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D. N. B. COFFIN, Jr.
Windlasses and Capstans.

No. 139,872 Patented June 17, 1873.

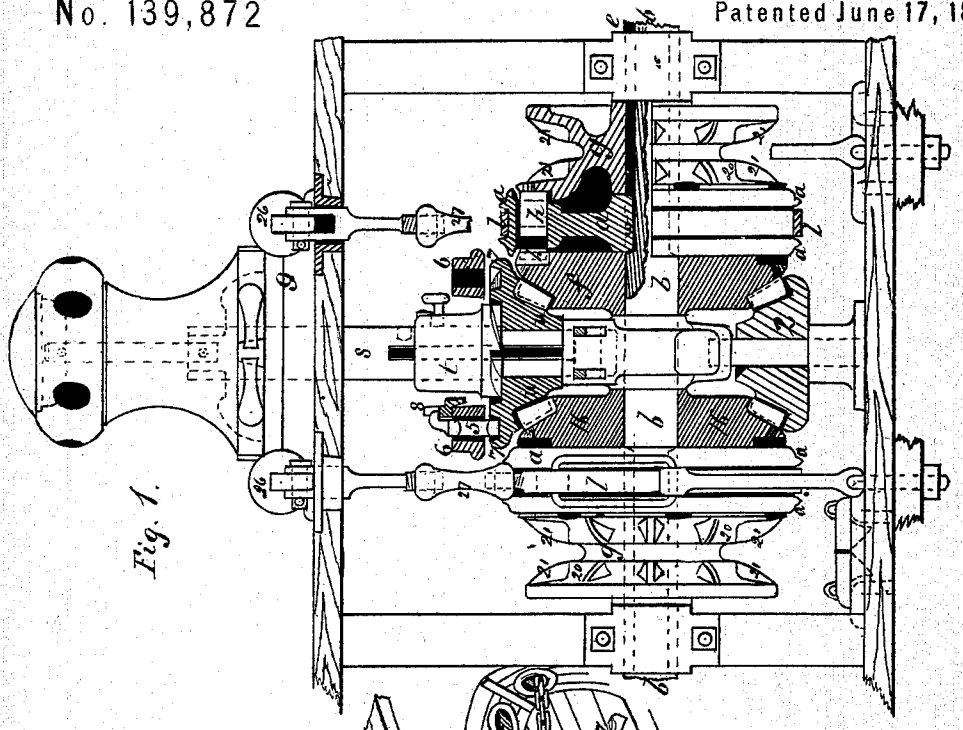

Fig. 1.

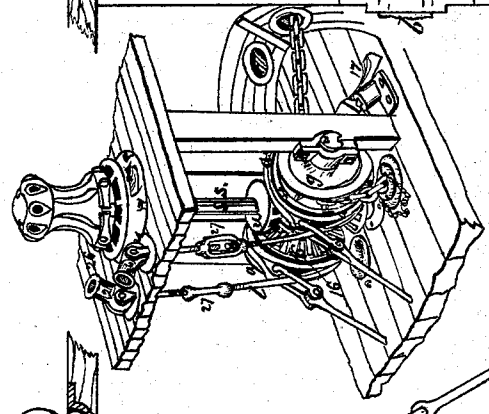

Fig. 1A.

