

(No Model.)

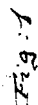
3 Sheets—Sheet 1.

A. D. FOX.

ELEVATOR FOR LOADING AND UNLOADING VESSELS, &c.

No. 265,592.

Patented Oct. 10, 1882.



Witnesses:
John C. Tunbridge
Henry D. Parker.

Inventor:
Alfred O. Fox
by his attorneys

Briesen & Betts

(No Model.)

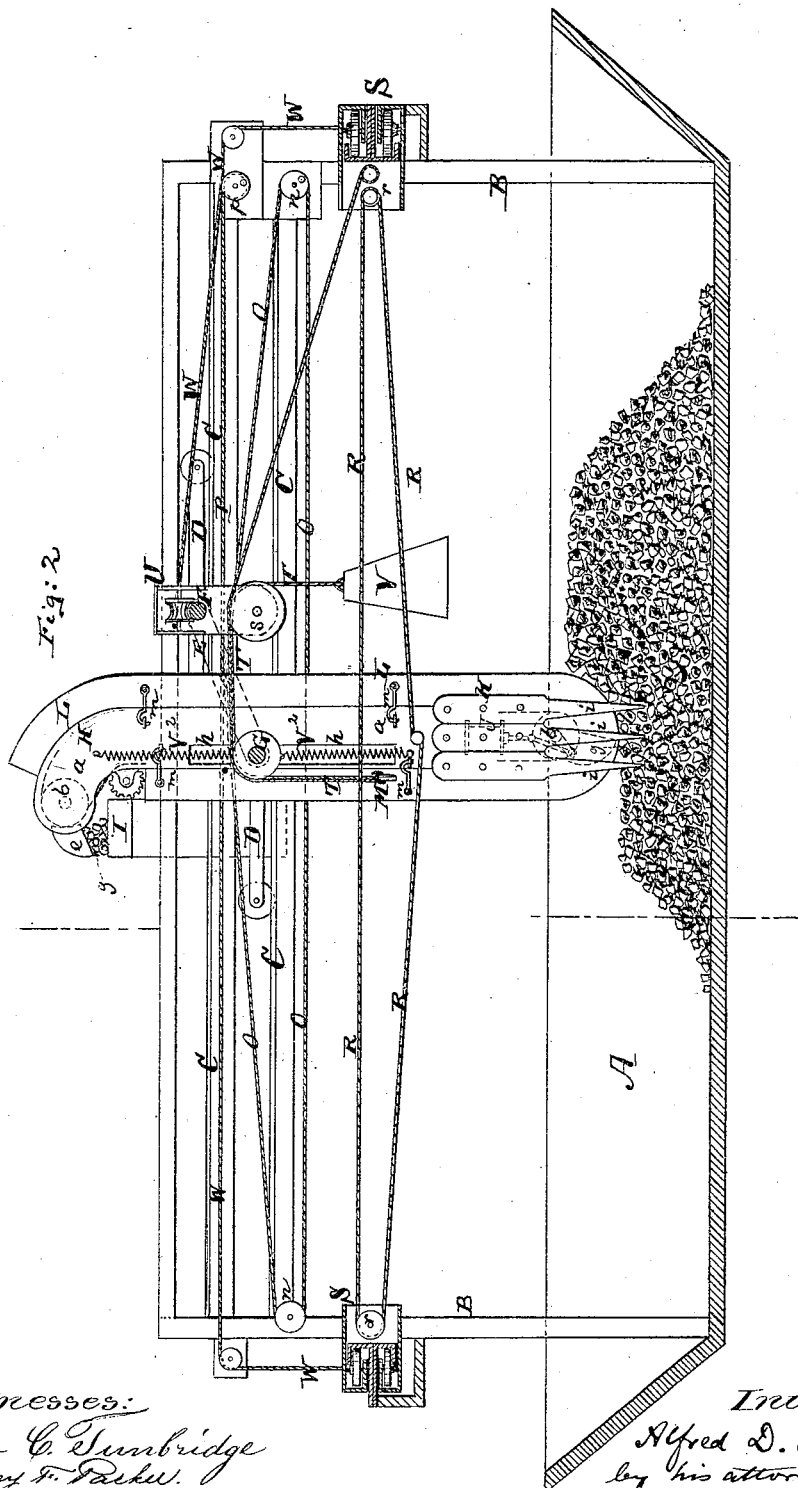
3 Sheets—Sheet 2.

