(No Model.)

L. S. DEMING.

DERRICK.

No. 405,082. Patented June 11, 1889.

Fig. 2

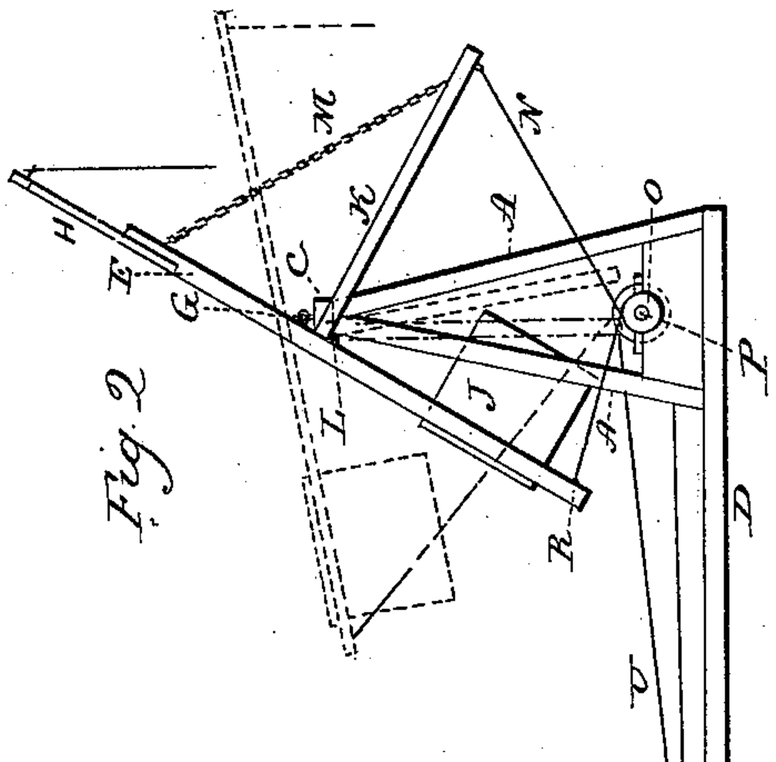


Fig. 3

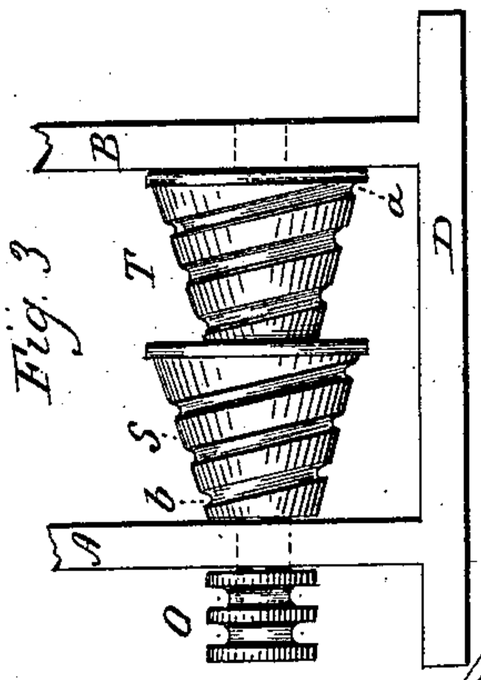
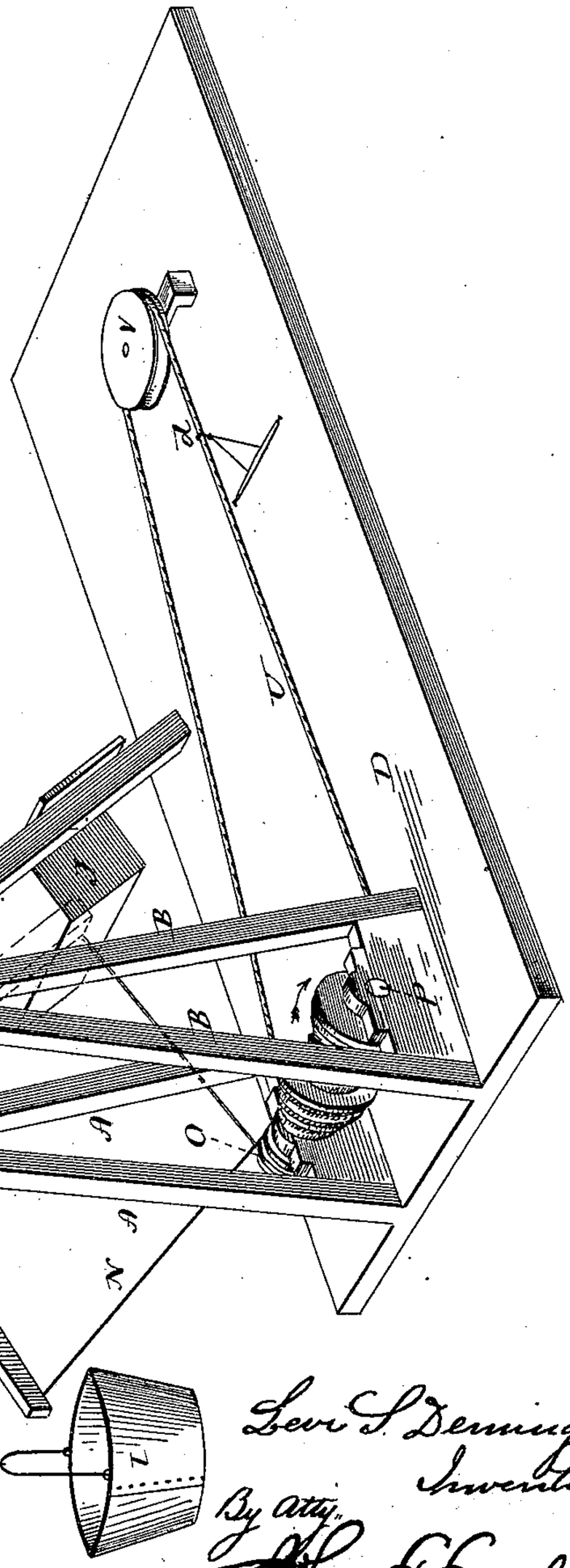


