

C. W. HUNT.
HOISTING MACHINERY.

No. 576,316.

Patented Feb. 2, 1897.

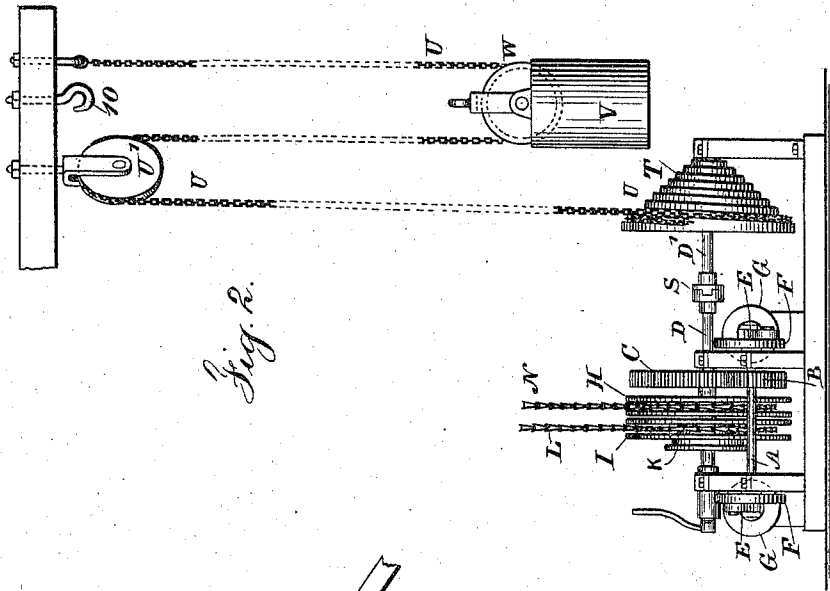


Fig. 2.

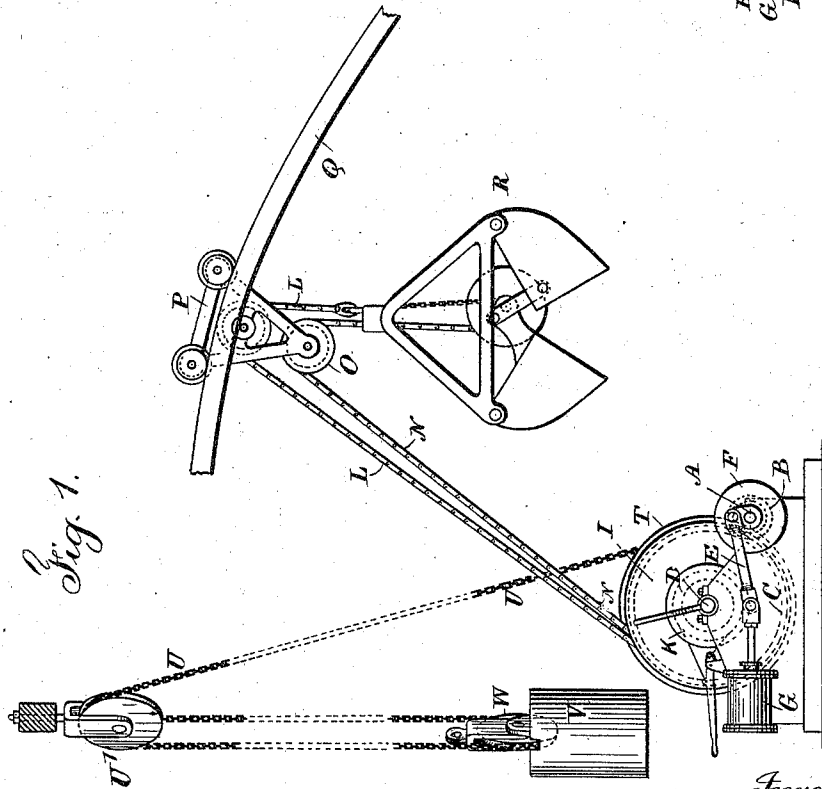


Fig. 1.