A. D. FOX.

ELEVATOR FOR LOADING AND UNLOADING VESSELS, &c.

No. 265,592.

Patented Oct. 10, 1882.



Witnesses:
John C. Lumbidge
Henry F. Parker.

Inventor:
Alfred D. Fox
by his attorneys
Brienen & Betts

(No Model.)

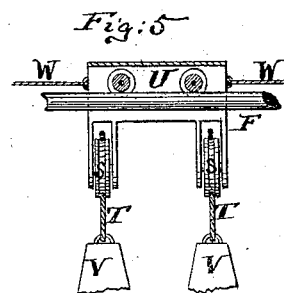
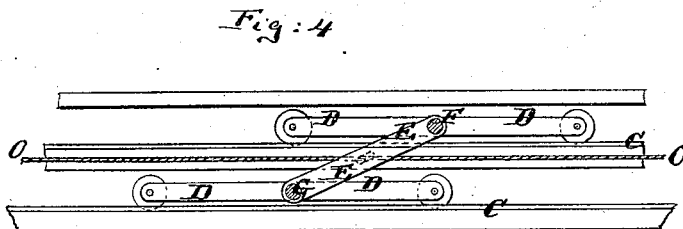
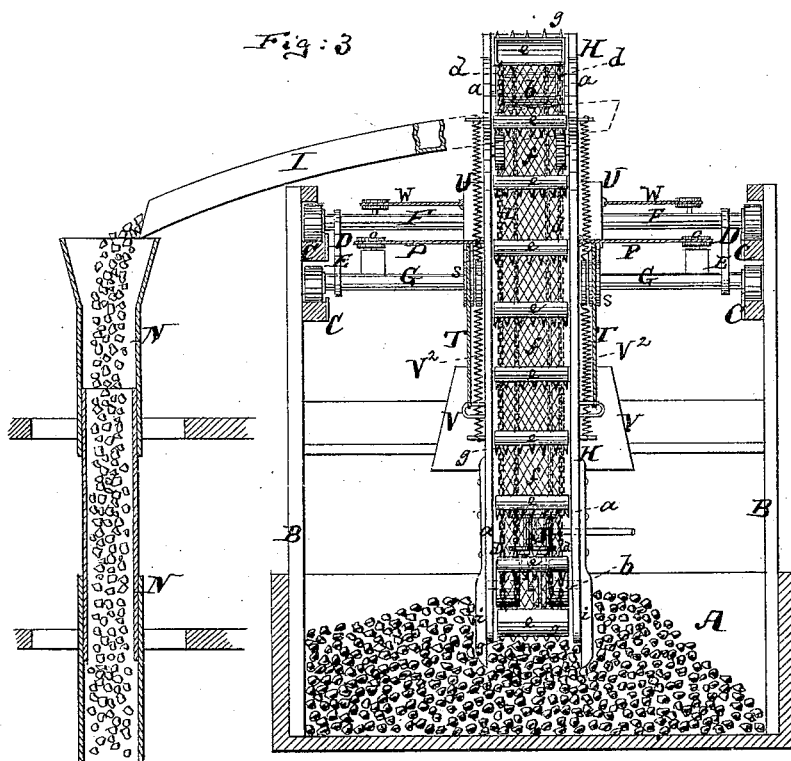
3 Sheets—Sheet 3.

A. D. FOX.

ELEVATOR FOR LOADING AND UNLOADING VESSELS, &c.

No. 265,592.

