

(No Model.)

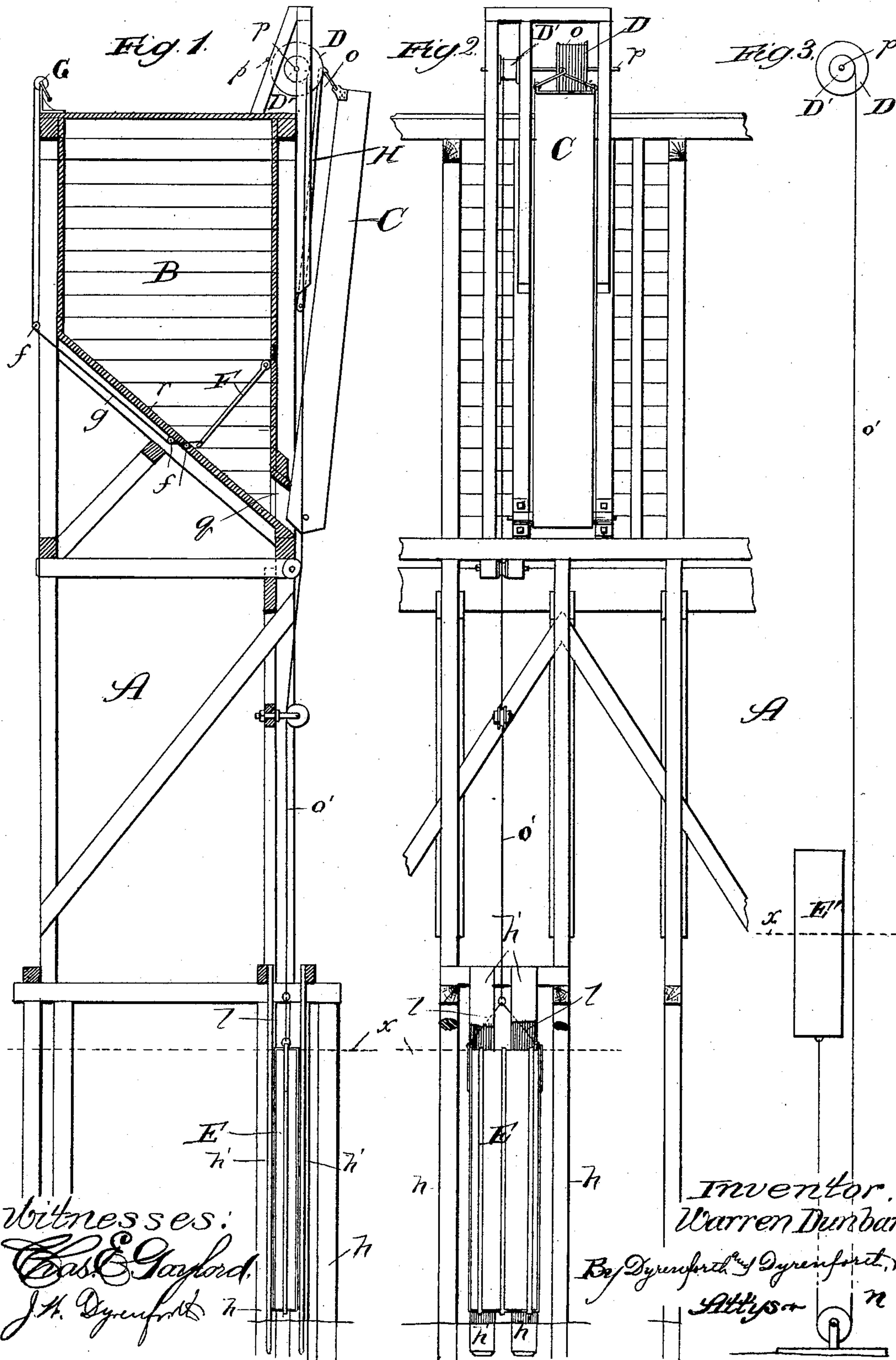
2 Sheets—Sheet 1.

