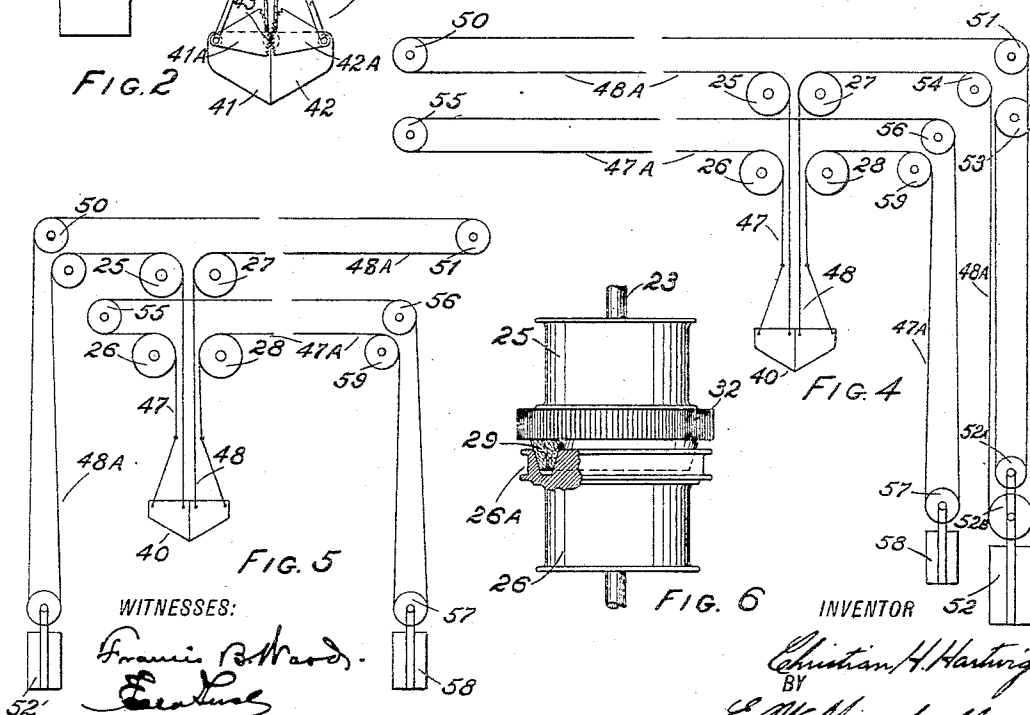
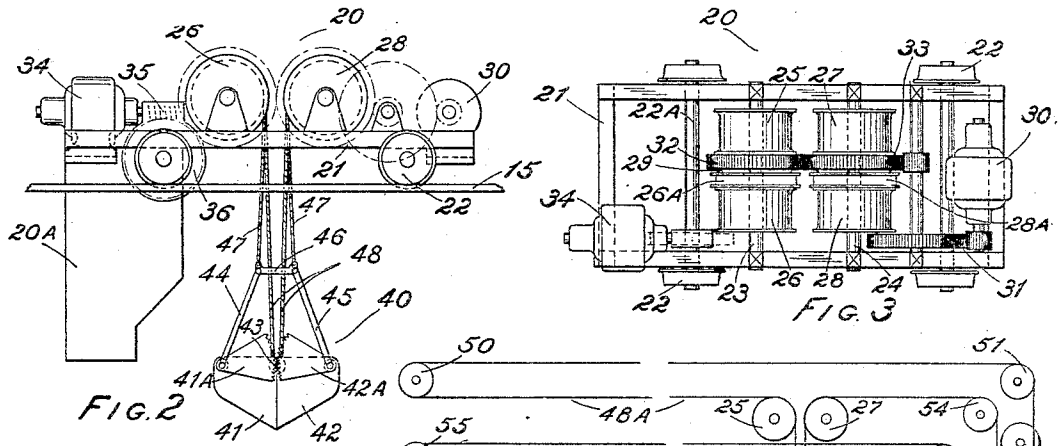
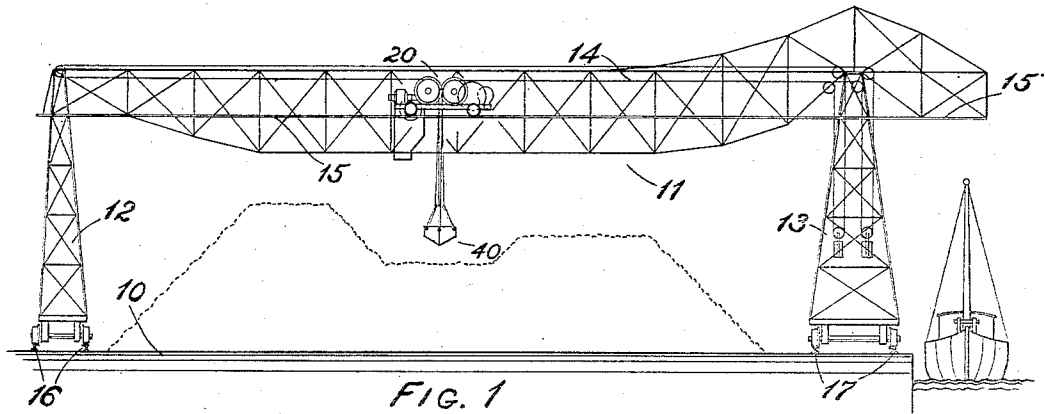


