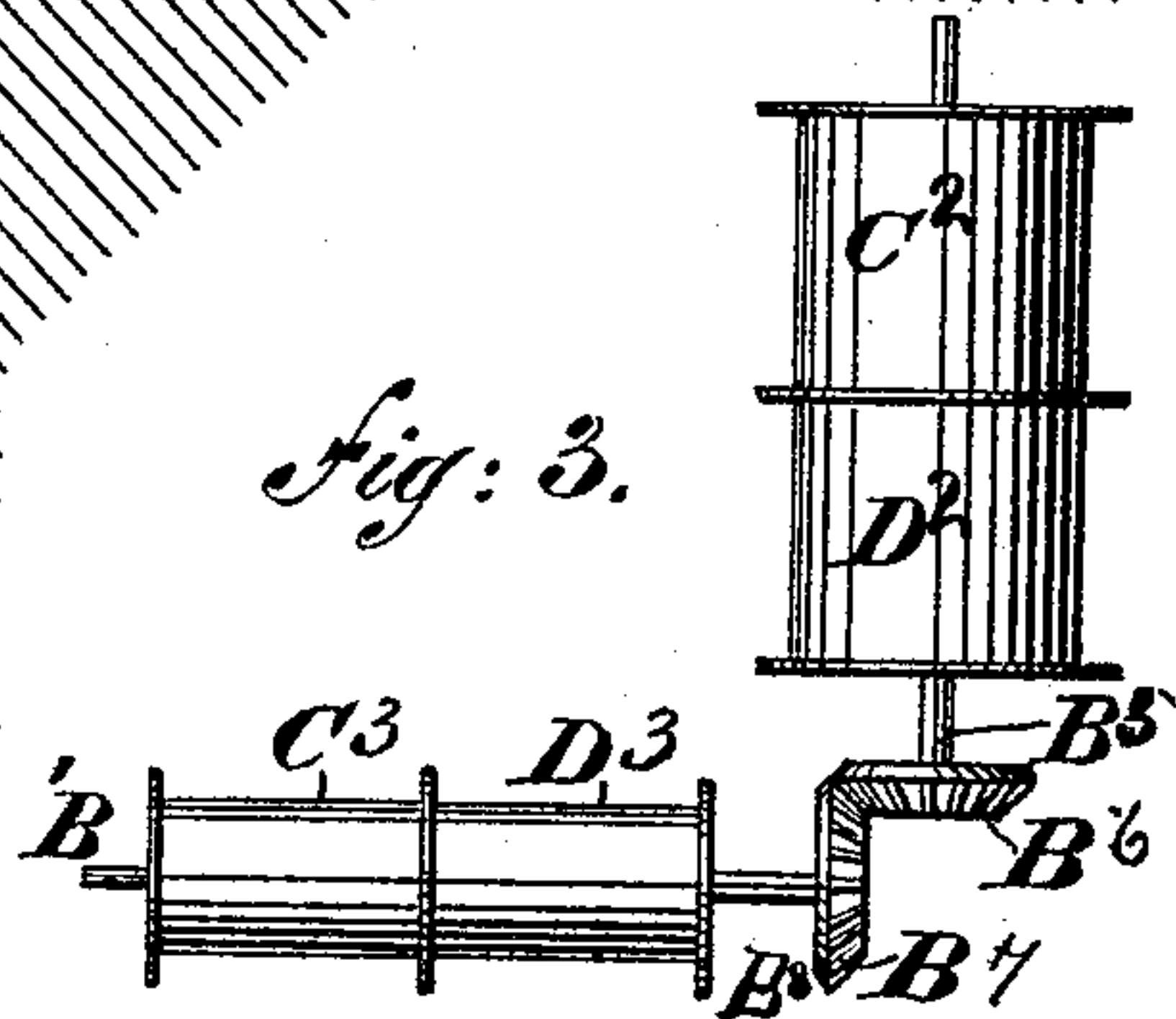
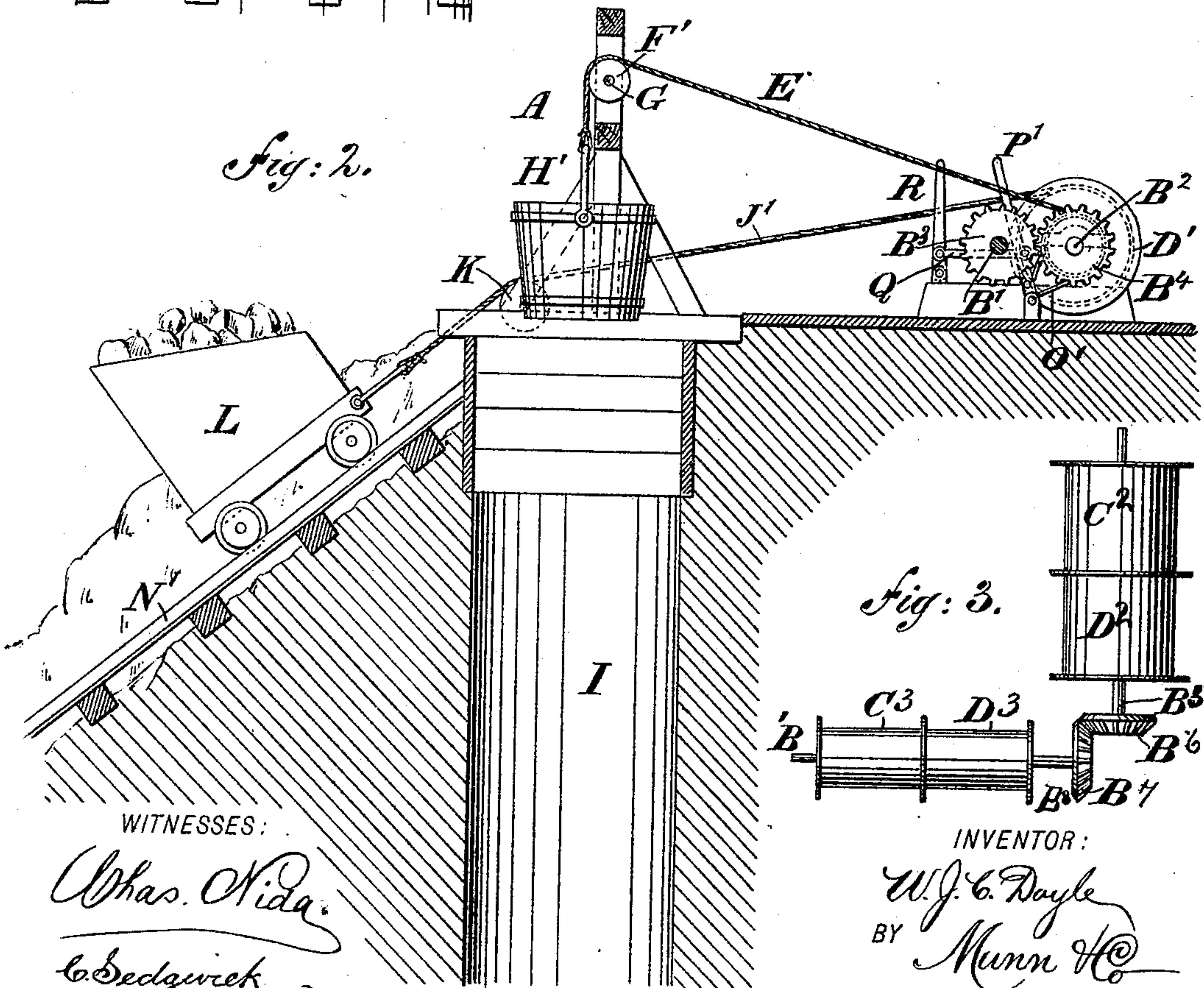
