E. Y. MOORE.

HOIST.

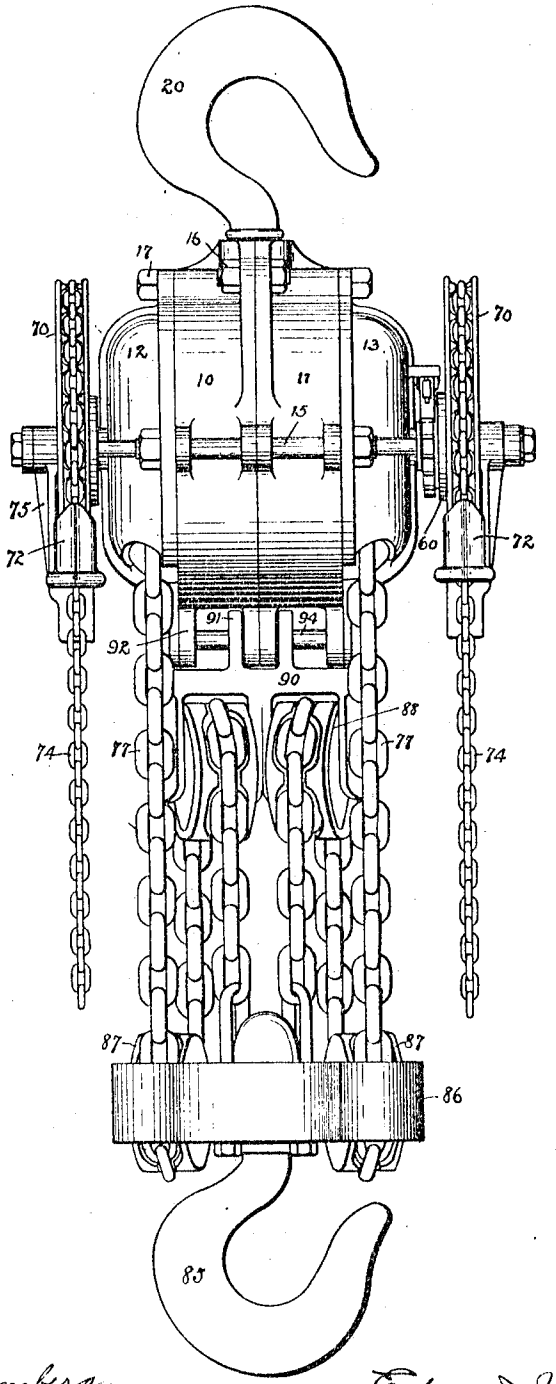
APPLICATION FILED NOV. 22, 1909.

1,035,030.

Patented Aug. 6, 1912.

4 SHEETS—SHEET 1.

Fig-1



Witnesses.
Arthur S. Remeberg.
Oliver M. Kappler.

Inventor.
Edward Y. Moore,
By Baker, Doyle & Hull,
Attys.

E. Y. MOORE.

HOIST.

APPLICATION FILED NOV. 22, 1909.

1,035,030.

Patented Aug. 6, 1912.