C. H. HARTWIG.
HOISTING APPARATUS.
APPLICATION FILED DEC. 27, 1907.

932,468.

Patented Aug. 31, 1909.



WITNESSES:

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HOISTING APPARATUS.

932,468.

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To all whom it may concern:

Be it known that I, CHRISTIAN H. HARTWIG, a citizen of the United States, and a resident of Coney Island, in the city of New York, county of Kings, and State of New York, United States of America, have invented certain new and useful Improvements in Hoisting Apparatus, of which the following is a specification.

My invention relates to improvements in hoisting apparatus and its object is to provide a simple and efficient construction and arrangement of parts and to improve upon devices of this class.

I will describe my invention in the following specification and point out the novel features thereof in claims.

Referring to the drawings, Figure 1 is a side elevation of a hoisting apparatus and its associated parts made according to my invention and illustrating the general arrangement of such an installation. Fig. 2 is a side elevation and Fig. 3 is a plan view of a hoisting carriage or trolley which I use in carrying out my invention. Fig. 4 is a diagrammatic representation of a preferred arrangement of hoisting drums, counterweights and ropes which I have invented. Fig. 5 is a similar view of another arrangement of similar parts. Fig. 6 is a plan view, partly in section, of a portion of the mechanism of the hoisting carriage or trolley.

Like characters of reference designate corresponding parts in all of the figures and the specification.

10 designates a foundation upon which the apparatus is installed.

11 is a frame of structural iron or other suitable material which in this case comprises two towers 12 and 13 connected together by a bridge 14 which supports a trolley-track 15. The towers may be supported upon trucks running on rails 16 and 17 in a well-known manner so that the whole arrangement may be moved back and forth laterally. Any other manner of supporting the track may be used as this constitutes no part of the invention.

20 designates a hoisting carriage or trolley which comprises a frame 21 provided with wheels 22 which are adapted to run upon the track 15.

23 and 24 are a pair of shafts mounted lat-

erally upon the frame 21. Supported upon the shaft 23 are a pair of hoisting drums 25 and 26. A similar pair of hoisting drums 27 and 28 are supported upon the shaft 24.

30 designates a motor which, through a train of gears 31, is mechanically connected with a pair of spur gears 32 and 33 which are mounted, respectively, upon the shafts 23 and 24. The gear 32 is rigidly connected with the hoisting drum 25 or may be an integral part thereof, and the gear 33 is similarly connected with the hoisting drum 27. It is evident, then, that the motion of the motor 30 is transmitted to the drums 26 and 27 at a reduced rate of speed and that these drums rotate in opposite directions whenever the motor is rotated, and that this rotation of the drums may be reversed by reversing the direction of the rotation of the motor.

A brake-wheel 26^A is connected with or is an integral part of the drum 26, and a similar brake-wheel 28^A is associated with the drum 28. Brakes may be used in connection with these brake-wheels to hold the drums 26 and 28 from rotation during a part of the operation.

29 designates a conical friction member which is connected with and projects from the spur gear 32 and is adapted to fit into an opening in the side of the brake-wheel 26^A as may be clearly seen from Fig. 6. A similar friction member is connected with the gear wheel 33 and is arranged to engage with the brake-wheel 28^A and its connected drum 28. The parts are so arranged that when the brake-wheels above mentioned are released the drums 26 and 28 are pushed against the friction members so that they rotate in unison with the drums 25 and 27. As mechanism for accomplishing the above results is well known I have not illustrated it in the drawings.

34 designates a motor which is mounted upon the frame 21. A worm-gear 35 upon the shaft of this motor is arranged to mesh with a gear wheel 36 which is mounted upon the journal 22^A to which two of the wheels 22 are attached.