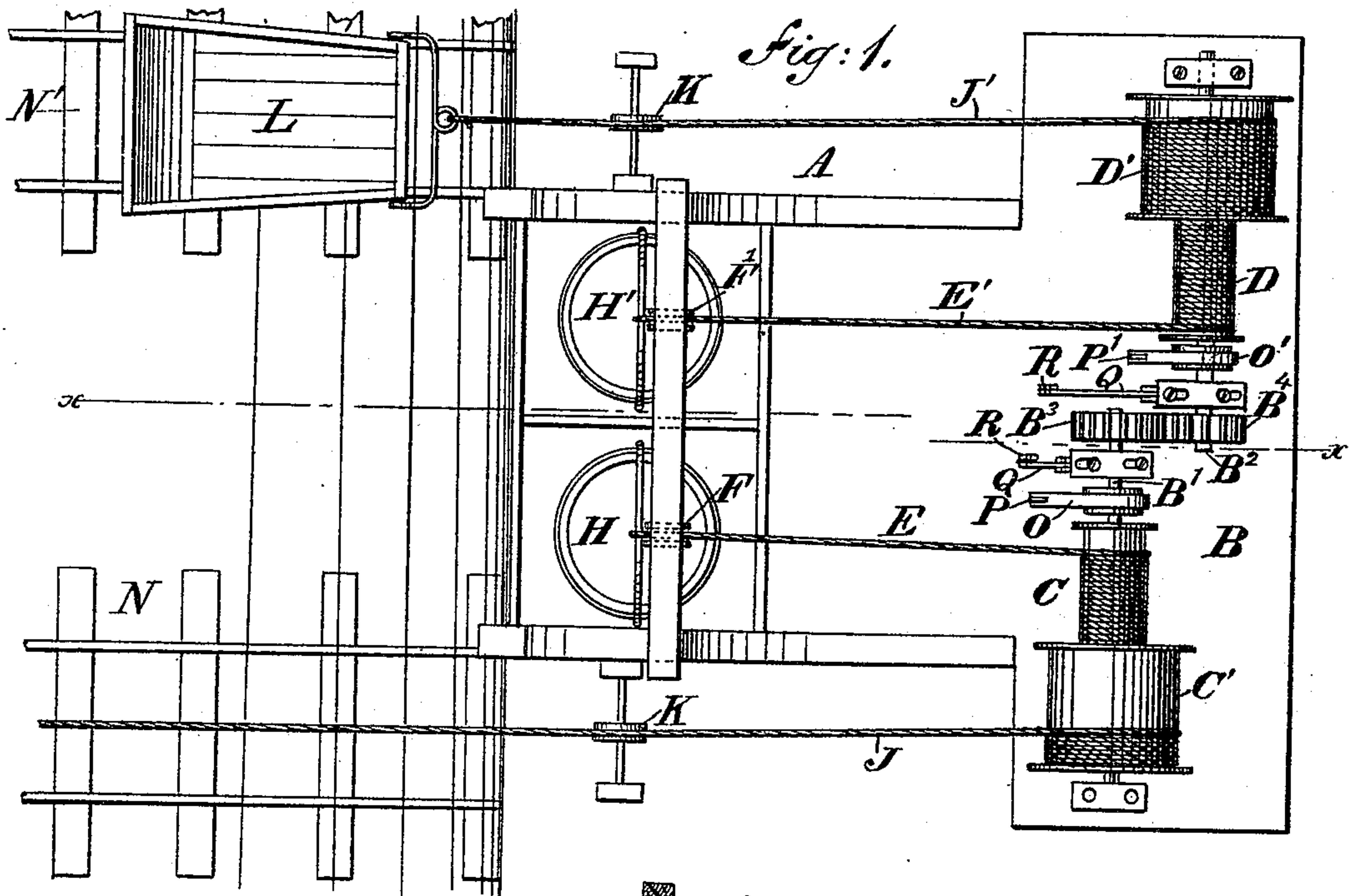


