No. 757,333. PATENTED APR. 12, 1904.

E. Y. MOORE.

HOIST.

APPLICATION FILED OCT. 17, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

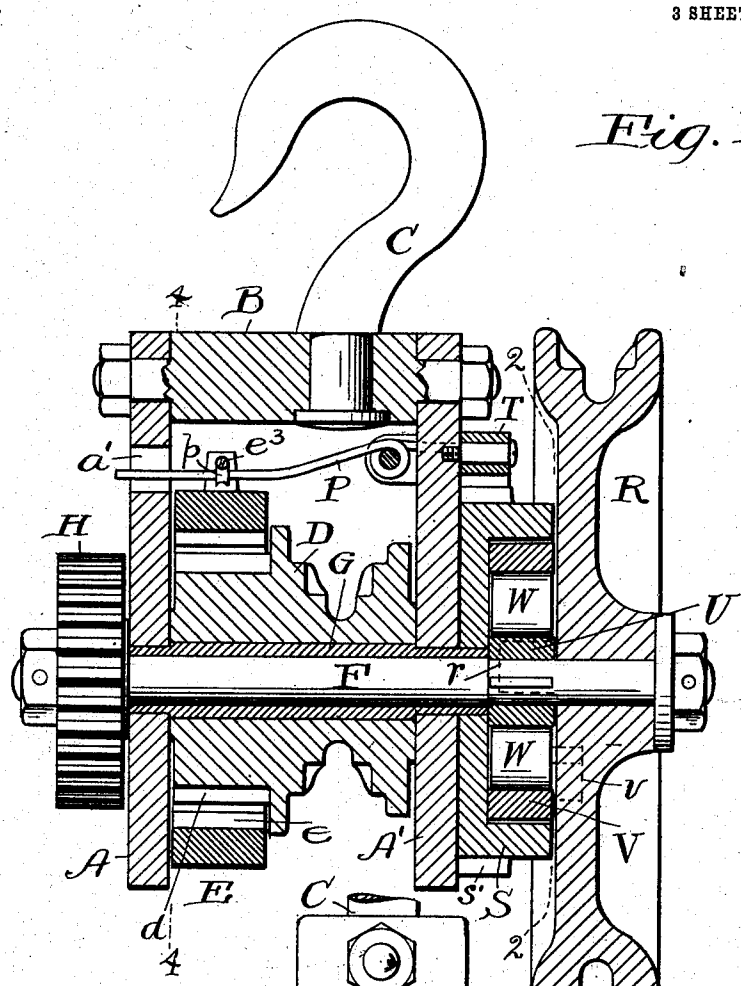
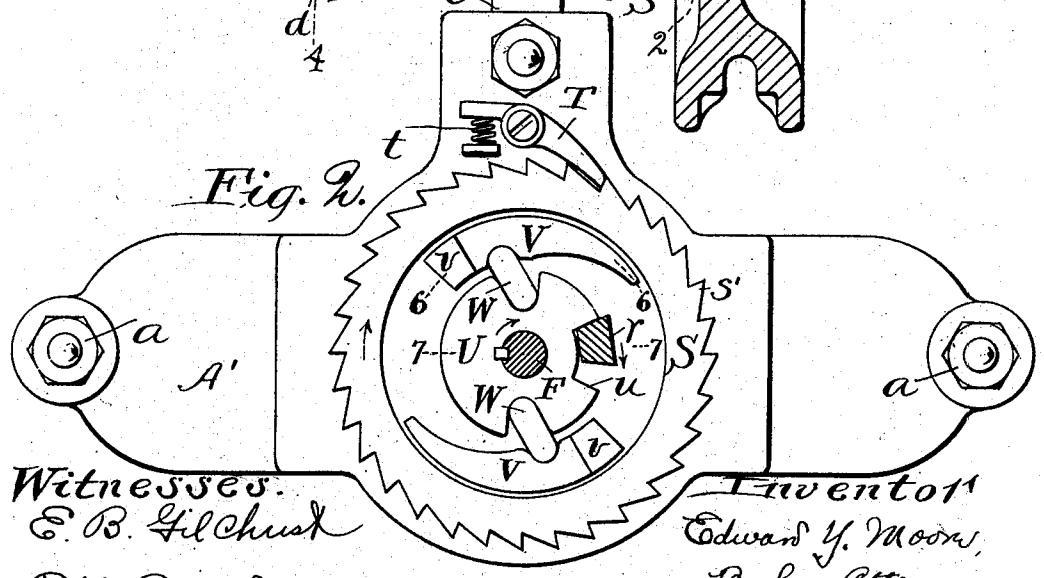


Fig. 2.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 3.