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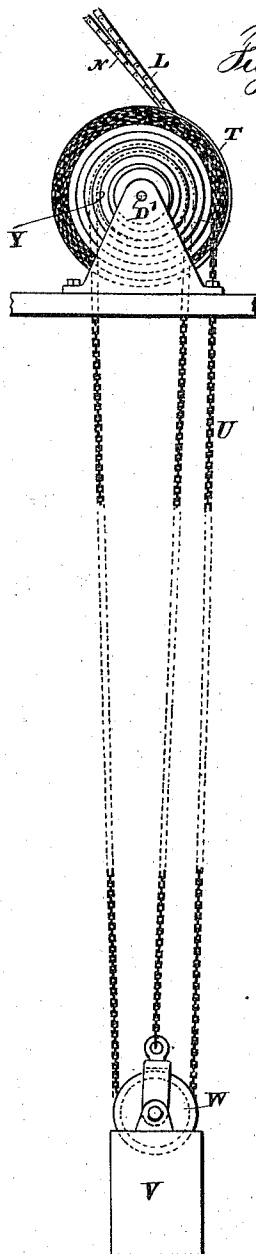
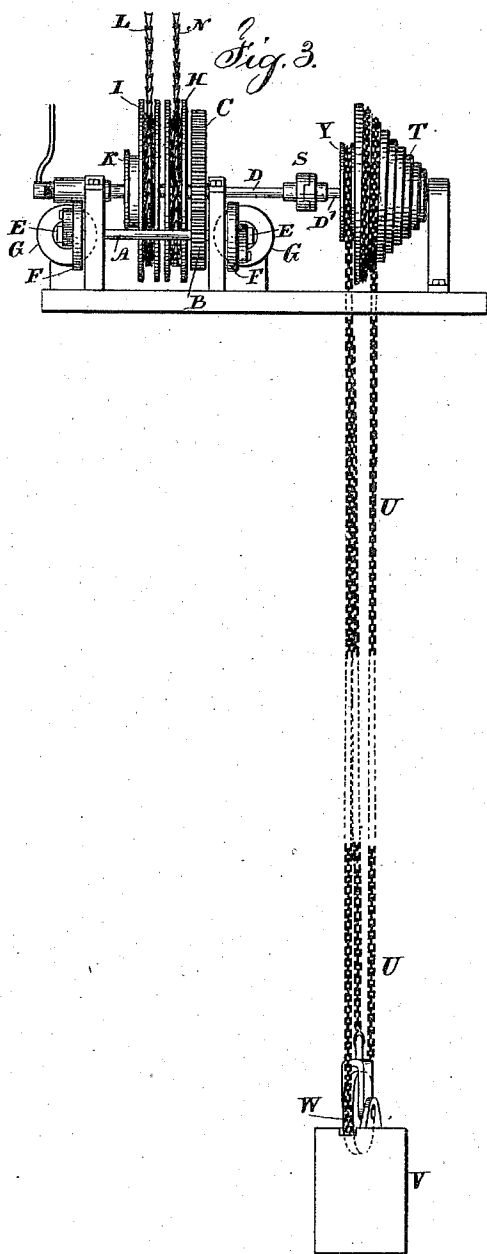
(No Model.)

2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

CHARLES W. HUNT, OF WEST NEW BRIGHTON, NEW YORK.

HOISTING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 576,816, dated February 2, 1897.

Application filed April 9, 1896. Serial No. 586,801. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. HUNT, a citizen of the United States, residing at West New Brighton, in the county of Richmond and State of New York, have invented an Improvement in Hoisting Machinery, of which the following is a specification.

In machinery for handling coal and similar material a two-part bucket has been made use of that is closed by the action of a chain and the continued pull upon such chain raises up such bucket, and a second chain has been provided for opening the bucket by drawing upon such second chain or by holding such second chain while the bucket is lowered by the first chain. In apparatus of this kind the lowering operation has often been controlled by a friction device applied to the winding-drum. In practice I have, however, found that it is advantageous to make use of an engine or other motor, such as an electric motor, the direction of rotation of which can be reversed, so as to lower the bucket with regularity as well as to raise it with reliability. When the hoisting apparatus has thus been arranged, there is a greater expenditure of power in raising the bucket and its load than there is in lowering the same. Hence the motor works to a disadvantage, having a heavy load while rotating in one direction and either a light load or an accelerating weight when working in the other direction.

