

(No Model.)

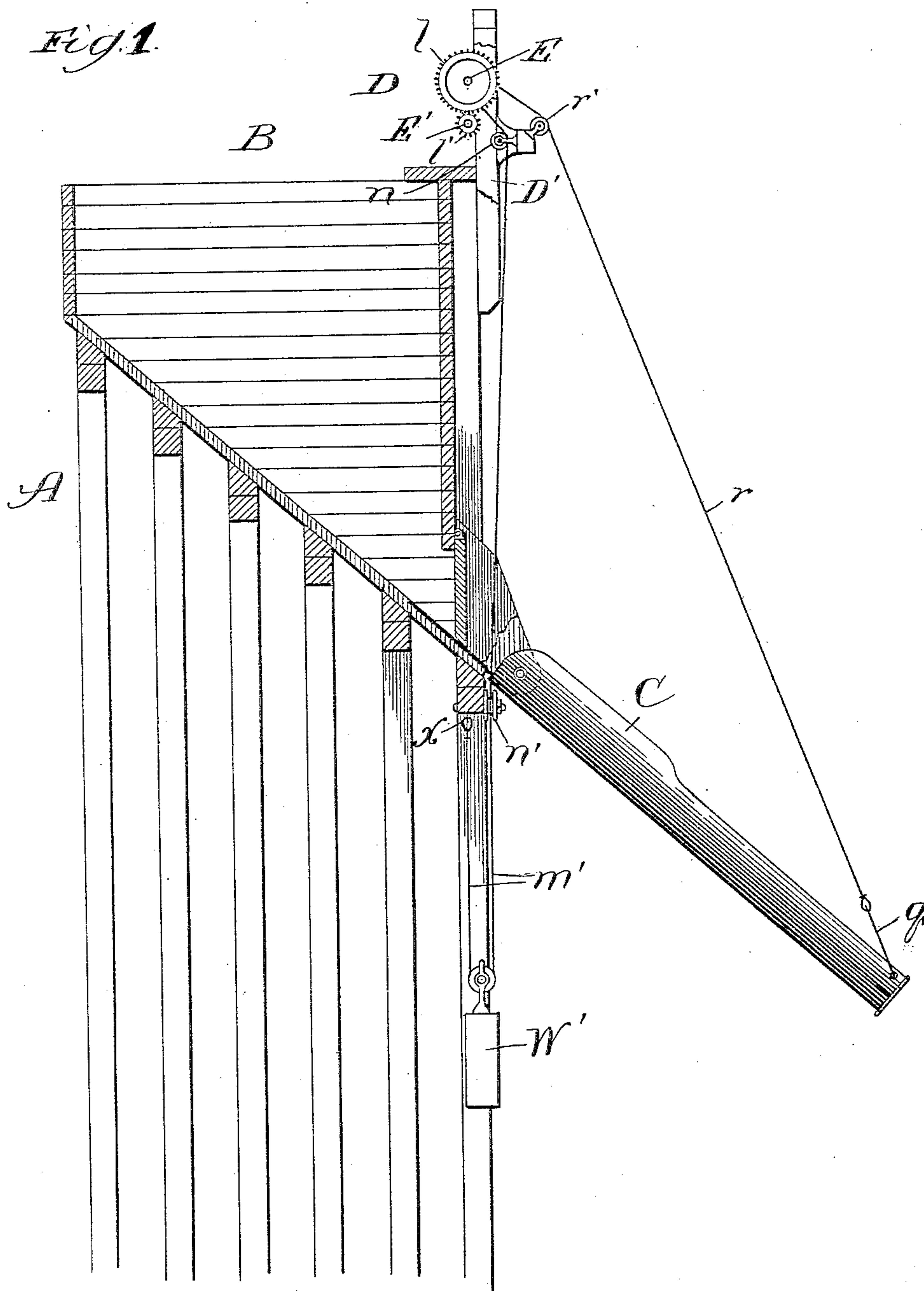
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R. W. ERICSON.

DISCHARGE APPARATUS FOR COAL OR ORE DOCKS.

No. 504,674.