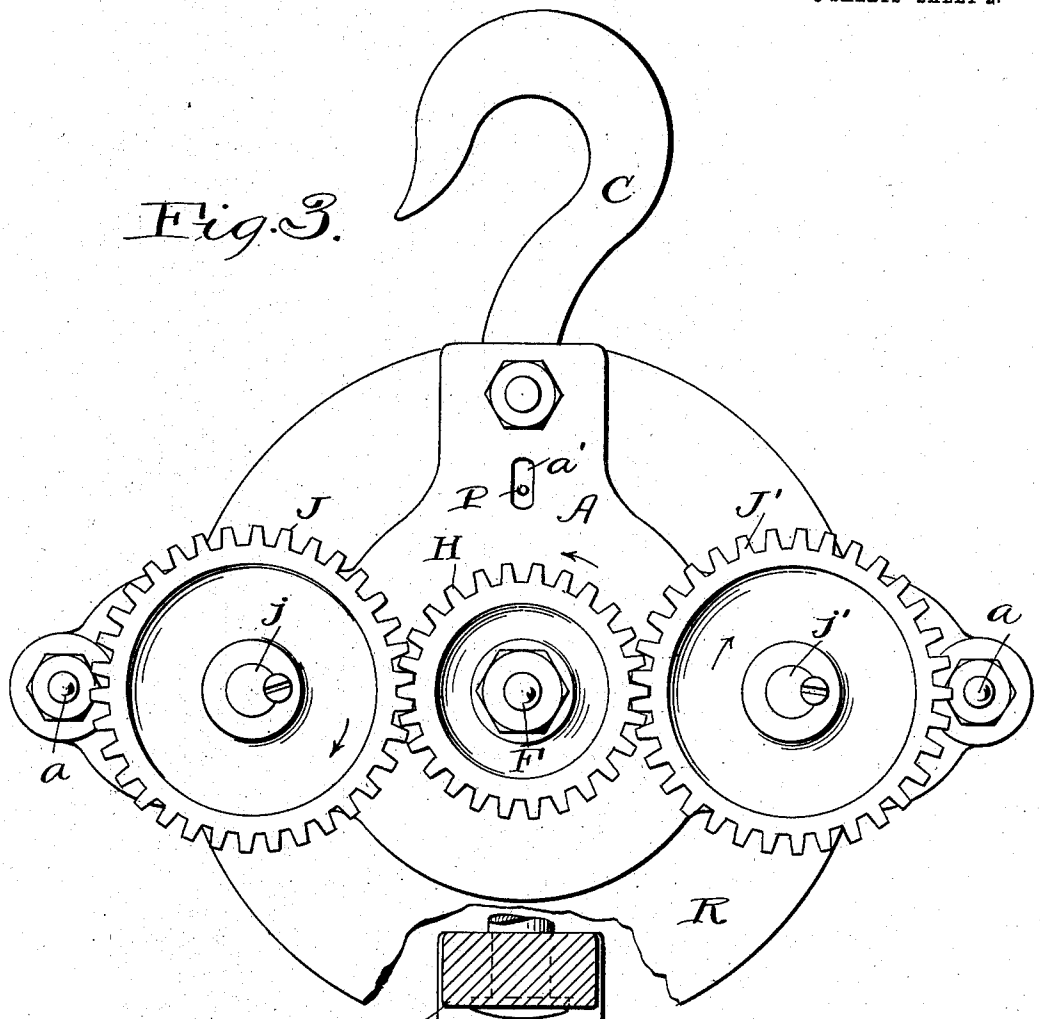
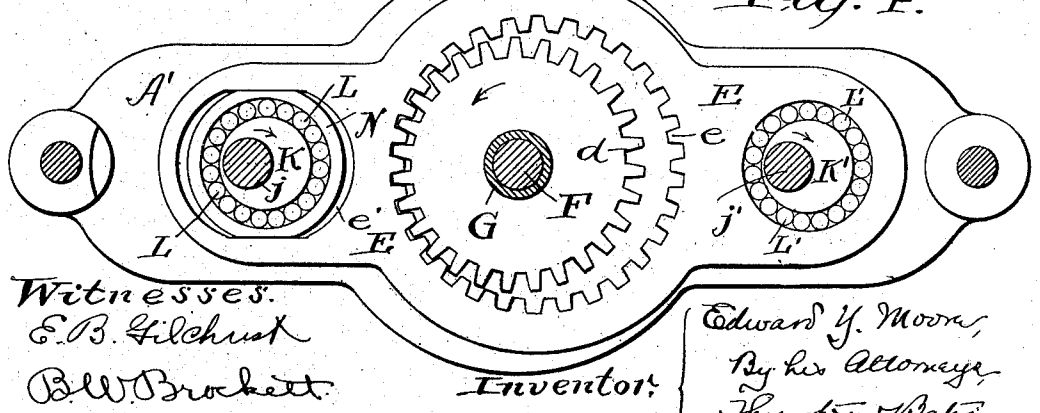