Patented Oct. 10, 1882.



Witnesses:
John C. Tunbridge
Henry M. Parker.

Inventor:
Alfred D. Fox
by his attorneys
Brisson & Bell

UNITED STATES PATENT OFFICE.

ALFRED D. FOX, OF NEW YORK, N. Y.

ELEVATOR FOR LOADING AND UNLOADING VESSELS, &c.

SPECIFICATION forming part of Letters Patent No. 265,592, dated October 10, 1882.

Application filed February 16, 1882. (No model.)

To all whom it may concern:

Be it known that I, ALFRED D. FOX, of New York, in the county and State of New York, have invented new and useful Improvements in Elevators for Loading and Unloading Vessels and other Structures, of which the following is a specification.

Figure 1 is a plan or top view of my improved elevator, showing it placed in a boat for use in loading ships from said boat. Fig. 2 is a side elevation, partly in section, of the same. Fig. 3 is a vertical cross-section of the same. Fig. 4 is a detail side view, showing the arrangement of longitudinally-movable carriages, from which the elevator is suspended. Fig. 5 is a detail face view of the arrangement for counterbalancing the elevator-leg.

The object of this invention is to produce a simple and in every direction adjustable apparatus for lifting things by buckets that are on an endless belt or chain, be that apparatus used as an elevator for lifting coal, grain, or the like, or as an excavator for lifting earth or mud, or for any other purpose whatever.

The invention relates to the means of adjusting, balancing, and giving direction to the elevator-leg and the appurtenances thereof, and has no limitation as to the uses to which the same can be put.

In the drawings I have shown the invention applied to a boat that could be used, for instance, when loaded with coal or grain, to be moored alongside of a ship, the elevator then serving to lift the contents of the boat into the ship; but in lieu of fastening the apparatus to a boat it may be secured in a building that is firmly placed on the ground; or, instead of making the elevator-leg project upwardly from the hold of a boat, it may be arranged to project downwardly to serve the purpose of an excavator.

My invention consists in the several arrangements of parts that are hereinafter more particularly described, for moving the leg of an elevator up and down, and horizontally backward and forward, and crosswise, and oscillating it and giving it any inclination that may be desired; also, in means for poising it, so that it will readily hold its balance; also, in the particular arrangement of the buckets and of the bucket-chains of the carriage on which the elevator-leg is suspended, and in

other details that are hereinafter more fully described.

A in the drawings represents a boat, carrying an upwardly-projecting frame, B, which carries horizontal parallel rails C C, on which rest, as is more clearly shown in Fig. 4, longitudinally-movable carriages D D, with friction-rollers thereon, that bear upon said rails. The carriages D D on each side of the frame are joined together by a brace or framing, E, to constitute one rigid structure on each side, and the two sets of carriages on opposite sides of the boat are united by cross-bars F G, so that by taking hold of one of said cross-bars and pushing or pulling thereon both sets of carriages will simultaneously be moved either forward or backward, as may be desired.

One of the bars, G, that joins the two sets of carriages constitutes the means of supporting the elevator-leg H. This elevator-leg H consists, as far as its body is concerned, of two face or cheek pieces, *a a*, between which are hung the shafts of the upper and lower rollers, *b b*, around which are passed the endless chains *d d* that carry the buckets *e e*. The shafts *b b* have suitable notched or toothed disks for guiding and receiving the chains *d*, so that by imparting rotary motion to any one of these shafts the endless chains that carry the buckets will be revolved.

The two chains *d d* are joined by a net-work, *f*, of wire, or equivalent fabric, so that the contents of the fabric, especially when the buckets reach the upper curved portion of the elevator-leg, will not be dropped into the inner part of the leg, but will be retained on that net until the bucket is in position to be emptied into the receiving-chute I.