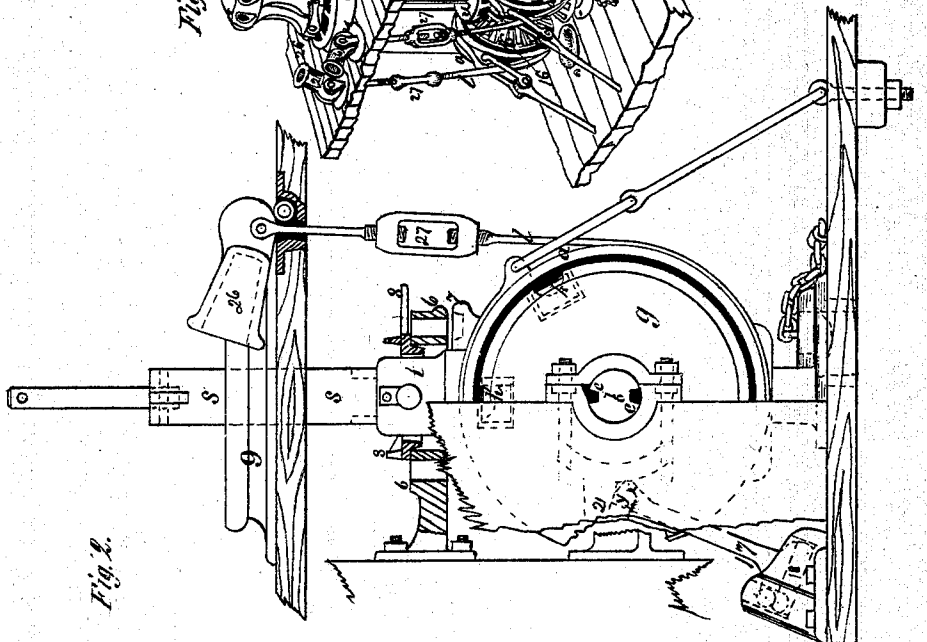

Fig. 2.

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A. Ruppert

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Inventor.
D. P. Holloway & Co.
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D. N. B. COFFIN, Jr.

Windlasses and Capstans.

