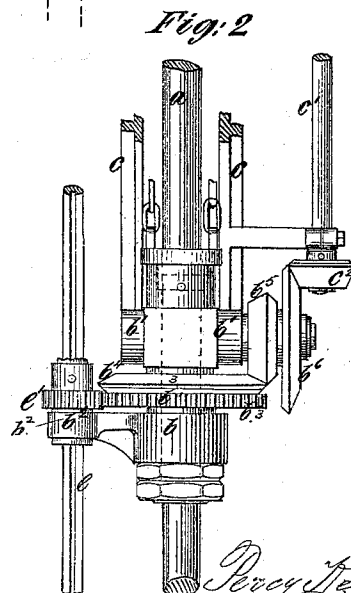
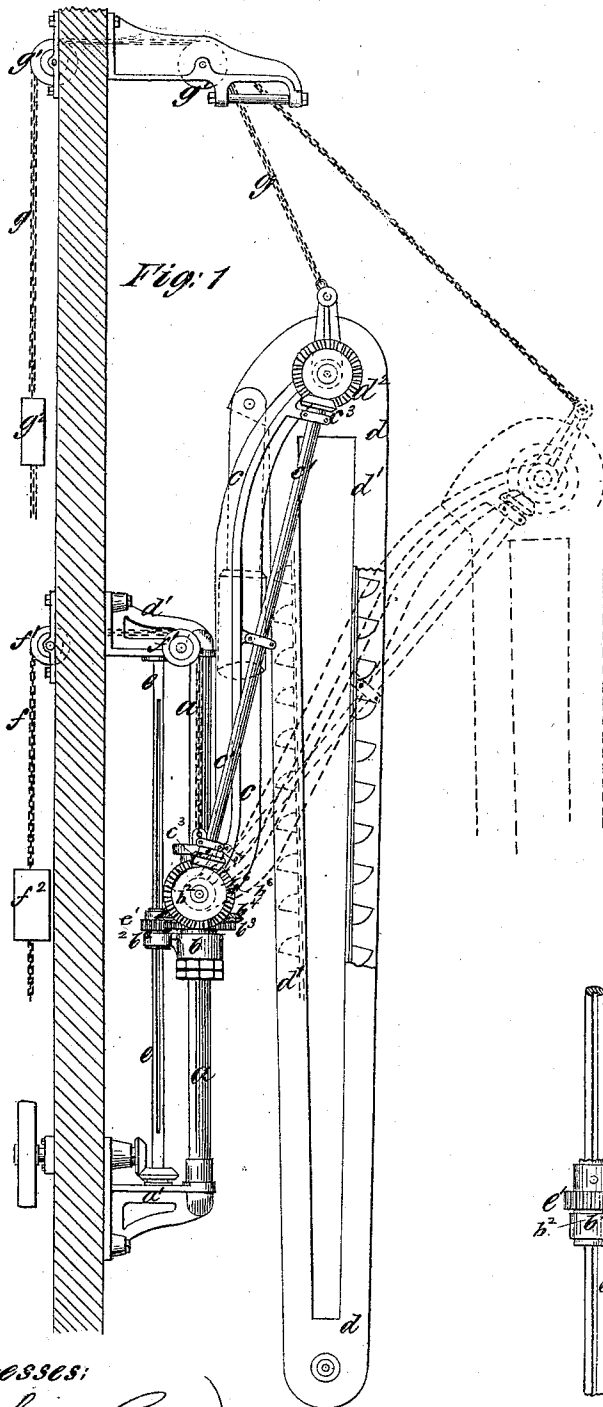


P. KEEN & J. DENCE.
Elevators.

No. 147,944.

Patented Feb. 24, 1874.