W. DUNBAR.

DISCHARGE APPARATUS FOR COAL OR ORE BINS.

No. 407,432.

Patented July 23, 1889.



(No Model.)

2 Sheets—Sheet 2.

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Fig. 4.

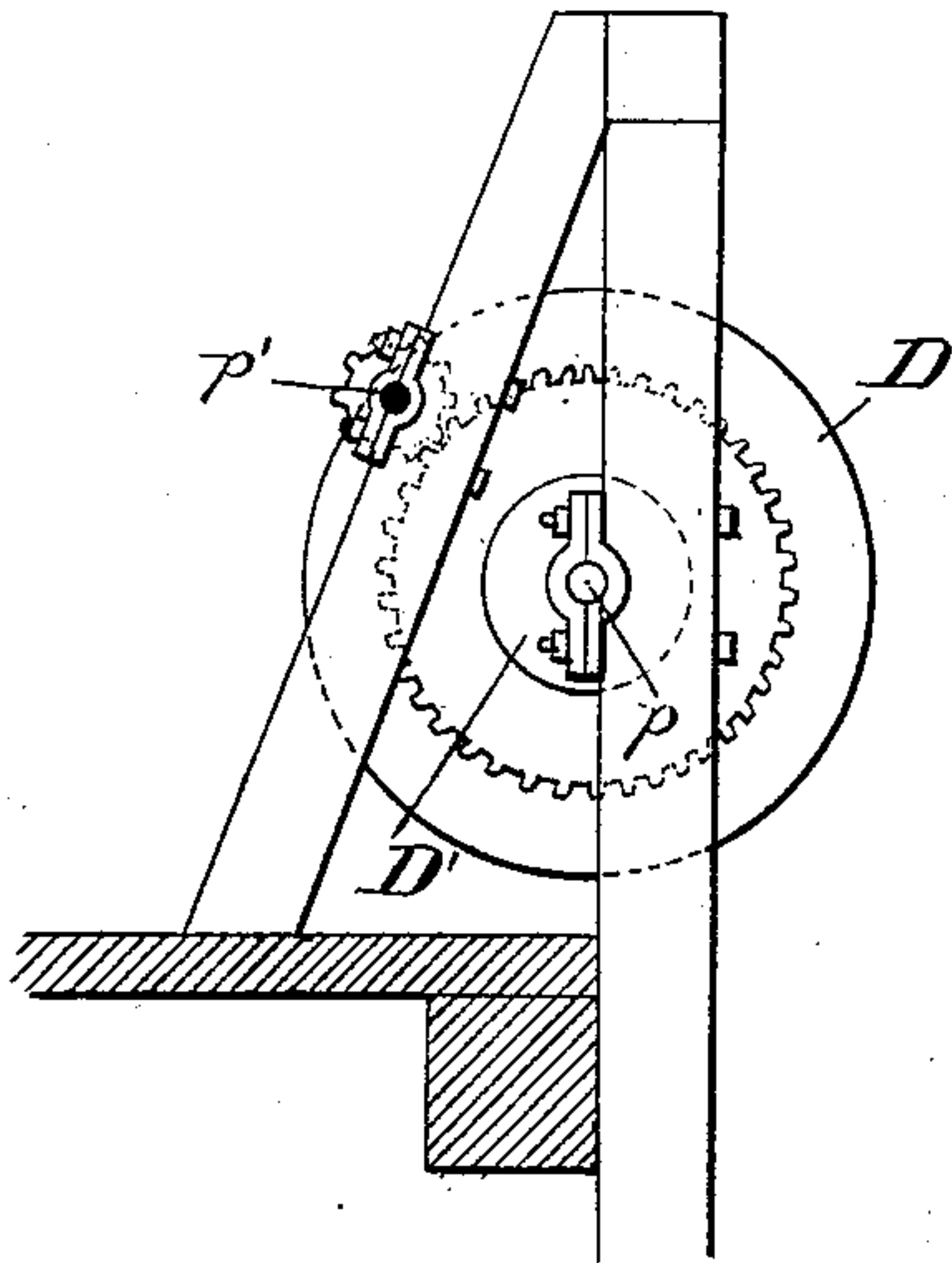


Fig. 5.