Fig. 4.



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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 5.

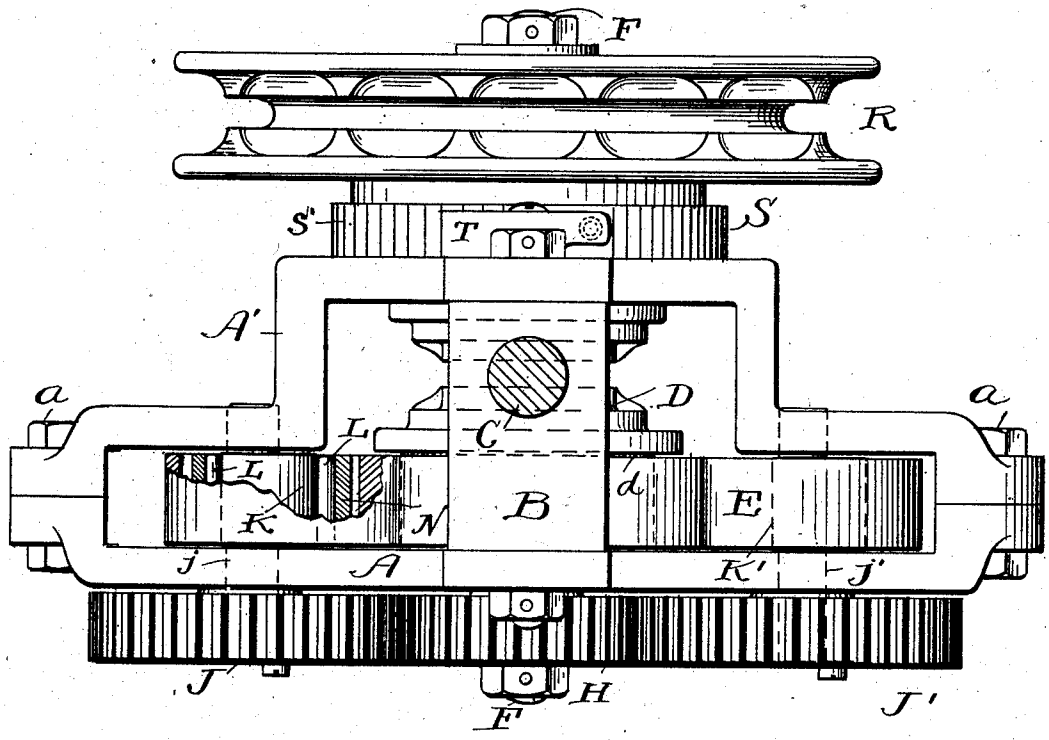


Fig. 6.

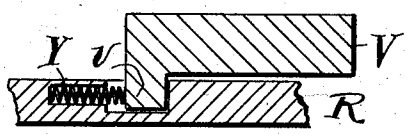
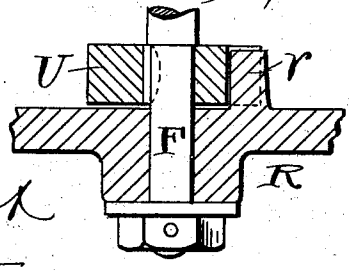


Fig. 7.



