(No Model.) 2 Sheets—Sheet 1.

R. L. ETTENGER & G. RUPLEY.

HOISTING DEVICE.

No. 576,779. Patented Feb. 9, 1897.

Fig. 1.

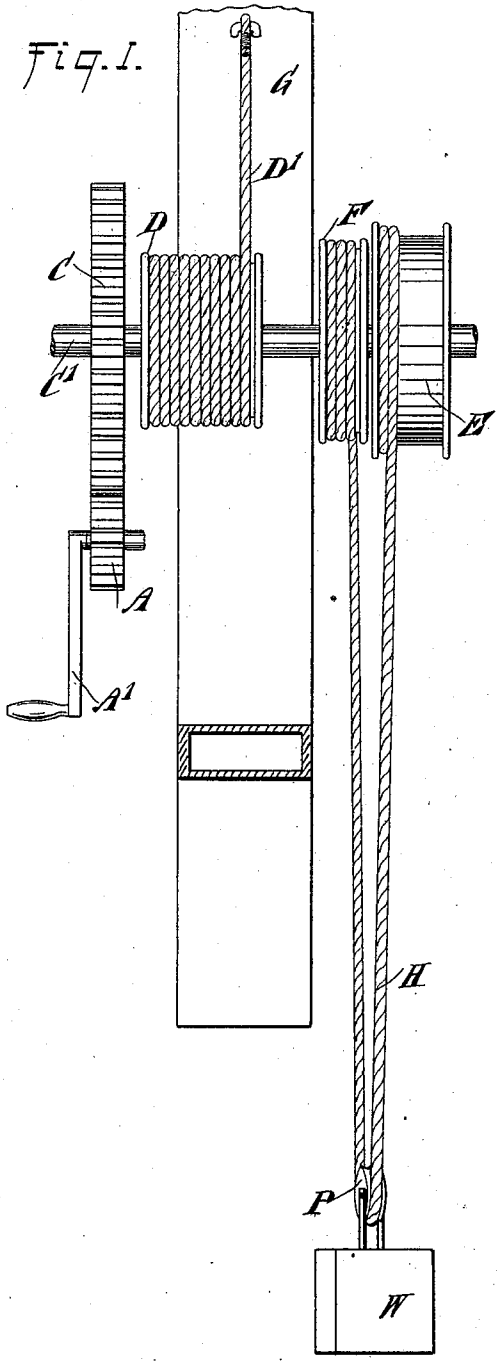
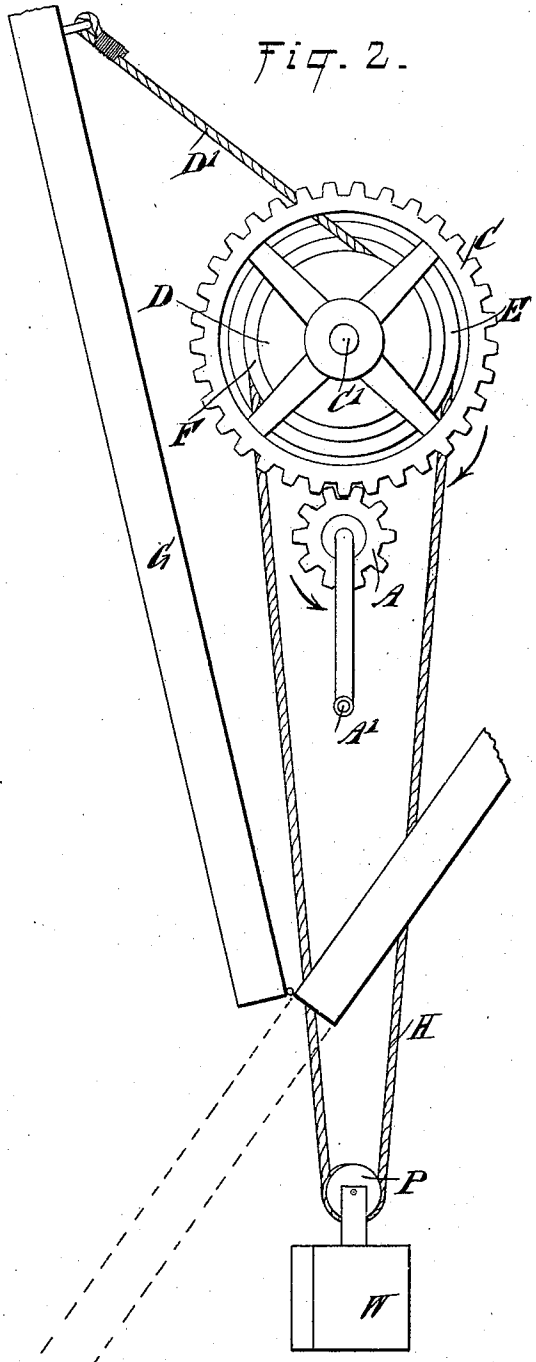


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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HOISTING DEVICE.