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Fig. 10

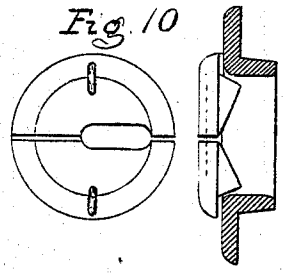

Fig. 6

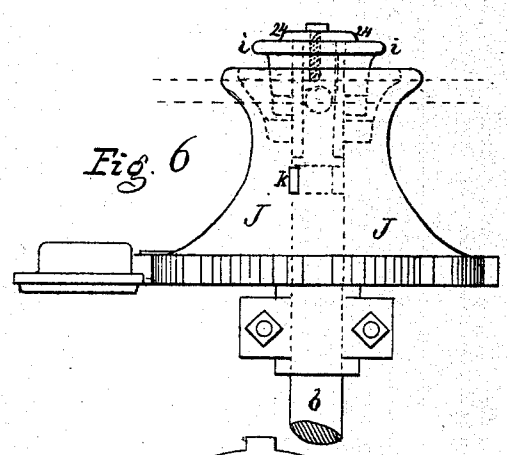

Fig. 9

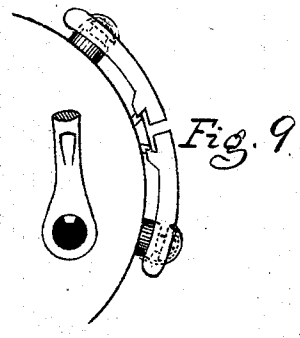

Fig. 5

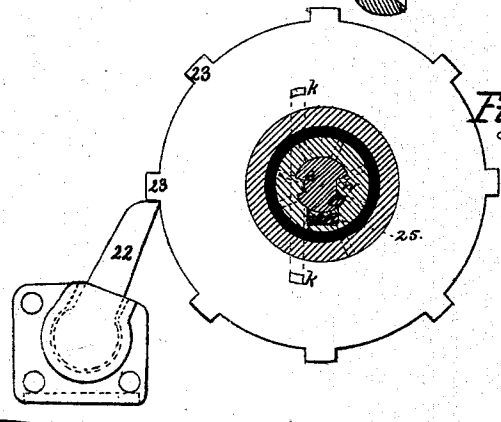

Fig. 19

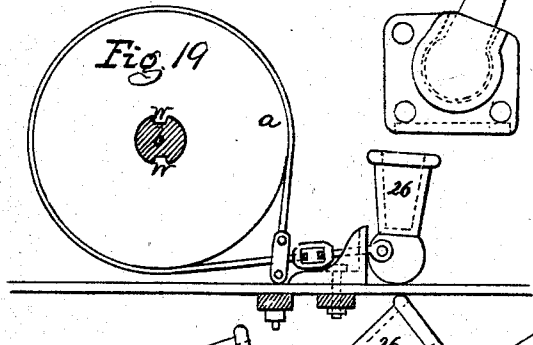

Fig. 7

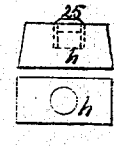

Fig. 11

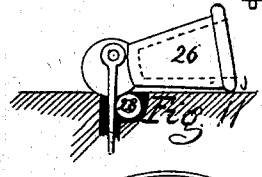

Fig. 12

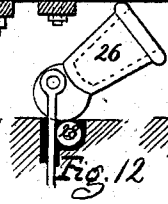

Fig. 18

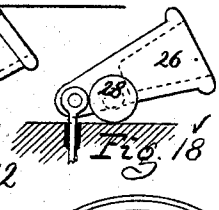

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Fig. 14

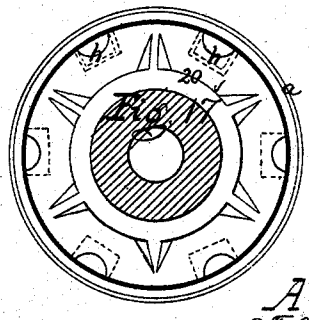
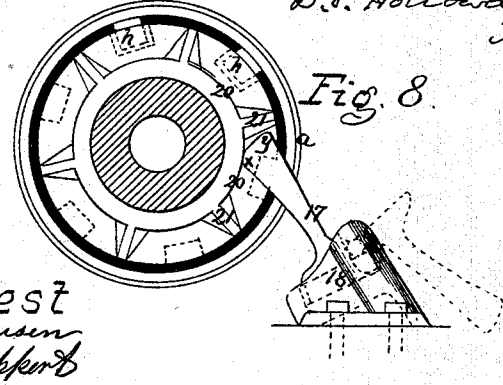


Fig. 8



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D. N. B. COFFIN, Jr.

Windlasses and Capstans.

No. 139,872. Patented June 17, 1873.

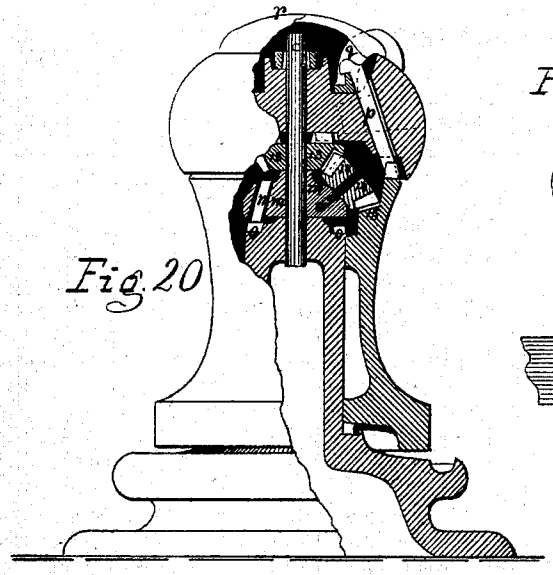


Fig. 20

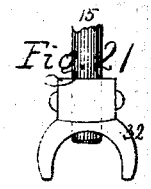
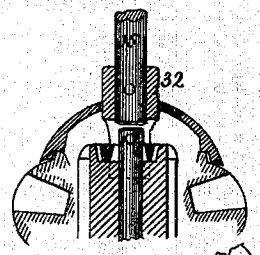


Fig. 21



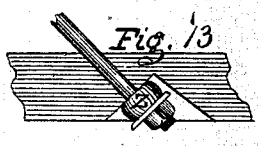


Fig. 13

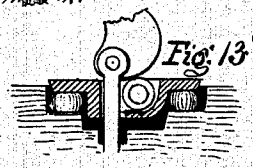


Fig. 13'