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No. 757,333. Patented April 12, 1904.

UNITED STATES PATENT OFFICE.

EDWARD Y. MOORE, OF CLEVELAND, OHIO.

HOIST.

SPECIFICATION forming part of Letters Patent No. 757,333, dated April 12, 1904.

Application filed October 17, 1903. Serial No. 177,459. (No model.)

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 a simple and efficient hoist—one which shall raise the load without undue loss of power in internal friction and shall be able to sustain it at any desired point.

The invention is hereinafter fully described, and its essential characteristics set out in the claims.

The drawings show my improved hoist as embodied in an apparatus suspensible from a hook and having an operating-wheel for the reception of the hand-chain.

Figure 1 is a vertical central cross-section of such hoist. Fig. 2 is a side elevation of the same sectioned through the operating-shaft and through a lug on the inner face of the hand-chain wheel, being on the line 2 2 of Fig. 1. Fig. 3 is a side elevation of the hoist from the left side of Fig. 1. Fig. 4 is a vertical section on the line 4 4 of Fig. 1. Fig. 5 is a plan sectioned through the shank of the supporting-hook. Figs. 6 and 7 are details, being sections through the hand-chain wheel and adjacent parts on the lines 6 6 and 7 7, respectively, of Fig. 2.

The same letters of reference designate the same parts in each figure.

The frame of the hoist, as shown, consists of the two side members A A′, secured together at their ends by bolts *a a*. A cross-head B is pivotally secured to such frame members, and to it is swiveled the supporting-hook C. Between the side members of the frame is the lifting-chain pulley or main pulley D. This pulley is rotatably carried by the frame members, the supporting means shown in the drawings being a stationary hollow sleeve G, which extends from the frame member A to the frame member A′ and constitutes virtually a portion of the frame. The frame member A′ is offset away from the frame member A, as shown in Fig. 5, to accommodate the main pulley.

Formed on an extension of the main pulley D is an external gear *d*. Surrounding this gear is a yoke-piece E, which has internal teeth *e*, meshing with the gear *d*. The number of the teeth *e* is in excess of the teeth on the gear *d*, with which they are adapted to mesh, so that if the yoke-piece E is given a circular translation or gyration, or what may be called an orbital non-rotative movement in contradistinction to a rotation, the gear *d*, and hence the main pulley D, is slowly revolved. Thus if the gear *d* has twenty-seven teeth and there are thirty teeth *e* in the yoke one complete gyration of the yoke will advance the main pulley the distance of three of its teeth. The mechanism for giving the yoke this gyration will now be described.

The main shaft F of the hoist extends through the sleeve G and carries at one end a pinion H, which meshes with a pair of gears J and J′. Each of these gears is rigidly connected to short shafts *j* and *j′*, journaled in the frame members A and A′ and carrying between these members eccentrics K and K′, respectively. These eccentrics occupy confining-openings in the yoke E. The eccentric K′ occupies a circular opening in the yoke, the space between the periphery of the eccentric and such opening being filled with a set of pins or rollers L′. The other eccentric, K, is similarly surrounded by rollers L; but in this instance the rollers are contained within a bushing N, which is slidably mounted in a somewhat elongated opening *e′* in the yoke E.

It will be apparent from the above-described construction that when the shaft F is revolved motion is communicated thereby from the gear H to the gears J and J′, thus rotating the eccentrics K and K′ and causing the yoke E to gyrate, and thus slowly rotate the main pulley D. The larger part of the weight of the load is borne first by one side of the yoke E and then by the other, according to the side of the wheel *d* engaged, and this would tend to give the yoke a somewhat jerky movement, which might cause the eccentrics to bind, and it is for this reason that I mount one of the eccentrics in the shiftable bushing N. One eccentric is sufficient to drive the yoke, the other acting as a guide to hold it in proper position

and the bushing allowing play to prevent binding. Unequal movement is further minimized by the spring P, carried by the frame member A′ and extending beneath the bar e^3 on the yoke-piece, the spring preferably carrying a roller p, riding beneath such bar. The end of this spring P extends through and is guided by a slot a' in the frame member A. This spring member keeps the yoke member easily floating and relieves any jerk and helps counterbalance it.