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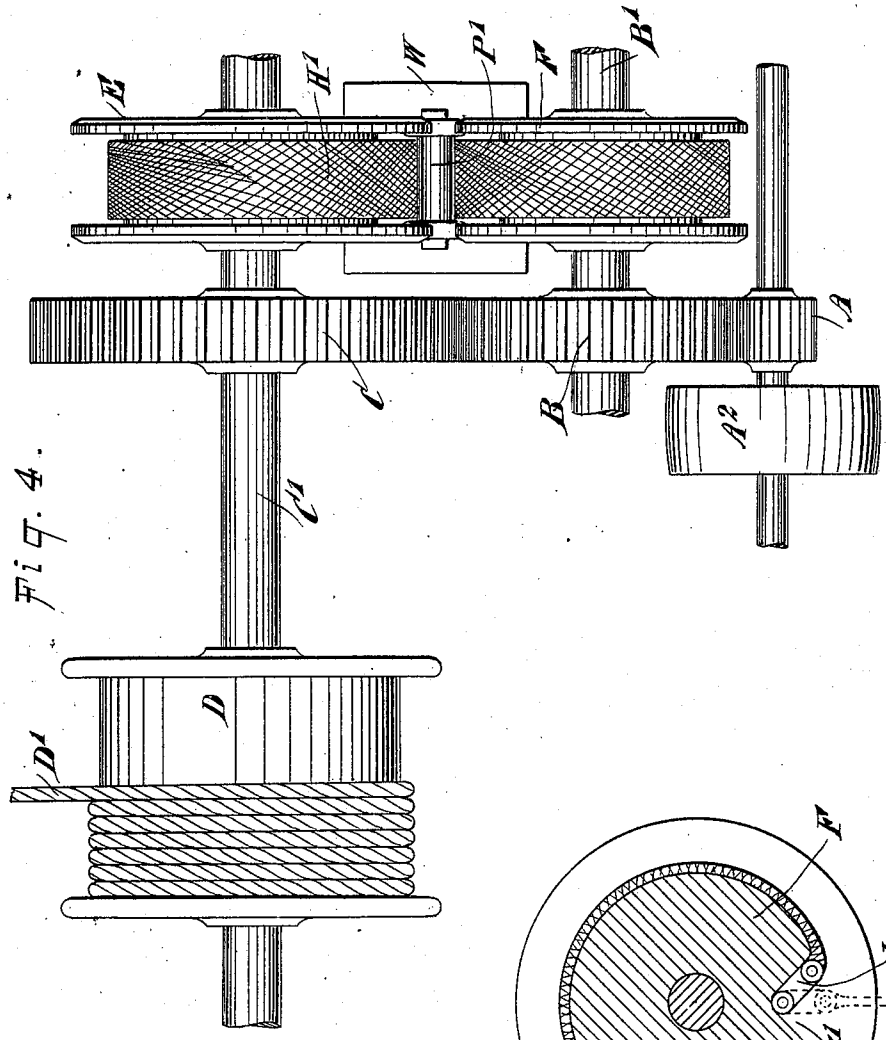

Fig. 4.

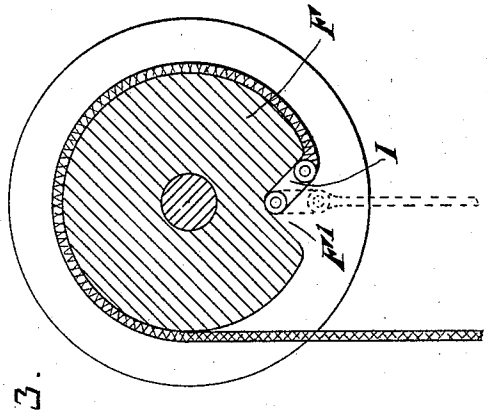

Fig. 3.

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UNITED STATES PATENT OFFICE.

ROBERT L. ETTENGER AND GEORGE RUPLEY, OF DULUTH, MINNESOTA, ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO THE PETTIBONE, MULLIKEN & COMPANY, OF CHICAGO, ILLINOIS.

HOISTING DEVICE.

SPECIFICATION forming part of Letters Patent No. 576,779, dated February 9, 1897.

Application filed February 3, 1896. Serial No. 577,884. (No model.)

To all whom it may concern:

Be it known that we, ROBERT L. ETTENGER and GEORGE RUPLEY, of Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Hoisting Devices, of which the following is a full, clear, and exact description.

