

E. Y. MOORE.
HOISTING MECHANISM.
APPLICATION FILED MAY 21, 1917.

1,260,243.

Patented Mar. 19, 1918.
3 SHEETS—SHEET 1.

Fig. 1

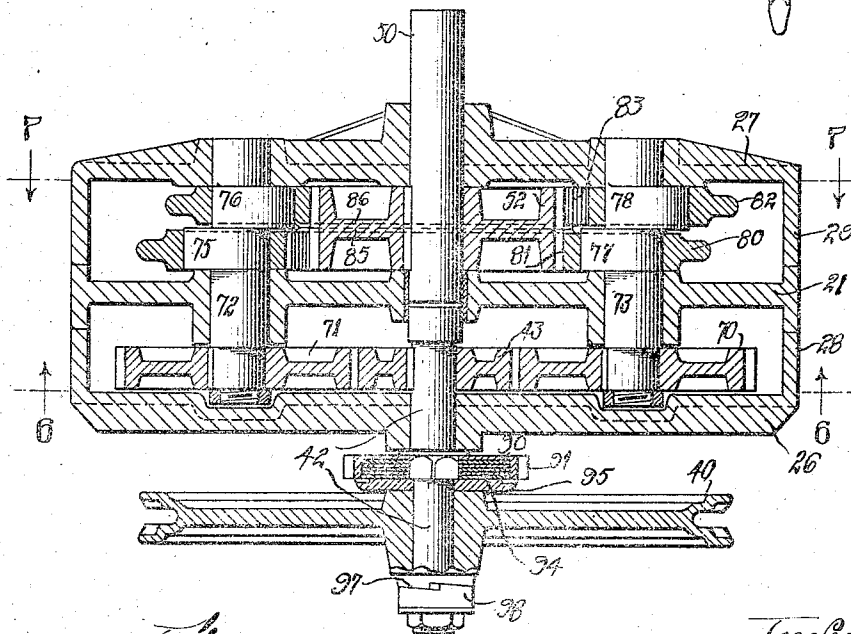
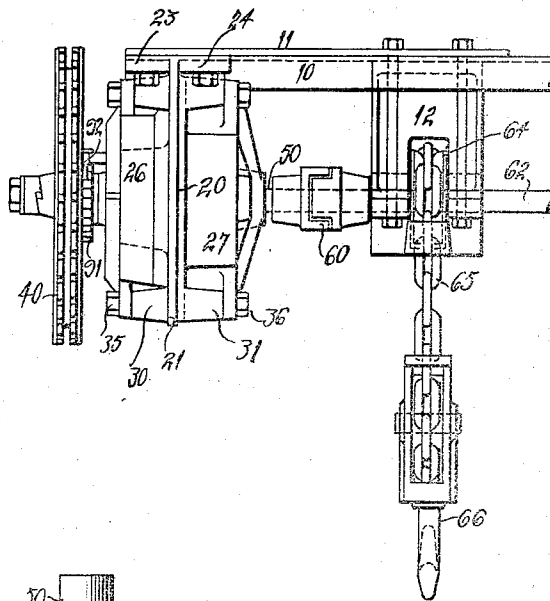


Fig. 2

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Fig. 3

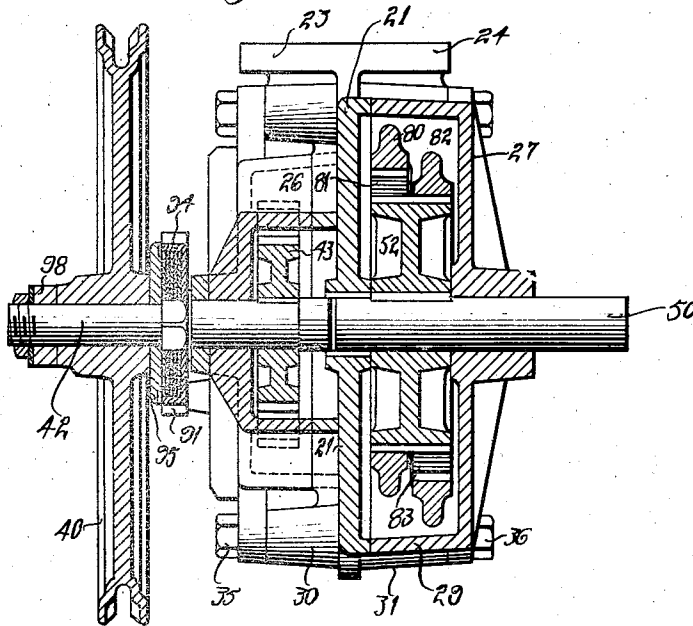


Fig. 4

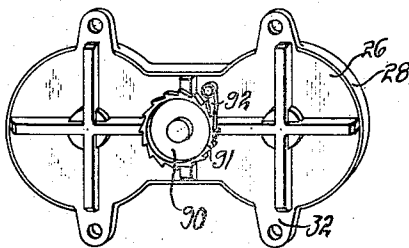
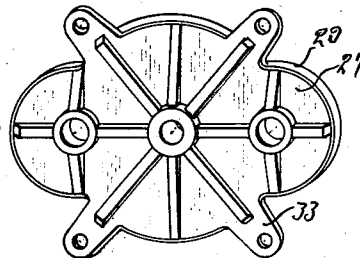


Fig. 5



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3 SHEETS—SHEET 3.