Patented Sept. 5, 1893



Witnesses:  
*E. C. Gaylord*  
*E. R. Shipley*

Inventor:  
*Richard W. Ericson*  
*By Dyrenforth and Dyrenforth*  
*Attorneys*

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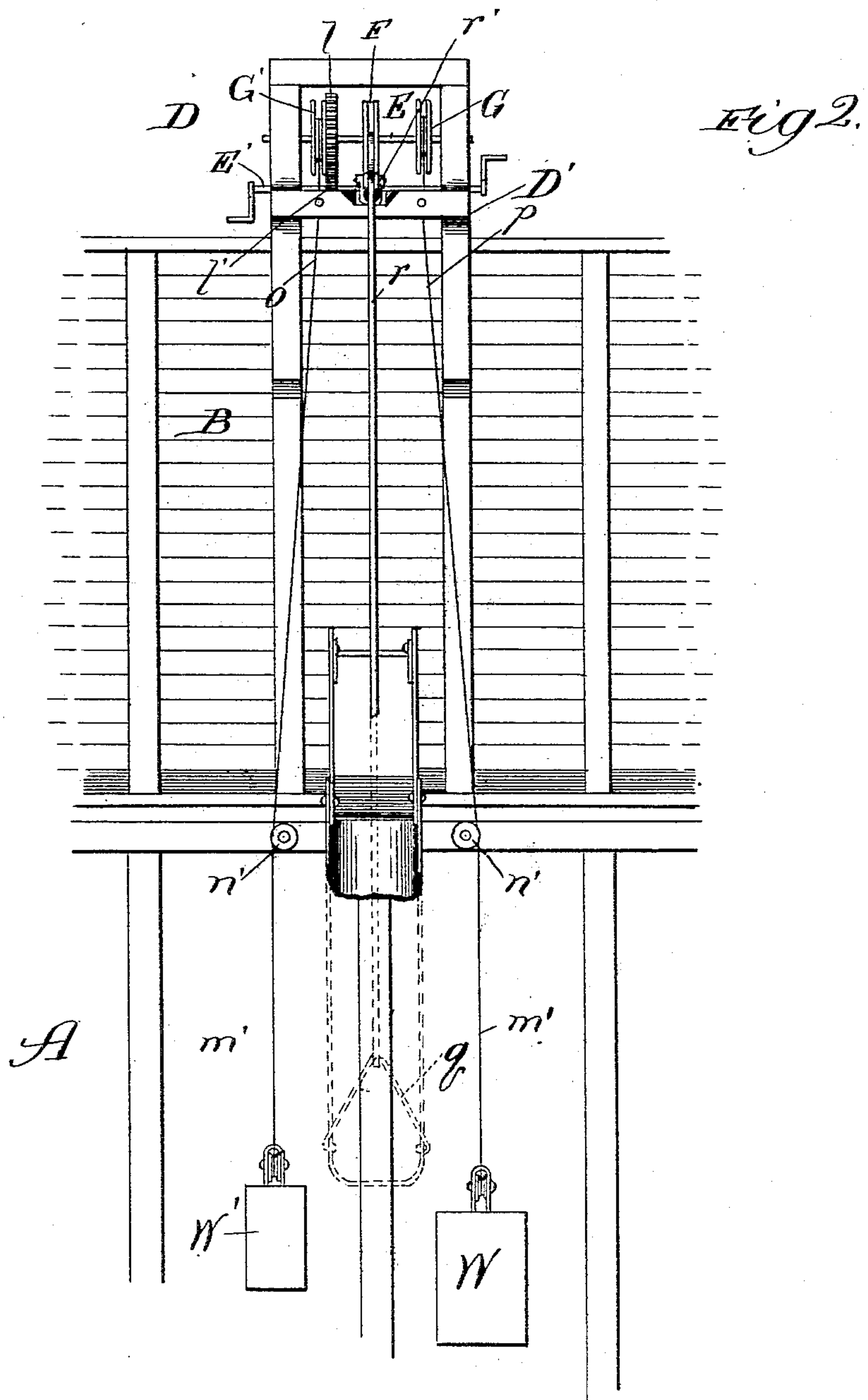
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E. R. Shipley.

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Richard W. Ericson,  
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# UNITED STATES PATENT OFFICE

RICHARD W. ERICSON, OF AURORA, ILLINOIS.

## DISCHARGE APPARATUS FOR COAL OR ORE DOCKS.

SPECIFICATION forming part of Letters Patent No. 504,674, dated September 5, 1893.

Application filed May 12, 1893. Serial No. 474,006. (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 Discharge Apparatus for Coal or Ore Docks, of which the following is a specification.

My invention relates, particularly, to an improvement in the counterbalancing mechanism for the chute through which the contents of a bin on the dock are loaded therefrom, as into a boat.

It is usual to provide each bin of a dock in the class to which my invention relates, with an ore chute, pivotally supported at its inner end near the discharge opening in the bin; and to provide hoisting mechanism for raising and lowering the chute on its pivot under the control of a counterbalance to facilitate the operation of the hoist. The chute is a very ponderous object, which, obviously, varies in resistance to the mechanism for operating it in its rise and fall, presenting the least resistance when raised, since then it is mainly supported on its pivot, and also when lowered, in which position it is mainly supported by suspension on its pivot; whereas it offers the greatest resistance when in the horizontal position, toward which the resistance necessarily increases in the ascent, while it decreases after passing the horizontal position.