The object of the present invention is to equalize as near as possible the duty required of the motor, so that the same force will be required, or nearly so, in lowering the bucket as in raising the loaded bucket, thereby insuring uniformity in the demand for steam or other source of power and equalizing wear and strain upon the respective parts.

I have found that it is advantageous to employ a flat-link chain for drawing up the bucket and to wind this chain as a spiral or volute of increasing diameter around a drum and between two guiding-heads. If a chain is wound along upon a cylindrical barrel, the direction of pull is constantly changing and varying in the angle to the axis of rotation of the barrel. Hence there is often an advantage in winding one convolution upon another in a plane perpendicular to the axis of rotation.

In order to meet the requirements before outlined, I provide a barrel upon the engine-shaft or upon a shaft driven by a connection to the motor and connect to the barrel one end of a chain, the same passing to the bucket or other device to be raised or lowered, so that the chain is wound one coil upon the other as a spiral or volute, and connected with the same shaft is a drum with another chain or rope to a counterweight, the weight being sufficient to counterbalance the bucket or hoisting device and preferably its average load, and the chain or rope from the counterpoise is wound upon a spiral or volute drum and raises the counterweight as the bucket is lowered. Hence the power of the engine is exerted in raising the counterweight when lowering the empty bucket, and the engine is aided by the weight when raising the load. The rope of the counterweight is advantageously attached to the largest portion of the spiral drum and winds to the smaller part as the hoisting-chain unwinds in the opposite direction, and the proportion of the parts is such that the leverage of the two chains against the motor-shaft is uniform, or nearly so, because the hoisting-chain as it is wound one coil on the other corresponds in distance from the shaft with the counterpoise-chain as it unwinds from the smaller to the larger part, and the leverage of the counterweight and chain in aid of the motor corresponds to the leverage of the hoisting-chain in closing and then raising the bucket, because by the time the bucket has been raised to the point of discharge with its chain coil of large diameter the rope or chain of the counterweight is unwound to the larger diameter of the spiral drum, and hence exerts a force that properly balances the weight of the bucket. By this arrangement the varying conditions are equalized, so that the motor works to the best advantage and with the least expenditure of power, both in raising the weight and in lowering the bucket or similar device.

In the drawings, Figure 1 is a diagrammatic elevation illustrating the present improvement, and Fig. 2 is a diagrammatic elevation at right angles to Fig. 1. In these figures the motor is below the point to which the counterweight and the bucket are raised. Fig. 3 is a diagrammatic elevation representing the

arrangements of the parts where the counterweight is below the motor, and Fig. 4 is a diagrammatic elevation of the parts shown in Fig. 3 and endwise of the shaft.

5 Any suitable motor may be made use of, either electric, or steam, or gas, direct or through gearing or belts. I have represented the shaft A as having a pinion B, gearing into the wheel C on the shaft D, that receives the
10 hoisting-drums, and this shaft A is represented as driven by connecting-rods E to right-angled cranks upon the crank wheels or disks F, and at G cylinders are represented for the engine.

15 Upon the shaft D are two drums H and I, the drum H being permanently connected with the shaft D and the drum I frictionally connected and provided with a friction-wheel K for a band by which such drum I can be held with
20 more or less power. I refer to Letters Patent No. 537,154, granted to me April 9, 1895, to illustrate the internal construction that may be made use of for actuating the drum I frictionally, but it is to be understood that any suitable mechanism may be employed in operating
25 and controlling the drum I and the second chain L therewith connected.

One end of the chain N, which I term the "hoisting-chain," is to be connected to the
30 drum II, and this is preferably a plate-link chain that winds up one coil upon the other and between the heads of the drum, so that the diameter increases with the convolution of the chain, and this chain N passes over a
35 pulley O, which may be upon a truck P upon an inclined track Q, as shown in Letters Patent No. 553,119, granted January 14, 1896, or the pulley may be supported in any desired manner, and I have represented a two-part
40 bucket R, which is also of known character, and it is operated by pulling upon the chain N, which first closes the bucket and then elevates the same with its contents, and the second chain L is employed for holding the
45 bucket in position while the chain N is lowered or slackened for opening the bucket and discharging the contents.

