(No Model.) 2 Sheets—Sheet 1.

R. W. ERICSON.

COUNTERBALANCE FOR THE DISCHARGE APPARATUS FOR COAL OR ORE BINS.

No. 485,789. Patented Nov. 8, 1892.

Fig. 1.

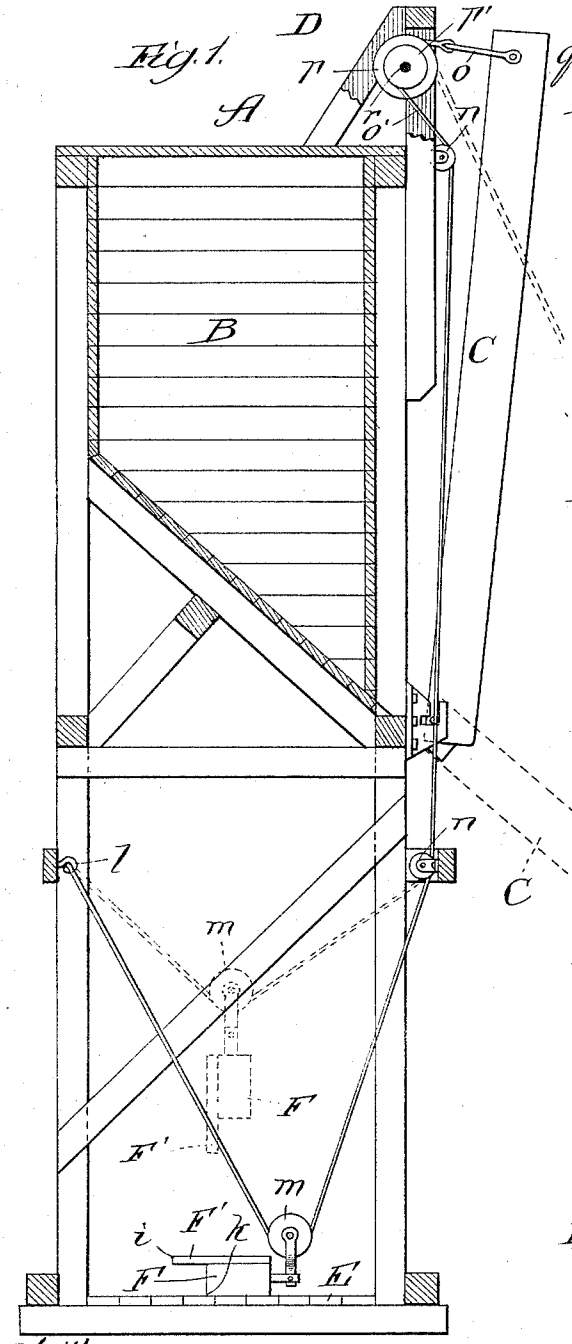
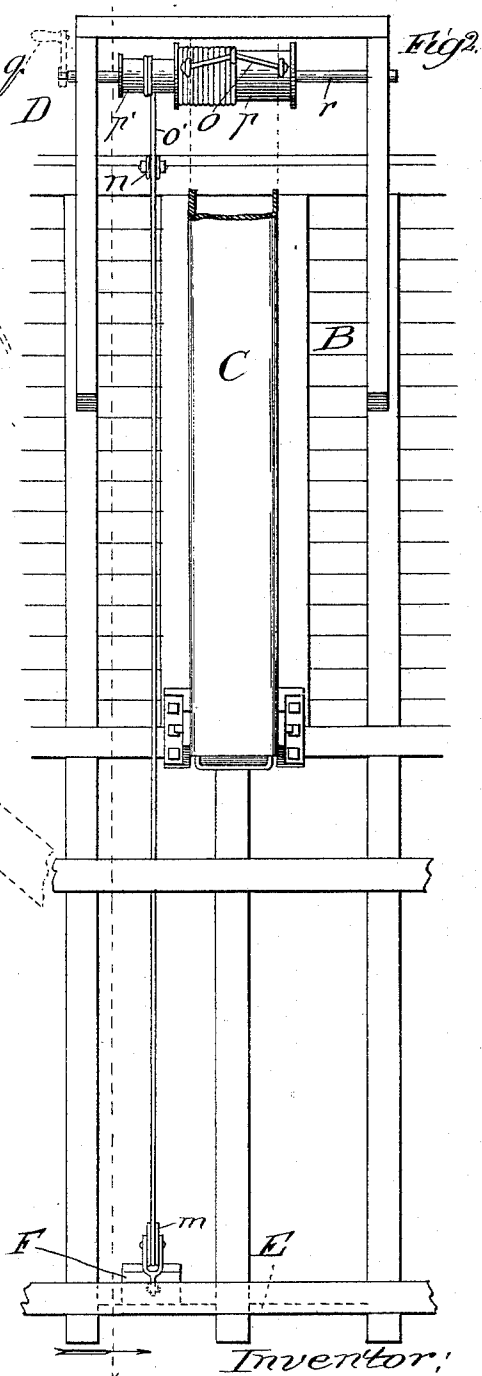