To rotate the hoist, I provide a wheel R upon the shaft F. A hand-chain (not shown) is adapted to turn this wheel as desired. The efficiency of this hoist is great enough so that the load would run down under its own weight unless some brake were provided. I provide this brake in a very simple and efficient form and it is one of the features of the present invention.

In the outer side of the frame member A′ and loosely journaled on the projecting end of the stationary sleeve F is a cup S. This cup has on its exterior periphery ratchet-teeth s'. These teeth are adapted to be engaged by a pawl T, pivoted to the frame member A′ and pressed toward the cup by a spring t. Within the cup and secured to the shaft F is a collar U, having a notch u, into which extends a lug r on the hand-wheel R. The lug being smaller than the notch, limited play is allowed between the hand-wheel and the collar U. This limited play is availed of to throw in a braking-clutch between the collar U and the cup S. The drawings show a preferred form of this clutch, consisting of a pair of brake-shoes V, having lugs v, which extend into recesses in the hand-wheel, the shoes being operated by struts W, seated in recesses in the shoes and in the collar U. By this arrangement when the hand-wheel is turned forward relatively to the collar U, taking up the gap between the end of the lug R and the recess u, the shoes V are shoved forward, thus swinging the struts W on their inner ends and causing the shoes to travel outward and bind against the inner periphery of the cup S. In raising the load this binding is idle, for it simply causes the cup S to rotate with the shaft F and collar U, the pawl clicking over the ratchet in this movement. Whenever the elevating force is removed from the driving-wheel R, the weight of the load tends to rotate the shaft F in the opposite direction, and this forces the shoes tightly against the inner periphery of the cup; but the pawl T prevents backward rotation of the cup, and this holds the load elevated. To lower the load, it is simply necessary to turn the driving-wheel R backward and keep it ahead of the shaft, thus swinging the struts W and allowing the brake-shoes V to play inward from the cup S. To prevent the raising force being transmitted from the hand-wheel to shaft F only by means of the brake-shoes, (thus causing unnecessary wear,) I provide some play between the lugs v on the pawls V and the recesses in the hand-wheel R, which these lugs occupy, this play being normally taken up by the buffer-springs Y, carried by the hand-wheel. This allows the hand-wheel in elevating the load to turn until the lug r is in engagement with the end of the notch u, thus driving the shaft directly.

With my hoist the load is elevated with ease on account of the slow rotation of the wheel D compared with the rotation of the driving-wheel R. At the same time, the internal friction being small, the efficiency is correspondingly great. When the raising force ceases, the brake holds the load at any desired point, while to lower the load it is simply necessary to turn the driving-wheel R backward by a downward pull of the other reach of its chain faster than the descending load would turn it.

Having described my invention, I claim—

1. In a hoist, the combination of a pulley, an external gear connected therewith, an internal gear surrounding the external gear and adapted to mesh therewith and having a larger number of teeth, and mechanism for gyrating said internal gear, said mechanism at the same time and of itself preventing said internal gear from rotating.

2. In a hoist, in combination, a pulley, external gear formed thereon, a yoke surrounding the external gear and having internal gear-teeth of a larger number than the teeth of the external gear, and means for gyrating said yoke.

3. In a hoist, a frame, a driving-shaft rotatably mounted therein, a rotatable pulley, an external gear connected therewith, a yoke surrounding the external gear and having internal teeth greater in number than the teeth of the internal gear, mechanism for gyrating said yoke, and an operative connection between said mechanism and said driving-shaft.

4. In a hoist, in combination, a frame, a driving-shaft rotatably mounted therein, a driven pulley loosely surrounding the driving-shaft, an external gear formed on said pulley, a yoke having internal teeth and surrounding said gear with play between them, mechanism for gyrating said yoke, and an operative connection between said mechanism and said shaft.

5. In a hoist, the combination of a pulley, a gear connected therewith, a yoke having teeth engaging one side of said gear, a pair of eccentrics for gyrating said yoke, a driving-shaft, and a gear connecting the same with one of said eccentrics.

6. In a hoist, in combination, a frame, a driving-shaft rotatably mounted therein, a driven pulley loosely surrounding the driving-shaft, an external gear formed on the driven pulley, a yoke having an internal gear surrounding said external gear and possessing more teeth,

a pair of eccentrics for gyrating said yoke, and driving connections between said eccentrics and said driving-shaft.

