A. B. NIMBS.

GRAIN ELEVATOR.

No. 45,336. Patented Dec. 6, 1864.

Fig. 3.

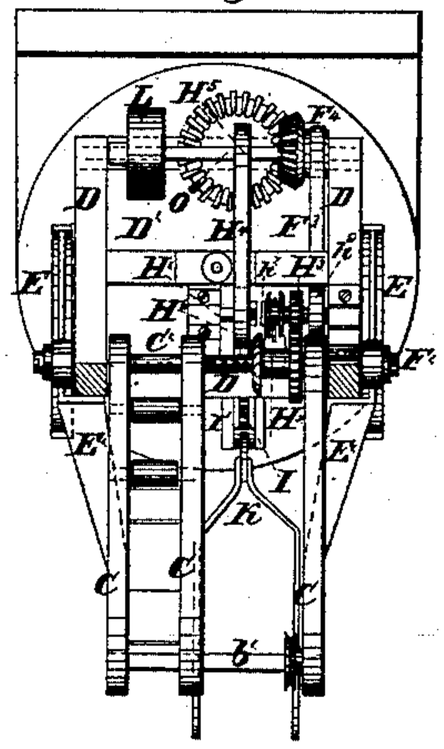

Fig. 4.

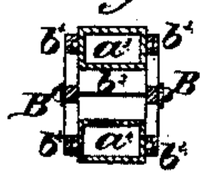

Fig. 2.

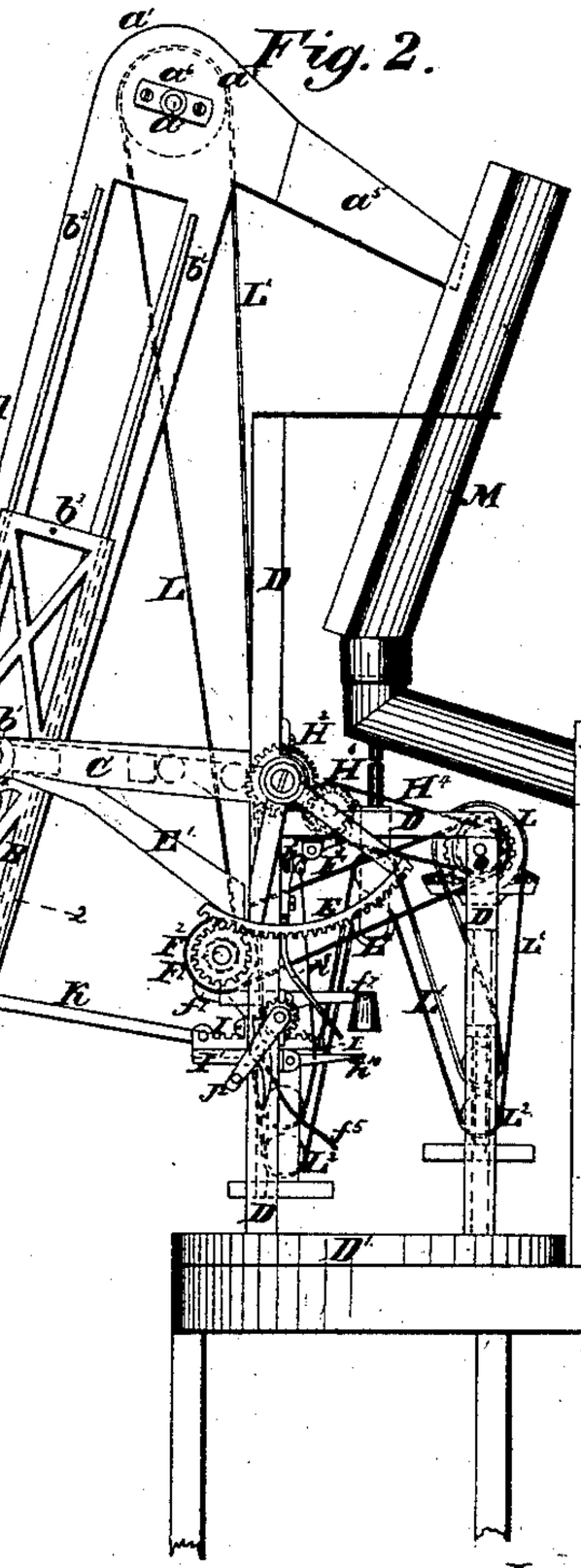

Fig. 1.

