O. Tufts.

Elevator.

No. 53,904. Patented Apr. 10, 1866.

Fig. 1.

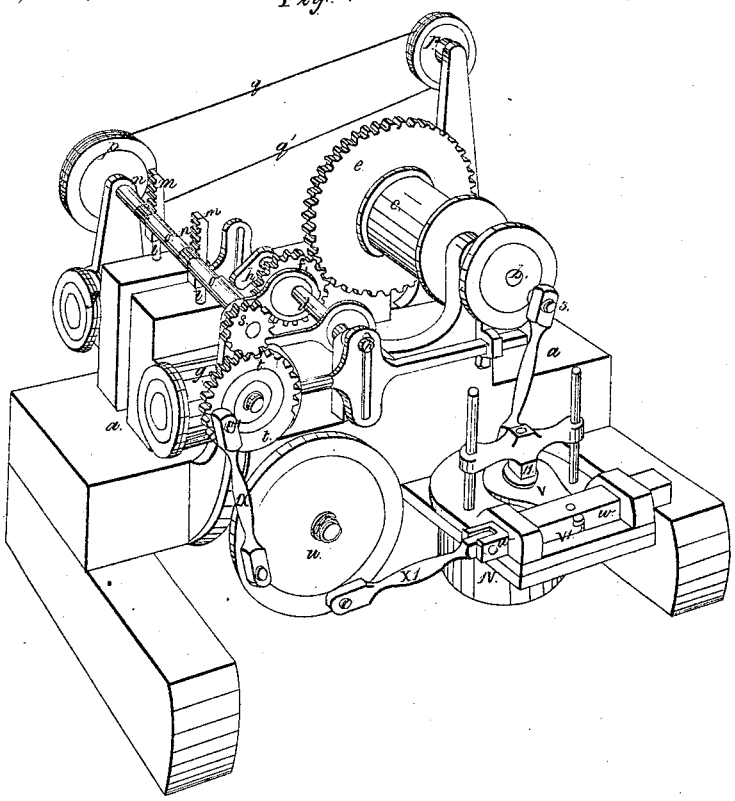


Fig. 2.

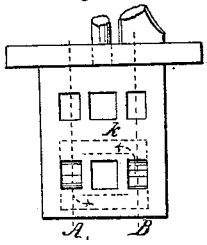


Fig. 3.

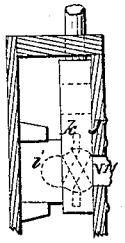


Fig. 4.

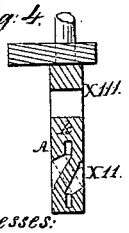


Fig. 5.

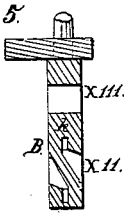


Fig. 6.

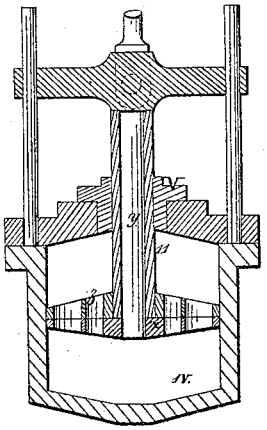


Fig. 7.

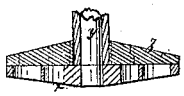
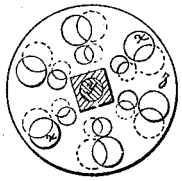


Fig. 8.



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UNITED STATES PATENT OFFICE.

OTIS TUFTS, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN STEAM HOISTING APPARATUS.

Specification forming part of Letters Patent No. **53,904**, dated April 10, 1866.

To all whom it may concern:

Be it known that I, OTIS TUFTS, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Steam Hoisting Machinery; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Like letters indicate the same or like parts in all the drawings.

With reference to the accompanying drawings, Figure 1 is a perspective view. Fig. 2 is a side view of the movable valve-seat for steam-valve; Fig. 3, an edge view of same, with steam-valve and section of steam-chest. Fig. 4 is a section of movable valve-seat at line B. Fig. 5 is a section of same at line A. Fig. 6 is a sectional view of the liquid-stop. In this view the valve is open. Fig. 7 is a sectional view of the piston-rod, valve, and stem of same, with valve closed. Fig. 8 is a view of the piston with valve partly open.

