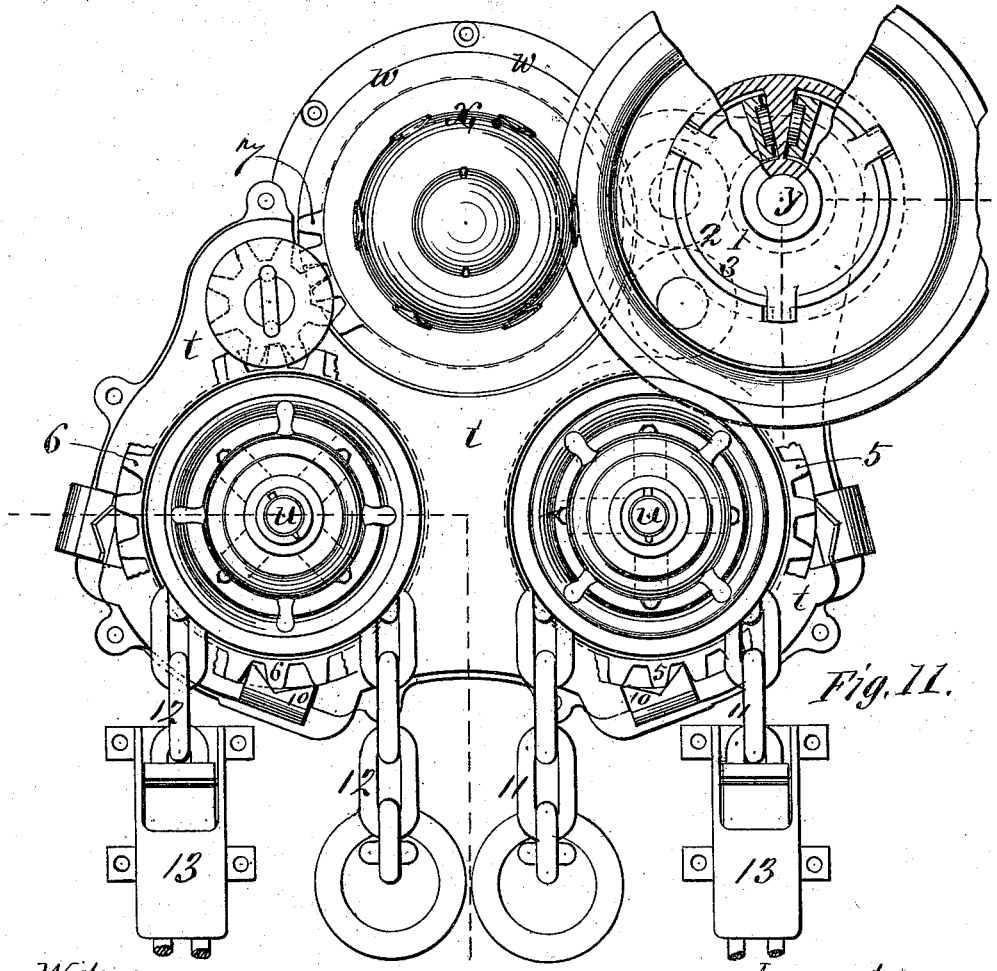

Fig. 11.

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4 Sheets--Sheet 3.

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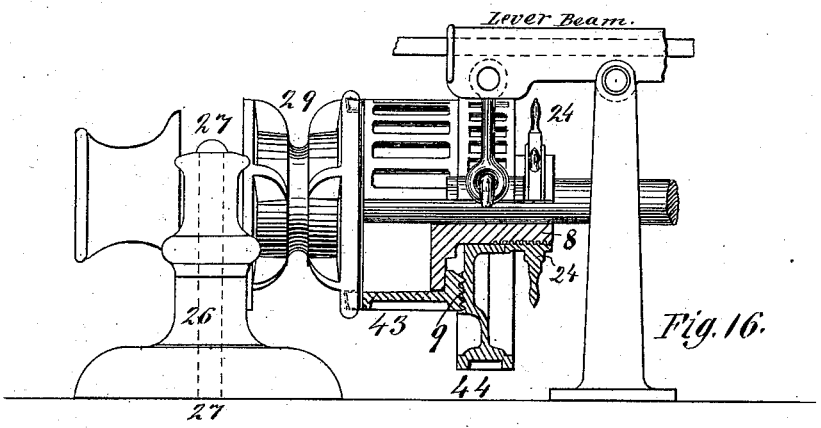

Fig. 16.

