J. L. CHESNUTT.

OPERATING MECHANISM FOR ELEVATING TRUCKS.

APPLICATION FILED AUG. 18, 1919.

1,353,564. Patented Sept. 21, 1920.

2 SHEETS—SHEET 1.

Fig. 2.

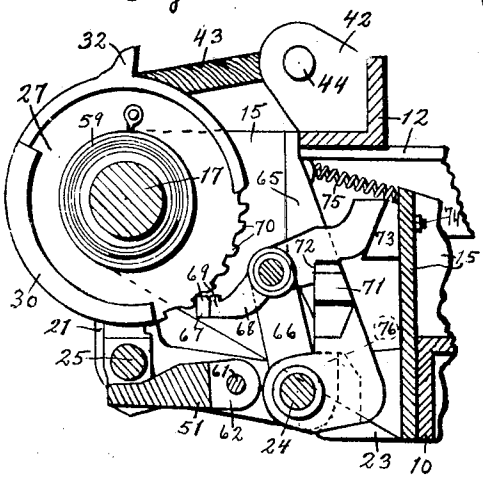


Fig. 1.

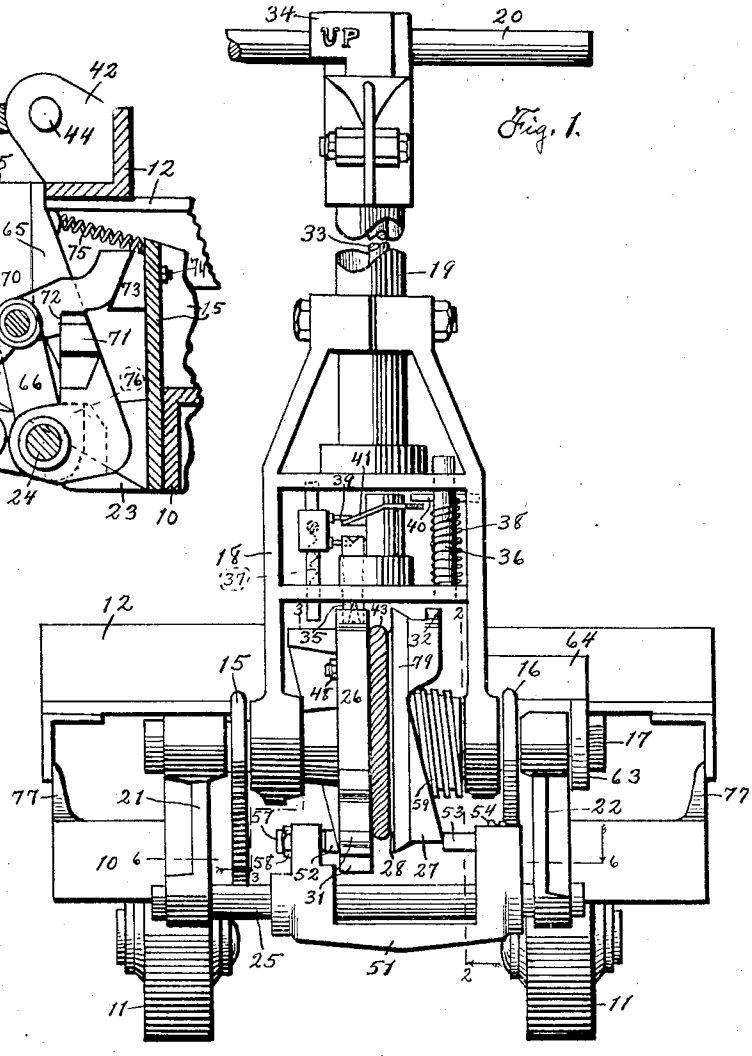
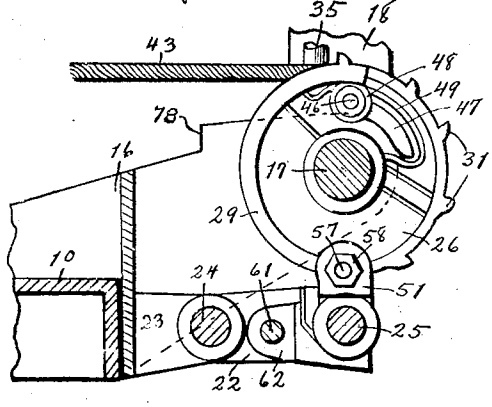


Fig. 3.