4 SHEETS-SHEET 2.

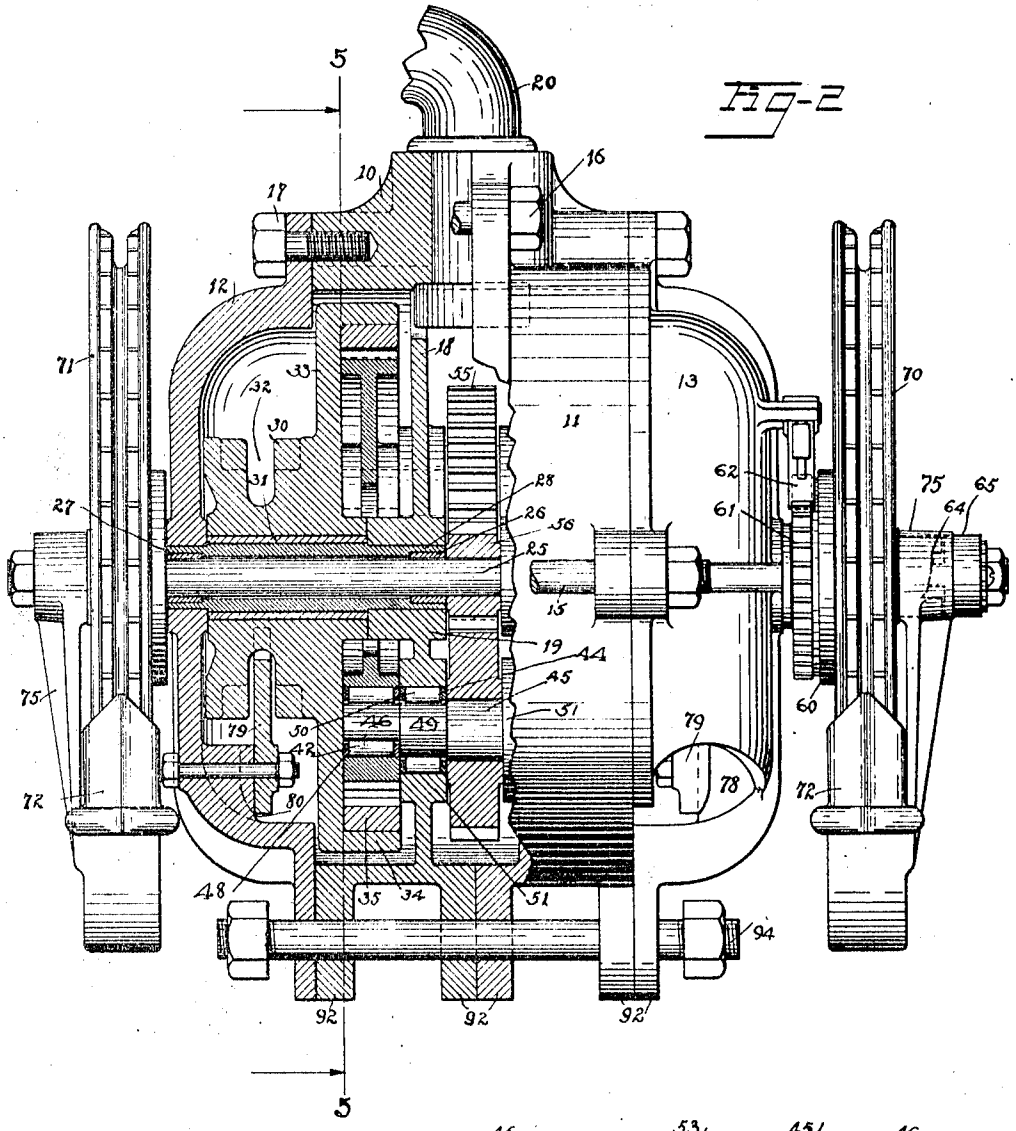


Fig-2

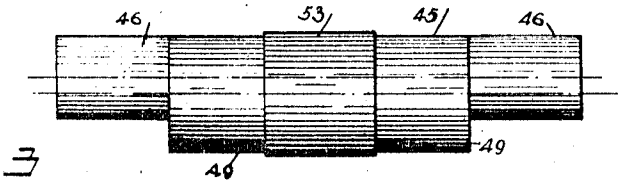


Fig-3

Witnesses-

Arthur S. Remsberg.

Oliver M. Kappler.

Inventor.

Edward Y. Moore,

By Watts, Gouty & Hull

Attys.

E. Y. MOORE.

HOIST.

APPLICATION FILED NOV. 22, 1909.

1,035,030.

Patented Aug. 6, 1912.