40 designates a hoisting bucket which may be constructed of two sections or parts 41 and 42 pivoted together at 43. Segmental gears 41^A and 42^A are connected, respectively, with the two sections 41 and 42 of the

bucket. A pair of rods 44 and 45 are pivotally connected with the outer ends of the sections 41 and 42. These rods are connected together by a cross-bar 46 to the outer ends of which the ends of the two hoisting ropes 47 are connected. 48 designates another pair of ropes which are used for closing the sections of the bucket and assisting in hoisting it. The hoisting ropes 47 are connected with the drums 26 and 28 so that when the latter are rotated in one direction or the other the bucket will be raised or lowered. The closing ropes 48 are similarly attached to the drums 25 and 27.

Before proceeding with the description of the invention I will briefly point out the operation of so much of the apparatus as has already been described.

It may be seen that the rotation of the hoisting drums is controlled by the movement of the motor 30 and this, in turn, may be controlled by any of the well-known arrangements from a cab 20^A which is suspended from and supported by the frame 21. The brakes and clutches for controlling the rotation of the drums 26 and 28 relative to that of the drums 25 and 27 may also be controlled by an operator from the cab 20^A. The above operation is for the purpose of raising and lowering the bucket 40 and causing it to be opened and closed at the desired points of its travel. It is believed to be unnecessary to give more than the above description of this operation as it is well-known in the art and may be accomplished in many ways.

The motor 34, which may also be controlled from the cab 20^A, is arranged to rotate two of the wheels 22 in one direction or another to cause the hoisting trolley or carriage to travel in one direction or another along the track 15. The connecting gear between the motor 34 and the journal 22^A is preferably a worm and gear of comparatively low pitch so that the motor cannot be driven back by the journal. This arrangement is made so that the hoisting carriage will stand at any desired point when the power is shut off from the motor 34 and avoids the necessity of a brake for this purpose. This operation is also one in too common use to need further description.

Referring now to Fig. 4 I will describe the arrangement of ropes and counterweights which I have invented for the purpose of improving upon the apparatus above described and adding to its efficiency. The ends of the bucket-closing rope 48 extend up from the bucket 40 to and around the drums 25 and 27 and are attached thereto as has been pointed out. One end of another rope 48^A is attached to the drum 25 and after it has been given several turns about this drum it is carried to one end of the structure 11 and over one or more supporting sheaves

such as 50; thence back to the other end of the structure over a supporting sheave 51. From thence it is carried down and under a sheave 52^A which is mounted upon a traveling counterweight 52. From the sheave 52^A the rope 48^A is carried up and over another supporting sheave 53; thence down and under a traveling sheave 52^B mounted on the counterweight 52; thence up and over a supporting sheave 54 near the upper portion of the structure. From this point it is carried back to the drum 27, given several turns around the latter and fastened thereto.

By following the above described arrangement of sheaves, ropes and counterweights, it may be seen that the rope 48^A forms in effect a continuation of the bucket-closing ropes 48 and that the counterweight 52 is suspended in a loop of this rope with a two-to-one reduction pulley-system. The counterweight 52 not only acts as a tension weight to keep the rope 48^A taut, but it may have considerable weight so that it will assist the motor 30 in performing its function of closing and raising the bucket 40.

The hoisting ropes 47 pass from the bucket 40 up to and around the hoisting drums 26 and 28 and are attached to them. A rope 47^A is attached to the drum 26 and after passing several times around it is led over a supporting sheave 55 at one end of the structure back to another supporting sheave 56 at the other end of the structure. It then extends down and under a sheave 57 which is mounted upon a counterweight 58, back over a supporting sheave 59 and to the drum 28 around which it passes and to which it is attached. Thus the rope 47^A forms a continuation of and a connection between the hoisting ropes 47 and the counterweight 58 is suspended in a loop of this connecting rope in such a manner as to tend to keep the rope from sagging and to assist the motor in raising the bucket.

From the above description it may be seen that the hoisting mechanism including its motive power is complete in itself and that therefore there is no necessity for connecting the buckets with a hoisting engine situated away from the trolley. Thus the costly and cumbersome system of ropes commonly in use is entirely done away with. The counterbalancing arrangement which I have invented may be placed entirely out of the zone of operation of the hoisting bucket. One of the great advantages of this arrangement is that the counterweights may be made heavier than the weight of the hoisting bucket and its connected parts. In practice I prefer to make the combined weights of the counterweights 52 and 58 equal to that of the hoisting bucket 40 plus one half of the load which it is adapted to raise as I find that this arrangement produces the greatest efficiency. By this arrangement the motor 30 is required

to exert the same amount of power in driving the empty bucket down for a load as it exerts in raising the filled bucket up with its load, but the power required to perform these operations is one half of that usually required to raise the load as the counterweights assist the motor in raising the load.