This invention relates to a new and useful improvement in counterbalance-hoists for variable weights, more particularly applicable to the spouts or chutes of ore, stone, or coal docks or grain-bins, but not necessarily confined to these. Such spouts are usually very heavy and are pivoted below the opening through which coal or grain is discharged from the bins or pockets in which they are stored. They must be raised out of the way of passing vessels and lowered into the hatches of vessels to be loaded. This raising or lowering is usually done by means of appliances at the top of the dock, and as these spouts are very heavy and the weight to be handled increases or decreases very rapidly, according as the spout approaches or recedes from a horizontal position, some form of variable counterbalance is necessary to enable them to be handled rapidly and safely.

The object of this improvement is to provide a simple and effective means of accomplishing this.

Referring to the accompanying drawings, Figure 1 is a front elevation of one form of our improved hoisting device. Fig. 2 is a side elevation thereof. Fig. 3 is a cross-section of one of the pulleys or drums, showing the manner of attaching the cable thereto; and Fig. 4 is a front elevation of another form of our hoisting device.

As illustrated by Figs. 1 and 2, A is a pinion adapted to be turned by a hand-crank A′ or other suitable means, said pinion meshing into the gear-wheel C on a shaft C′. On said shaft is further rigidly mounted the drum D, on which winds the cable D′, connected to the spout G or other part to be hoisted. The shaft C′ has further rigidly secured to it two drums or pulleys E and F, respectively, to each of which is secured one end of a rope H, winding in opposite directions on said pulleys, as shown, and the central portion of said rope hangs down loosely and carries a pulley P, from which is suspended a counterbalancing-weight W. In order that the rope H may wind on the drum F in either direction, for a purpose stated hereinafter, the end of the rope, as shown in Fig. 3, is secured to a link I, pivoted within a recess F′ of the drum.

The operation is as follows: When it is desired to raise a weight which decreases as it rises, as a spout or chute, the wheels are turned, as shown by the arrows in Fig. 2, thus winding up the rope or chain on drum D and unwinding the rope H from the drum E. It will be evident that when the rope or chain is entirely unwound from drum F it will begin to wind up from the opposite side, the link I swinging on its pivot, the rope H and weight W thus in effect partially counterbalancing drum E, and so reducing the effect of the counterbalance against the decreasing weight to be lifted. Similarly in lowering the spout at the starting-point, when the spout is in nearly vertical position, the rope or chain is upon the drum F in such a manner as to largely neutralize the effect of counterbalance W upon the drum E, but as the spout is lowered the rope H on the drum F unwinds until it reaches its end or neutral point, and then commences to wind in the opposite direction, thus assisting the drum E in balancing the increasing weight of the spout and obtaining the full effect of the counterbalance W.

The construction shown in Fig. 4 is functionally an equivalent of that hereinbefore described, the only difference in construction residing in the employment of an additional shaft B′, carrying a gear-wheel B and the drum E, the drums F and E having a belt H′ wound thereon instead of the rope H, and a roller P′ being substituted for the pulley P. A^2 is a pulley substituted for the crank A′ and serving to turn the pinion A. The operation is exactly the same as described with reference to Figs. 1, 2, and 3.

It will be seen that the chute or other article to be raised or hoisted is properly counterbalanced both during its upward and downward movements. The arrangement of the wheels and drums may be varied considerably, also chains, belts, or ropes may be used

as conditions may require, and the drums will be formed to receive said flexible supports of the counterbalance W, either in juxtaposited coils (see Fig. 1) or in superposed layers, as in Fig. 4. It will be understood that the pulley P or roller P′ or other part engaging the cable and secured to the counterbalance W is movable relatively to the cable H or H′ to permit said cable to wind or unwind while the counterbalance remains at the lowest point of the cable.

To insure an easy operation of the apparatus, we prefer to make the drum F as small as possible and to use a flat belt or rope H′ on the same, so that the reversing movement will take place smoothly and the increase of diameter of the coiled portion of the belt will be gradual.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. In a hoisting device, the combination with the hoisting-drum and the object connected therewith to be raised and lowered, of differential winding mechanism for counterbalancing said object, comprising two pulleys connected with said drum to turn with it, a cable secured to and winding on each of said pulleys, and a weight supported on the loose central portion of said cable, substantially as described.

2. A hoisting device, comprising a hoisting-drum or hoisting-gear proper, two pulleys connected to turn with said hoisting-drum, a cable secured to and winding on each of said pulleys, the cable being arranged to wind in one direction on one of the pulleys, and in both directions successively on the other pulley during the hoisting of the load, and a counterbalance supported on the loose central portion of the cable, the counterbalancing being greater or less according as the cable unwinds from both pulleys or from one only, substantially as described.

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