Fig. 2.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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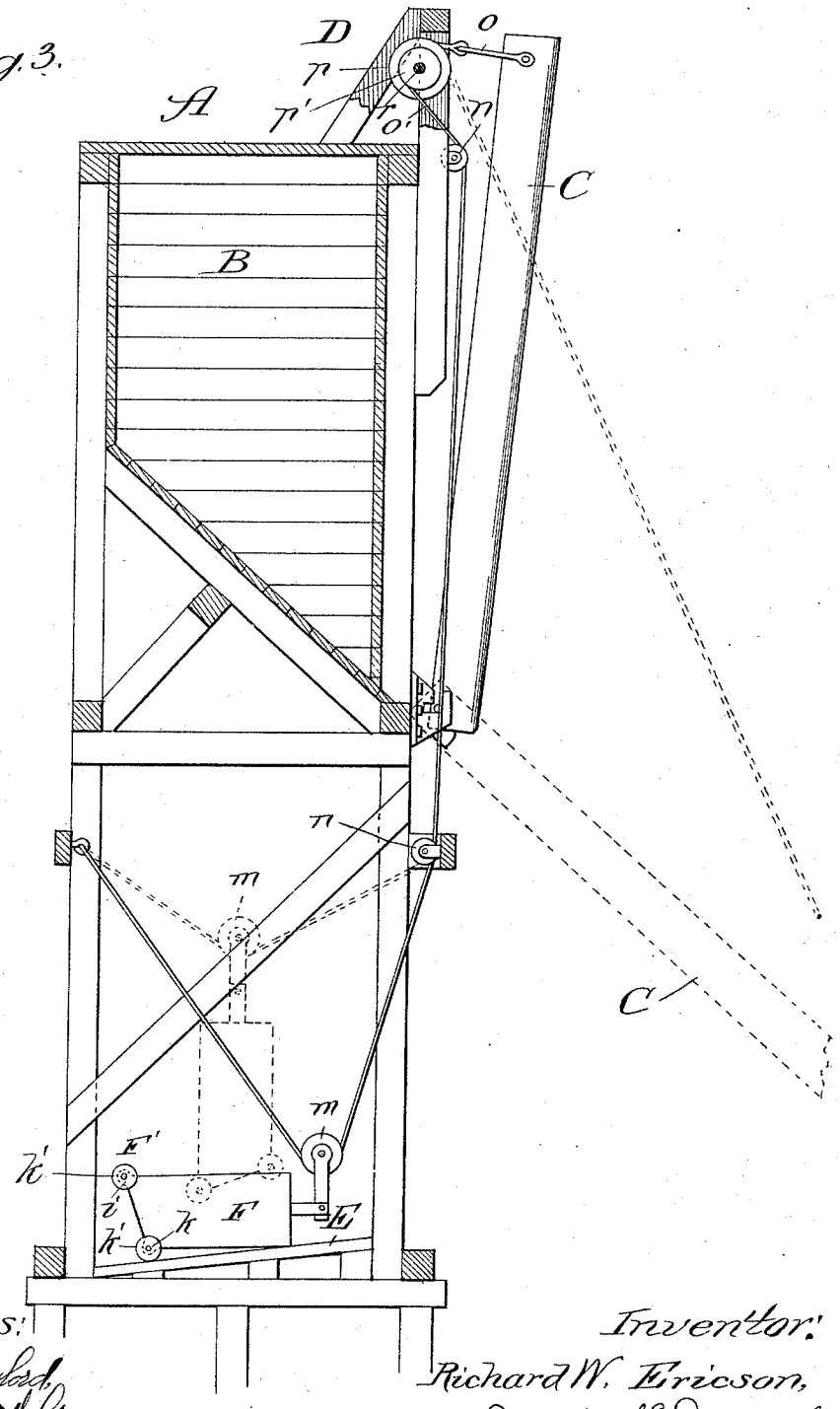
Fig. 3.