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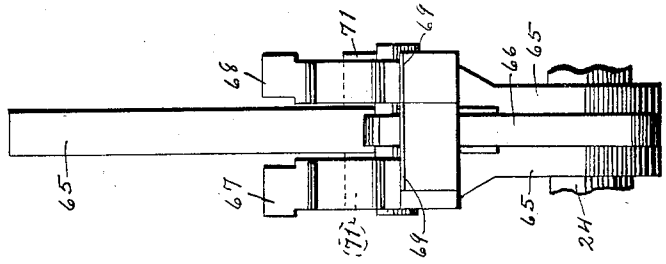
2 SHEETS—SHEET 2.

Fig. 5.



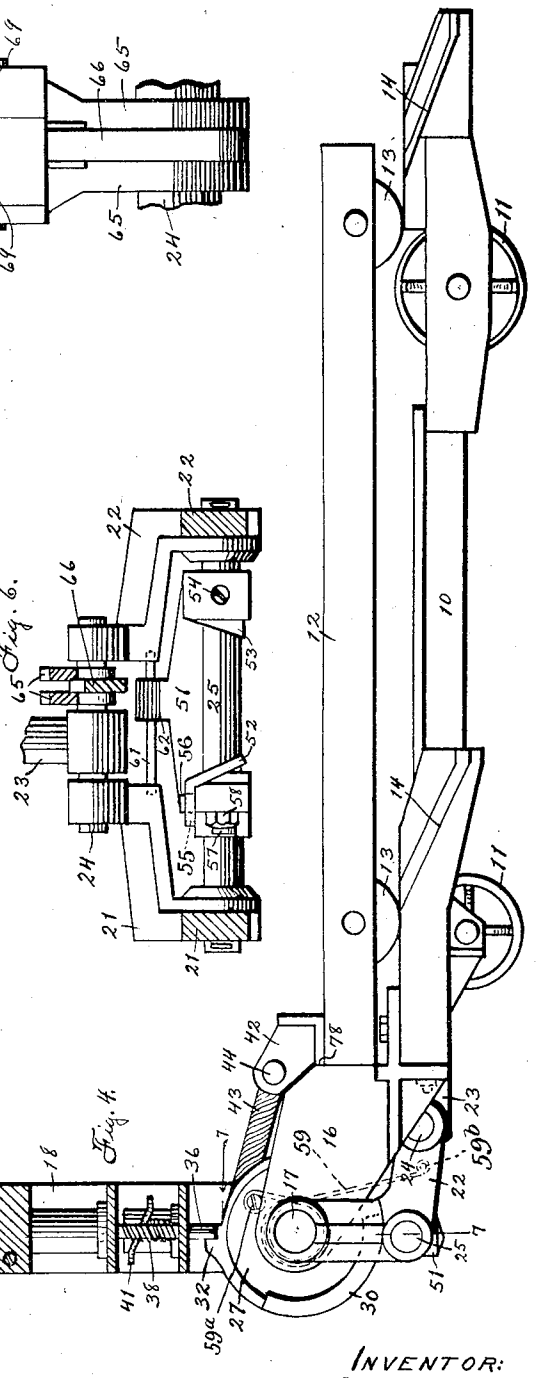


Fig. 7.

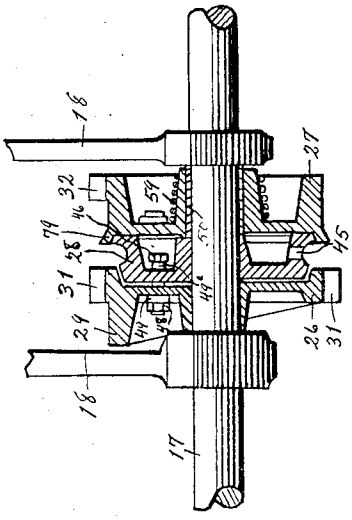


Fig. 6.

Fig. 4.

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UNITED STATES PATENT OFFICE.

JOHN LOUCIEN CHESNUTT, OF KANSAS CITY, MISSOURI, ASSIGNOR TO THE SERVICE CASTER & TRUCK COMPANY, OF KANSAS CITY, MISSOURI, A CORPORATION OF MISSOURI.

OPERATING MECHANISM FOR ELEVATING-TRUCKS.

1,353,564. Specification of Letters Patent. Patented Sept. 21, 1920.

Application filed August 18, 1919. Serial No. 318,130.