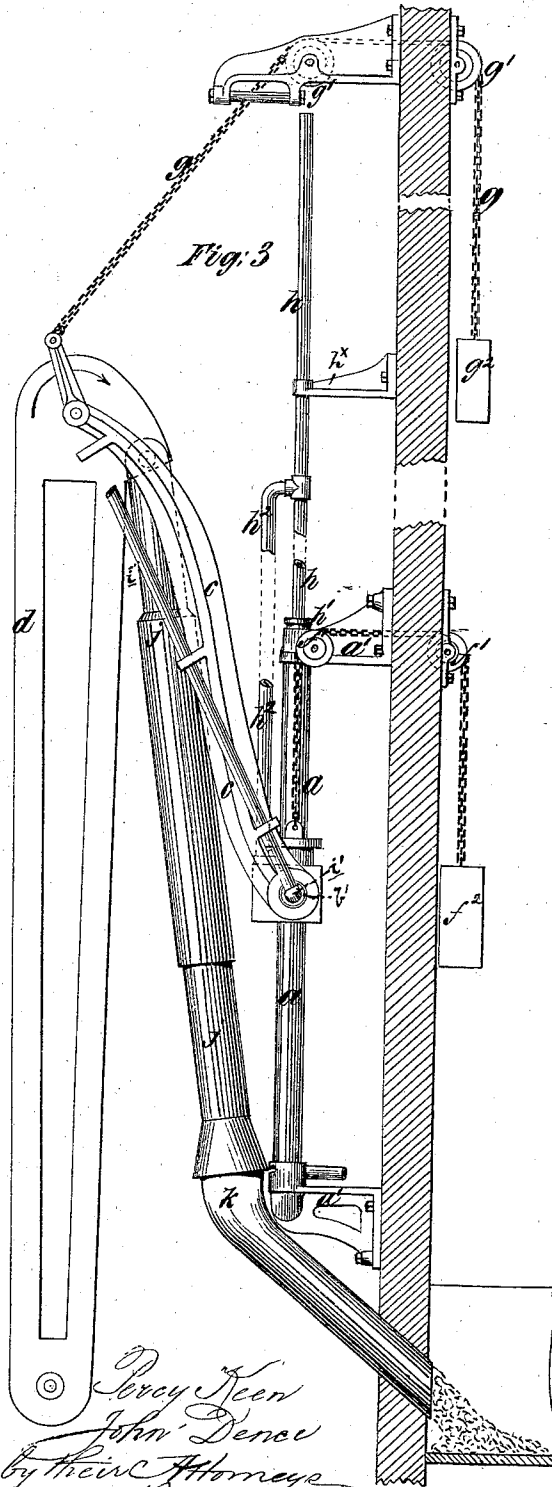
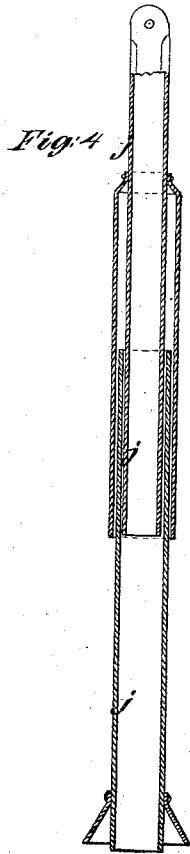
Witnesses:
Michael Ryan
Thos Haynes

Percy Keen
John Dence
by their Attorneys
Pennell & Allen

P. KEEN & J. DENCE.
Elevators.

No.147,944.

Patented Feb. 24, 1874.



Witnesses:

Michael Ryan
Fred. Holmes

Percy Keen
John Dence
by their Attorneys
Brown & Allen

UNITED STATES PATENT OFFICE.

PERCY KEEN, OF SHAD THAMES, AND JOHN DENCE, OF LONDON, ENGLAND.

IMPROVEMENT IN ELEVATORS.

Specification forming part of Letters Patent No. **147,944**, dated February 24, 1874; application filed December 31, 1873.

To all whom it may concern:

Be it known that we, PERCY KEEN, of Shad Thames, in the county of Surrey, and JOHN DENCE, of Mark Lane, in the city of London, both of England, have invented certain new and useful Improvements in Elevators for Grain and other materials, of which the following is a specification:

This invention has reference to certain new and useful improvements in elevators for conveying grain, minerals, and other materials, and is specially designed for use in unloading vessels or other places of deposit, which change their relative position in respect to the elevator. The invention consists, first, in mounting the trunk, case, or leg of an ordinary elevator in a swinging crane or frame which is capable of moving outward from its point of suspension, so as to enable the elevator to receive an outward and backward adjustment in respect to a boat or other vessel to be unloaded; the crane or swing-frame carrying the elevator being provided with a counterbalance device, so as to permit it to rise and fall with the motion of a vessel; second, in pivoting the swinging crane or frame which carries the elevator to a carriage or block, which is free to move on a stationary column or pillar, both in a vertical and horizontal or axial plane, so as to permit the elevator to rise and fall and to operate on either side of the point of suspension, the movable carriage being also combined with a counterbalance device, so as to enable it to rise and fall automatically.

In the drawings, Figure 1 is a side view of an elevator constructed according to our invention. Fig. 2 is a detail view of some of the parts on a larger scale. Fig. 3 is a side view of the elevator, showing a modified form of devices for operating the elevator-belt. Fig. 4 is a detail view of a movable tube for conveying the material from the elevator.

Referring to the drawing, *a* designates a vertical column or post, which is mounted in brackets *a' a'* applied to the sides of a building, vessel, or other suitable object. A sliding carriage or block, *b*, fitted on said column, is free to rise or fall, and also to rotate on the same, and is provided with lateral studs or gudgeons *b b¹*, which form the points of suspension of a swinging crane, jib, or frame, *c*.