4 SHEETS—SHEET 3.

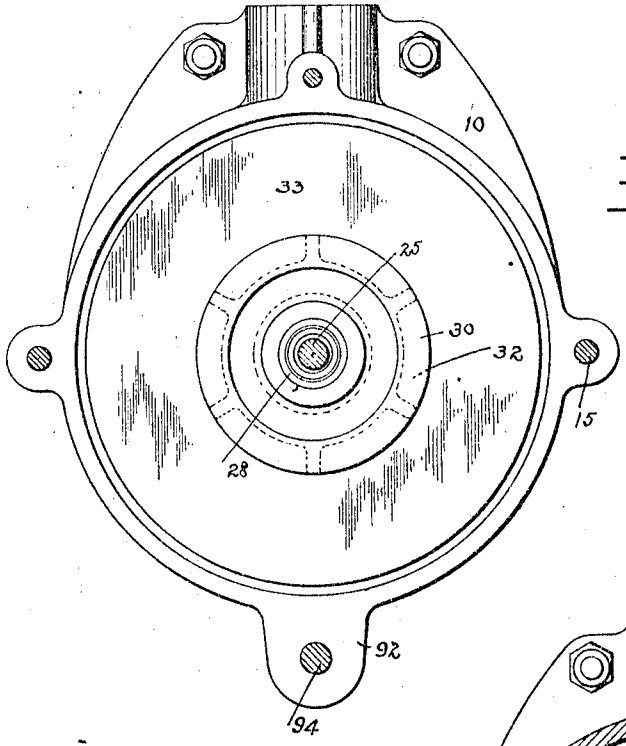


Fig. 4

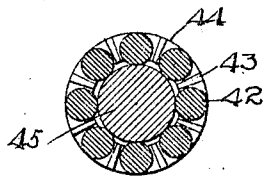


Fig 8

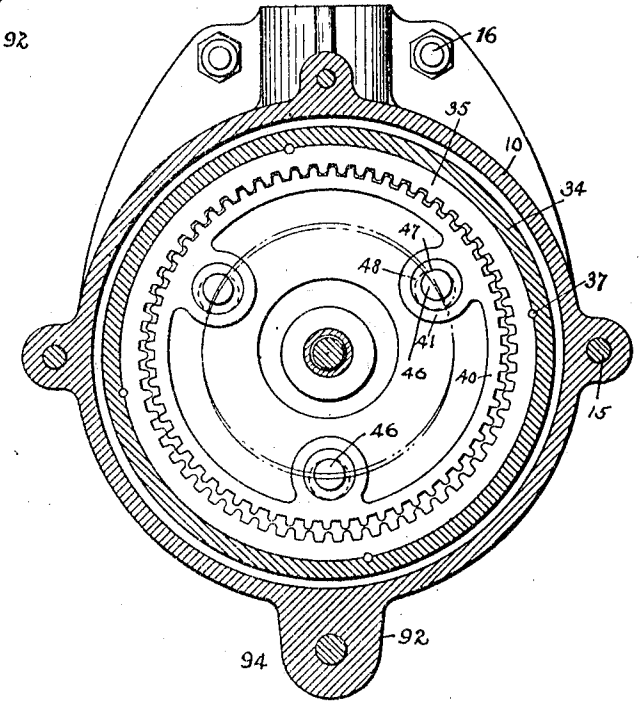


Fig. 5

Witnesses.
Arthur S. Remsberg.
Oliver M. Kappler.

Inventor.
Edward Y. Moore,
By Baker, Doutt & Hull,
Attys.

E. Y. MOORE.

HOIST.

APPLICATION FILED NOV. 22, 1909.

1,035,030.

Patented Aug. 6, 1912.

4 SHEETS—SHEET 4.

Fig- 6.

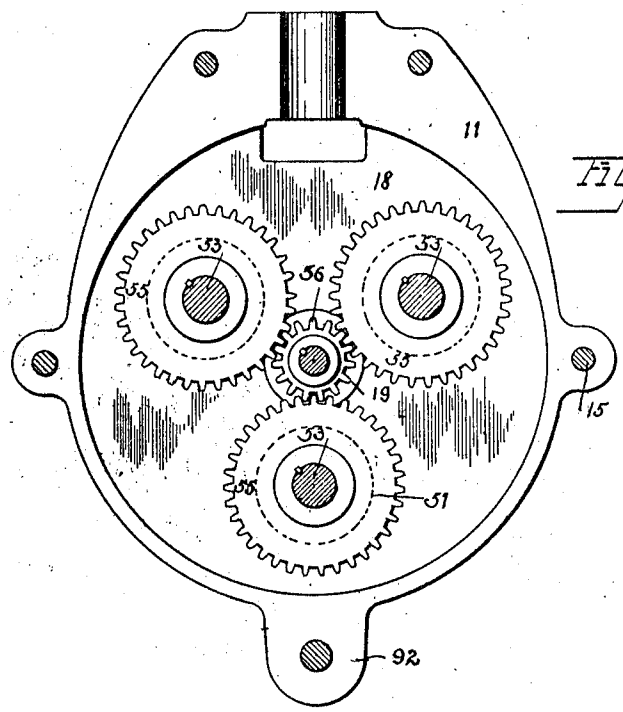
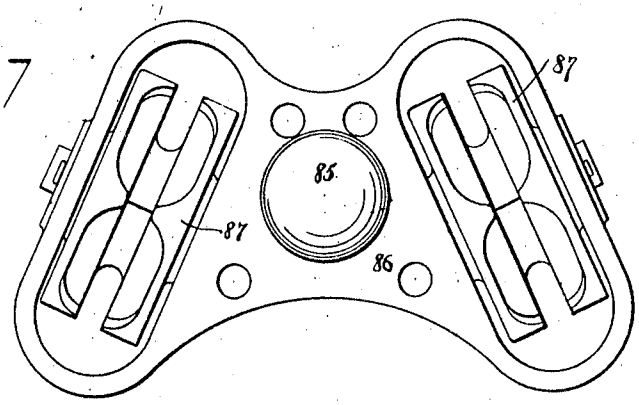