To all whom it may concern:

Be it known that I, JOHN LOUCIEN CHESNUTT, a citizen of the United States of America, and resident of Kansas City, Jackson county, Missouri, have invented a new and useful Operating Mechanism for Elevating-Trucks, of which the following is a specification.

The object of this invention is to provide an improved mechanism adapted for manual control in the raising and lowering of the vertically movable portion of an elevating truck.

A further object of this invention is to provide an improved operating mechanism for elevating trucks wherein the load is always under perfect control of the operator at all times during the raising or lowering operation; wherein the load is prevented from descending with a jolt or jar; and wherein injury to the operator through accidental flying up of the handle is eliminated; the descent of the load being automatically checked whenever positive pressure on the handle by the operator is terminated.

A further object of this invention is to provide improved means for adjusting the connection between the operating mechanism and the vertically movable truck frame.

A further object of this invention is to provide improved means to initiate the downward movement of the load.

With these and other objects in view, my invention consists in the construction, arrangement and combination of elements hereinafter set forth, pointed out in my claims and illustrated by the accompanying drawing, in which—

Figure 1 is a front elevation of an elevating truck equipped with my improved operating mechanism. Figs. 2 and 3 are cross-sections on the lines 2—2 and 3—3 respectively of Fig. 1, on an enlarged scale. Fig. 4 is a side elevation, partly in section, illustrating the truck and operating mechanism, a portion of the handle being broken away. Fig. 5 is a front elevation of the tripping mechanism. Fig. 6 is a horizontal section taken substantially on the line 6—6 of Fig. 1, the cam wheels being omitted. Fig. 7 is a vertical section taken substantially on the line 7—7 of Fig. 4. In all of the views the parts are shown in the raised position.

In the construction of the device and mechanism as shown the numeral 10 designates generally a lower truck frame having suitable supporting wheels 11 adapted for contact with a tread surface. The numeral 12 designates generally an upper or load carrying truck frame adapted for support on and vertical movement relative to the lower frame 10, such vertical movement being accomplished by means of rollers 13 journaled in the upper frame 12 and adapted to travel on inclined tracks 14 formed on the lower frame 10. The upper frame is adapted to be elevated, and to elevate a load carried thereby, through a distance of substantially three inches, by forward movement on the lower frame, to the position shown in the accompanying drawing. The construction and arrangement of the respective truck frames, other than above briefly outlined, is immaterial, as my present invention relates to the mechanism for operating the elevating devices, and procuring the vertical movement of the upper or elevating truck frame.

Spaced brackets 15, 16 are fixed to and extend forwardly and slightly upwardly from the forward member of the lower truck frame 10, and a tongue bolt 17 is carried by said brackets, and arranged parallel with and spaced relative to the forward member of said frame. A tongue yoke 18 is provided and has end portions of its arms pivoted on the tongue bolt 17 adjacent to and between the brackets 15, 16. A tubular tongue member 19 is clamped in the upper portion of the yoke 18 and extends a suitable distance therefrom to adapt it for manual control in conveying the device from place to place on the supporting wheels 11, and for other uses hereinafter to be made clear. A cross handle bar 20 is carried by the free end of the tongue member 19.

L-shaped braces 21, 22 have their upper ends carried by the tongue bolt 17, just outside the brackets 15, 16, thence extend downwardly and then rearwardly toward the forward member of the lower truck frame 10, the rearwardly extending portions of said braces being offset inwardly between their

ends as shown in Fig. 6. A bracket 23 is formed on the central portion of the forward member of the lower frame 10 and extends forwardly beneath and between the brackets 15, 16, but is of considerably less length than said last named brackets. A bolt 24 passes through the bracket 23 and through the rear end portions of the L-shaped braces 21, 22. A spindle 25 is carried by the forward lower corners of the L-shaped braces 21, 22, being arranged parallel with and directly beneath the tongue bolt 17.

