F. E. SICKELS.

POWER AND HAND WINDLASS COMBINED.

No. 188,425. Patented March 13, 1877.

Fig. 1.

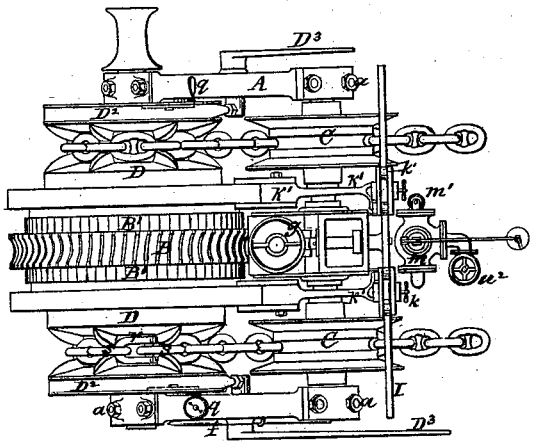


Fig. 2.

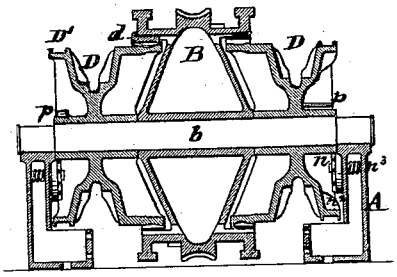


Fig. 3.

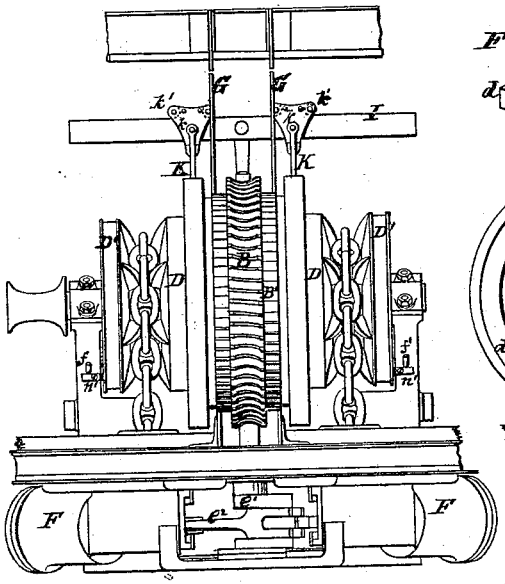


Fig. 4.

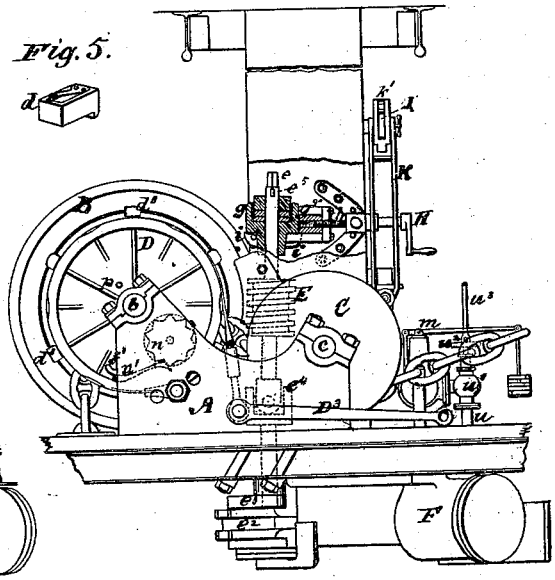


Fig. 5.

Fig. 6.

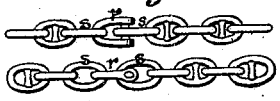


Fig. 7.

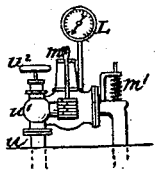
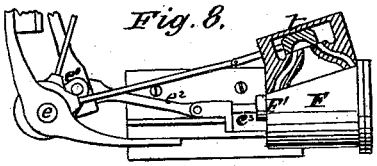


Fig. 8.