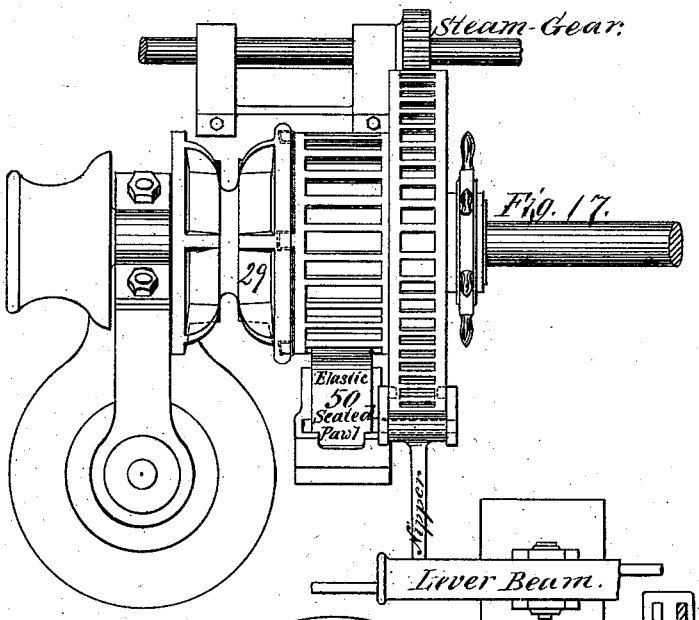

Fig. 17.

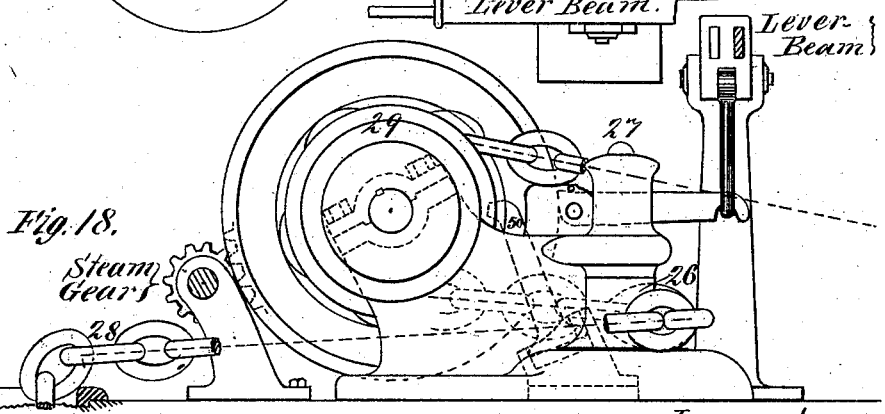

Fig. 18.

Witnesses.

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4 Sheets--Sheet 4.

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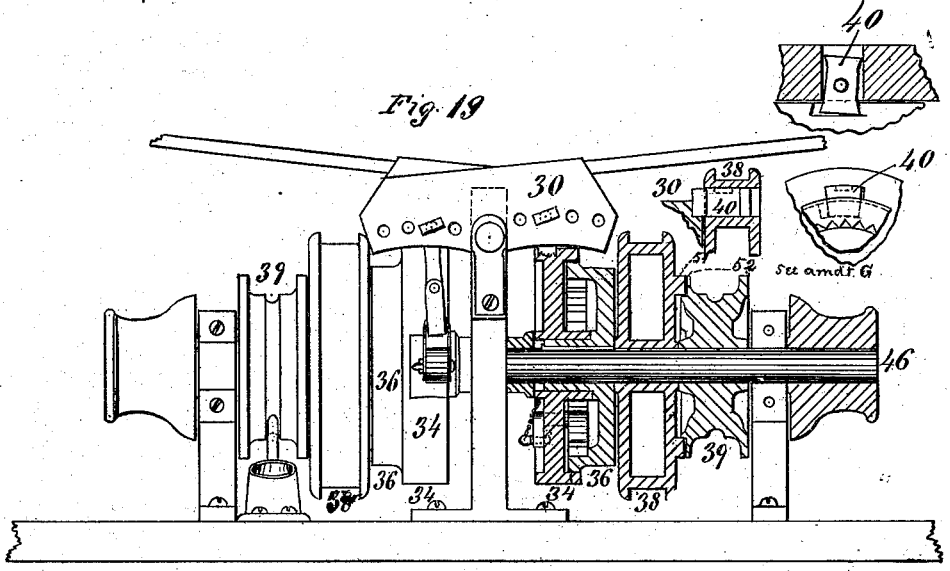
Windlass and Capstan.