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UNITED STATES PATENT OFFICE.

RICHARD W. ERICSON, OF AURORA, ASSIGNOR TO THE PETTIBONE-MULLIKEN & COMPANY, OF CHICAGO, ILLINOIS.

COUNTERBALANCE FOR THE DISCHARGE APPARATUS FOR COAL OR ORE BINS.

SPECIFICATION forming part of Letters Patent No. 485,789, dated November 8, 1892.

Application filed September 2, 1892. Serial No. 444,875. (No model.)

To all whom it may concern:

Be it known that I, RICHARD W. ERICSON, a citizen of the United States, residing at Aurora, in the county of Kane and State of Illinois, have invented a new and useful Improvement in a Counterbalance for the Discharge Apparatus for Coal or Ore Bins, of which the following is a specification.

My invention is in the nature of an improvement on the chute-counterbalancing means shown and described in Letters Patent of the United States No. 412,374, dated October 8, 1889, and No. 435,356, dated August 26, 1890.

My present improvement involves two additional ways of applying the principle of operation of the counterbalance in each of the aforesaid patents—namely, that of affording a resistance to the downward movement of the chute on its pivot varied according to variation in the gravity of the chute by the chute, which is connected from near its free end with the weight lowering and raising the weight through a defined arc.

The generic peculiarity in my improvement consists in the counterbalancing-weight being supported on a sustaining-base to be raised and lowered by the fall and rise of the pivotal chute from one end upon its opposite end, which thus affords a fulcrum and which is formed to produce a shifting fulcrum, whereby the leverage of the weight is increased with the descent of the chute and decreased by its rise, and the weight bears at its fulcrum on the supporting-base till the chute reaches or approaches nearly to its lowest (and therefore heaviest) position, wherein it has raised the weight completely from the supporting-base thereof and holds it by the connecting-cable suspended to exert the greatest resistance in opposition to that of the chute.

My improvement is illustrated in the accompanying drawings, in which—

Figure 1 is a view in cross-section of an ore-dock having a pivotal chute provided with my improved counterbalance. Fig. 2 is a view of the same in front elevation. Fig. 3 is a view like that presented in Fig. 1, but showing a modified construction of my improved counterbalance.

The bin B of the dock A, the pivotal chute C, and the hoisting means D, comprising a rotary shaft r, supported above the bin to be actuated by hand from a crank q, as shown, or by other means requiring different motive power and carrying the drum p, connected by a chain o or the like with the chute near its free end and a cable or rope o' or the like for the weight secured at one end to a drum p' on the shaft r to be wound thereon in controlling the weight in a direction opposite that of winding the chain o may all be of known or any suitable construction and need not therefore be herein described in detail. Below the bin is the supporting-track or platform E for the counterbalancing-weight F. In Fig. 1 the weight is represented as a rectangular block resting normally flat upon a horizontal base E and provided with a rear extension F′ from its upper side, being connected from its forward end with the chute C through the medium of the cable o', which passes from the drum p' over suitable guides n under a pulley m on the weight and to a fastening-point l at the rear of the dock or at any other suitable location. In Fig. 3 the base E is inclined from the horizontal, and the weight F, which is connected with the chute, as represented in Fig. 1, differs from the weight shown in that figure by having the rear extension F′ formed by a rearward and upward bevel, extending from (or from near) the base to the top of the rear end, where the weight is provided at the opposite extremities k and i of its beveled end with rollers k'. The showing in Fig. 2 may apply to the construction presented in either of the other views.