Witnesses:
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Inventor:
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UNITED STATES PATENT OFFICE.

FREDERICK E. SICKELS, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN POWER AND HAND WINDLASS COMBINED.

Specification forming part of Letters Patent No. **188,425**, dated March 13, 1877; application filed November 1, 1876.

To all whom it may concern:

Be it known that I, FREDERICK E. SICKELS, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Power and Hand Windlass Combined and its Chain-Cable Connections; and that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 represents a top view of the windlass. Fig. 2 represents a vertical section through the main gear-wheel and the wild-cats or ribbed pulleys. Fig. 3 represents a rear elevation of the windlass and its connection with the steam-cylinders. Fig. 4 represents a side elevation of the same, partly in section, to show parts in the interior of the frame. Fig. 5 represents, in perspective, one of the keys used to connect the main driving-gear with either of the wild-cats. Fig. 6 represents a portion of an anchor-chain, with a shackle uniting two sections of chain. Fig. 7 represents, in front view, the main steam and automatic pressure-regulating valves, and spring-valve, and the indicator of tension upon the anchor-chain. Fig. 8 represents a bottom view, partly in section, of one of the cylinders, steam-chest, and connections used to operate the windlass by steam-power.

Similar letters of reference, where they occur, denote like parts in all the figures.

My invention relates to windlasses that can be operated either by steam-power or by hand, as may be desired; and my invention consists in certain devices and combinations of mechanisms by which additional rapidity and security is produced in casting and taking up anchors. For this purpose the pressure of steam is limited by an automatic pressure-regulating valve, so that if the anchor-chain fouls while the engine is running rapidly it will stop before breaking it or any other part. The shackle and shackle-links at the ends of each length of chain are fitted to the wild-cats, so that they will engage with the stops or ribs, in the same manner as the other links without mounting the ribs and slipping. Spring-keys are used to connect the wild-cats with the windlass. These keys are placed into square recesses cut out of both the wild-cats and windlass. These recesses extend through the windlass, so as to admit a bar to back out or remove the keys.

The worm-wheel pinion connecting the engines with the windlass is placed on a vibrating rotary shaft, so as to be drawn out of gear to disconnect the engines from the windlass.

The standards for sustaining the hand-power brake are made of wrought-iron plates at such distance apart as to inclose the worm-wheel pinion, and form a column between decks to resist strains of tension as well as of compression.

A spring-valve is used in connection with an automatic pressure-regulating valve, so as to insure perfect safety, even if the latter should stick while open and be inoperative.

The position of the anchors is indicated by a separate counter connected to each wild-cat, so as to register as well in paying out as in taking in the anchor-chain.

The eccentrics are set on the engine-shaft, so as to operate the slide-valve of each steam-chest, and keep the exhaust-port open until the piston has reached the ends of the cylinder to avoid the use of pet-cocks, and so that they can be started and operated from the different decks by any inexperienced person without requiring the operator to go to the engine to let out condensed water, the admission of steam being delayed until the engine has passed the center.

In the drawings, A represents the frame, that supports the shaft *b* of the windlass B, and the shaft *c* passing through the axis of the guiding-pulleys C. The frame A is securely bolted to the deck by diagonal bolts *a* and other bolts. Upon the central portion of the shaft *b* the windlass B is mounted. It has a concave gear-wheel with slightly-bevel teeth formed upon its periphery, to engage, when desired, with a worm-wheel, E, mounted upon a shaft, *e*, that is connected by means of cranks e^1 and connecting-rods e^2 with the piston-rods e^3 and pistons of the steam-cylinders F. The shaft *b* carries also two wild-cat pulleys, D, loose upon said shaft and free to revolve, except when connected with the windlass B by keys *d*, introduced into openings *d'*, formed partly into the flange of the windlass and part-

ly in the rim of each wild-cat. The openings *d'* extend through to the opposite side. The opening there may be made partly circular, and too small to receive one of the keys *d*, but large enough to receive a crow-bar or hand-spike, *f*, with which the keys *d* can be pushed out of the opening *d'* from the opposite side from which they have been introduced, and either of the wild-cat pulleys rendered free to revolve independent of the windlass, upon each side of which the opening *d'* may be made alternately rectangular and semicircular. The keys *d* are provided with springs, so that they cannot drop accidentally out of the openings *d'*, but must be forcibly pulled or pushed out. Each wild-cat pulley is formed with a groove, D^1, to receive a brake-band, D^2, that is connected with a brake-lever, D^3, placed on the side of the frame to save room, and remains connected with said band D^2.