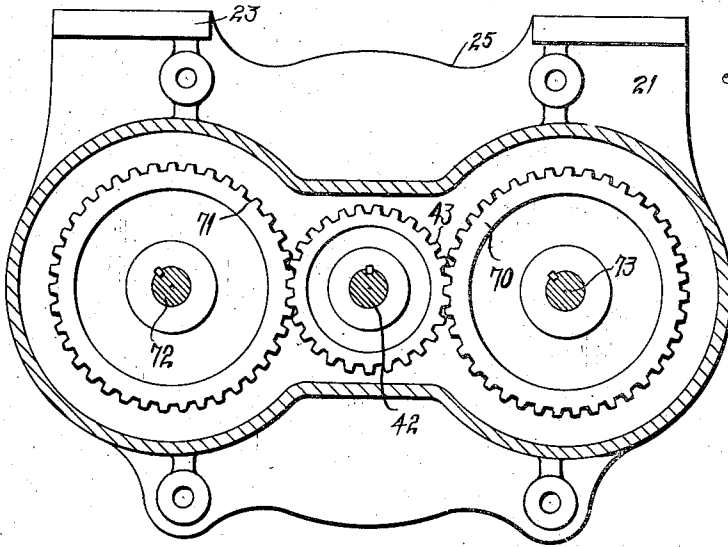


Fig. 6

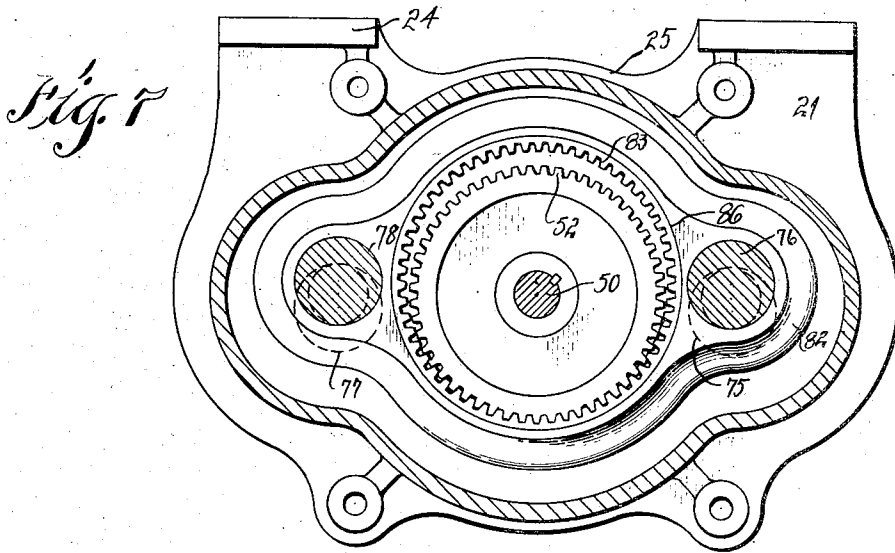


Fig. 7

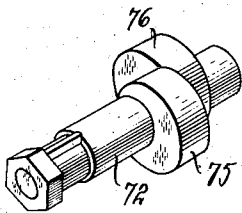


Fig. 8

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UNITED STATES PATENT OFFICE.

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HOISTING MECHANISM.

1,260,243.

Specification of Letters Patent.

Patented Mar. 19, 1918.

Original application filed March 2, 1917, Serial No. 151,883. Divided and this application filed May 21, 1917. Serial No. 169,847.

To all whom it may concern:

Be it known that I, EDWARD Y. MOORE, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Hoisting Mechanism, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

My prior application No. 151,883, filed March 2, 1917, of which this is a division, shows a dual trolley hoist wherein two raising members are operated by a single power mechanism. The present application relates to the particular form of power mechanism shown for rotating the shaft, which carries a plurality of lift wheels. This power mechanism has the advantages of being compact, reliable and efficient, giving comparatively slow rotations to the driven shaft when the driving hand wheel is operated, and effectively holding the load against running down. The invention is hereinafter more fully explained, in connection with the drawings, and the essential characteristics are set out in the claims.