The object of my improvement is to provide simple and efficacious counterbalancing and hoisting mechanism for the chute, by means of which the counterbalancing effect shall vary in proportion, or approximately in the proportion of the variation in the resistance of the chute.

To this end my invention consists in the general construction of my improved mechanism; and it also consists in details of construction and combinations of parts.

Referring to the accompanying drawings—Figure 1 is a view in sectional side elevation of the dock provided with my improvement; and Fig. 2 is a view of the same in front elevation.

A is the dock, of which B is a bin, having a chute C, of usual or any suitable construction, pivotally supported on one end at the bin-discharge opening, in a manner to adapt

it to be raised and lowered through a vertical arc on its pivot from a hoist D under the control of the counterbalance.

My improved hoist involves a frame D' extending above the bin and supporting a rotary shaft E carrying peripherally-grooved drums F, G and G', the last two preferably flanking the drum F, which should be centrally located on the shaft. A cable, chain, or the like, *r*, connects the drum F, (the peripheral groove in which should be only wide enough to accommodate the width of the connection *r*,) with the chute near its outer end, preferably at a bail *q*; and the connecting medium is shown as passing over a suitably located guide pulley *r'*. Cables, chains, or the like, *p* and *o* are fastened, each at one end, respectively to the drums G and G' in a manner to be wound thereon in the grooves, while the connecting medium *r* is being unwound from the groove of the drum F. From the drums G and G', the connections *p* and *o* depend, passing suitably located guide pulleys *n'*, and being fastened at their lower ends to a stable part of the dock, as at *x*, in a manner to produce the loops *m'*, in which are suspended weights W and W'. The cable, or the like, *p*, is longer than the one *o*; and the weights thereon may be differential, that on the cable *p* being the heavier.

The operation is as follows: For working the hoist I show a crank shaft E', carrying a pinion *l'* meshing with a gear wheel *l* on the shaft E. To raise the chute from the lowered position, in which it is illustrated, the shaft E is turned in a direction to wind the cable *r* on the drum F and unwind the cables *p* and *o* from the drums G and G', whereby the weights W and W' descend in opposition to the rise of the chute. The winding upon the drum F and unwinding from the drum G continue until the chute has been fully raised; but the cable *o* is fully unwound from the drum G' when the chute has somewhat passed its horizontal position, or position of greatest resistance. Then, by continuing the rotation in the same direction of the shaft E, the cable *o* will wind upon the drum G' in the direction to raise the weight W' with the chute, thereby reducing the opposing gravity to the latter in the proportion, or about the proportion, to the decreasing resistance of the chute



in its rise from the horizontal position. In lowering the chute, the same counterbalancing effect is exerted upon it. That is to say, as the cable  $r$  is unwound from the drum F by properly turning the shaft E, the cables  $p$  and  $o$  respectively wind upon and unwind from the drums G and G', the winding of the cable  $p$  continuing throughout the descent of the chute, while the length of the cable  $o$  permits it to unwind from its drum only till the chute has nearly reached its horizontal position, when it begins to wind thereon, correspondingly with the winding of the cable  $p$  on its drum, to raise the weight W' with the weight W in opposition to the falling chute.

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

1. In a coal, ore, or the like, dock, the combination with a pivotal chute at a bin, of a hoist having a rotary shaft, a connection  $r$  between said shaft and the chute near its outer end, weights, and flexible suspending mediums  $m'$ ,  $m'$ , of differential lengths, suspending the weights from the shaft and relatively proportioned to cause, by the continuous rotation of the shaft in either direction, the one weight to rise or fall in opposition to and throughout the movement of the chute, and

the other to move correspondingly with the chute throughout part of its movement, but in opposition thereto when near and passing its horizontal position, substantially as and for the purpose set forth.

2. In a coal, ore, or the like, dock, the combination with a pivotal chute, at a bin, of a hoist having a rotary shaft carrying drums F, G and G', a connection  $r$ , connecting the drum G with the chute near its outer end, and weights suspended from the drums G and G' by cables  $p$  and  $o$ , of differential lengths, substantially as and for the purpose set forth.

3. In a coal, ore, or the like, dock, the combination with a pivotal chute, at a bin, of a hoist D having a rotary shaft E carrying drums F, G and G', a connection  $r$ , connecting the drum G with the chute near its outer end, and differential weights W and W' suspended by cables  $p$  and  $o$ , of differential lengths, respectively from the drums G and G', substantially as and for the purpose set forth.

RICHARD W. ERICSON.

In presence of—  
F. W. PAGEL,  
F. H. FALK.