(No Model.)

W. J. C. DOYLE.  
HOISTING APPARATUS.

No. 460,000.

Patented Sept. 22, 1891.



WITNESSES:

Chas. Wida.  
C. Sedgwick

INVENTOR:

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ATTORNEYS



# UNITED STATES PATENT OFFICE.

WILLIAM J. C. DOYLE, OF ASPEN, COLORADO.

## HOISTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 460,000, dated September 22, 1891.

Application filed March 6, 1891. Serial No. 384,016. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM J. C. DOYLE, of Aspen, in the county of Pitkin and State of Colorado, have invented a new and Improved Gravity-Hoist, of which the following is a full, clear, and exact description.

The invention relates to gravity-hoists such as are shown and described in the Letters Patent of the United States, No. 430,073, granted to me June 10, 1890.

The object of the present invention is to provide a new and improved gravity-hoist which is simple and durable in construction, insures perfect safety for the operator, and is more especially adapted for use in sinking deep wells and shafts.

The invention consists of differential drums geared together and connected at their smaller diameters with two hoisting-ropes for the hoisting-buckets traveling in opposite directions in the shaft or well, the said drums being connected at their larger diameters with two cables for cars traveling in opposite directions on inclined tracks.

The invention also consists of certain parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of the improvement. Fig. 2 is a sectional side elevation of the same on the line  $x x$  of Fig. 1, and Fig. 3 is a plan view of a modification.

The improved gravity-hoist is provided with a suitably-constructed frame A, on the rear end of which is arranged a hoisting device B, consisting, principally, of two differential drums or windlasses geared together. This device B is provided with two shafts  $B'$  and  $B^2$ , mounted to turn in suitable bearings and connected with each other by gear-wheels  $B^3$  and  $B^4$ . The shafts  $B'$  and  $B^2$  carry differential spools  $C C'$  and  $D D'$ , respectively, of which the spools  $C'$  and  $D'$  are considerably larger in diameter than the spools  $C$  and  $D$ , respectively.