The worm-wheel E and its shaft *e* can be made in one piece and inclined, so as to adapt the mechanism to steam or hand power. For this purpose the shaft *e* is formed of two lengths, connected by a universal joint, e^4, and it is supported at its upper end by a key, e^5, passing through said shaft, and resting upon washers carried in a cup-bearing, *g*. This bearing *g* rests upon plates *i*, attached to, and projecting from, the inside of the wrought-iron standards G, and can be moved back and forth by means of the hand-crank H, operating a screw, *h*, that engages with a nut, *g'*, carried by the bearing *g*. Thus the worm-wheel E can be placed in gear with the windlass, and be operated by steam-power, by means of the crank H bringing the worm-wheel E in gear with the windlass B. The windlass is provided with ratchet-gears B', with which retaining-pawls engage, in the usual manner. When the worm-wheel E is thrown out of gear with the windlass through the medium of the handle H, the windlass can be operated by hand by means of the double oscillating brake or lever I, (united to ordinary hand-brakes,) working upon connecting-rods K, and the latter operating upon levers K', one end of which clamps the rim of the windlass B, in the usual manner. The upper end of each of the connecting-rods K is pivoted to blocks *k*, that completely embrace the end lever I; and said blocks *k* can be shifted without any effort, as they are provided with friction-rollers *k'*, and can be clamped upon the lever I in any desired position, to vary the leverage according to the weight that is to be lifted.

When operating the windlass by steam the pressure marked upon the steam-gage or indicator L will correspond with the strain in tons borne by the anchor-chain, according to the area of the steam-pistons and their relative motion, compared with the motion of the chain. Thus the size of the steam-cylinder can be varied so that for each increase of one pound of pressure, as shown upon the gage, the increase of the strain upon the cable may be one ton, two tons, &c., as may be desired.

The automatic regulating-valve *m* may be made with a piston loaded to the desired pressure, and connected to a balance-valve that will, in its upward movement, close, and prevent the further admission of steam to the cylinders F, when the desired pressure is reached; or the automatic regulating-valve may be of any other of the usual forms of construction. To further insure a safe limit to the strain on the cable the steam-pipe between the automatic regulating-valve *m* and the cylinder F is provided with a valve, *m'*, loaded to blow off in case the automatic regulating-valve sticks open.

The position of the anchors is indicated by a separate counter connected to each wild-cat, either in paying out or taking in the cable. Each counter is composed of a star-wheel, *n*, with preferably ten V-shaped teeth and indentations, with one of which a pin, *p*, carried by each wild-cat or its hub, engages at each revolution, and a spring, n^1, retains the star-wheel immovable, except when advanced or retracted by the pin *p*. This star-wheel *n* and a corresponding wheel, n^2, upon which ten consecutive numbers are placed, are mounted together upon a short shaft, carrying a worm-wheel, n^3, through which the number of revolutions made by the star-wheel are transmitted to an indicator, *q*, placed upon the frame A, said frame carrying also the star-wheel *n* and its retaining-spring, n^1. Anchor-chains are made in length of fifteen fathoms, more or less, that are united by shackles. These shackles, as now made and connected to the end links of each section of chain, give an increased length between the outer ends of the adjoining links. When so made they are liable to mount the stops and cause the chain to slip, when it only passes over the top of the wild cat, and does not embrace a large proportion of its circumference. The shackle *r* is made short, as shown in Fig. 6, to have the distance between the outer ends of the end links *s s* united by the shackle, substantially of the same length as any three consecutive links of the chain, so that they will engage the wild-cat in the same manner as other portions of the chain.