Two cam wheels, designated generally by the numerals 26, 27, are mounted for rotary movement on the tongue bolt 17 between the arms of the yoke 18, while a grooved wheel 28 is also mounted on said tongue bolt, between said cam wheels, and is secured to the cam wheel 26, which may be designated as the "lifting" wheel, the cam wheel 27 similarly being the "lowering" wheel. The lifting cam wheel 26 is formed on its outer face with a circumferentially arranged wedge-shaped cam 29, which extends throughout approximately one-half of the periphery of said wheel; and the lowering cam wheel 27 is formed on its outer face with a circumferentially arranged wedge-shaped cam 30, which extends throughout approximately one-fourth of the periphery of said wheel. The widest point of the cam 30 corresponds in width to the widest point of the cam 29; that is to say, the cam 30 advances the same amount as the cam 29 in one-half the lineal space, and is consequently of twice the pitch. The lifting cam wheel 26 is formed with a plurality of spaced lugs 31 on its periphery, in this instance four in number, and the lowering cam wheel 27 is formed preferably with a single lug 32 on its periphery. Each of the lugs 31, 32 is formed with one straight face, which is arranged substantially radially of the wheel on which the lug is formed, adapted to be engaged by a pawl to produce rotary movement of the wheel. A controlling shaft 33 is journaled in and longitudinally of the yoke 18, extends within and through the tubular tongue member 19, and projects from the upper or free end thereof, having a thumb piece 34 fixed to its upper projecting end. Pawls 35, 36 are mounted for rectilinear reciprocation in the yoke 18, on opposite sides of the shaft 33 and directly opposite and adapted for engagement with the lugs of the respective cam wheels 26 and 27. The pawls 35, 36 are pressed to operative engagement by coil springs 37, 38 respectively. The pawls 35, 36 also are formed with fingers, 39, 40 respectively, projecting inwardly toward the shaft 33, which is formed or provided with a cam disk 41 engaging beneath said fingers, and so arranged that but one of the pawls can be in operative engagement at a given time; one or both of the pawls at all times being held by said cam disk out of operative engagement with the adjacent cam wheel, against the influence of its spring.

A bracket 42 is fixed to and projects forwardly and upwardly from the central portion of the forward member of the upper truck frame 12, and a draft cable 43 is fixed at one end to said bracket, as by means of a pin or bolt 44. The cable 43 extends forwardly over the grooved wheel 28 and has its opposite end extended through a peripheral hole 45 (Fig. 7) in said wheel, and secured to said wheel in any suitable manner as by babbitting. A bolt 46 passes through the grooved wheel 28 and through an arcuate slot 47 in the lifting cam wheel 26 and is secured by a nut 48. A boss 49 is formed on the outer face of the cam wheel 26 surrounding the arcuate slot 47, and said boss is wedge-shaped, having its thickest end to the rear when the cam wheel is rotated in such manner as to apply strain on the cable 43, the nut 48 contacting with the inclined face of said boss. It is the purpose of this construction to provide means for adjusting the grooved wheel relative to the lifting cam wheel so as to adjust the effective length of the draft cable, in order that the vertically movable upper truck frame may be in the proper position to correspond to the various positions of the lifting cam. When strain is applied on the cable 43 in the lifting operation the inclined face of the boss 49 prevents movement of the connecting bolt 46 and tends to prevent disarrangement of the adjustment of the parts. The wheel 28 also is formed with a boss, 49^a, inclined oppositely to the boss 49, so that strain is applied evenly on the bolt 46.

The cam wheels 26, 27 and grooved wheel 28 are formed with extended hubs which substantially fill the space on the tongue bolt 17 between the arms of the yoke 18. A sleeve 50 is mounted on the tongue bolt 17, within the hub of the cam wheel 27, and is of slightly greater length than said hub, to prevent binding of said wheel in certain of its movements. The hubs of the wheels 26 and 28, together with the sleeve 50, fill the space on the tongue bolt 17 between the arms of the yoke 18. The grooved wheel 28 is formed with an annular face in frictional contact with the inner face of the lowering cam wheel 27.

A traveling brake member 51, of yoke form, has its arms slidably mounted on the spindle 25 and projecting upwardly from said spindle through a horizontal plane intersected by the peripheries of the cam wheels 26, 27, said arms being located outside of the vertical planes of said cam wheels and spaced apart a distance corresponding substantially to the horizontal distance be-

tween the widest portion of one cam wheel and the narrowest portion of the other cam wheel. Removable brake shoes 52, 53 are carried by the inner faces of the arms of the brake member 51 and have inclined inner faces adapted for contact with the cam surfaces of the wheels 26, 27 respectively. The brake shoe 53 is mounted in a recess in one arm of the brake member 51 and is secured thereto by a vertical pivot bolt or screw 54, so that said brake shoe may oscillate slightly on a vertical axis to conform to irregularities which may occur in the cam surface with which it contacts. The brake shoe 52 is substantially L-shaped and has its rear arm extending across the rear side of an arm of the brake member 51 and formed with a longitudinal slot 55 (dotted lines Fig. 6) through which passes a screw 56 seated in the said arm of the brake member. This connection permits the brake shoe to oscillate in order to automatically adjust itself to any variation in the cam surface with which it contacts. It also permits a bodily adjustment of the brake shoe laterally, to compensate for wear and in order to secure the proper spacing of the brake shoes; such adjustment being accomplished by means of an adjusting screw 57 seated in the arm of the brake member and engaging said brake shoe, and provided at its outer end with a lock nut 58 to secure such adjustment when made.