No. 168,139. Patented Sept. 28, 1875.

Fig. 19



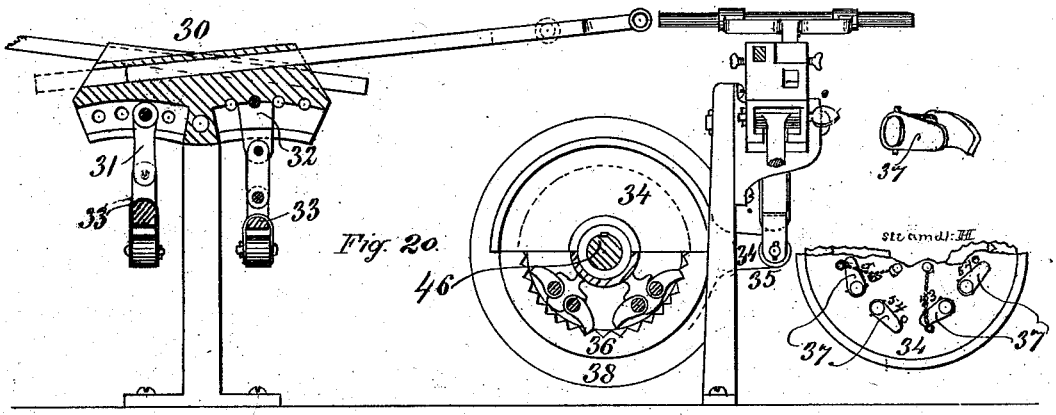


Fig. 20.

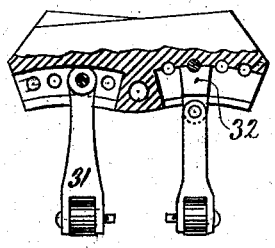
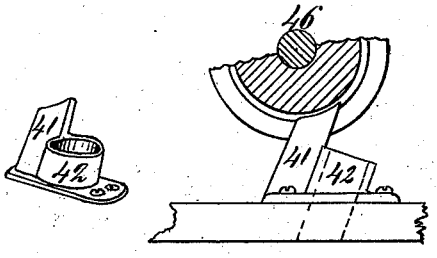


Fig. 21.



Witnesses.
Frank R. K. Rogers
Milford White

Inventor.
David N. B. Coffin Jr.

UNITED STATES PATENT OFFICE.

DAVID N. B. COFFIN, JR., OF NEWTON, MASSACHUSETTS.

IMPROVEMENT IN WINDLASSES AND CAPSTANS.

Specification forming part of Letters Patent No. **168,139**, dated September 28, 1875; application filed April 22, 1874.

To all whom it may concern:

Be it known that I, DAVID N. B. COFFIN, Jr., of Boston, resident in the city of Newton, county of Middlesex and State of Massachusetts, have invented an Improvement in Capstans and Windlasses, of which the following is a specification:

This invention comprises improvements in or upon the several parts of capstans and windlasses previously well known, the usual construction of which is fully shown in previous patents granted to myself and others, which renders it unnecessary in this specification to describe the well-known construction of such machines further than to show the application and use of these present improvements, the nature, construction, and use of which I will proceed to describe, with reference to the accompanying drawings.