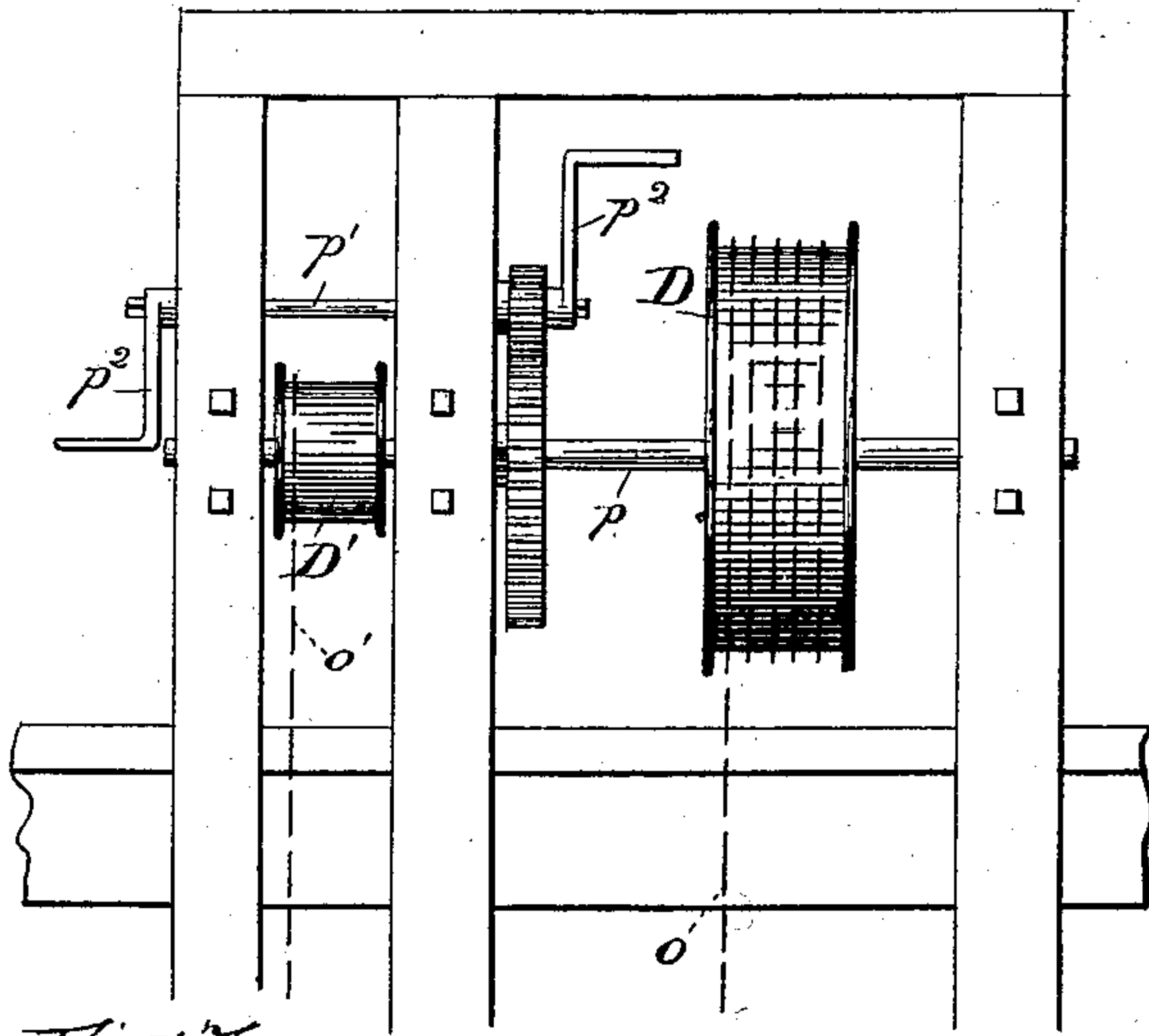


Fig. 6.