The buckets themselves are at their outer edges (I mean the edges that are lowest when the buckets dip into the hold of the boat A) made with projecting teeth *g*, that are clearly indicated in Fig. 3. By these teeth the matter to be lifted is more or less loosened by the progressing bucket, and the bucket is not liable to scrape the lower portion of the matter to be raised tight on the bottom of the boat, but will loosen it, and enable thereby the next bucket to take it up.

The elevator-leg H is slotted vertically or otherwise, as shown at *h* in Fig. 2, at the place where the shaft or rod G passes through it, so

that by virtue of this slot the whole leg can either be lifted or lowered at will. There being such a slot on each side, the elevator-leg can also be oscillated transversely and inclined in the lateral direction into any desired position. This enables the attendants to bring the lower part of the elevator-leg into contact laterally with any part of the boat or ground from which the substance is to be lifted.

Downwardly-projecting teeth *i* are attached to the lower end of the elevator-leg, on each side of its cheeks, which teeth are clearly shown in Fig. 2, and which serve, when the elevator-leg is lowered, to enter into the matter or material to be lifted, and prevent the coal or other material from injuring the buckets, whereas if there were no such teeth *i* the elevator-leg would not be lowered as far into the coal or other substance as it can when the teeth are provided.

In order to move the endless belt, a crank or set of cranks can be attached to either one of the shafts *b*, over which the chains *d* are passed, and rotary motion may be imparted to such shaft by manual labor; but I prefer to attach a small-power engine, *J*, which is indicated in Fig. 2, to the elevator-leg, between its cheeks *a*, and connect the piston-rod of said engine with the lower shaft of the endless belt or apron, so as to cause said engine to revolve said shaft, and thereby the chains and move the buckets. The engine, being rigidly attached to the elevator-leg, will always be in the proper relative position to the shaft to be driven, and may be connected to its boiler by elastic pipe, if desired. I prefer to have two such engines or steam-cylinders *J*, one on each cheek *a*, and so set that when the piston of one has finished its stroke that of the other will be near the middle of its stroke, thus avoiding any stoppage of the buckets by reason of a dead-center.

As a precaution against accident or stoppage of the apparatus in case one of the chains *d* should break, I attach the buckets *e* also to another set of chains, *l*, which also pass around the rollers or shafts *b*, but which in the ordinary operation of the apparatus are not used, but follow idly along the motion of the other chains; but if one of the chains *d* should break, or if they both should break, the chain *l* will take up the load and retain the buckets in the proper operative position and continue to hold the whole apparatus in operation, if desired.

To the outer and inner faces of the elevator-leg, where otherwise the buckets would be exposed to view, I fasten by means of hooks and eyes *m*, or by any other analogous means, covers or caps *L* and *M*, which are hollowed on their inner sides to allow the buckets to pass, and which protect the buckets against rain and snow, and also prevent the contents of the buckets from being lost by falling over the ends thereof. The inner cover, *M*, also serves the purpose of preventing the chains from sagging and the buckets with them, especially in

case the elevator-leg is placed into a more or less horizontal position. These caps also protect the engines that are placed between the cheeks of the elevator-leg from dirt, &c.

The chute *I*, into which the elevator discharges the lifted load, should be connected in suitable manner to the upper part of the elevator-leg, and reaches over the framing *B* to the place into which the load is to be deposited. If this load is to be discharged into the hold of a vessel, the chute should lead into telescopic tubes *N*, (indicated in Fig. 3,) so that the grain or coal can be by these telescopic tubes led into any part of the vessel, or between any suitable decks, without requiring adjustment or attention further than to properly adjust the length of the telescopic tubing and direct it into the necessary hatch.

In order to move the elevator-leg lengthwise—that is, parallel to the direction of the rails *C*—I connect the two ends of a chain or rope, *O*, with the framing *E*, and pass said rope around friction-rollers *n*, so that by revolving any one of these friction-rollers the entire framing *D E F G*, and with it the elevator-leg, will be moved toward the desired end of the frame *B*.