In the drawings Figure 1 is a side elevation of the hoisting mechanism of this invention, the driven shaft, which may carry any number of lift wheels, and the support, being broken off. Fig. 2 is a horizontal central section of the power mechanism on a larger scale; Fig. 3 is a vertical central section of the power mechanism on the same scale as Fig. 2; Figs. 4 and 5 are perspectives on a reduced scale of the front and rear frame plates of the power mechanism respectively; Figs. 6 and 7 are sectional elevations on the lines 6—6 and 7—7 respectively on Fig. 2, each looking toward the intermediate frame plate of the hoist. Fig. 8 is a perspective view of one of the double eccentric shafts employed in the hoist.

As shown in Fig. 1, 10 indicates the supporting member of the hoisting mechanism, which is shown as a downwardly facing horizontal channel beam equipped with a surmounting plate 11. 12 is a bearing block bolted to the under side of the channel beam. 20 indicates the power mechanism with which this invention is specifically concerned, which is shown as bolted to the under side of the plate 11. The power mechanism is equipped with a driving hand wheel 40, resulting, as hereinafter described, in slow rotation of the driven shaft 50. This driven

shaft is connected by a suitable loose-play coupling 60 with a shaft 62 mounted in the bearing block 12 and carrying a lift wheel 64, over which extends a lift chain 65 leading to the lift hook 66.

I will now describe particularly the power mechanism, referring to the other figures of the drawing.

The power mechanism proper is mounted on a vertical central frame plate 21 which has at its upper end horizontal lugs 23 and 24 lying against the under side of the plate 11 and securely bolted thereto. The plate 21 is recessed at its upper edge, as shown at 25, to allow it to extend readily beneath the channel beam 10. The frame of the power mechanism includes, beside the central supporting plate 21, a front plate 26 and a rear plate 27 bolted to the central plate. These plates 26 and 27 are of the general form shown in Figs. 4 and 5 respectively, being stiffened by webs and having flanges, 28 and 29 respectively, which abut correspondingly formed flanges on the central frame plate. The central frame plate is provided with suitable bosses 30 and 31, and the front and rear plates have ears 32 and 33 abutting against the ends of these bosses respectively. The cap screws 35 and 36 passing through the ears into the bosses hold the structure together.

The driving shaft of the power mechanism is designated 42. It is mounted in the front frame member 26 and in the central plate 21. This shaft is rotated preferably by the hand wheel 40 which is mounted on the shaft and connected with it in a manner hereinafter described. A chain, not shown, is adapted to rotate the hand wheel.

Mounted on the shaft 42 on the inner face of the front plate 26 is a spur gear 43. This gear meshes with two other spur gears 70 and 71, which are rigid on shafts 72 and 73. These shafts are journaled in the central plate 21 and also in the other side plate 27. Between the plates 21 and 27 the shafts 72 and 73 are provided each with two eccentrics designated respectively 75, 76 and 77, 78. The eccentrics 75 and 77 lie in the same direction and extend into circular openings in a yoke plate 80, which has internal teeth 81. Similarly, the eccentrics 76 and 78 extend in the same direction, which is opposite to the two other eccentrics, and these eccentrics occupy circular openings in the yoke 82 which has internal teeth 83.

The two sets of internal teeth work on a driven spur gear 52, which is located within the openings of both yokes and mounted on the driven shaft 50, this shaft being journaled in the central frame plate 21 and the rear plate 27.

The result of the above construction is that, as the driving shaft 42 is rotated, the shafts 72 and 73 carrying the eccentrics, are rotated, and the eccentrics give the two yokes circular translations, or gyrations, which cause their internal teeth to slowly carry around the driven wheel 52 and the driven shaft. It will be seen that the speed of the driven shaft is dependent on the difference in the number of teeth between the spur gear 52 and the internal gears on the yokes. That is to say, for each cycle of movement of the yokes the driven shaft is rotated such a portion of a complete rotation as the difference between the number of internal teeth on the yoke and the number of external teeth on the spur gear bears to the total number of teeth on the spur gear. The rotation of the driven shaft, therefore, is comparatively slow in proportion to that of the driving shaft, and thus the power is correspondingly increased.

To prevent either yoke from abutting the eccentrics appertaining to the other yoke, I form bosses or enlargements on the inner sides of the respective yokes. These enlargements are designated 85 and 86 respectively. They engage each other sufficiently to prevent either yoke contacting with the eccentrics for the other yoke.