Said frame or crane *c* is formed of two parallel arms, between which is located or mounted the trunk, case, or leg *d* of an ordinary endless chain or belt elevator *d'*. The carriage or block *b*, carrying the crane and elevator, is capable of rising and falling on the column *a*, so as to always maintain the elevator in proper relation to a boat or other object to be unloaded, notwithstanding the motion to which the same is subjected by variations of the tide or the commotion of the water. In order to enable the sliding carriage to rise in a vertical direction, and to resume its normal position, I provide the same with a counterbalance device consisting of a chain, *f*, which passes over sheaves *f¹*, and carries a weight, *f²*, the lower end of said chain being attached to a windlass or other suitable device, so as to provide means for adjusting the elevator to operate at any desired height. The crane *c*, carrying the elevator, is susceptible of turning freely at its point of suspension, so as to enable it to fall outward or backward, according to the position of the boat or vessel; and, for enabling the automatic adjustment of the crane to take place, a counterbalance-chain, *g*, passing over sheave, *g¹*, and carrying a weight, *g²*, is combined with said crane. The adjustment of the carriage *b* in an axial or horizontal plane is designed for the purpose of enabling the elevator to operate at a point on either side of the point of suspension of the crane, this adjustment of the elevator being necessary in view of the fact that a boat is liable to move backward or forward while the discharging operation is taking place.

The mechanism for driving the elevator may be varied, and consists, in one instance, of the vertical shaft *e*, journaled in the brackets *a' a'*, and driven by a suitable prime motor. Said shaft carries a pinion or spur wheel, *e'*, connected to the same by a slot and feather, and capable of sliding up and down on the shaft, being carried by a bracket, *b²*, projecting from the carriage *b* and encircling the shaft *e*. The spur-wheel *e'* gears into another spur-wheel, *b³*, revolving horizontally at the base of the sliding carriage and carrying a bevel-gear wheel, *b⁴*, which gears into another bevel-wheel, *b⁵*, carried on a stud projecting from the side arms, one or both, of the sliding carriage.

A bevel-wheel, b^6 , attached to the back of the wheel b^5 , gears into a small bevel-wheel, c^2 , on the end of a shaft, c^1 , carried in bearings bolted to the side of the crane or swinging frame c . At the upper end of the shaft c^1 there is located another bevel-wheel, c^3 , gearing into a bevel-wheel, d^2 , on the end of the spindle of the drum which gives motion to the elevator-belt d^1 .

As a modification of our invention, we propose to substitute for the driving mechanism previously described a more direct application of the power for actuating the apparatus, as shown in Figs. 3 and 4 of the drawing.

For this purpose, the column a , on which the carriage slides, is made tubular, and has a passage formed down to its center the whole length, and in this passage a pipe or tube, h , is arranged to slide, said tube passing out at the top through a stuffing-box, h^1 , and through a guide, h^x . A branch tube, h^2 , is connected at its upper end with the tube h , and is fixed at its lower end to the sliding carriage, which communicates its own vertical and axial motion to both tubes, as will be obvious. In the body of the carriage a passage is formed leading from the tube or pipe h^2 and out through the center of the side arm or arms b^1 . A tube or pipe, i , passes along the side of the crane or swinging frame c , the lower end of which tube terminates in an elbow, i^1 , entering the side arm b^1 of the carriage through a stuffing-box, and in which it is free to oscillate or move according to the motion of the crane. The other end of the tube or pipe i communicates with a convenient or suitable form of motive-power engine for supplying steam, air, or water thereto, said engine being secured to the side of the crane, or arranged in any other suitable manner for operating the drum which gives motion to the elevator-belt. The grain or other material is delivered from the head of the elevator through a spout, j , made in several lengths, which slide one within the other, into a chute or discharge-hopper, k . The upper end of said chute enters the end of the lower section of the telescopically-sliding tubes j , but is not con-

nected with the same, in order to permit the delivery-tubes to rotate in accordance with the axial movement of the carriage b .

From the above description it will be seen that by counterweighting all the parts, upon an upward pressure being applied to the bottom of the elevator, the carriage and operative mechanism slide freely in a vertical direction, or in case the boat moves off from the wharf the crane falls outward, and so keeps the apparatus up to its work. Furthermore, if the boat surges backward or forward, the entire apparatus turns around either to the right or left on the supporting-column, thus adapting itself to any position required.

An elevating apparatus constructed according to our invention may be applied to existing buildings or permanent structures, or vessels specially constructed may carry the elevator, so that they may move about and be used in any required position for loading, discharging, or transshipping grain, coal, and other materials.

What we claim is—

1. In an elevator for grain and other materials, the elevator leg or trunk mounted in a crane or swinging frame, combined with a counterbalance device, as set forth, so as to render the trunk self-adjusting in a backward and forward direction, substantially as described.

2. The elevator leg of a grain or other elevator, combined with a vertically-adjustable carriage or block, which receives also an axial movement on a supporting column or post, substantially as described.

3. The combination, in an elevator, of the jib or swinging frame carrying the elevator-leg, and mounted in a sliding carriage or block, capable of receiving a vertical and axial adjustment, substantially as described.

PERCY KEEN.
JOHN DENCE.

Witnesses:

JOHN GARRETT TONGUE,
G. F. WARREN.