Figure 1 is a vertical central section of a capstan constructed so as to operate, first, by means of a crank or cranks and screws when great power is required, and, second, by simple levers when speed rather than power is required. Fig. 2 is an inverted plan of the head, showing the screws, &c. Fig. 3 is a plan of the capstan-barrel with nut or internal gear *a*, into which mesh the screws *b*, and the deck-plate below. Fig. 4 shows the improved device for holding up the capstan-pawls when not in use. Fig. 5 shows two views of the part *h* of the same device. Fig. 6 is a view of the same device shown transversely to the view in Fig. 4. Fig. 7 comprises three views of the improved device for operating the friction strap or brake, which is used both for letting out and for holding on to the anchor chain or cable. Figs. 8 and 9 are views of the improved center-bearing for windlasses. Figs. 8 and 10 also illustrate the improved elastic clutch, which relieves the dangerous strains caused by the surges of the anchor-chain. Fig. 11 is a plan, and Fig. 12 is a sectional elevation, of windlass, showing the improvement of fixed non-rotating spindles *u u*, and other parts relating thereto. Figs. 16, 17, and 18 illustrate the improved upright roller-bit, the arrangement of the cable in relation thereto, and other parts. Fig. 19 is a sectional elevation with details, illustrating improvements in the brake-lever beam, ratchet and lock-bolt mechanism, and chain guard and guide combined. Fig. 20 comprises several detail views illustrative of the same. Fig. 21 illustrates the chain guard and guide 41 and 42, the lever-beam 30, and links.

The co-operation of the capstan *x*, as shown in Figs. 11 and 12, to drive the windlass, arranged with upright spindles, as there illustrated, is hereinafter set forth, and the employment of the capstan, constructed with a screw-purchase, (shown in Figs. 1, 2, and 3,) in the same way, needs no further explanation than that it has for that purpose the gear 7 cast upon the barrel *c*.

The capstan, as shown in either figure, is designed and used for driving the horizontal shaft-windlass of Figs. 16 to 21, inclusive. This application of the capstan to co-operate in driving the windlass is so fully illustrated in my former patents (No. 139,872, June 17, 1873; December 21, 1869; reissue No. 4,455, July 4, 1871; November 27, 1866; reissue, August 16, 1870, No. 4,100, and July 2, 1867, No. 66,299) that I need not more particularly describe it than to say that the shaft is keyed to the capstan-barrel and extended in the usual manner, and the connection formed by means of the center-bearing of Figs. 8 and 9, and the elastic connection of Figs. 8 and 10, hereinafter more fully described, as shown in the patents referred to, space being reserved at the middle of the windlass-shaft for these connections, as usual, in which case they co-operate with the brakes or lever-purchases, or operate without their aid, at pleasure, and that when the screw-purchase, shown in Fig. 1, &c., is used in the capstan to drive the windlass, the capstan-pawls *i* are let into action to stop the rotation of the capstan-barrel; but when the lever-purchase is used, these pawls may be up or down, as preferred.

The capstan-barrel *c* is mounted upon the spindle *e* and its deck-plate. (See Figs. 1, 2, 3.) A head, *d*, rests upon the spindle, and may be fitted to turn freely thereon, and provided with a bar, *g*. The bar *g* is made fast to some stationary object when the screw-power is to be used, so as to hold the head stationary, but may represent a hand-lever for the past purchase, when that is required; but in cases where the fast purchase is not re-

quired at all, the head may be a fixture upon the spindle, and non-rotating, if required for capstan work only.

The screws *b* play into the nut or internal gear *a* in the barrel, and are toothed in their thread similar to a gear-wheel, and are impelled to give the power movement to the barrel by means of the gears shown in connection with them. (See Figs. 1 and 2.) The larger of the two gears is mounted on and driven by the shaft *f*. The shaft *f* may be turned by the crank, as shown, or other means. When the shaft turns the screws are rotated, giving impulse to the barrel, the head being held stationary, as above mentioned. In case of required simple purchase, or speed instead of power, the head and barrel may be operated like a simple capstan directly by the hand-levers *g*. The holding-up device for the capstan-pawls (see Figs. 4, 5, 6) consists of the hinged support or holder *h*, jointed to the capstan-barrel *c*. The holder can be turned up, as shown in dotted line, Fig. 6, when not in use; but when thrown down, as shown in Figs. 4 and 6, it maintains an approximately horizontal position, and will hold up two pawls very securely, as see Fig. 4. When turned up the pawls drop freely past it and its connection to the barrel.