For moving the elevator-leg laterally—that is to say, on the supporting shaft or rod *G*—its two sides are connected with ropes or chains *P*, that pass over friction-rollers *o* and thence over winding-shafts *p*, so that by turning one of these shafts by a crank-handle the necessary lateral motion of the elevator-leg will be obtained.

For oscillating the elevator-leg longitudinally its lower part is connected to the ends of a rope, *R*, that passes over drums *r*, which hang in laterally-movable frames *S*. By revolving one of these drums *r* the fastened ends of the rope or chains *R* will be moved so as to swing the lower part of the elevator-leg in either direction desired.

For maintaining the elevator-leg properly balanced in either direction I fasten to it ropes or chains *T*, which pass over friction-rollers *s* that hang in a laterally-sliding frame, *U*, which is supported on the rod *F*, the ropes or chains *T* carrying weights *V* at their lower ends, as clearly shown in Fig. 2; but, in addition to these counterbalancing-weights *V*, springs *V*² can be applied to the elevator-leg above and below the shaft or rod *G*, as shown in Fig. 2.

It will be readily perceived from the foregoing description that the elevator-leg, if moved laterally on the rod *G*, would distort its connections, above described, with the laterally-adjustable frames *S* and *U*. Hence it is necessary to have these frames *S* and *U* join in any lateral motion of the elevator-leg. In Fig. 1 is clearly shown how this is done—namely, by passing ropes *W*, that extend from the ends of these laterally-sliding frames *S* and *U*, around the same drums or shafts *p* over which the ropes or chains *P* that control the lateral motion of the elevator-leg are passed, as already stated. Then, by turning either drum *p*, the

elevator-leg will be moved laterally, as stated; but to the same ratio said sliding frames or carriers S and U will also be moved laterally.

I claim—

- 5 1. In an elevator-leg, the combination of the elevator-chains *d d*, having buckets *e e*, with the reticulated filling *f* between said chains, substantially as described.
- 10 2. In an elevator having an endless belt or carrier with buckets thereon, the buckets made with projecting teeth *g*, substantially as herein shown and described.
- 15 3. The elevator-leg made with upright slots *h*, through which passes the suspending-bar *G* of the supporting-frame, substantially as and for the purpose specified.
4. The vertically-adjustable elevator-leg made with downwardly-projecting teeth *i*, substantially as herein shown and described.
- 20 5. In an elevator, the combination of the elevator-leg with one or more engines, *J*, rigidly attached thereto, substantially as specified.
- 25 6. In an elevator, the combination of the elevator-leg with the chains *d*, carrying the buckets, and with additional chains, *l*, that pass around the shafts of the elevator-leg and are united to the buckets, substantially as and for the purpose described.
- 30 7. The combination of the elevator-leg with the removable caps or covers *L M*, substantially as specified.
8. The combination of the elevator-leg with the longitudinally-movable carriage *D E F G*,

and with the rope or chain *O* passing over the rollers *n*, substantially as and for the purpose described. 35

9. The combination of the elevator-leg with the shaft or supporting-bar *G*, and with the chains or ropes *P*, friction-rollers *o*, and winding-shafts *p*, substantially as described. 40

10. The combination of the elevator-leg with the rope or chain *R*, having its ends fastened thereto, and with the drums *r*, around which said rope or chain passes, substantially as described. 45

11. The combination of the elevator-leg with the ropes or chains *R*, having their ends fastened to it, and with the drums *r* and laterally-sliding frames *S*, substantially as specified. 50

12. The adjustable elevator-leg, combined with the balancing weight or weights *V* and laterally-movable framing *U*, substantially as described. 55

13. The elevator-leg, combined with the balancing-springs *V*², above and below its supporting-shaft *G*, substantially as specified. 60

14. The combination of the movable elevator-leg with the laterally-movable frames *S* and *U*, and with the ropes *P W* and winding-drums *p*, all for operation substantially as specified. 65

ALFRED D. FOX.

Witnesses:

WILLY G. E. SCHULTZ,
JAMES TURK.