The nature of my invention relates—

First, to a combination of devices applied to perform the function of stopping, starting, regulating the speed, and reversing the direction of motion in steam hoisting machinery.

Secondly, to the employment of a device for stopping the motion of the machinery in a steam hoisting apparatus, and to lock the same and hold it stationary, with or without its load, the device consisting of a piston connected to the moving parts of the apparatus and made changeable at the pleasure of the operator, and while in motion, from a closed impervious to an open frame or perforated one, and back again, so as, in the first case, to allow it to pass freely through a liquid within a vessel, to which the piston is fitted closely or loosely, according to the degree of perfectness required, or, in the second case, not to be movable at all through the liquid. This I have denominated a "liquid-stop."

Thirdly, to the combination of the two foregoing features, so as to secure automatically a conjoint action, causing the stop always to act at the proper point of time relatively to the movement of the stopping and starting device, which controls the admission of steam to the engine or engines.

An engine-bed, *a*, supports a drum-shaft, *b*, carrying drum *c*, for winding the hoisting-ropes. This shaft is driven directly, or through intermediate gearing, by the engine-shaft *d* and gears *e f*.

The steam-cylinders *g*—one, two, or more—are secured to bed *a*, their pistons being connected in any of the usual modes to cranks *h*, and driving them. These cylinders *g* are furnished with steam-chests and common slide-valves and suitable ports, the valves being driven by eccentrics on shaft *d* in the usual manner.

In the space intervening between the slide-valve *i* and seat *j*, as shown, I interpose a secondary movable seat, *k*, arranged to move transversely to the valve's line of motion, and having one series of openings corresponding to the steam-ports and passing directly through it, and another series of openings also corresponding to the steam-ports on the two sides, but which, in passing through the seat, exchange locations, the one corresponding to one steam-port on the valve side of the movable seat coming out to match the opposite port on the cylinder side, so reversing the steam from one end of the cylinder to the other, accordingly as the movable seat *k* is changed, so as to bring one or the other series of openings to match the steam-ports. This movable valve-seat *k* is furnished with a stem, *l*, passing through a stuffing-box in the side of the chest, and joined to a rack, *m*, which rack is moved to change the seat *k* by the pinion *n* on shaft *o*, and this shaft *o* is furnished with wheel *p*, upon which play the hand rope or chains used to rotate it. These hand ropes or chains *q q'* pass from this wheel through or near the hoisting-platform, and extend all the way to an elevation above the highest point to which it is to be raised, and are thus ever accessible to the operator, who may be standing on the moving platform or at stationary points, the ropes passing from wheel *p* over a wheel, *r*, at the top, and back to the wheel again. On this shaft is fixed a pinion, *s*, which plays into and causes to rotate, through one-half revolution, a wheel, *t*. From a pin in this wheel *t* a connecting-rod passes to, and connects with, directly or by intervention of crank *u* and rod, the slide *w*.

A cylinder or other vessel furnished with a piston, *x*, and supplied with water or other liquid, is secured to bed *a*. The piston *x* is furnished with a rod, *y*, and a series of ports

or perforations and a valve, *z*, with corresponding ports or perforations, is fitted to turn upon this piston, so that the ports or perforations may be alternately opened and closed, and is furnished with a hollow stem, II, incasing rod *y*, the stem, rod, and piston all moving lengthwise together, but the hollow valve-stem and valve are susceptible of a reciprocating rotary movement independent of piston *x* and rod *y*. This movement opens and closes the ports or perforations in the piston by bringing those in the valve to coincide with them or otherwise. The inner rod, *y*, is connected to a crank, III, by which the piston is made to reciprocate within the vessel IV. The hollow valve-stem II is furnished with an arm, V, which may also be a part of, or be connected to, a stuffing-box for stem II. Within this arm the stem is prevented from turning by being splined or made square for that purpose, and can only turn with the arm.

The arm V is connected by a link, VI, or otherwise, and receives a vibratory motion from slide *w*.