The improved center-bearing of Figs. 8 and 9 is used to support the upright shaft *m*, which gives impulse, through suitable gear-wheels, to the horizontal windlass-shaft *o*, and as a guide or bearing for the latter shaft *o*. It has a step for shaft *m* and bars *n* in suitable mortises or holes, which bars *n* pass through the necking of shaft *m* to prevent its rising, and, where such movement is required, they permit it to have a motion in the direction of their length. These bars *n* are notched, so that the ends of button *n'* enter the notches and keep them in place. When they are to be removed the screw upon which the button *n'* turns is loosened, the button turned into an upright position, which frees them.

In consequence of the severe surges to which a ship's windlass is subjected, they are often disabled by breaking. The cable-chain is also often parted from the same cause. The elastic clutch of Figs. 8 and 10, and 11 and 12, comprising the four elastic cushions *l*, constitutes an improvement in windlass mechanism adapted to overcome the dangers named. Figs. 8 and 10, also Figs. 11 and 12, show the arrangement and combination of the two pairs or four elastic cushions in relation to the driving and driven parts of the gear. Whichever way the surge comes, whether direct strain forward or backlash, in any case, two of the cushions come into operation at once, giving substantial relief to the parts and to the cable. With reference to Figs. 8 and 10, the shaft *m* or gear *j* are the driving parts, and the gear *k* the driven, between which the springs *l* are interposed.

The improved device for working the friction strap or brake of Fig. 7 comprises the combination of lever-socket *p'*, its cam hinged to screw-rod *q*, and nut *r*, connected to the friction strap or brake. When the lever-socket *p'* is turned down, as dotted, it is used to adjust the screw *q*; otherwise the lever *q'* is inserted in the socket *p'*, for the purpose of operating its cam, and so straining or applying the friction-brake, or relieving it, as occasion requires. In Figs. 11 and 12, *u u* are fixed or non-rotating spindles, secured in a suitable base or deck plate, in connection with which is also arranged the capstan *x*, provided with a gear, 7. On the spindles *u u* are mounted corresponding gears 5 and 6. Motion is communicated from the capstan to the gears 5 or 6, at pleasure, by means of intermediate gears 2, 3, and 4, either of which may be lifted off their spindles at pleasure by means of an attached bail or handle, for the purpose of disconnecting gear 7 from either 5 or 6, or both. Another gear, 1, plays into gear 2, and is provided with a chain messenger-wheel, 46, by means of the elastic clutch *l*, elsewhere described, so that the power from an engine or other agent may be communicated through a chain-messenger or other belt to drive either the capstan alone, or, through it, either of the gears 6 5. The capstan may also be operated at pleasure by hand-levers. United to the gears 5 6 each is a friction-plate, from which projects the sleeve 8, which is fitted to turn freely on the spindle *u*, and on which is fitted to turn freely the chain-wheel *v*, also provided with a friction-plate corresponding to the one attached to gears 5 and 6. In the friction-plates are formed concentric grooves, so that the ridges of one plate may fit the grooves of the other, (as see 9, Fig. 16,) or so arranged as to receive friction-rings, (as see 9, Fig. 12,) which rings may remain entire, or be cut in sections.