Fig- 7



Witnesses=
Arthur S. Remberg
Oliver M. Kappler.

Inventor:
Edward Y. Moore,
By Baker, Foutz, Bluhm,
Attys-

UNITED STATES PATENT OFFICE.

EDWARD Y. MOORE, OF CLEVELAND, OHIO.

HOIST.

1,035,030. Specification of Letters Patent. Patented Aug. 6, 1912.

Application filed November 22, 1909. Serial No. 529,167.

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 Hoists, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The object of this invention is to provide an efficient and powerful hoist adapted to be arranged in very compact form. To this end I provide, in the preferred form, a pair of lift wheels having gears connected with them, a second pair of gears adapted respectively to mesh therewith, and eccentrics driven from a common point for gyrating such second pair of gears.

The invention comprises broadly a hoist so constructed, and various other features contributing to the efficiency thereof, as hereinafter described and claimed.

In the drawings—Figure 1 is a side elevation of my hoist complete, showing the raising chains and lift hook; Fig. 2 is a sectional side elevation of the hoisting mechanism without the chains or lift hook; Fig. 3 is a side elevation of one of the eccentric shafts; Fig. 4 is an elevation of the hoisting mechanism at right angles to Fig. 2, and with the corresponding hand-wheel and outer member of the casing removed; Fig. 5 is a vertical section through the mechanism as indicated by the line 5—5 of Fig. 2, looking toward the center of the hoisting; Fig. 6 is a vertical section through substantially the center of the hoist in a plane parallel with Figs. 4 and 5; and Fig. 7 is a plan of the supporting yoke and lift hook shown in elevation in Fig. 1. Fig. 8 is a section through one of the roller bearings.

As shown in the drawing, the hoist frame consists of four parts, namely, the two ring-like members 10 and 11, abutting each other at the central plane of the hoist, and the two outer saucer-shaped members 12 and 13, abutting the outer edges of the members 10 and 11. These various members are secured together by suitable bolts, which may be through bolts for all members, as shown at 15 in Fig. 1, or individual bolts or cap-screws connecting to abutting members as indicated at 16 and 17. Each of the members 10 and 11 has a transverse internal diaphragm or web 18 which furnishes a bearing for the hoisting mechanism, as hereinafter explained. The supporting hook 20 is swiveled in coöperating recesses provided by the members 10 and 11, as is well understood.

The main driving shaft of the hoist is designated 25. It extends transversely of the hoist at the axis of the various frame members and is journaled, as shown, in graphite bronze bushings 26 and 27 which are mounted within the bore of stationary sleeves 28, of which there are two, the respective sleeves being mounted at their outer ends in the frame members 12 and 13 respectively, and at their inner ends in bosses 19 formed on the diaphragms 18 of the frame members 10 and 11.

Journaled around the stationary sleeves 28 are the lift wheels, of which one is shown at 30 in Figs. 2 and 4. Between the sleeve 28 and the lift wheel is shown a graphite bronze sleeve 31 which is fixed in the lift wheel and provides a good bearing surface on the sleeve 28. Each lift wheel has the usual chain receiving pockets 32 and is formed on its inner side into a disk 33 which carries near its periphery a flange 34 extending toward the center of the hoist. This flange 34 has internal gear teeth which preferably are formed in a separate member 35 rigidly held in place within the flange. Fig. 5 shows pins 37 insuring rigidity between the gear 35 and the flange.