Fig. 1



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UNITED STATES PATENT OFFICE.

LEVI S. DEMING, OF MIDDLETOWN, CONNECTICUT.

DERRICK.

SPECIFICATION forming part of Letters Patent No. 405,082, dated June 11, 1889.

Application filed February 18, 1889. Serial No. 300,227. (No model.)

To all whom it may concern:

Be it known that I, LEVI S. DEMING, of Middletown, in the county of Middlesex and State of Connecticut, have invented a new Improvement in Derricks; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a perspective view of the derrick as in use; Fig. 2, a side view of the same on a reduced scale, illustrating its operation; Fig. 3, a detached view showing a side view of the drums and pulley enlarged.

This invention relates to an improvement in derricks specially adapted for hoisting coal and like purposes, and in which horse-power is usually employed as the power for hoisting. These derricks are usually a beam hung upon an axis with the bucket at one end, and so that a depression of that end of the beam will take the bucket into the hold to be filled, and a line attached to the other end of the beam, running around a stationary pulley to the horse, so that as the horse advances that end of the beam will be drawn downward and raise the other with the bucket. Then as the horse returns after the dumping of the bucket the weight of the bucket itself will cause its end of the beam to descend and raise the other end. By this arrangement the power of the horse is applied only to the raising of the bucket, the power required being at least equal to the weight of the bucket—that is, the horse works only in the direction of hoisting, but returns free.

The object of my invention is a construction of derrick whereby the power required will be divided, so that the horse will pull, say, half the weight of the bucket and its load, and on the return will pull the other half of the weight, and so that the work upon the horse will be distributed in a more equal manner than under the usual construction of derrick; and the invention consists in the construction as hereinafter described, and particularly recited in the claims.

The derrick, as here represented, consists of an upright composed of two pairs of posts A A and B B, these posts joined by a cross-piece C at the top, the posts being firmly secured upon the ground D.

The beam is formed of two arms E F, and, as here represented, is constructed so as to provide a longitudinal connection on the cross-piece C. The beam is pivoted to this cross-piece C, as at G, and, as here represented, an arm H runs diagonally from the arms E F to complete the bucket-arm of the beam, and this arm H is arranged diagonally across the arms E F, so as to take the bucket to one side of the apparatus. This is a convenience in handling coal, but is not essential to the invention, as the beam may be simply a straight beam, as in the more common construction of derricks.

To the hoisting-arm of the beam the bucket I is suspended in the usual manner. To the other arm a counterbalancing-weight J is made fast, which may be in the form of a box, as shown, into which weights can be introduced or removed to adjust the counter-balance. This counter-balance is adjusted with relation to the weight of the loaded bucket. Suppose, for illustration, the bucket weigh one hundred pounds and the coal four hundred pounds, making a total load of five hundred pounds on that arm of the beam. The counter-balance upon the other arm under these circumstances is made three hundred pounds, so that the difference between the counter-balance and the load is two hundred pounds. This represents the power which the horse is required to draw. After the bucket is dumped, then the counter-balance will be still three hundred pounds, but the bucket will be one hundred pounds; hence two hundred pounds will be required to draw the bucket downward, and this is the power which it is required for the horse to draw on the return to cause the bucket to descend—that is to say, the counter-balance should be one-half the weight of the load in the bucket plus the weight of the bucket.