By counterbalancing both the closing and hoisting ropes of the bucket very little power is required to lift the load at high speed, and as the action of the counterweights is entirely automatic they do not prevent the movement of the carriage along the track while the hoisting operation is still proceeding. The hoisting trolley need have but little weight, and the absence of all extraneous sheaves and supports for hoisting and hauling ropes as well as the elimination of the usual heavy hoisting engines make this system one of great simplicity and one which may be installed without great expense.

In Fig. 5 another arrangement of the counterweights and their connecting rope system is shown. In this case the counterweight 58 is connected in the same manner as that shown in Fig. 4, but the counterweight 52', which is in a loop of the connecting rope 48^A, is not given a two-to-one movement and is shown as arranged at the opposite end of the structure from that at which the weight 58 is placed.

I have shown more than one modification of my invention to show that I do not confine myself to any specific construction or arrangement of parts.

What I claim is:—

1. A hoisting mechanism movably mounted upon a track, a rope extending along the path of movement of the hoisting mechanism, the ends of the rope connected with the hoisting mechanism, and a counterweight in said rope arranged to assist said hoisting mechanism in lifting a load.
2. A track, a hoisting mechanism movably supported thereon, a rope extending along the track, the ends of said rope connected with the hoisting mechanism, a counterweight, and a sheave connected with the counterweight, said counterweight sheave being supported by the rope and arranged to assist said hoisting mechanism in lifting a load.
3. A track, a hoisting mechanism movably supported thereon, said mechanism comprising a hoisting drum, a rope extending along the track, the ends of said rope connected with the hoisting drum, a counterweight for assisting said hoisting mechanism in lifting a load, and a sheave connected with the counterweight, said counterweight sheave being supported by the rope and so arranged that the lateral movement of the hoisting mechanism does not affect the position of the counterweight.

4. A laterally movable hoisting mechanism comprising a pair of hoisting drums, a counterweight outside the path of movement of said mechanism, and a rope connecting the counterweight and the two hoisting drums.

5. A laterally movable hoisting mechanism comprising a pair of hoisting drums, a counterweight outside the path of movement of said mechanism, and a rope connecting the two hoisting drums, said counterweight being in a loop in the connecting rope.

6. A track, a hoisting mechanism movably supported thereon, said mechanism comprising a pair of hoisting drums, a counterweight near one end of the track, a sheave connected with the counterweight, and a rope connecting the two hoisting drums, said counterweight sheave being in a loop in said connecting rope.

7. A track, a hoisting mechanism movably supported thereon, said mechanism comprising a pair of hoisting drums, a load bearing member connected with said drums, a counterweight near the end of the track, and a rope connecting the counterweight with the two hoisting drums, said counterweight being in a loop in the connecting rope.

8. A track, a hoisting mechanism movably supported thereon, said mechanism comprising a pair of hoisting drums, a load bearing member, ropes or cables connecting the load bearing member with both of the drums, a counterweight near the end of the track, a sheave connected with the counterweight, and a rope connecting the counterweight with the two hoisting drums, said counterweight sheave being in a loop in the connecting rope.

9. A track, a hoisting mechanism movably supported thereon, said mechanism comprising a pair of hoisting drums and means for actuating the drums, a hoisting bucket, ropes or cables connecting the bucket with both of the drums, a counterweight near the end of the track, and a rope system connecting the counterweight with the hoisting drums, said rope system being so arranged that the lateral movement of the hoisting mechanism does not affect the position of the counterweight.

10. A track, a hoisting mechanism movably supported thereon, said mechanism comprising a pair of hoisting drums and means for actuating the drums, a hoisting bucket, ropes or cables connecting the bucket with both of the drums, a counterweight near the end of the track, a rope system connecting the counterweight with the hoisting mechanism, and means for moving the hoisting mechanism along the track, the rope system being so arranged that the lateral movement of the hoisting mechanism does not affect the position of the counterweight.

11. A track, a hoisting mechanism movably supported thereon, said mechanism

comprising a pair of hoisting drums and a motor for actuating the drums, a hoisting bucket, ropes or cables connecting the bucket with both of the drums, a counterweight near the end of the track, a rope system connecting the counterweight with the hoisting drums, and an independent motor for moving the hoisting mechanism along the track, the rope system being so arranged that the lateral movement of the hoisting mechanism does not affect the position of the counterweight.