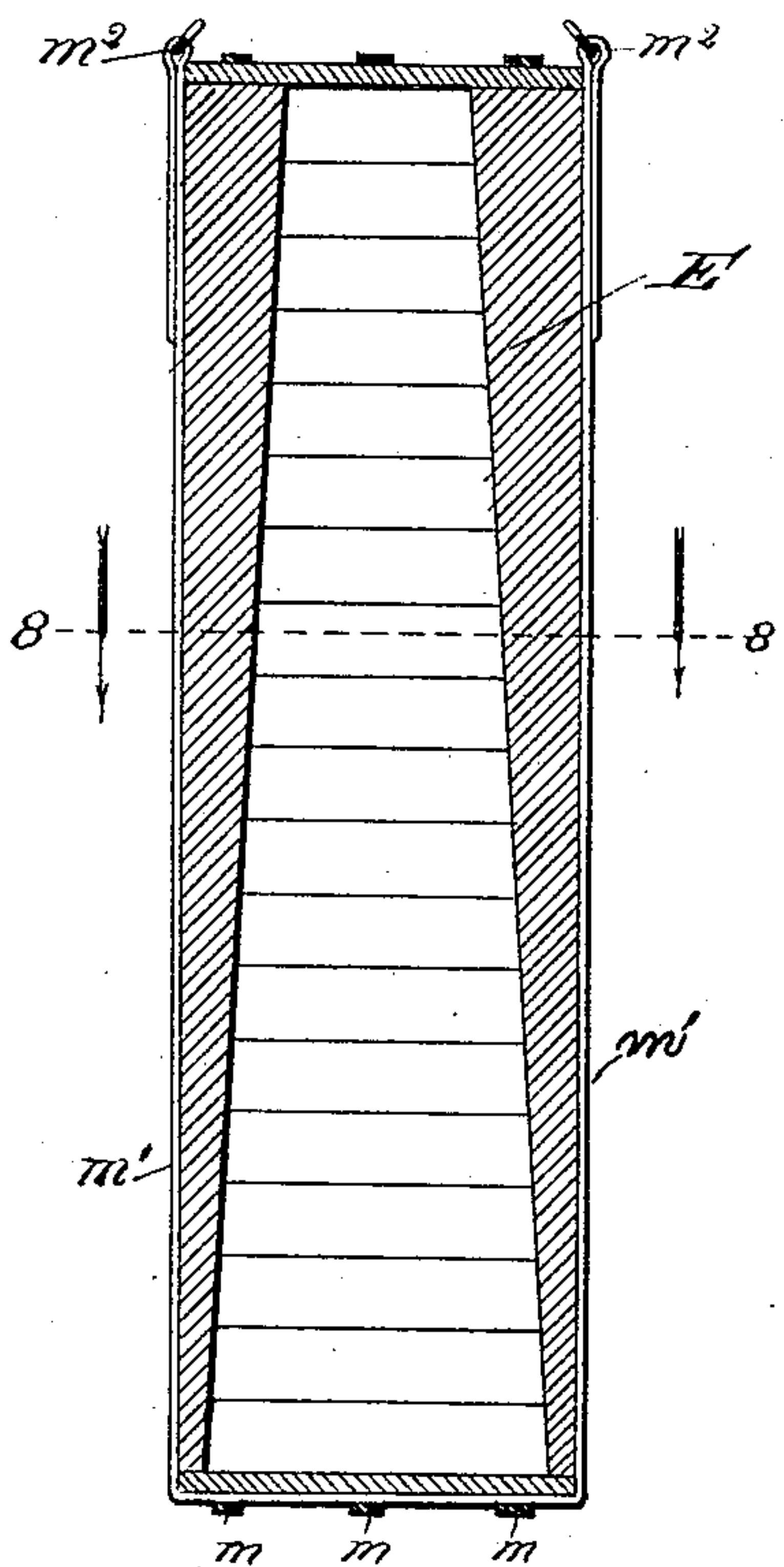


Fig. 7.