The shaft D' is coupled to the shaft D by any suitable device, such as a clutch or coupling S, and upon this shaft D' is the spiral
50 drum T, and the rope or chain U is connected at one end to the spiral drum T, and such chain extends to the counterweight V. There may be a single lift where sufficient fall can
55 be obtained for the counterweight, but I have represented a pulley W upon the counterweight, so that there will be a two or three fold fall, the weight itself being correspondingly greater and the vertical motion of such
60 weight correspondingly less, and where the motor is below the place of delivery and below the counterweight the chain U will pass up over the pulley U' and down below the pulley W and up to the frame or other support, as
65 shown in Figs. 1 and 2, but where the counterweight is below the motor, or where a three-fold fall is desired, the chain U extends down

and below the pulley W and up over the loose pulley or wheel Y upon the shaft D' and down to the counterweight, where the end is connected, as seen in Figs. 3 and 4. 70

The chain U, being connected at one end to the larger part of the spiral drum, is always at the same distance, or nearly so, as the chain N from the axis of the drums, and said chain
75 U unwinds from the spiral drum T, from the smaller to the larger part, as the chain N is wound as a volute, one coil upon the other, around the drum II, and the leverage remains the same. Hence the counterpoise bears a
80 uniform relation, or nearly so, to the weight raised regardless of the variations in the distances from the shaft of the chains as they pass away from the drums.

It will now be understood that in either of
85 the forms shown the motor raises the counterweight while the bucket is being lowered, and the weight of the bucket aids in raising the counterweight. Hence when the bucket has
90 been lowered to its full extent and the motor is reversed the counterweight exerts its force in aid of the motor in closing and raising the bucket.

Bearing in mind the general principles before enumerated, this improvement can be
95 availed of in rendering uniform, or nearly so, the resistance to the motor when running in either one direction or the other, and thereby not only save unnecessary wear upon the
100 motor, but lessen the expenditure of power in raising and discharging the coal or other weight.

I have represented a hook at 10 which may engage the bail of the counterweight when the latter has been fully raised, the object being to suspend the counterweight while the
105 motor or bucket may be moved from one place to another, as is frequently necessary, or when it is desired to temporarily suspend the use of the counterweight, and it will be apparent
110 that the clutch S allows for disconnecting the spiral drum T and shaft D' from the shaft D when the counterweight is out of action.

I claim as my invention—

1. The combination with the bucket and
115 the two chains for actuating the same, of a motor and two chain-drums driven by the motor, such chains winding with one convolution outside the other, a counterweight and a
120 chain acted upon by such counterweight and attached to the larger part of the conical drum, so that the chain is wound from the larger to the smaller part of the drum as the bucket is lowered, substantially as specified. 125

2. The combination with the bucket and the two chains for actuating the same, of a motor and two chain-drums driven by the motor, such chains winding with one convolution outside the other, a conical drum also
130 rotated by the power, a counterweight and a chain acted upon by such counterweight and attached to the larger part of the conical drum, so that the chain is wound from the larger to

the smaller part of the drum as the bucket is lowered, and frictional devices for controlling the drums and chains to the bucket, substantially as specified.

5 3. The combination with a motor, of a drum, a flat-link chain connected at one end to the drum so as to be wound thereon with one convolution outside the other, a second chain or rope and drum adjacent to the main drum
10 and controlled by friction, a spiral drum upon a shaft connected with the shaft of the main drum, a counterweight and a chain to the same, one end of such chain being connected so that the chain is wound upon the spiral
15 drum and the counterweight raised as the receptacle is lowered, substantially as set forth.

4. The combination with a motor, of a shaft and drum driven by the motor, a chain connected at one end and wound upon the drum

with one convolution of the chain upon the 20 other, a receptacle connected with the chain and to be raised or lowered thereby, a counterweight and spiral drum, a chain connected with the spiral drum and extending to the counterweight, the parts being arranged so 25 that the counterweight is raised by the power as the receptacle is lowered to receive the weight, and such counterweight acts with varying force in aid of the motor in raising the weight, and a clutch for connecting the 30 spiral drum to the hoisting-drum or disconnecting the same, substantially as set forth.

Signed by me this 7th day of April, 1896.

CHAS. W. HUNT.

Witnesses:

CHAS. C. LEVENSON,
M. V. R. WEYANT.