Within each of the internal gears 35 is an external gear 40 having a less number of teeth than the internal gear and adapted to mesh with it at any point. The external gears 40 are, as shown, rings having an open interior and having three inwardly extending bosses 41. Journaled within the two diaphragms 18 at three points are the shafts 45. The inner ends of these shafts 46 are turned eccentrically and occupy openings 47 in the bosses 41, there being preferably, roller bearings 48 between the eccentrics 46 and the bosses. At their bearings in the diaphragms 18 the portions 49 of the shafts preferably also occupy roller bearings 50 which are within bosses 51 of the diaphragms. Each of these bearings is preferably of the construction shown in Fig. 8, and comprises rollers 42 separated by spacers 43 held by end rings 44. On the central portion 53 of each shaft 45 is rigidly secured a spur gear 55. The three spur

gears 55 shown, mesh with the centrally located spur pinion 56, which is rigid on the driving shaft 25.

From the above construction it results that when the main shaft is rotated the pinion 56 and the gears 55 rotate in unison, and the three shafts 45, by reason of the eccentric extensions 46 thereon, cause the two external gears 40 to have a gyratory motion within the internal gears 35. The result of this is that each complete gyration of the external gear drives the internal gear such a portion of a rotation as the difference between the number of teeth on the external and internal gears bears to the whole number of teeth on the internal gear. Accordingly, such gyration gives the internal gear a very slow rotation, which causes the wheels to raise the chain at a correspondingly reduced speed. This great reduction in the speed, by reason of the exter. al g aring, as well as the further reduction by the spur gearing, enables a very powerful hoist to be comparatively small.

The construction of the parts described is such that there is a very high efficiency in raising the load, and concomitantly a tendency of the load to run down when the raising movement ceases. To prevent such running down, I provide a brake between the hand wheel and the main shaft which is idle during the raising operation, but is effective to prevent the reverse rotation.

The brake which I prefer to employ is that shown, described and claimed in my Patent #794,997 and will be hereinafter only briefly described. It comprises a hollow cup-like member 60 (Figs. 1 and 2) journaled around the main shaft adjacent to the inner side of the hand wheel 70 and having on its exterior, ratchet teeth 61 with which coöperate a pawl 62 carried by the casing 13. On the inferior of the cup 60 are a series of friction disks, not shown, which are connected alternatively with the cup and the shaft, so that when these disks are pressed toward each other the cup is frictionally locked to the shaft, while in the absence of such pressure the cup is free. The hand wheel has a cam connection with the main shaft by means of diagonal faces on two adjacent collars 64 and 65, one of which is rigid with the hand wheel and the other with the shaft.

The faces of the inclines or cams are in such direction that when the hand wheel is turned to raise the load it is forced inwardly to bind the disks in the brake, thus causing the cup 60 to rotate idly with the hand wheel and shaft, the ratchet teeth 61 passing freely under the pawl 62. As soon as the lifting rotation ceases, the tendency of the main shaft to rotate backwards, by reason of the weight thereon is counteracted by the pawl engaging a ratchet tooth, thereby holding the load at any point to which it may have been raised. To lower the load the hand wheel is simply turned backwardly faster than the main shaft turns under the influence of the load, this advancement of the hand wheel on the shaft freeing the brake and allowing the shaft to turn within the stationarily held cup 60.

The drawing shows two hand wheels 70 and 71, though it is obvious, of course, that one wheel alone may be employed, if desired. When two are employed, one is rigid on the shaft and the other has the brake connection referred to. The hand wheels preferably have chain guards 72 providing sleeves adapted to surround the hand chains 74. These guards are shown as carried by central arms 75 journaled on the projecting ends of the main shaft. The lift chain 77 extends down through openings 78 in the frame members 12 and 13. To insure the lift chain being properly freed from the lift wheels, I provide the separators 79 which are bolted to bosses 80 on the inner faces of the frame members 12 and 13 and stand between the two depending legs of the chain as it passes down over the wheel.

It is obvious that the lift chains 77 may be connected with the lower hook in any suitable manner, for example, they could be anchored at their lower ends to a bar in which the hook is switched, or the lift wheels could be of different diameter and a single chain pass off of opposite sides and carry the lift hook in a bight, thus making a differential hoist; or the chains may run off of the same side of the lift wheels. The latter is the form shown in the drawing, wherein the hook 85 is swiveled in a yoke 86, in which are journaled chain wheels 87, which lie in bights in the two lift chains. These lift chains are shown as passing upwardly from the wheels 87 over wheels 88 carried by a shackle 90 supported by the hoist frame, the chains passing downwardly from these wheels 88 to the yoke 86, where their ends are anchored. This arrangement of chain and pulleys 87 and 88 gives a very powerful action, trippling the power delivered by the lift wheels to the lift chain.