A spring 59 is wound on the hub of the lowering cam wheel 27 and secured at one end thereto as through the medium of a stud 59^a, and has its opposite end secured to the frame, preferably the inner face of the member 22 as at 59^b. The tendency of the spring 59 is to turn the lowering cam wheel 27 rearwardly and to force its cam against the brake shoe 53 and induce frictional contact between said members. Rearward strain on the cable 43, due to weight of the load (the upper truck frame 12 and whatever may be carried thereby), has a tendency to turn the lifting cam wheel 26 rearwardly and to force its cam against the brake shoe 52. The rearward tendency of the two cam wheels causes a wedging of the two cams between the two brake shoes, limiting such rearward movement and causing a frictional engagement between the rims of the wheels 27 and 28. It is apparent that further rearward movement of either cam wheel, under the causative forces above set forth, can occur only when the other of said wheels is forcibly and positively rotated in the opposite direction, or forwardly, thus relieving pressure of its cam on the corresponding brake shoe; and that as soon as such positive forward rotation ceases, the tendencies toward rearward rotation of both cam wheels will again counteract each other, by wedging the wheels between the brake shoes, and the parts will remain in the position where left. Forward rotation of the lifting cam wheel 26, through engagement of the pawl 35 with either of the lugs 31 thereof, permits a rearward movement of rotation of the lowering cam wheel 27, by relieving pressure on the brake member as above stated, and such rearward rotation of the cam wheel 27 causes a lateral sliding movement of the brake member 51 on the spindle 25 through action of its cam on the brake shoe 53. This lateral movement of the brake member 51 retains the brake shoe 52 in its approximate position relative to the cam of the forwardly moving wheel 26, ready to engage and prevent opposite movement of said cam when the force causing the forward movement is released. It is apparent that forward rotation of the lifting cam wheel 26, starting with the truck in its lowered position, will have the effect of raising or elevating the upper truck frame 12, and its load, relative to the supporting frame 10, by winding the cable 43 on the grooved wheel 28 attached to said lifting cam wheel, the rollers 13 of said upper frame rising on the inclined ways 14 of the lower frame.

Forward rotation of the lowering cam wheel 27, through engagement of the pawl 36 with the lug 32 thereof, permits a rearward rotary movement of the lifting cam wheel 26, by relieving pressure on the brake member as previously stated, and such rearward rotation of the lifting cam wheel causes a lateral sliding movement of the brake member 51 on the spindle 25 through action of its cam on the brake shoe 52. It is apparent that such rearward rotary movement of the lifting cam wheel 26, starting with the truck in its elevated position, permits a descent by gravity of the upper truck frame 12 on the frame 10.

The cam disk 41 is turned for raising and lowering the pawls 35, 36 by operation of the controlling shaft 33, manually operable by the thumb piece 34, which may be turned laterally in one direction to permit operative engagement of one of said pawls and in the other direction to permit operative engagement of the other, and preferably has indications on its respective sides, such as the words "Up" and "Down," to guide the operator. When the thumb piece 34 projects forwardly in the position shown in Fig. 4, the cam disk 41 is in such position as to hold out of operative engagement both of the pawls 35, 36, and the tongue may then be oscillated on the tongue bolt 17 without any effect upon the cam wheels and other operating mechanism. This is desirable when hauling the truck from place to place or when it is not desired to employ the raising and lowering mechanism. A lug 60 may project forwardly from the upper end of the tongue member 19, immediately below

the thumb piece 34, being of greater length than said thumb piece, so as to protect said piece from injury in case the end of the tongue falls to the floor when said piece is in extended position.

A rod 61 is mounted transversely between the rear end portions of the L-shaped members 21, 22, between the bolt 24 and spindle 25, and a lug or projection 62 on the rear of the yoke shaped brake member 51 slidably engages said rod. It is the function of this construction to prevent tipping of the sliding brake member and to hold the brake shoes 52, 53 in their proper positions.