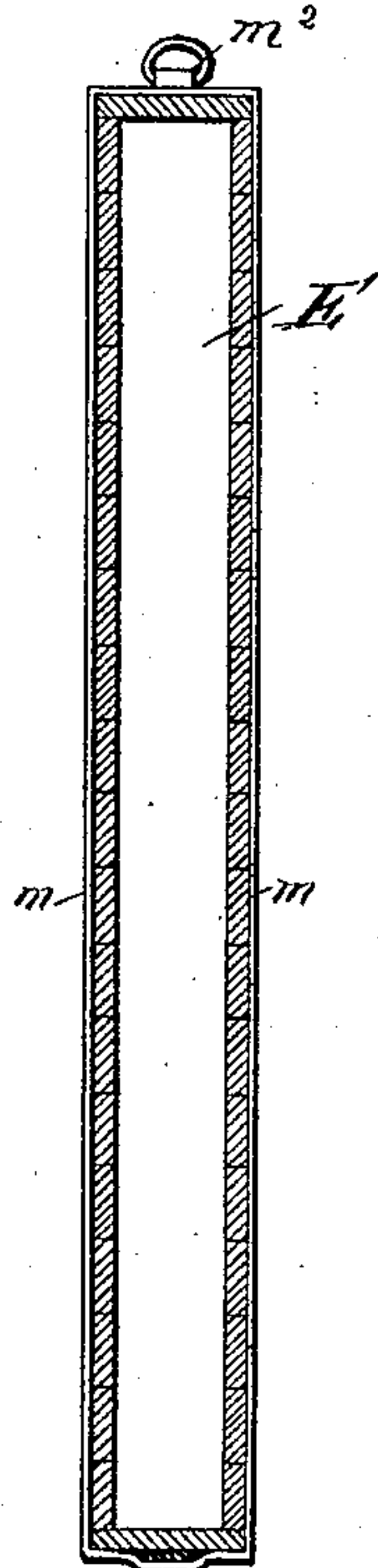