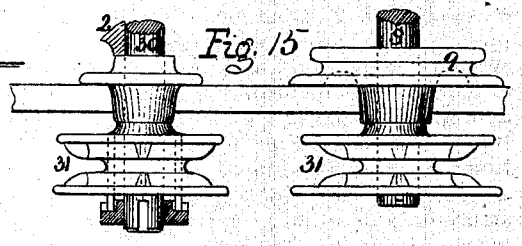


Fig. 15

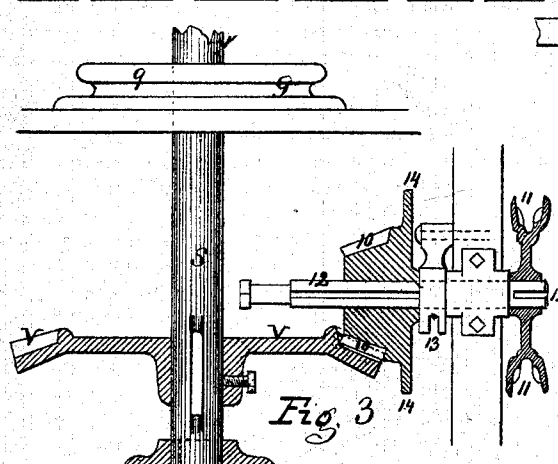


Fig. 3

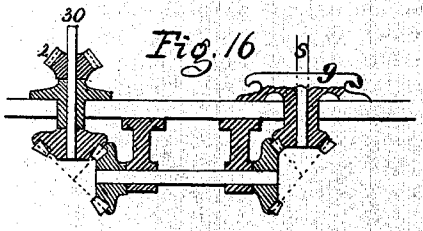


Fig. 16

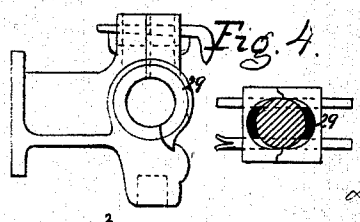
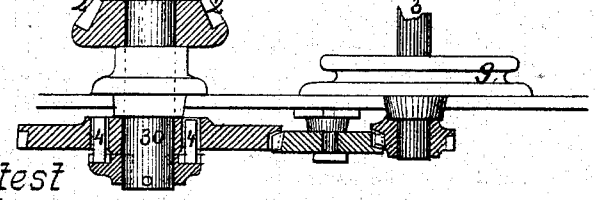


Fig. 4



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Inventor

D. P. Holloway & Co

Attys

Attest

C. F. Clausen

A. Ruppert

UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN WINDLASSES AND CAPSTANS.

Specification forming part of Letters Patent No. **139,872**, dated June 17, 1873; application filed December 8, 1871.

To all whom it may concern:

Be it known that I, DAVID N. B. COFFIN, Jr., of the city of Boston, Suffolk county, State of Massachusetts, have invented certain Improvements in Windlasses and Capstans, of which the following is a specification:

This invention relates to improvements upon former inventions in the same class of machinery made and patented by me.

Figure 1 is a sectional elevation. Fig. 2 is a sectional elevation. Fig. 3 is a sectional elevation. Fig. 4, an elevation and sectional plan; Fig. 5, a sectional elevation; Fig. 6, a sectional elevation; Fig. 7, two views; Fig. 8, a sectional elevation; Fig. 9, an elevation and sectional plan; Fig. 10, a plan and elevation (sectional;) Fig. 11, a sectional elevation; Fig. 12, a sectional elevation; Fig. 13, a sectional elevation, illustrating the construction and details of the improved windlass and capstan, and their combined construction and use for "forecastle-deck" vessels, or cases of "double deck," and particularly where the application of both hand and steam as well as other power, independent warping, independent and elastic riding, paying out, and heaving in facilities, are all required. Fig. 14 is a perspective view, showing the windlass constructed without independent ends or steam-gear, and without clutch *t*, of Fig. 1. Fig. 15 is a sectional elevation, and Fig. 16, as also the lower part of Fig. 3, a like elevation of the connecting parts of a "flush-deck," or "single-deck" capstan-windlass. Fig. 17 is a sectional elevation. Fig. 18 is a sectional elevation. Fig. 19 is a sectional elevation, of modified details. Fig. 20 is a sectional elevation of a capstan for separate use, with gears in the top. Fig. 21 embraces two views in sectional elevation, showing the connection of steam or other power-driven shafting directly to the capstan lever-head to operate the capstan auxiliary to or without the aid of the hand-bars. Two friction wheels, *a*, have tongues, *w* (see Figs. 1, 5, 19) cast in, and are slipped on the windlass-shaft *b*, the two tongues, *w*, passing in the grooves seen at *e*, Figs. 1, 2, 19, &c., so that both turn together with the shaft *b*. Provision is made to lock these friction-wheels to either of the chain-wheels *g*, or both, or to the heaving-gear *f*, or to all. The locking-bolts *h* for this purpose are illustrated in Fig. 7, and are shown also in Figs. 1, 2, and 14, 17, and 8, and are so placed in mortices or chambers in the friction-wheels as to be free from contact with the gear or chain wheels *g*, or may be thrust into the lock-notches of either, at pleasure, moving in a line parallel to the axis of the windlass. These bolts are partially exposed at both ends, for access to push them, by the local openings shown in Fig. 17, or the continuous or annular one shown in Fig. 8, and are prevented from accidental displacement by a friction-bearer, shown in Fig. 7, consisting of a spring and bearing-plate arranged to press constantly against one or more sides of their chamber in the friction-wheel. In Fig. 1, one of these lock-bolts *h* is represented as engaged with the chain-wheel *g* and the other with gear *f*. These bolts are protected from removal by a stop at each end against the gear and against the chain-wheel or other barrel.