The vessel IV is supplied with water or other liquid, and when the ports or perforations in the piston *x* are closed it cannot move inward by reason of the resistance of the water, nor outward by reason of the resistance of the atmosphere pressing toward the vacuum, which the withdrawing of the piston tends to produce. It is only necessary to close the valve *z* to stop the motion of the piston through the water, or to open it to allow it to pass freely, and the piston being connected to a crank on the drum-shaft that must stop and be liberated also with it. The vessel IV may be entirely filled with liquid, in which case the piston will be resisted on either side by liquid, instead of by the atmosphere on one side and water on the other, an ordinary stuffing-box being used around the stem II where it passes through the head in the one case, but none being required in the other. Two or more of these liquid stops may be used, in which case the crank-pins to which they are connected should be set at varying angles.

The operation is as follows: The movable seats *k* for the steam-valves being adjusted centrally, in which position the steam is excluded from the cylinders, and the valve *z* also being adjusted at its center of movement so as to prevent the passage of the piston *x* through the liquid the operator, purposing to set the machinery in motion for hoisting, draws the hand-rope *q*, rotating shaft *o*, and, through pinion *n* and rack *m*, moves the seat *k*, bringing its direct openings XIII to coincide with the steam-ports VII, and so admitting steam to set the engine in motion, the pinion *s* simultaneously driving the wheel *t* and causing the pin VIII to move from its central position, and consequently with its quickest motion relatively at the first start, communicating motion through rod IX, crank *u*, and rod XI to arm V, and thence through valve-stem II to the valve *z*, so rotating the valve *z* and bringing its perforations to coincide with those in the piston *x* and allowing the piston *x* to pass freely through the liquid. When the operator would stop the operation or motion he draws the other rope-rotating shaft *o* and pinion *n* in the opposite direction until the movable seats *k* are brought to a central position again, so shutting off the steam from entering the cylinder and through pinion *s*, wheel *t*, and connections to stem of valve *z*, returns this valve or secondary piston to its central position, where the passage of the piston through the liquid is made to cease, and, being confined, it obliges the connected machinery to stand still. When he would start again in the same direction he gives a return movement to the rope, opening the valves on the same side of the center of their movement; but if he would start in the opposite direction he continues the movement of the hand-rope in the same direction, causing the steam-valve's movable seat *k* to move from its central position in the opposite direction, bringing the reversed openings XII in the valve-seat *k* to coincide with the steam-ports VII, so causing the steam, and consequently the motion, to be reversed, the valve *z* being rotated in the opposite direction, but giving passage for the piston in the same manner by bringing the next series of openings in the valve *z* to coincide with those in the piston *x*, thus liberating the machinery. I propose to adjust the valve *z* so as to open exactly at the same time the steam is admitted to the cylinders or either before or after, as may be found desirable under differing circumstances, but always in connection with, and by the same movement of, the hand-rope or chain as operates the seat.

By a slight movement of the movable seats through the means described the speed of the engine can be regulated by the operator at pleasure, as by this means he can cause from the smallest to the largest fraction of the width of the steam-ports to come into use to admit steam.

Having described the construction and operation of my improvements, what I claim as my invention, and desire to secure by Letters Patent, is as follows:

1. The transversely movable valve-seats *k*, in combination with the pulley-shaft *o* and rack and pinion *m n*, or equivalent, for the purpose of stopping, starting, regulating the speed, and reversing the direction of motion in steam-hoisting apparatus, substantially as represented.

2. In combination with a hoisting apparatus and more particularly with the starting and stopping cord or rod thereof of a closed vessel filled with liquid and provided with a piston, when such cord or rod is so arranged as by movement imparted thereto to open or close apertures which will, by allowing the liquid to pass the piston, permit motion of the

hoisting apparatus, or by preventing the liquid from passing the piston, will stop the hoisting apparatus and hold it from moving, substantially as described.

3. The combination, with the stopping and starting cord or rod of a hoisting apparatus, of the valves of a liquid-stop apparatus and the steam-valve or movable seat of the steam-engine motor operating substantially as described.

OTIS TUFTS.

Witnesses:
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