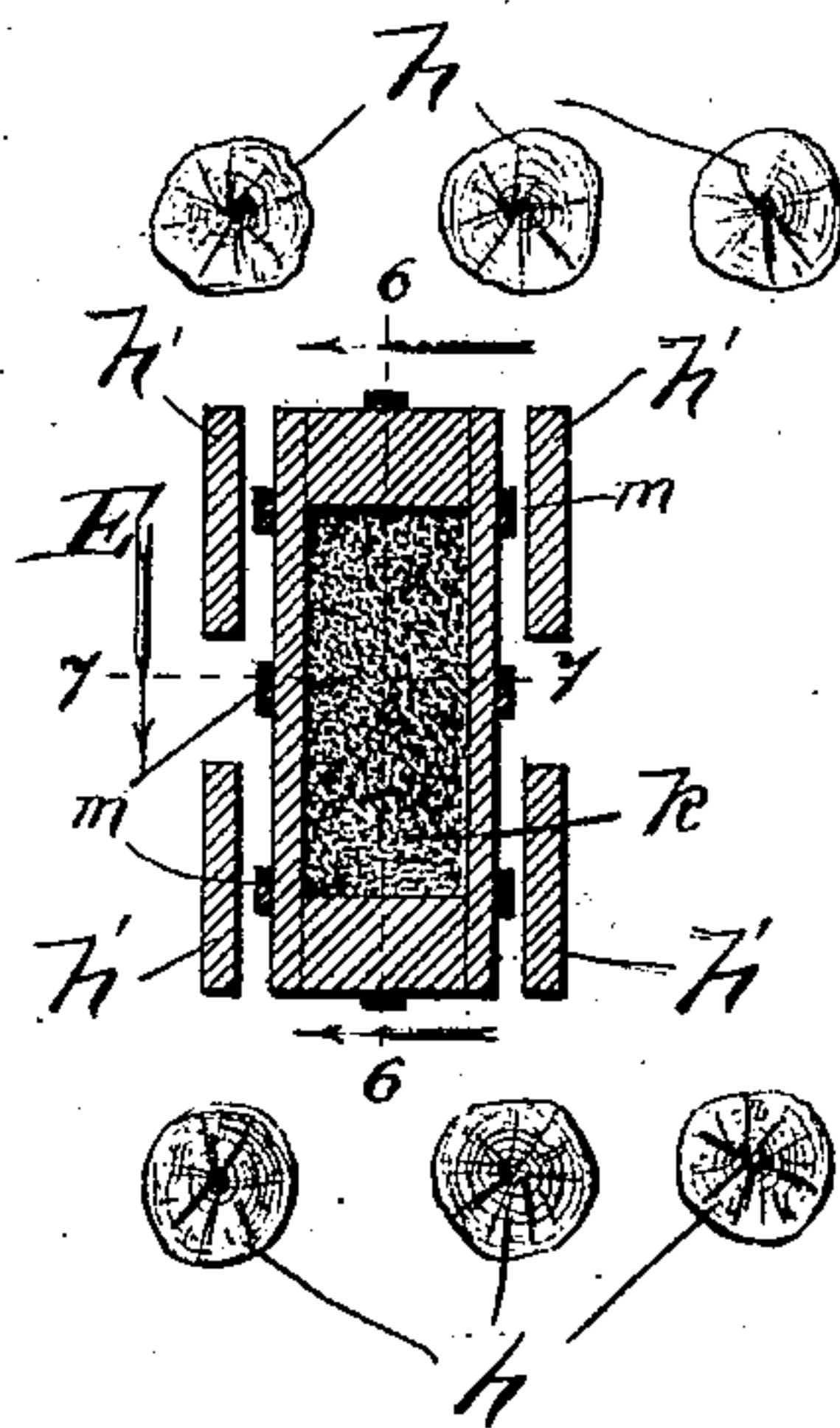