In Figs. 2, 8, and 14 is shown a pawl or rider 17, made and arranged to act independently of the ordinary riding-pawls of a windlass upon the chain-lugs of each chain-wheel by itself, so that the vessel may ride at anchor by either chain-wheel, while the capstan or the other barrels of the windlass remain free to be used for warping, letting go or heaving up the anchor, &c. This pawl is provided with an elastic cushion or seat, 18, upon the deck or deck-timbers, and is in no case dependent upon the pawl-bit or Samson-post as are other windlass riding-pawls. It does not act upon the windlass as a whole like other riding-pawls, but separately and independently upon its own chain-wheel, and that alone, leaving the windlass free. The elastic cushion 18 is appropriated to its own wheel-pawl and cable. The rider has its head *x y* which rests upon the cheeks 20 of the chain-wheel made thick, so as to carry the bearing upon the chain-lugs 21 out a good distance from the center of the chain-wheel to gain a better purchase in resisting the rotation of the chain-wheel caused by the strain of the cable.

In Figs. 5 and 6 are illustrated the improved end barrels, made independently, acting as follows: The same grooves, shown at *e*, Figs.

1 and 2, being extended to the end of the windlass-shaft, a clutch, *i*, is furnished with tongues *w* to match, (see Figs. 5 and 6,) and is made to engage with clutch-lugs in the barrel *j*. The clutch is movable freely longitudinally to the shaft, while the barrel *j* is prevented from longitudinal movement by a key, *k*, passing through a circumferential groove in the windlass-shaft *b*. A special pawl, 22, for each barrel *j* is provided to act upon suitable ratchet-teeth or lugs 23 on the barrel, so that when the clutch *i* is disengaged, as shown in Fig. 6, by being moved outward to a stop, 24, the shaft *b* thereby becomes free from the barrel *j*, and may be turned freely for operating other barrels, &c., while the end barrel *j* will be prevented by the pawl 22 from turning back, and so will hold any strain it may have on of the line in use upon it. When the clutch *i* is thrust into engagement again with the barrel *j* it is ready to heave a further strain. These independently-acting ends become exceedingly useful on steamers where several lines in various directions are used all at once, each being hove upon and holding strain alternately. One line may be worked on each end and one also on the power-capstan, though that on the capstan would not hold its strain while heaving with the ends, but would heave together with them. A friction-bearer, 25, is placed in the clutch *i* to bear on shaft *b* similar to that (25) in the locking-bolt of Fig. 7 to prevent the too free displacement of it.

Figs. 11 and 12 illustrate the use of the two friction-straps upon the two jointly-acting friction-wheels *a*. The lever-sockets 26 are operated with the same bars used in the capstan. That shown in Fig. 11 is pressed entirely down, or down to a self-holding position, and the attached friction-strap *l* is so adjusted by means of the turn-buckle 27, shown in Fig. 2, that in this position the strap receives the proper tension around the friction-wheel in ordinary cases to prevent its rotation and that of any barrels locked to it. This lever-socket and friction is used for light riding and letting go a small anchor. The other lever-socket, Fig. 12, is differently used, as a reserve when the first is not sufficient, and consequently should have its strap adjusted by the turn-buckle 27, so that it cannot be forced to the stationary or self-holding position, but so as to stand, as in the drawing, ready for further action as a reserve. These lever-sockets for applying the friction may be used without the rollers 28 if preferred.

Fig. 18 shows the rolling fulcrum 28 journaled to the lever-socket, which, in some cases, may be found more convenient of application; and Fig. 19 shows the arrangement of the friction-strap and lever-socket when required for a flush-deck windlass.