The pulleys 87 in the yoke 86 are placed diagonally as shown in Figs. 1 and 7 so that the ascending and descending chains do not interfere and the chain support on the hoist frame may be as compact as possible. The pulleys 88 being oppositely diagonal, as shown, the final reach of the chains may also be out of the way, being anchored comparatively near the upper end of the supporting hook.

Obviously, the wheels 88 could be dispensed with and the ends of the lift chains anchored to the shackle if a less powerful mechanism were desired, or the power may be further increased by additional wheels. The shackle 90 may conveniently be formed

with upwardly extending ears 91 adapted to lie adjacent to downwardly extending ears 92 on the various members of the hoist frame, these latter ears carrying a through bolt 94 on which the shackle is mounted.

Having thus described my invention, what I claim is:—

1. In a hoist, the combination, with a frame having two internal diaphragms and two external parts, of a pair of lift wheels rotatably mounted on opposite sides of the two diaphragms and each having an overhanging flange projecting toward the diaphragm and provided with internal gear teeth, a pair of external gears located respectively within such internal gear and between the body of the lift wheel and the corresponding diaphragm, eccentric shafts extending across the diaphragms and journaled therein and extending into the external gears and adapted to gyrate them, spur gears on said eccentric shafts between the diaphragms, a centrally located drive shaft, and a pinion thereon meshing with the spur gears.

2. In a hoist, a frame comprising two intermediate parts and two outside parts, the whole making a substantially closed structure, a hook swiveled between the two intermediate parts, a pair of diaphragms carried by the intermediate parts, two raising mechanisms between the diaphragms and the outer parts of the casing, there being openings through such outer parts for the passage of the lifting chain, supports for the raising mechanisms carried by the four parts of the frame independently of the driving shaft, a driving shaft axial with the raising mechanisms, and driving mechanism connected therewith and mounted between the diaphragms.

3. In a hoist, the combination of a pair of parallel frame plates, a pair of lift wheels suitably journaled on the outer sides of said frame plates and each having a portion overhanging toward the adjacent plate, such overhanging portion being provided with internal gear teeth, a pair of external gears adapted to engage the internal teeth referred to, such external gears being located between the lift wheels and frame plates, a shaft journaled in both frame plates, eccentrics on the outer ends of said shaft adapted to drive the two external gears, and means engaging said shaft between the frame plates for driving it.

4. In a hoist, the combination of a frame having two outer supporting portions and two intermediate supporting portions, a pair of alined tubes journaled each in one of the outer portions and adjacent the intermediate portion, a pair of lift wheels journaled on the respective tubes, each lift wheel having an internal gear adjacent to the corresponding inner support, a pair of external gears meshing with the internal gears respectively, shafts mounted in the two inner supports, eccentrics on the ends of said shafts engaging the two external gears, pinions on said shafts between the intermediate supports, and a drive shaft occupying said tubes and having a pinion meshing with the pinions first-mentioned.

5. The combination, with a hoisting mechanism having a pair of lift wheels, of a device carried by the frame of said hoisting mechanism and having a pair of pulleys at an acute angle to each other, a load supporting device having a pair of pulleys at an acute angle to each other, the more distant portions of one set of said pulleys being a distance apart corresponding to the closer portions of the other set of pulleys, and flexible lifting members passing across the lift wheels and the various pulleys.

6. The combination, with hoisting mechanism, of a frame therefor, a load support having obliquely placed pulleys, lift pulleys parallel with each other carried by the hoist frame, other pulleys obliquely placed and carried by the hoist frame intermediate of the lift pulleys, and flexible raising members passing beneath the obliquely placed pulleys first-mentioned and over the obliquely placed pulleys last-mentioned, said raising mechanism being connected with the hoisting mechanism.

7. The combination, with a hoisting mechanism, having a pair of parallel lift wheels, a device carried by the frame of said hoisting mechanism and having a pair of spools side by side but at an acute angle to each other, a load supporting block having a pair of pulleys side by side but at an acute angle to each other, the more distant portions of the last-mentioned pulleys being a distance apart corresponding to that of the lift wheels and the closer portions being a distance apart corresponding to that of the obliquely placed pulleys firstmentioned, and a supporting hook carried by said load supporting block.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

EDWARD Y. MOORE.

Witnesses:
V. MUMFORD MOORE,
THOMAS W. JOHNSON.