The slide-valve *t* of the steam-chest of each cylinder F is operated by an eccentric so set on the engine-shaft that in moving the valve *t* the exhaust-port is kept open at the end F' of the cylinder until the piston has reached its extreme position at that end; and the same operation is repeated at the other end. To facilitate the said operation, the slide-valve *t* may be made with an exhaust-port larger than it is commonly made for effective steam-engines, so as to keep the exhaust-port open until each engine has passed its center, respectively, and allow any water that may be in the cylinder to escape; and even if a small portion of the steam is wasted, this disadvantage is well overbalanced by the conven-

ience of having the engine started and operated from the deck above by any unskilled hand without danger of accidents.

When it is desired to operate the windlass by steam-power, the worm-wheel E is pushed into gear with the windlass by turning the crank H. Steam is then admitted to the cylinders F from the boiler through the pipe *u* and cock u^1 by means of the hand-wheel u^2, or from the deck above with a vertical rod, u^3, extending upward from the hand-wheel u^2. After steam has been admitted, its pressure is regulated by the valve *m*, that is loaded to blow off before there is any danger to the cables from too great tension. If steam is not to be used, the worm-wheel is disconnected from the windlass by inclining the shaft *e* forward with the screw *h*, revolved by the crank H, and the apparatus is in condition to be operated by the oscillating lever I, attached to the connecting-rods K, and the latter with the clamping-levers K′, that embrace the rim of the windlass B.

It is often desired, when preparing to cast anchor, to have a few fathoms of chain lying next to the hawse-hole. For this purpose the chain may be passed over either wild-cat by revolving the latter with the hand-spike *f*, resting upon the horns *f′* as a fulcrum, its extremity passing against the outer ribs of the wild-cat pulley D.

Having now fully described my invention, I claim—

1. In a windlass operated by steam-power, an automatic pressure-controlling valve, *m*, and indicator L, limiting the pressure upon the chain-cable if the latter should foul while the engines are running rapidly, and indicating the tension upon said chain, substantially in the manner described.

2. In combination with a windlass operated by steam or hand power, the shackle *r* and links *s s* at the ends of each section of chain, formed so that the length of the three united shall be substantially equal to the length of three consecutive links of the adjacent section of chain, substantially as and for the purpose described.

3. In combination with the wild-cat pulleys D, and keys *d* to connect the wild-cat pulleys D and the windlass B, the said windlass B having openings *d′* extending through it, so that a bar, *f*, can be introduced through said openings, to disconnect the windlass from the wild-cat pulleys, substantially as described.

4. The worm-wheel pinion E, located upon a vibrating rotary shaft, in combination with a windlass, operated by steam or hand power, to connect or disconnect the engines from the windlass, substantially as described.

5. The standards G, for sustaining the hand-power lever I, made of wrought-iron plates, united by bolts at such distance apart as to inclose the worm-wheel pinion, and form a column to resist tension as well as compression strains without through vertical bolts between decks, as set forth.

6. In a windlass operated by steam, the spring-valve *m′*, to limit the pressure upon the cable-chain if the latter should foul while the engines are running rapidly, substantially as described.

7. In combination with the wild-cat pulleys of a windlass, and the projection *p* upon said pulleys, the counter-wheel *n*, connected with each wild-cat pulley, so as to register as well in paying out as in taking in the anchor-chain, substantially in the manner described.

8. In combination with the oscillating hand-lever I and the connecting-rods K, used to operate upon the windlass, the adjustable shifting-blocks *k*, inclosing the hand-lever I, said blocks being provided with friction-rollers *k′*, as described.

9. In combination with a windlass operated by steam-power, the slide-valve *t* of the steam-chest of each cylinder, so proportioned in relation to the steam and exhaust ports, and to the position of the eccentric, as to keep the exhaust-port open until each engine has passed its center, respectively, to let out water that may have accumulated within the cylinder, substantially as described.

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