Fig. 8.



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UNITED STATES PATENT OFFICE.

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DISCHARGE APPARATUS FOR COAL OR ORE BINS.

SPECIFICATION forming part of Letters Patent No. 407,432, dated July 23, 1889.

Application filed April 4, 1889. Serial No. 305,928. (No model.)

To all whom it may concern:

Be it known that I, WARREN DUNBAR, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented a new and useful Improvement in Discharge Apparatus for Coal and Ore Bins, of which the following is a specification.

My invention relates to an improvement in the class of apparatus employed at docks for the purpose of transferring the contents (coal, ore, or the like) of bins provided thereon to ships; and it relates, more particularly, to means for automatically counterbalancing the pivotal chute or spout of such an apparatus in any position it assumes in adjustment from its lowermost inclined or operative position to its raised position, or vice versa, whereby the operations of lowering and raising it will not have to be performed against the weight of the chute.

The primary object of my improvement is to provide simple and effective means for producing the desired counterbalancing of the chute in the various positions it assumes when adjusted and while being adjusted, employing to that end water as the medium for increasing and decreasing, according to the increase and decrease of the resistance of the pivotal chute, the gravity of a counter-weight or body controlling it by immersing the counter-weight or body to different depths in the water.

In the accompanying drawings, Figure 1 is a view showing my improved apparatus in sectional side elevation; Fig. 2, a broken front elevation of the same; Fig. 3, a diagram or skeleton view illustrating another construction; Fig. 4, a broken sectional view showing the winding mechanism in side elevation; Fig. 5, a similar view showing the same in front elevation; Fig. 6, a view in sectional elevation of the counter-weight, showing the construction thereof I prefer to employ, the section being taken on the line 6 6 of Fig. 8, and viewed in the direction of the arrows; Fig. 7, a similar view of the same, taken on the line 7 7 of Fig. 8; and Fig. 8, a section taken on the line 8 8 of Fig. 6, and viewed in the direction of the arrows.

A is the dock supporting the common or any suitable form of bin B, provided in any

desired number, and each having the usual opening in its top through which to dump into it the material, a bottom *r*, slanting toward the discharge-opening *q*, and a chute C, pivotally supported near one end at the discharge-opening, and thereby adapted to be raised on its pivotal support to the position illustrated, wherein it is out of the way when not in use and lowered to its downward inclined operative position, the means I provide for controlling the raising and lowering operations being a drum D on a rotatory shaft *p*, supported in suitable position on the dock and geared to a counter-shaft *p'*, provided with winches *p''*, and a cable *o* connecting the chute or spout C from near its outer or free end with the drum D.

In the raised position in which the chute is illustrated it presents the least resistance to being held in that position, and in being raised to that position from the operative or downwardly-inclined position referred to, its resistance constantly decreases, while in being lowered from its raised to its operative position its gravity constantly increases. My object being so to overcome the gravity and resistance of the chute that for raising and lowering it will require the exertion of a power sufficient merely to guide and move it, renders it necessary that it be counterbalanced in each of the positions assumed in describing the arc traversed by it during its adjustment; and the counterbalancing medium must be such as will decrease in its resistance in proportion to the decrease of resistance of the rising chute, and increase therein as the gravity of the falling chute increases. Accordingly I employ, as the preferred means, a weighted body E, connected by a cable *o'*, passing over guide-pulleys suitably located, as shown in Figs. 1 and 2, with a drum D' on the shaft *p*, and which drum should be of smaller diameter than the drum D, and suitably proportioned with reference to the latter and to the gravity of the weight, which gravity is such that when the weight is immersed to a certain depth in water (as the body of water to which the dock is adjacent) or raised just out of the water, it will counterbalance the chute when in its lowest position, and whereby when the chute is being raised to its "out-of-the-way" position the weight will thereby be

lowered in or into the water to a gradually-increasing depth, the increase in which lessens the gravity of the weight in proportion to the decrease in the resistance of the chute. The construction whereby this result is effected to attain the proper relative diameters of the drums D and D' and gravity of the weight E, which are determined by test, is illustrated in Figs. 1 and 2. The same object may, however, be accomplished by the arrangement indicated in Fig. 3, which I intend to be included as within the spirit of my invention, and in which E' is a float—such as an air-tight hollow box—connected with the drum D' by a cable o' passed around a pulley n, secured in proper position below the surface of the water, the line of which is indicated by the dotted line x for each construction. As the chute C is lowered, whereby it sinks the float-body E' deeper and deeper in the water, the resistance of the latter to the immersion of the float increases as the gravity of the chute increases; and, conversely, as the resistance of the chute decreases in being raised, whereby the float is permitted to ascend, the resistance to the latter also decreases. The preferred arrangement, however, is that shown in Figs. 1 and 2, in which I employ a weighted body E, comprising an oblong rectangular box, formed, preferably, of wood, inclosed on all sides and strengthened by means of metal straps m and m', the latter terminating near the upper end of the box in eyes m², having secured to them a cable l, to which the cable o' is fastened. The box E may be weighted by filling it to the required extent with sand k, iron ore, or the like; and to avoid top-heaviness of the weighted box when immersed, it should flare internally from or from near its upper toward its lower end, as illustrated. Guiding means for the box may be provided in the water in the form of guides h', protected by piles h, driven in proper positions.