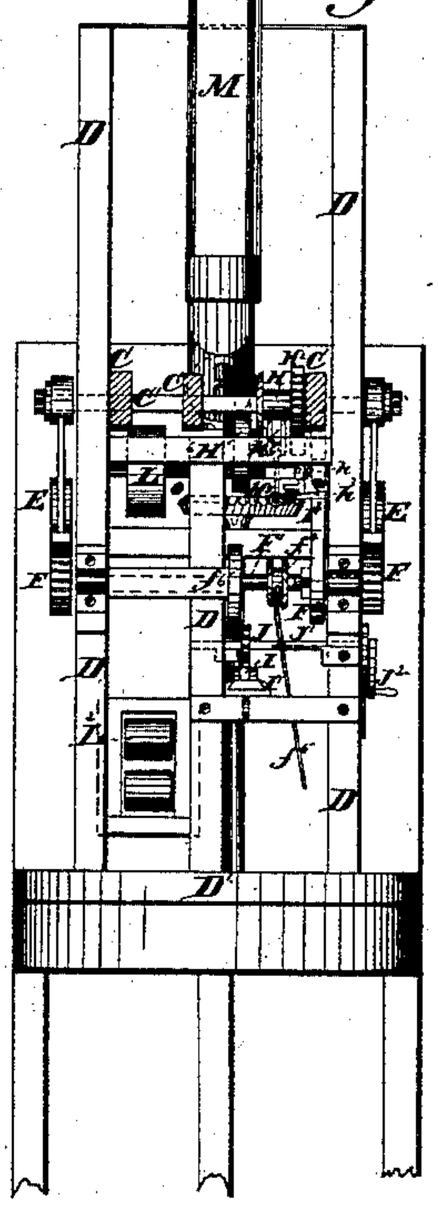

Fig. 5.

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UNITED STATES PATENT OFFICE.

A. B. NIMBS, OF BUFFALO, NEW YORK, N. Y.

IMPROVED GRAIN-ELEVATOR.

Specification forming part of Letters Patent No. **45,336,** dated December 6, 1864.

To all whom it may concern:

Be it known that I, ARHEUNA B. NIMBS, of the city of Buffalo, county of Erie, and State of New York, have invented certain new and useful Improvements in Grain-Elevators; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification.

These improvements relate to the machanism by which the elevator-leg is suspended and its movements controlled. They are designed for and the drawings represent their application to the floating grain-elevator for which Letters Patent were granted to me August 12, 1862, but they are also applicable to other elevators, either floating or stationary.

The nature of the invention consists, first, in suspending the elevator-leg between grooved jaws or frames, which are hung at the ends of swinging suspension-arms hinged to the front posts of the main frame-work raised on the vessel in a floating elevator or of the "tower" in a stationary elevator, by which a compound movement to the elevator-leg is obtained—viz., a movement outboard by the lowering of the suspension-arms, which brings the leg into position to enter the hatch of the vessel to be unloaded at the proper angle for the most perfect working of the elevator-buckets, and a vertical movement between the jaws which allows the leg to pass through the hatch of the vessel into the hold; second, in the construction of an extension-foot to the elevator-leg, by which the lower or foot pulley may be moved in a direction to tighten the bucket-belt and prevent it from slipping; third, in the mechanical means for controlling the inclination of the elevator-leg.

For a description of the hull, receiving-bins, weighing-scales, driving-gear, &c., reference is made to the before-mentioned patent.

Figure I is a front elevation of my improvements. Fig. II is a side elevation of same. Fig. III is a top plan of same. Fig. IV is a cross-section of leg and jaws on line 1 and 2; and Fig. V is a cross-section of extension-foot on line 3 and 4.