To allow the power mechanism to automatically hold its load and at the same time to operate rapidly in the direction corresponding to descent of the load, enabling the load to run down freely when desired, I provide a ratchet device for the driving shaft controlled by a friction clutch between the hand wheel and shaft. The clutch is active on the raising movement but is released by a relatively backward movement of the hand wheel to allow the shaft 42 to turn independently of the ratchet. Briefly, this mechanism consists of a cup 90 freely rotatable on the shaft 42 and provided with ratchet teeth 91 on its periphery adapted to be engaged by a pawl 92 carried by the front plate 26. Within the cup are a number of friction disks 94 connected alternately with the cup and shaft 42. That is to say, the first disk may be connected at its inner periphery with the shaft, and the next disk at its outer periphery with the cup, and so on. Bearing against the front of these disks is a plate 95. Against this plate the rear face of the hand wheel hub bears. The forward end of this hub is formed with an incline 97 which bears against an inclined collar 98 rigidly, though adjustably, secured to the shaft 42.

The inclines between the collar 98 and the hand wheel hub are in the direction to force the hand wheel toward the power mechanism when the hand wheel is turned in the raising direction. Such operation, therefore, clamps the disks and locks the hand wheel to the ratchet cup. The teeth on this cup are in such direction that the cup may rotate freely under the pawl 92, in the raising direction of rotation. Accordingly, in the raising direction the hand wheel, disks and cup, rotate as a unit, the ratchet teeth clicking idly under the pawl but being held thereby whenever the movement ceases.

To lower the load the hand wheel is turned in the opposite direction and this allows it to play back from the clutch, freeing the disks so that the shaft turns independently of the ratchet cup, and the load runs down so long as the hand wheel is kept in advance in rotation from that caused by the descending load. Whenever this advance ceases the load is automatically held by the friction clutch, ratchet and pawl.

Such power mechanism as described, comprising broadly a gyrating internally toothed yoke driven by an eccentric, and the arrangement of two of such yokes operating concurrently, and the arrangement of the clutch-controlled ratchet, are claimed in prior patents of mine, namely: Nos. 757,333, of April 12, 1904; 794,997, of July 18, 1905; 946,253, of January 11, 1910. Such patents, however, show a lift wheel within the hoist mechanism on a sleeve through which the driving shaft extends. The present invention enables the lift wheel to be located at any desired point at the side of the frame of the power mechanism, and any number of lift wheels to be employed. The power mechanism is consolidated into the minimum of space, resulting in a very compact and efficient machine for causing rapid rotations of the hand wheel to result in slow rotations of the driven shaft.

Having thus described my invention, what I claim is:

1. In a hoisting mechanism, the combination of a frame comprising three vertical plates side by side connected together, a pair of aligned shafts both mounted in the intermediate plate and each extending through one of the side plates, a hand wheel on one of the shafts beyond the frame, a pair of individual shafts mounted in the intermediate plate and the other side plate, an eccentric on each individual shaft, a spur gear on the driven shaft in the space between the intermediate plate and the last mentioned side plate, a yoke in such space having internal teeth engaging the spur gear and having the eccentrics mounted in it, the individual shafts extending through the intermediate plate to the space on the other side thereof, gears on said individual

shafts in such latter space, and a central gear on the driving shaft in such latter space meshing with the gears first mentioned.

2. The combination of a driving and a driven shaft, a gear on the driven shaft, a pair of internally-toothed yokes mounted side by side and surrounding said gear, a pair of shafts each provided with two eccentrics for gyrating said yokes, bosses on the adjacent faces of said yokes preventing either from engaging the eccentrics appertaining to the other, and gearing connecting the driving shaft with said eccentrics.

3. In a hoisting mechanism, the combination of a frame comprising three vertical plates side by side connected together, a pair of alined shafts both mounted in the intermediate plate and each extending through one of the side plates, a pair of individual shafts mounted in the intermediate plate and one of the side plates, two eccentrics on each individual shaft, a spur gear on the driven shaft in the space between the intermediate plate and the last mentioned side plate, a pair of yokes in such space each having internal teeth engaging the spur gear and having the eccentrics mounted in it, the two yokes being provided on their adjacent sides with means for main-

taining them separated when they surround the eccentrics, gears on said individual shafts on the other side of the intermediate frame plate, and a central gear on the driving shaft meshing with the gears first mentioned.

4. In a hoisting mechanism, the combination of an intermediate frame plate having laterally extending supporting ears, a driving shaft on one side of the plate and journaled therein, a driven shaft on the other side of the plate journaled therein and in alinement with the driving shaft, a pair of individual shafts extending through said plate, gearing between the driving shaft and the individual shafts on one side of the plate, eccentrics on the individual shafts on the other side of the plate, an internally toothed yoke mounted on said eccentrics, a spur gear on the driven shaft lying within and engaged by the internal teeth of the yoke, and two frame plates carrying respectively the other bearings of the driving and driven shaft and bolted to said intermediate plate on opposite sides thereof.

In testimony whereof, I hereunto affix my signature.

EDWARD Y. MOORE.