The sleeves 8 are formed into a screw at the end remote from the friction-plate, and are fitted with a suitable nut-wheel, 24, between which and the part acted on by the nut is interposed an anti-friction washer or washers. The collar 25 in Fig. 12 serves to lift the upper friction-plate when the nut is unscrewed. Pawls 10 (see Figs. 11 and 12) will retain the gears 5 6, being counterbalanced inside the bed-plate. A set being furnished to operate in either direction, when one set is used, a pin may be used to hold the other out of action. When the nut-wheel 24 is screwed against the part bearing the near friction-plate, friction is produced between the plates to a greater or less degree, regulated by the force applied to screw it, and by this means the chain-wheels may be made to revolve or rotate with the gear 5 or 6, or be allowed to slip more or less at pleasure, and so control the letting out of the anchor chain or cable carried by the chain-wheel *v*. A convenient arrangement of the anchor-cable is shown in Fig. 11, but others may be used. The cable-stoppers may be located as shown in Fig. 11, or may be placed between the chain-wheel and deck-pipe. The windlass is subjected to less strain when lo-

cated as in Fig. 11. The messenger-wheel 46 is arranged to be lifted off when not in use, as also gear 1.

In Fig. 18 the anchor-chain is shown passing directly from the anchor and hawse-hole over chain-wheel 29, around and forward underneath it; thence around the vertical roller 26, and thence aft to the deck-chain pipe.

Figs. 16, 17, and 18 illustrate the improvements adapting the windlass to this most convenient arrangement of the anchor-chain, and also the friction mechanism already referred to, as see 9, Fig. 16, and 9, Fig. 12. The base of the bit is made broad, giving stability, and the upright roll 26 introduced, so as to carry the chain easily around the bit.

By this arrangement and construction I preserve the lifting action of the windlass on the chain as it comes in through the hawse-pipe to the top of the windlass, and also get it with facility around the bit low down out of the way, and draw it aft in part or whole by the weight of the chain passing down into the hold. A chain-stopper may be located between the roll 26 and the deck-pipe, or between the windlass and hawse-pipe. A yielding pawl, 50, Figs. 17 and 18, may be applied, as shown, to the pawl wheel or drum 43. This pawl is similar to that in my Patent No. 139,873, Figs. 2, 8, and 4, but is not, like that, applied to the chain-lugs of the chain-wheel directly.

I will here explain that the friction mechanism for controlling movements of the anchor-chain is shown, as before alluded to, in both Fig. 12 and Figs. 16 and 17, to show its adaptation to different forms of the windlass. The screw-sleeve, nut-wheel, and grooved plates are common to both, with or without the friction-rings shown at 9, Fig. 12; also, the separate construction of the chain-wheel from its adjoining friction-wheel and pawl wheel or drum, with their automatic interlocking shoulders or recesses and projections, are shown, the first in Fig. 19 and the latter in Figs. 16 and 17, showing the applicability of this feature to different forms of windlass.

With reference to Figs. 19, 20, and 21, the windlass-shaft 46 has the chain wheel or barrel 39 fitted to turn freely on it; but this chain-wheel, although separate, is controlled in its movements by the adjacent friction-wheel, the two being automatically connected when placed on the shaft by the shoulders or recesses and projections formed on each, as shown in Fig. 19. Friction-wheel 38 is provided with a sliding lock-bolt, 40, (see also details same Fig. 19,) by which it may at pleasure be connected to, or disconnected from, the internal ratchet or pawl wheel 36, which is keyed to the shaft 46. A wheel or lever, 34, 35, covers the hollow side or face of wheel 36, and carries one or more pairs of reversely-operating pawls, (see Fig. 20,) which, by a vibratory movement of lever 34, 35, gives rotary motion to wheel 36 and shaft 46 in one or the other direction, accordingly as one or the other set of pawls is let into action. The pawls have external ends or weights, which assist their action, (see Fig. 20,) and by which they may be lifted and secured out of action by means of a pin, as shown, or otherwise. A beam, 30, is shown applicable to any lever-purchase windlass. Its peculiarities are through lever-sockets, which are arranged obliquely to each other, so that levers of great length may be used by pushing in or drawing out as long or short levers to vary the purchase and accommodate wide or narrow decks, so also that, the beam being set high, the levers may be inserted in the drooping end of the sockets to bring them suitably low, or when the beam is set high may be inserted in the elevated ends of the sockets, causing them to range at a suitable height; and, further, the attachment of the links to the beam is made by means of T-shaped male and female parts. In the drawing, Figs. 20 and 21, the beam is provided with the slot or female member, while the link 31 or block 32 is formed to fit the slot in a corresponding T-shaped form, which may be denoted the male part. These parts—the male and female—may, however, be transposed, the beam being provided with the solid or male part, and the block or link provided with the suitable T-shaped slot to fit it. This mode of connecting the link and beam is simple, inexpensive, and very strong and safe, and affords all desirable facility for adjustment while in operation, and avoids danger of accidental disconnecting while in operation.