The flow of material out of the bin into the chute may be rendered controllable by means of a rake F hinged to the front inner side of the bin above its discharge-opening, the normal position of which rake is hanging vertically against the side of the bin, and from which it may be swung by means of a cable g passing over rollers f to a windlass G, in readily-accessible position on top of the bin, to extend, as shown, across the discharge-opening q. I also provide a boom H, hinged at one end to the front side of the bin and extending therefrom against the cable o, to be moved up or down on its hinge by the raising and lowering of the chute, and thereby tend to ease the strain on the cable.

The term "cable" employed in the foregoing description and in the appended claims is intended to include, as an equivalent, a chain or analogous medium serving the purpose of a cable.

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

1. In a discharge apparatus for coal and ore bins, the combination, with the dock A, having a bin B, a pivotal chute C, and means for raising and lowering the latter, of means for counterbalancing the chute, comprising a body in water and connected with the chute and adapted to be raised and lowered in the water by the adjustment of the chute, thereby automatically proportioning to each other the varying degrees of resistance of the said chute and body, substantially as described. 70

2. In a discharge apparatus for coal and ore bins, the combination, with the dock A, having a bin B, the pivotal chute C, and means for raising and lowering the latter, of means for counterbalancing the chute, comprising a weight E in water and connected with the chute and adapted to be raised and lowered in the water by the lowering and raising of the chute, thereby automatically proportioning to each other the varying degrees of resistance of the said chute and weight, substantially as described. 80

3. In a discharge apparatus for coal and ore bins, the combination, with the dock A, having a bin B, the pivotal chute C, and means for raising and lowering the latter, of means for counterbalancing the chute, comprising an oblong rectangular box flaring internally from near its upper toward its lower end and containing sand or the like, the box being connected with the chute and adapted to be raised and lowered in water by the lowering and raising of the chute, thereby automatically proportioning to each other the varying degrees of resistance of the said chute and weighted box, substantially as described. 90

4. In a discharge apparatus for coal and ore bins, the combination, with the dock A, having a bin B, and the pivotal chute C, of a shaft p, supporting drums D and D', a cable o, connecting the chute with the drum, means for rotating the shaft p, and a body in water and connected with the drum D' by a cable o' and adapted to be raised and lowered in the water by the adjustment of the chute, thereby automatically proportioning to each other the varying degrees of resistance of the said chute and body, substantially as described. 100

5. In a discharge apparatus for coal and ore bins, the combination, with the dock A, having a bin B, and the pivotal chute C, of a shaft p, supporting drums D and D', a cable o, connecting the chute with the drum D, means for rotating the shaft p, and a weight E in water and connected with the drum D' by a cable o' and adapted to be raised and lowered in the water by the lowering and raising of the chute, thereby automatically proportioning to each other the varying degrees of resistance of the said chute and weight, substantially as described. 110

6. In a discharge apparatus for coal and ore bins, the combination, with the dock A, having a bin B, and the pivotal chute C, of a shaft p, supporting drums D and D', a cable 120

o, connecting the chute with the drum D, means for rotating the shaft *p*, an oblong rectangular box flaring internally from near its upper toward its lower end and containing
5 sand or the like, piles *h* in the water below the dock affording a guide for the weighted box, and a cable *o'*, connecting the box with the drum D', whereby in raising and lowering the chute the weighted box is adapted to
10 be lowered and raised in the water and the varying degrees of resistance of the chute and weight are automatically proportioned to each other, substantially as described.

7. In a discharge apparatus for coal and
15 ore bins, the combination, with the dock A, having a bin B, and the pivotal chute C, of a

shaft *p*, supporting drums D and D', a cable
o, connecting the chute with the drum D, means for rotating the shaft *p*, a hinged boom
H, extending from the bin against the cable 20
o, and a body E in the water below the dock and connected by a cable *o'* with the drum D' and adapted to be raised and lowered in the water by the adjustment of the chute, thereby automatically proportioning to each 25
other the varying degrees of resistance of the said chute and body, substantially as described.

WARREN DUNBAR.

In presence of—

FRED HUBER,
A. W. WOLFE.