12. A track, a hoisting mechanism movably supported thereon, said mechanism comprising a pair of hoisting drums and a motor for actuating the drums, a hoisting bucket, ropes or cables connecting the bucket with both of the drums, a counterweight heavier than the weight of the bucket, said counterweight being near the end of the track, a sheave on the counterweight, a rope system passing under the counterweight sheave and connecting the counterweight with the hoisting drums, and an independent motor for moving the hoisting mechanism along the track, the rope system being so arranged that the lateral movement of the hoisting mechanism does not affect the position of the counterweight.

13. A track, a hoisting mechanism movably supported thereon, said mechanism comprising a pair of hoisting drums and a motor and intermediate mechanism for connecting said motor and the hoisting drums; a hoisting bucket, ropes or cables connecting the bucket with both of the drums, a counterweight heavier than the weight of the bucket, said counterweight being near the end of the track, a sheave on the counterweight, a rope system passing under the counterweight sheave and connecting the counterweight with the hoisting drums, and an independent motor and a worm and gear mechanism for moving the hoisting mechanism along the track, the rope system being so arranged that the lateral movement of the hoisting mechanism does not affect the position of the counterweight.

14. A laterally movable hoisting mechanism comprising two pairs of drums and a motor for actuating the drums, a hoisting bucket, ropes or cables connecting the bucket with all of the drums, a counterweight outside the path of movement of said mechanism, a flexible connection between the counterweight and one pair of said drums, a second counterweight outside the path of movement of the hoisting mechanism and a flexible connection between said second counterweight and the other pair of said drums.

15. A track, a hoisting mechanism movably supported thereon, said mechanism comprising two pairs of drums and a motor for actuating the drums; a hoisting bucket, ropes or cables connecting the bucket with

all of the drums, two counterweights near the end of the track, and a rope system connecting one of the counterweights with one pair of said drums, and the other counterweight with the other pair of said drums, said rope system being so arranged that the lateral movement of the hoisting mechanism does not affect the position of the counterweights.

16. A track, a hoisting mechanism movably supported thereon, said mechanism comprising two pairs of drums and a motor for actuating the drums; a hoisting bucket, ropes or cables connecting the bucket with all of the drums, a counterweight near the end of the track, a sheave on said counterweight, a rope passing under said counterweight sheave and connected with each of one pair of drums, a second counterweight near the end of the track, a sheave on said second counterweight, and an independent rope passing under the sheave on said second counterweight and connected with each of the other pair of drums.

17. A track, a hoisting mechanism movably supported thereon, said mechanism comprising two pairs of hoisting drums, a motor, and intermediate mechanism connecting said motor with said drums; a hoisting bucket, ropes or cables connecting the bucket with all of the drums, a counterweight near the end of the track, a sheave on said counterweight, a rope passing under said counterweight sheave and connected with each of one pair of drums, a second counterweight near the end of the track, a sheave on said second counterweight, an independent rope passing under the sheave on said second counterweight and connected with each of the other pair of drums, supporting sheaves for both of said connecting ropes, and an independent motor and worm and gear mechanism on the hoisting mechanism for moving the hoisting mechanism along the track, said ropes and sheaves being so arranged that the lateral movement of the hoisting mechanism does not affect the position of the counterweights.

18. A track, a hoisting mechanism movably supported thereon, said mechanism comprising two pairs of hoisting drums, a motor, and intermediate mechanism connecting said motor with said drums, said mechanism being so arranged that one pair of drums may be rotated relatively to the other pair of drums; a hoisting bucket, ropes or cables connecting the bucket with all of the drums, said bucket being opened and closed by the relative rotation of the two pairs of drums, a counterweight near the end of the track, a sheave on said counterweight, a rope passing under said counterweight sheave and connected with each of one pair of drums, a second counterweight near the end of the track, a sheave on said second

counterweight and connected with each of
the other pair of drums, supporting sheaves
for both of said connecting ropes, the com-
bined weight of the two counterweights be-
5 ing greater than that of the hoisting bucket;
and an independent motor and worm and
gear mechanism on the hoisting mechanism
for moving the hoisting mechanism along
the track, said ropes and sheaves being so
10 arranged that the lateral movement of the

hoisting mechanism does not affect the posi-
tion of the counterweights.

In testimony whereof I have signed my
name to this specification in the presence of
two subscribing witnesses.

CHRISTIAN H. HARTWIG.

Witnesses:

ERNEST W. MARSHALL,
ELLA TUCH.