Fig. 10 illustrates an appurtenance to this windlass that serves as chain-supporter and chain-pipe cover, automatic in its action, being always ready for letting go anchor; the construction is in two parts, so formed that when closed together upon the chain-pipe and embracing a link of the chain it sets firmly, supporting the chain in position always ready to let go anchor, while effectually acting as cover to the pipe.

Similar clutch-grooves to those described in the windlass-shaft *b* for the friction-wheels and their cast-in lugs are formed in the capstan-shaft *s* at its upper shoulder, to embrace corresponding lugs formed in process of casting in the capstan-barrel, which may be either a geared or simple capstan-barrel, and also at its lower end to embrace similar cast-in lugs in clutch *t*, as in Figs. 1 and 2, or gear *u*, as in Figs. 3 and 14. The steam-gear *v*, Fig. 3, is not connected in this manner, but is keyed in the ordinary or customary manner.

Fig. 4 illustrates the center bearing for windlass-shaft and capstan-shaft *s*. The cap 29 is secured and the shaft *s* held down by its neck by means of gibs or keys, as see drawing, Figs. 4, 1, and 3.

Fig. 3 shows the lower gear 2 of the windlass, connected by its shaft 30 and a train of spur-gears to the capstan-shaft 3, so that both may be operated in combination upon a flush deck or single deck, the lock-bolts 4 automatically disconnecting when operating in one direction, and engaging when operated in the opposite direction.

Fig. 15 illustrates a similar arrangement, in which chain-wheels 31 are used to form a chain-belt connection.

Fig. 16 shows a similar arrangement in which bevel or miter gears may be used for the same purpose.

In Figs. 1 and 2 is illustrated the use of automatic pawl-bolts 5, in a fixed carrier, 6, to act upon gear *u* 7 to detain the windlass, instead of the customary pawls, obviating the necessity for and doing away with the ordinary pawl-wheel. These pawl-bolts slip over when the gear is turned one way, and engage to prevent its return in the opposite direction. A lifter, 8, with inclines, is provided to lift them and prevent their automatic action at pleasure. The gear *u* is provided with ratchet or detaining lugs, at 7, for these pawl-bolts to act on.

Fig. 3 shows, beneath the capstan 9 and above the windlass-shaft *b*, a gear, *v*, before referred to, keyed to shaft, *s*, also a gear, 10, playing into it, for the purpose of actuating the shaft *s* by means of steam or other power. The gear 10 is provided with lugs cast in, playing in grooves in shaft 12 similar to those described in shaft *b*, so that the gear 10 may be slipped out of gear with gear *v*. It is held in gear by means of the hinged clasp 13. To throw it out the clasp 13 is lifted, and to hold it out of gear the clasp is dropped with its notch embracing the flange 14′.

Fig. 13 illustrates the application of elasticity to the friction-strap connections, two views being given, showing springs *z* applied to both the stationary and the movable ends or connections; their location may be varied.

Fig. 9 illustrates the improved device for holding up the capstan-pawls when not in use; the pawls may be lifted up and dropped past the catch, or turned over, and will operate either way.

The top-geared capstan in Fig. 20 has several novel features. The gear-carrying head *m* is provided with lock-bolts *n* beveled to slip over the teeth or lugs *o* attached to the spindle when the head is turned in one direction, but which engage the teeth with an opposite movement. There is no tendency with the lock-bolts applied in this way to lift the head *m*, as is the case when pawls are used, while the construction is made simpler and better.

The gears here shown, viz., 13, 14, and 15, are a new feature both in construction and consequent arrangement, and are much superior to the customary vertical axis and parallel-sided gears, as all are flanged and put together without difficulty, while larger and stronger gears are easily inclosed in the limited space afforded in the top of the capstan. It will be apparent that to insure a proper action of the gears 13, 14, and 15, it is essential that the loose gear-carrier *m* shall have no lifting tendency when engaged by the locking devices to the spindle. Hence the application of the sliding lock-bolts to the gear-carrier *m* is of especial importance in connection with the gearing here shown.

The locking-bolts *p* are arranged and have their socket constructed in an upwardly-converging position relatively to the axis of the capstan; this secures a better action and freer one of the inclined lifters *q* in lifting them, while it also allows them to occupy less space in the head, which is consequently covered with a smaller and stronger cap.