Letters of like name and kind refer to like parts of each of the figures.

A represents the elevator-leg, consisting of a head part, a', within which is placed the head-pulley and foot part a^2, which carries the foot-pulley, the head and foot parts being connected by the long trunks or boxes a^3 a^4, through which the grain-buckets travel, passing over the foot-pulley and ascending through the forward trunk, a^3, passing over the head-pulley, and descending through the rear trunk, a^4. The buckets discharge their load at the top into the spout a^5. The head-pulley has its journal-bearings a^6 secured to the sides of the head part a', and its shaft a^7 projects through on one side and carries the driving-pulley a^8.

B B represent the grooved jaws or frames, between which the elevator-leg is suspended. They are hung at the outer ends of the suspension-arms C by the shaft b', passing through them and the ends of the arms. They each consist of a rectangular frame, of wrought-iron, with diagonal braces, and are of sufficient length to give a firm lateral support to the leg. A longitudinal groove is formed in each side piece of each frame or jaw, into which the parallel tongues b^2, secured longitudinally to each side of the back and front trunks a^3 a^4 of the leg fit, so that, as the leg is raised or towered between the jaws, the tongues slide in the grooves and hold and guide the leg in its movement. The two jaws are connected firmly together by bolts b^3, passing through between the back and front trunks of the leg. The length of the tongues b^2 is governed by the required movement of the leg through the jaws.

C C represent the suspension-arms, formed of stout timbers, hinged at their inboard ends to the front posts of the main frame-work D D D D by a shaft, C, and carrying at their outboard ends the shaft b', upon which shaft, and between the suspension-arms, are hung the jaws B B, through which the elevator-leg is raised and lowered. The frame-work D D is raised upon the turn-table D′, and carries all the machinery for handling and operating the elevator-leg, as described in the before-mentioned patent.

E E represent heavy gear-segments, placed upon the ends of the shaft C′ outside of the frame-work D D, and connected to and forming part of the suspension-arms by means of the braces E′ E′.

F F represent pinions gearing with the segments E E. They are keyed upon the ends of a shaft, F′, which has its bearings in the front posts, D D. The shaft F′ has a loose pulley, F^2, upon it, which is driven by a belt, F^3, from

a pulley, F^4, on the line-shaft O. The motion of the shaft G, which is constant, from which the motion of the elevating-buckets and all the mechanism for operating and handling the leg is derived, is obtained in the manner described in the before-mentioned patent. The loose pulley F^2 is provided with a clutch, f^4, of common construction, operated by a clutch-lever, f^5, by which it may be thrown in gear with and drive the shaft F′ or allowed to run loose at pleasure.

The position of the suspension-arms when the leg is at work is horizontal. When not at work, they are raised to a vertical position, or nearly so. This movement is obtained by throwing the pulley F^2 in gear with the shaft F′ by operating the clutch f^4, thereby giving motion to the pinions F F, acting on the segments E E. The reverse motion from the vertical to horizontal position is given by the weight of the leg, which is sustained by the suspension arms, the descent being governed by a friction-brake consisting of a friction-wheel, f, keyed firmly on the shaft F′, and weighted brake-lever f^7.

The raising and lowering of the leg by means of these suspension-arms is only a part of the movement which it is necessary to give the leg. It simply throws it outboard and brings it into position to enter the hatch of the vessel to be unloaded at the proper angle to secure the most perfect working of the elevator-buckets.