7. In a hoist, the combination of a pulley, an external gear connected therewith, an internal gear surrounding the external gear and adapted to mesh therewith and having a larger number of teeth, means for bodily circulating said internal gear, and means tending to balance said internal gear.

8. In a hoist, in combination, a frame, a pulley rotatably mounted therein, an external gear connected therewith, a yoke having an internal gear surrounding said external gear and possessing more teeth, means for gyrating said yoke, and a spring arranged to assist in supporting said yoke.

9. In a hoist, in combination, a frame, a driving-shaft rotatably mounted therein, a driven pulley loosely surrounding the driving-shaft, an external gear formed on the driven pulley, a yoke having an internal gear surrounding said external gear and possessing more teeth, a pair of eccentrics for gyrating said yoke, a pair of gears connected with said eccentrics, and a gear on the driving-shaft meshing with each of the said pair of gears.

10. In a hoist, in combination, a frame, a driving-shaft rotatably mounted therein, a driven pulley loosely surrounding the driving-shaft, an external gear formed on the driven pulley, a yoke having an internal gear surrounding said external gear and possessing more teeth, a pair of eccentrics for gyrating said yoke, operative connections between said eccentrics and shaft, and a spring assisting in supporting said yoke.

11. In a hoist, in combination, a frame having a pair of side members, a driving-shaft journaled across said members, a main pulley between said members supported thereby and loosely surrounding said driving-shaft, an external gear formed on said main pulley, a yoke between said side members surrounding said external gear and having an internal gear of a greater number of teeth than the external gear, short shafts journaled in said side members on opposite sides of the main pulley, an eccentric on each shaft occupying an opening in the yoke, a gear on each of said short shafts, and a gear on the driving-shaft meshing with the two gears last mentioned.

12. In a hoist, in combination, a frame, a pulley, an external gear connected to said pulley, a yoke surrounding said external gear and having an internal gear of a greater number of teeth than the external gear, eccentrics for gyrating the yoke, one of said eccentrics having independent lateral movement with reference to the yoke, and means for operating the eccentrics.

13. In a hoist, in combination, a frame, a pulley, an external gear connected to said pulley, a yoke surrounding said external gear and having an internal gear of a greater number of teeth than the external gear, eccentrics for gyrating the yoke, one of said eccentrics occupying a laterally-elongated opening in the yoke, and means for operating the eccentrics.

14. In a hoist, in combination, a frame having a pair of side members, a driving-shaft journaled across said members, a main pulley between said members supported thereby and loosely surrounding said driving-shaft, an external gear formed on said main pulley, a yoke between said side members surrounding said external gear and having an internal gear of a greater number of teeth than the external gear, short shafts journaled in said side members on opposite sides of the main pulley, an eccentric in each shaft for gyrating the yoke, a gear on each of said short shafts, and a gear on the driving-shaft meshing with the two gears last mentioned, one of said eccentrics having around it a bushing slidably occupying a laterally-elongated opening in the yoke, and rollers between the last-mentioned eccentric and the bushing.

15. In a hoist, the combination of a pair of side members connected together, a hollow sleeve carried thereby extending across the members, a main pulley mounted on said sleeve and having formed on it an external gear, the frame being offset outwardly to accommodate the main pulley, a yoke loosely confined between the side members of the frame and having an internal gear of a greater number of teeth than the external gear, and surrounding the said external gear with play between them, mechanism for gyrating said yoke, a main driving-shaft journaled in said sleeve and a connection between said shaft and said mechanism.

16. In a hoist, the combination of a pair of side members connected together, a main pulley carried thereby and having formed on it an external gear, the frame being offset outwardly to accommodate the main pulley, a yoke loosely confined between the side members of the frame and having an internal gear of a greater number of teeth than the external gear and surrounding the said external gear with play between them, a pair of eccentrics rotatably mounted between the side members of the frame within openings in the yoke whereby the rotation of the eccentrics gyrates the yoke, a main driving-shaft loosely extending through the axis of said pulley, and gearing connecting said driving-shaft with the eccentrics.

17. In a hoist, the combination of a frame, a pulley carried thereby and having formed on it an external gear, a yoke having an internal gear of a greater number of teeth than the external gear and surrounding the said external gear with play between them, a pair of eccentrics rotatably mounted within openings in the yoke whereby the rotation of the eccentrics gyrates the yoke, a main driving-shaft, gearing connecting said driving-shaft

with the eccentrics, a driving-wheel for operating the main shaft, and a brake adapted to be thrown on by the descending load and thrown off by the driving-wheel.