On the spools  $C$  and  $D$  are adapted to wind two hoisting-ropes  $E E'$ , respectively, passing over pulleys  $F F'$ , respectively, carried

by a transversely-extending shaft  $G$ , mounted to turn in suitable bearings in standards of the frame A, erected over the shaft or well I. The ropes  $E E'$  each support a hoisting-bucket H or  $H'$ , respectively, adapted to travel in the well or shaft I; the two ropes being so arranged that when one bucket travels down the shaft or well the other one rises, and vice versa.

On the spools  $C' D'$  are adapted to wind the cables  $J J'$ , respectively, passing to the sides of the shaft I over the friction-pulleys K to connect with wheeled cars L, mounted to travel in opposite directions on the inclined tracks  $N N'$ , respectively. When one car travels down its respective inclined track, the other moves upward on its track at the same time that one of the buckets H travels down in the well or shaft and the other rises therein, as is previously described. The ropes  $E E'$  are so arranged relative to the cables  $J J'$  that the hoisting-bucket of the rope E is on top of the shaft I at the time the car on the cable J is at the upper end of the incline, so that the hoisting-bucket can be conveniently emptied into the car standing alongside the upper end of the well. In a similar manner the bucket on the rope  $E'$  is arranged relative to the car L on the cable  $J'$ . A brake-band O or  $O'$  is provided for each shaft  $B'$  or  $B^2$ , respectively, and is operated by a lever P or  $P'$ , respectively, under the control of the operator.

In order to disconnect the two shafts  $B'$  and  $B^2$  for lengthening or shortening the respective ropes and cables connected with their spools, the said shafts have their bearings at one end fitted to slide to disconnect the gear-wheels  $B^3$  and  $B^4$  when desired. For this purpose the bearings are each connected by a link Q with the lever R, pivoted on the frame A and under the control of the operator.

The operation is as follows: When a filled bucket is at the upper end of the shaft or well, then the other bucket is at the bottom of the well to be filled. The filled bucket at the top of the well is emptied into its respective car, which now travels down the inclined track, and by pulling with its rope on the large spool  $C'$  or  $D'$  actuates the hoisting device B, so that the bucket which has been



filled in the bottom of the well or shaft is hoisted, while the emptied bucket travels downward. At the same time the emptied car at the lower end of its inclined track  
 5 commences to travel upward. The operator controlling the lever P or P' of the brake-band O or O' can regulate the speed of the shafts and spools. When the filled car has reached the lower end of its track, the filled  
 10 bucket is at the top of the well and is emptied into the empty car, while the other car at the end of the track is emptied. The above-described operation is then again repeated.

As shown in Fig. 3, the large spools C<sup>2</sup> and  
 15 D<sup>2</sup> are secured on a shaft B<sup>5</sup>, connected by beveled gear-wheels B<sup>6</sup> and B<sup>7</sup> with a shaft B<sup>8</sup>, carrying the smaller spools C<sup>3</sup> D<sup>3</sup>, the said shafts standing at right angles to each other. The bucket-ropes for the smaller spools are  
 20 wound in opposite directions thereon, so that when the shaft B<sup>8</sup> is rotated one spool winds up its rope, while the other spool unwinds its rope. The cables for the larger spools C<sup>2</sup> D<sup>2</sup>  
 25 are arranged in a like manner, so that the pull exerted by a filled car on its cable and large spool causes rotation of all the spools in such a manner that the pulling-cable and the rope carrying the empty bucket unwinds,  
 30 while the other cable and rope are wound upon their respective spools. This arrangement is necessary in case the well does not extend vertically, but is inclined.

It will be seen that by giving the spools C' and D' a considerably larger diameter than  
 35 the spools C D sufficient power is obtained to readily hoist the filled buckets in the well I.

At the same time the cars are given a greater traveling distance than the buckets H H'. It will be seen that this arrangement is very simple in construction and is under full con- 40  
 trol of the operator.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a gravity-hoist, the combination, with 45  
 two differential drums geared together, of hoisting-ropes connected with the smaller spools of the said drums, buckets supported on the said hoisting-ropes and adapted to travel in opposite directions in the well or 50  
 shaft, cables connected with the larger spools of said drums, and cars connected with the said cables and mounted to travel in opposite directions on inclined tracks, substantially as shown and described. 55

2. In a gravity-hoist, the combination, with 55  
 two differential drums geared together, of hoisting-ropes connected with the smaller spools of the said drums, buckets supported on the said hoisting-ropes and adapted to 60  
 travel in opposite directions in the well or shaft, cables connected with the larger spools of said drums, cars connected with the said cables and mounted to travel in opposite direc- 65  
 tions on inclined tracks, and means, substantially as described, for connecting or disconnecting the shafts of the two differential drums, substantially as shown and described.

WILLIAM J. C. DOYLE.

Witnesses:

A. R. HANEGAN,  
 WILLIAM LINKINS.