The operation is as follows: As the chute (with reference to Fig. 1) is lowered from its raised position or position of least resistance, wherein the weight F rests flat upon its supporting-base, the cable o' is wound upon the drum p' in the direction to shorten it, and thereby raise the weight on its rear lower edge k, then forming its fulcrum, from which its leverage is exerted on the chute through the intermediate connections therewith. As the descent of the chute and its resistance accordingly increases, the weight assumes the position of bearing at the end i of its extension F′, which then affords the fulcrum from

which the leverage of the weight is exerted and increased accordingly, and as the chute reaches its lowest position the weight is raised entirely from its track or platform E, and thereby suspended entirely on the cable o', as represented by the dotted lines, in which position it brings the greatest resistance to bear against that of the chute. As the chute is raised the relative conditions of the weight are obviously reversed.

With reference to Fig. 3 the operation is practically the same as that already described, though it will be noticed that the incline or "bend" from the horizontal in the track or platform E the more gradually in lowering the chute increases the resistance of the weight exerted first from its fulcrum k and then from its fulcrum i, and in raising the chute decreases the resistance thereof then exerted from its fulcrum i and afterward from its fulcrum k.

With either of the described constructions it will be apparent that the counterbalancing-weight in being raised and lowered on its support E is moved through a defined arc, and that while being moved on its said support its fulcrum is shifted to vary the leverage and accordingly its degree of resistance, with corresponding variation in the resistance of the chute.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the pivotal chute and hoisting mechanism therefor, of a coal or ore bin, a support E below the bin, a weight F, normally resting on the support and having at one end the fulcrums k and i, and a cable o', fastened at opposite ends, respectively, behind the chute, as at l, and to the hoisting mechanism and connected with the weight at the end thereof opposite its said fulcrums, substantially as and for the purpose set forth.

2. The combination, with the pivotal chute and hoisting mechanism therefor, of a coal or ore bin, a support E below the bin, a weight F, normally resting on the support and having at one end an extension F′, affording fulcrums i and k, and a cable o', fastened at opposite ends, respectively, behind the chute, as at l, and to the hoisting mechanism and connected with the weight at the end thereof opposite its said extension, substantially as and for the purpose set forth.

3. The combination, with the pivotal chute and hoisting mechanism therefor, of a coal or ore bin, an inclined support E below the bin, a weight F, normally resting on the support and having at one end an extension F′, affording fulcrums i and k, and a cable o', fastened at opposite ends, respectively, behind the chute, as at l, and to the hoisting mechanism and connected with the weight at the end thereof opposite its said extension, substantially as and for the purpose set forth.

4. The combination, with the pivotal chute and hoisting mechanism therefor, of a coal or ore bin, an inclined support E below the bin, a weight F, normally resting on the support and having at one end an extension F′, affording fulcrums i and k, rollers k' at the said fulcrums, and a cable o', fastened at opposite ends, respectively, behind the chute, as at l, and to the hoisting mechanism and connected with the weight at the end thereof opposite its said extension, substantially as and for the purpose set forth.

5. The combination, with the pivotal chute and hoisting mechanism therefor, of a coal or ore bin, an inclined support E below the bin, a weight F′, normally resting on the support and carrying at one end a pulley m and beveled at its opposite end, the bevel forming an extension F′, affording fulcrums i and k, rollers k' at the said fulcrums, and a cable o', fastened at opposite ends, respectively, behind the chute, as at l, and to the hoisting mechanism and passing between its ends under the pulley m, the whole being constructed and arranged to operate substantially as and for the purpose set forth.

RICHARD W. ERICSON.

In presence of—
W. H. DEPUNG,
L. J. LINDQUIST.