18. In a hoist, in combination, a main pulley, a driving-shaft, an operative connection between the driving-shaft and main pulley, a cup loosely surrounding the driving-shaft, ratchet mechanism for allowing said cup to rotate in one direction but not in the other, a collar on the shaft within the cup, brake-shoes between the collar and the inner periphery of the cup arranged to be thrown into engagement with such periphery by relative rotative movement between the shoes and collar, a driving-wheel loosely mounted on said shaft and connected with said shoes, and a connection between said driving-wheel and said collar which connection allows limited rotative movement between the same.

19. In a hoist, in combination, a driving-shaft, a cup loosely surrounding the same, teeth on the exterior of said cup, a pawl engaging said teeth and preventing rotation of the cup in one direction, a hand-wheel loosely mounted on the shaft, brake-shoes within the cup connected with the hand-wheel, a collar rigid on the shaft within the cup, there being a wedging connection between the collar and brake-shoes whereby when the hand-wheel is turned relatively faster than the collar in the direction of movement allowed to the cup the brake-shoes are forced toward the cup.

20. In a hoist, in combination, a driving-shaft, a cup loosely surrounding the same, teeth on the exterior of said cup, a pawl engaging said teeth and preventing rotation of the cup in one direction, a hand-wheel loosely mounted on the shaft, brake-shoes within the cup connected with the hand-wheel, a collar rigid on the shaft within the cup, there being a wedging connection between the collar and brake-shoes whereby when the hand-wheel is turned relatively faster than the collar in the direction of movement allowed to the cup the brake-shoes are forced toward the cup, the connection from the hand-wheel to the brake-shoes having loose play, and tending to take up such play, buffer-springs, and a connection between the hand-wheel and the collar having loose play.

21. In a hoist, in combination, a pair of side members, a hollow sleeve carried by said members and projecting beyond one of them, a main pulley mounted on said sleeve between said members, a main driving-shaft journaled within said sleeve, operating mechanism connecting said driving-shaft with said main pulley, a cup mounted on said hollow sleeve and on the outer side of one of said frame members, ratchet-teeth on the outer side of said cup, a pawl carried by the adjacent frame member and engaging said teeth, a hand-wheel on the main shaft on the outer side of said cup, and a friction-clutch within the cup between it and the hand-wheel, which clutch is thrown into action when the hand-wheel rotates relatively faster than the driving-shaft in the direction to elevate the load or relatively slower in the direction to lower the load.

22. In a hoist, the combination of raising mechanism including a driving-wheel and shaft, a clutch member rotatable in one direction but not in the other, and a friction-brake arranged to be established in both directions of rotation of the raising means by differential rotative movement of the driving-wheel and shaft.

23. In a hoist, in combination, a pulley, a driving-shaft, a connection between the shaft and the pulley, a rotatable clutch member, mechanism for allowing said member to rotate in one direction but not in the other, means for driving said shaft, and a clutch between said shaft and said clutch member adapted to be thrown into engagement in either direction of rotation of said shaft by relative rotative movement between the shaft and its driving means.

24. In a hoist, in combination, a main pulley, a main shaft, an operative connection between said shaft and pulley, a clutch member loosely surrounding said shaft, a ratchet and pawl to allow said clutch to rotate in the direction to raise the load but not in the opposite direction, a wheel mounted on said shaft and having limited rotation relative thereto, and a friction-brake adapted to engage said clutch member when the wheel rotates relatively slower than the shaft in the direction to lower the load.

25. In a hoist, the combination of a pulley, a gear connected therewith, another gear meshing with the gear first mentioned, one of said gears being external and the other a surrounding internal gear having a larger number of teeth, and a plurality of eccentrics for gyrating one of said gears.

26. In a hoist, in combination, a pulley, a yoke, an external gear connected with one of such members, a meshing internal gear connected with the other of such members and having a larger number of teeth than the external gear, and a driving mechanism adapted of itself and without additional guiding means to give said yoke an orbital non-rotative movement.

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

EDWARD Y. MOORE.

Witnesses:
ALBERT H. BATES,
B. W. BROCKETT.