Fig. 21 embraces two views illustrating the clutching of the shaft 15 to the head of the capstan. The shaft 15 represents a connection to any steam or other power driven machinery for operating the capstan, and through it the windlass in aid of or independently of the hand-bars.

When I construct the windlass with clutch *t*, as in Figs. 1 and 2, the capstan is turned with the sun to heave in, and in the opposite direction is always free to be used independently of the windlass. To reverse the motion of the windlass the gear 16, Fig. 1, is locked to the friction-wheel and the gear *f* released; and to lower away by the bars the pawl-bolts 5 are lifted.

In letting go anchor the chain-wheel remains locked to the friction-wheel while the friction is applied and the gear *f* disengaged from the friction-wheel, the other gear, 16, being at all times disengaged from the friction-wheel except it is required to reverse the heaving motion of the windlass.

When I construct the windlass as in Fig. 14, the shaft *s* being locked directly in the gear *u*, the capstan is turned with the sun to heave in and in the opposite direction to reverse the movement of the windlass, and there is no occasion ever to connect the gear 16 with its adjacent friction-wheel directly, but the other gear only is engaged by a lock-bolt both to heave in or reverse the motion of the windlass, and is disengaged after putting on the friction for letting go the anchor. The steam-gear *v* 10, Fig. 3, when applied to the windlass constructed with clutch *t*, as in Figs. 1 and 2, is used to drive the windlass by running the engine in one direction, but on reversing the engine the capstan alone is driven with no other change.

When applied to the windlass as constructed in Fig. 14, the lock-bolt *h* is disengaged from the gear *f* when the capstan alone is to be driven, and both the capstan and windlass are driven in one or the other direction by reversing the engine's motion, or the men's travel when hand-bars are used.

The steam-gears *v* 10, Fig. 3, may be driven through a chain-belt actuating chain-wheel 11 from the hoisting-engine, or otherwise.

I claim—

1. In a windlass, the combination, with a single shaft, of two or more fast friction-wheels, a corresponding number of correlative loose chain-wheels, and suitable means for locking the chain-wheels severally to their respective friction-wheels or to the shaft, substantially as and for the purposes specified.

2. The combination of the fast friction-wheel *a*, loose heaving-gear *f*, loose chain-wheel *g*, and lock-bolts *h*, or their equivalents, operating substantially in the manner and for the purpose specified.

3. The heaving-gear, friction-wheel, and chain-wheel, as arranged with relation to one another, when the flanges of the gear-wheel and the chain-wheel are constructed as described so as to form local openings or annular openings for a partial exposure of the lock-bolts *h* in the friction-wheel upon both sides thereof, substantially as and for the purpose specified.

4. In a windlass, the combination of two or more loose chain-wheels, *g*, and a corresponding number of independent riding-pawls 17 acting upon the chain-lugs 21, substantially as and for the purposes specified.

5. The independent riding-pawl 17, constructed at its free end, as shown at *x y*, to act upon the loose chain-wheel in the manner and for the purpose specified.

6. The combination of the friction-wheel *a*, friction-strap *l*, and spring *z*, substantially as and for the purposes specified.

7. The gear-wheel *v* upon the capstan-shaft, in combination with the shiftable gear-wheel 10, having a flange, 14′, and the clasp 13, substantially as and for the purpose specified.

8. The capstan-pawls having lateral lugs, or their equivalents, formed upon them, in combination with the fixed catches upon the capstan-barrel, all substantially as shown in Fig. 9, and for the purpose specified.

9. The spindle, barrel, and head of the capstan, in combination with the inclined and

inverted taper-gears 13 14 15, gear-carrier *m*, and lock-bolts *p* and *n*, or their equivalents, all arranged and operating substantially as and for the purpose specified.

10. The inclined and inverted taper-gears 13 14 15, and gear-carrier *m*, in combination with the sliding lock-bolts *n*, substantially as and for the purpose specified.

11. The center-bearing constructed substantially as shown and described, whereby it is made to support the main shaft *b*, and at the same time hold the end of the capstan-shaft in position, and prevent it from being carried upward by the action of the wheels into which its gear-wheel meshes.

DAVID N. B. COFFIN, JR.

Witnesses:
FRANKLIN WOODSIDE,
D. WEBSTER BULLARD.