At 33 is shown an elastic link-connection between the lever-beam and the primary lever of the windlass, 33 indicating the spring of rubber or other elastic material. This gives ease of action to the hand-levers and the windlass generally. This link as well as the beam is applicable to all lever-power windlasses. The adjustment of the link 31 or block 32 relatively to the center of the beam may be made secure by the use of pins or set-screws. Through-bolts are inadmissible, as it would involve an open slot transversely in the beam, which would result in weakness and danger of breakage.

The improved chain-guard 41 and guide 42 illustrated in Fig. 21 is intended, by its unitary construction and consequent fixed relative adjustment, to overcome the evils of maladjustment, which are constantly causing trouble.

The combined construction reduces the cost of construction and of setting, and produces a better article.

I claim—

1. The combination of the internal worm-gear or nut-wheel *a* with the screw or screws *b* and barrel *c* of the capstan.

2. The combination of the two screws *b*, the two gears, and shaft *f* with the head of the capstan.

3. The pawl-holder *h*, hinged to the capstan, substantially as and for the purpose set forth.

4. The combination of short lever-socket p', its cam hinged to the screw-rod q, made to turn in the deck, and nut r, attached to the friction brake or strap of a windlass, substantially as shown and described.

5. The arrangement and combination of two sets of elastic cushions between and with the driving and driven parts of the actuating or impelling mechanism of a windlass, substantially as shown and described.

6. The center-bearing constructed with step and bars n for upright shaft, and the rest or bearing for the horizontal shaft, substantially as shown.

7. The combination of the two fixed non-rotating spindles u u with the chain-wheels or windlass-barrels v, the capstan, and suitable connecting-gears, substantially as shown.

8. The combination of the two fixed non-rotating spindles u u, the chain-wheels or windlass-barrels v, and the messenger-wheel 46 with suitable connecting-gears, substantially as shown.

9. The combination of the capstan x and the messenger-wheel 46 with suitable connecting-gear, substantially as shown.

10. The sleeve 8, in combination with its friction-grooved plate, the chain-wheel, and the friction-grooved plate connected thereto, and the nut-wheel 24, substantially as described.

11. Friction-rings or sections of rings 9, (see Fig. 12,) in combination with the grooved friction-plates.

12. In a windlass, the arrangement of an anchor-chain to engage with the chain-wheel at its lower forward side, extend around aft and upward, leaving the periphery on the upper forward side for the hawse-pipe and anchor, in combination with a turn around the forward side of the bit as it passes from the deck-pipe to the windlass.

13. The upright roller 26, in combination with the windlass-bit and the arrangement of the cable or anchor-chain, as shown and claimed above.

14. The combination of the pawl 50, located forward of the windlass, with the chain-wheel and its pawl wheel or drum 43, substantially as shown.

15. The separate friction-wheel 38, in combination with the separate chain-wheel, when the two are automatically locked to each other, substantially as described.

16. The combination of the sliding lock-bolt 40, friction-wheel 38, and a ratchet-wheel and shaft, 36 and 46, substantially as described.

17. The construction of a windlass-beam with the T-section-shaped connection to the links, substantially as described.

18. The construction of a windlass-beam with through-open sockets for levers arranged obliquely to each other, substantially as described.

19. The internal ratchet-wheel 36, in combination with the pawl lever or wheel 34, 35 and the windlass-shaft, substantially as shown.

20. The double series or reversed pawls of wheel 34, in combination with the ratchet-wheel 36, substantially as shown.

21. The construction of the chain-guard and chain-guide in one article for the double use, substantially as described.

22. The chain wheel or barrel 29 and pawl-wheel 43, constructed separately, and automatically clutched together by projections and recesses or shoulders, substantially as and for the purpose set forth.

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