From near the pivot of the beam an arm K extends downward at substantially right angles from the beam, and it is preferably hinged at L, as seen in Fig. 2. A chain M, or

other suitable tie, connects the arm K to a forward point on the beam, as represented, so as to hold the arm K rigidly with the beam and so that it may swing with it. This arm K corresponds substantially to the balance end or arm of the derrick-beam.

A line N is secured by one end to the arm K. Thence, running around the pulley O on a shaft P, supported in suitable bearings in the uprights, is continued and secured by its other end to the weighted end of the beam, as at R. Now if power be applied to rotate the shaft P and the pulley O in one direction—say as from the position in Fig. 2 to that in broken lines in same figure—the draft is made upon the line N, which raises the weighted end of the beam and causes the bucket to descend, as indicated in broken lines, Fig. 2; but if turned in the opposite direction then the line N and the bucket will rise, while the counterbalancing end of the beam will descend, the engagement of the line around the pulley O being such that its rotation will impart this active movement to the line, and thence to the beam, either directly upon the beam itself in one direction or upon the arm K in the opposite direction.

As a convenient means for thus operating the pulley O, I arrange upon the shaft two conical drums S T. (See Fig. 3.) These drums are spirally grooved, and into the groove at the larger diameter of the drum T one end of a line U is made fast, and to the smaller diameter on the other drum S the other end of the same line is made fast, as at *b*. This line extends to a distant point and passes around a stationary pulley V. (See Figs. 1 and 2.) This pulley V is at a distance greater than that which is required to be traveled by the horse in operating the apparatus.

As represented in Fig. 1, the derrick is shown as with the bucket in the raised position and ready for descent. The horse in this case is attached to the line U, as at *d*, and now moves toward the uprights. This will cause the run of the line opposite that to which the horse is attached to be drawn from the drum S and impart rotation thereto. At the same time the run to which the horse is attached will be correspondingly wound upon its drum T. The direction of the rotation under the advance of the horse toward the uprights will be as indicated by the arrow in Fig. 1, and this will impart a corresponding rotation to the pulley O, which rotation through the line N will cause the beam to swing and the bucket to descend. The bucket, having reached its down position, is loaded. The horse turns and moves in the opposite direction, which unwinds the line before wound upon the drum T, imparting rotation thereto in the opposite direction, at the same time winding the other run of the line upon the drum S.

Because of the counterbalancing as before described, the weight of the load is so distributed that it is the same upon the horse (or power applied) in both raising and descent, and theoretically but one-half the weight of the load in each direction. As the line is drawn from one drum, say S, it is wound upon the other drum T to the same extent. I prefer the conical-shaped drums, because it applies the greater power at the start, which power is reduced toward the stop both in raising the load and lowering the bucket.

The arm K is preferably hinged to the beam, so that when the derrick is not required for use and stands normally in the raised position the arm K may be dropped, as indicated in broken lines, and be out of the way. This is desirable where the derrick is arranged close to a dock where a ship is to come up, and in which case the arm if made stationary might interfere with the ship coming up to the dock.

While I have represented the power as applied by a horse through the drums, it will be understood that any of the usual attachments or mechanisms may be employed for operating the derrick.

I claim—

1. The combination of a beam hung upon an upright so as to form a projecting arm both sides of the point of hanging, one arm adapted to carry the load, a counter-balance upon the other arm of substantially one-half the load, a third arm projecting from the beam near the pivot at substantially right angles and downward, a pulley and a line connected by one end to the counterbalance-arm of the beam and the other end to the said third arm, the said line passing around said pulley, the said pulley being adapted to be rotated under the application of power thereto, substantially as described.

2. The combination of a beam hung upon an upright and so as to swing thereon, the beam extending both sides of the pivot and so as to form two arms, one of said arms adapted to carry the load, a counter-balance on the other arm, the third arm extending from the beam near the hanging point downward, a line connected by one end to the counterbalance-beam and by the other to the said third arm, a pulley around which the said line is run, a pair of drums upon the shaft of said pulley, and a line fixed by one end to one drum and by the other to the other drum, the line extending to a distant point around a stationary pulley, one run of said line adapted for the application of power, substantially as described.

3. The combination of a beam hung upon an upright and so as to form an arm projecting each side of said upright, one arm adapted to carry the load, a counter-balance arranged upon the other arm, a third arm K, hinged to the beam near the hanging point, a connection L between the said arm K and the beam to support said arm K at substantially right

angles to the beam, a pulley O, arranged upon a shaft in suitable stationary bearings, a line N, attached by one end to the arm F of the beam and by the other end to the arm K, said line passing around the said pulley O, and means, substantially such as described, for producing the revolution of the said pulley O, substantially as and for the purpose specified.

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