To enable the leg to enter the hold of the vessel it is lowered through the jaws B B. This movement and the reverse one of raising the leg out from the hold of the vessel is accomplished as follows: G G represent a system of sheaves or pulleys placed between the front and rear trunk of the leg near the foot upon a shaft or bolt, G′, held by the straps G^2, bolted to the leg. G^3 G^3 represent a corresponding system of sheaves placed between the jaws B B, just below the shaft b', upon a shaft or bolt, G^4, sustained by the jaws. A rope, G^5, passes over this system of sheaves and leads onto a windlass-barrel, H, placed loose upon the suspension-shaft C′. By the winding or unwinding of this rope on the windlass-barrel the leg is raised or lowered through the jaws B B, the tongues on the leg sliding in the grooves in the jaws and holding and guiding the leg in its movement. The windlass-barrel is driven from a countershaft, H′, the spur-gear H^2 forming one head of the windlass barrel, meshing with the pinion H^3 on the countershaft, which is driven by a belt, H^4, leading from the pulley H^5 on the line-shaft G to the pulley H^6 on the countershaft. The pulley H^6 runs loose on the countershaft, except when it is necessary to operate the windlass. It is then thrown into gear with said shaft by operating the clutch h^7 by means of the clutch-lever h^8 and motion is given to the windlass-barrel in a direction to wind up the rope G^5 and raise the elevator-leg through the jaws B B.

The downward motion of the leg through the jaws is given by its own weight, unwinding the rope from the windlass, which is then thrown out of gear, but the descent is governed by the action of a friction-brake, consisting of the friction-wheel h^9 on the countershaft H′ and weighted brake-lever h^{10}.

The inclination of the jaws B B to the perpendicular (and consequently of the elevator leg) may be varied and regulated at pleasure, so that the foot of the leg may be thrown out to any required distance to enter the hatch of the vessel being unloaded or drawn inboard to "house" the leg by means of the following-described mechanism:

I is a rack sliding in a grooved bed, I′, bolted to the frame-work D D.

J is a pinion gearing with the rack I and keyed on the shaft J′, having its bearings bolted to the front posts of the frame-work D D above the rack.

J^2 is a winch-handle on the outer end of the shaft J′, by which motion is given to the pinion J, and thence to the rack in either direction, as desired.

K represents a forked rod, forming a connection between the rack and the lower ends of the jaws B B, so that the movement of the rack causes the jaws to swing on the shaft b', upon which they are hung, in a manner to vary their inclination, for the purpose before mentioned. The length of the connecting-rod between centers should be the same as the length of the suspension-arms between centers, so that in the raising of the jaws and leg by the suspension-arm their inclination remains unchanged.

L represents the driving-pulley on the line-shaft O, from which motion is given to the elevator-buckets by the belt L′.

L^2 represents tension-pulleys, by which the slack in the belt L′, occasioned by the movements of the elevator-leg, is taken up and the belt kept taut.

a^2 represents the extension-foot, which contains the lower or foot pulley, over which the grain-buckets run. It consists of a rectangular box, a^9, built of wood or cast-iron, open at the bottom and top, and having openings a^{10} at the side, through which the grain enters to feed the buckets. The shaft of the foot-pulley runs in journal-bearings bolted to the upper edges of the side of the box a^9.

a^{11} represents corner-pieces, extending upward from the four corners of the box a^9, connected together by one or more bands, a^{12}, passing around the trunk part of the leg, forming a connection between the box and leg, which allows the box to be moved in a direction to extend the length of the leg.

a^{13} represents adjusting-screws working through iron bars a^{14} let into the sides of and firmly bolted to the trunk part of the leg, and bearing upon the edges of the box a^9 over the center of the foot-pulley shaft. By turning these screws the above-mentioned movement is given to the foot-pulley and box, which in-

creases the length of the leg, and consequently gives any desired tension to the bucket-belt.

M represents the receiving-spout, the foot of which stands over the center of the turn-table, but which is inclined to a degree corresponding to the mean angle of inclination which it is found necessary to give the elevator-leg, so that the head-spout of the leg will follow the receiving-spout and be in proper position to discharge therein during any part of its up-and-down movement.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of the suspension-arms C with the grooved jaws B B and the elevator-leg A, constructed and operating in the manner and for the purposes substantially as herein set forth.

2. The extension-foot a^2, constructed and operating substantially as and for the purpose set forth.

3. Controlling the inclination of the jaws B B and leg A by means of the rack I, pinion J, and connecting-rod K, substantially as and for the purpose set forth.

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