The parts are so arranged that the first of the lugs 31 of the lifting cam wheel 26 is at the top of the wheel and just in front of the position of the pawl 35, when the upper truck 12 is in its lowermost position. When it is desired to elevate the upper truck frame, the thumb piece is turned to the indicated position for permitting operative engagement of the pawl 35. Then forward and downward pressure is applied to the tongue or handle by the operator, causing a forward rotation of the lifting wheel 26 with the result previously explained. The tongue or handle may be moved through an arc of approximately ninety degrees with the pawl in engagement with the first or foremost lug 31 if desired; but if the load is heavy it will be found more convenient, and greater purchase on the handle obtained by the operator, if he will move the tongue successively through shorter arcs, engaging the pawl 35 successively with the lugs 31, which are here four in number, until the lifting cam has been moved through an arc of approximately one-hundred eighty degrees, the effective length of the cam. It will be observed that it requires at least two movements of the tongue to accomplish the lifting operation, as the lifting cam must be turned a half revolution, while the movement of the tongue is restricted to approximately a ninety degree sweep at one time, starting from the approximate vertical position. When it is desired to lower the truck from the elevated position the thumb piece is turned to the opposite side to permit the engagement of the pawl 36 with the lug 32 of the lowering cam wheel 27, which in this position of the devices is approximately at the top of the said wheel. Then the tongue or handle is moved forwardly and downwardly from vertical to approximately horizontal position, with the result previously described. As the pitch of the cam of the lowering wheel is greater than that of the lifting wheel, extending through an effective length of but ninety degrees circumferentially of its wheel, it follows that a single movement of the tongue or handle through an arc of ninety degrees will accomplish the lowering operation. Hence the necessity of but one lug 32, it being noted that because of such arrangement the wheel 27 rotates more slowly than the wheel 26. Very little force is required to effect the lowering operation, as it is only necessary for the operator to rotate the lowering cam wheel 27, which permits the descent of the load by force of gravity.

The braking effect of the sliding brake member 51 on the cams of the wheels 26, 27 is such that it will hold the load against descent at any time, either during the process of raising or of lowering the upper truck, that pressure is relieved from the handle and positive forward movement of one or the other of the cam wheels ceases, on account of the fact that the normal rearward tendencies of the two wheels counteract each other and force the cams into frictional contact with the two sides of said brake member. Because of this automatic braking effect the load may be handled without danger to the operator from the handle flying up and striking him as sometimes happens in the use of other devices when the weight of the load accidentally gets beyond his control during the raising or lowering operation.

A combined foot rest and handle stop preferably is employed, comprising a hub or collar 63 secured to one end portion of the tongue bolt 17 and formed with a projection 64 extending over the upper end of the adjacent L-shaped member 22 and bracket 16 and behind the adjacent arm of the tongue yoke 18. This projection limits rearward movement of the handle, preventing its falling rearwardly against the load or the cable 43; and also affords a foot rest for the operator in applying pressure to the handle to initiate the raising of a load.

It is desirable that when the upper frame is in its elevated position the rollers 13 shall rest on a horizontal plane beyond the upper ends of the inclined ways 14, as shown in Fig. 4. As this normally relieves the strain on cable 43 through force of gravity on the elevated load, it becomes necessary to provide a means for starting the load (upper truck frame) rearwardly, and forcing the rollers 13 upon the inclined planes 14, when the lowering operation is initiated. A lever 65 is fulcrumed at its lower end on the bolt 24 and projects upwardly in front of the position occupied by the forward member of the upper truck frame 12 when in raised position, as shown in Fig. 2. The lever 65 is bifurcated at its lower end and straddles an arm 66 which also is pivoted at its lower end on the bolt 24 and extends forwardly and upwardly in front of said lever. A pair of pawls 67, 68 are provided and are mounted on opposite sides of the lever 65 and arm 66 and pivoted intermediate of their ends to said arm. At their forward ends the pawls 67, 68 are formed each with an up-

standing tooth 69 adapted to engage between teeth 70 formed on a portion of the periphery of the lowering cam wheel 27, said teeth being in position for engagement by said pawls when the parts are in the elevated position. One of the pawls 67, 68 is slightly longer than the other, by an amount corresponding approximately to one-half the distance between teeth of the cam wheel, so that one of said pawls is always ready for engagement of its tooth between teeth of the wheel, and said pawls are affected and moved promptly upon movement of rotation of said cam wheel, as will hereinafter be explained. Rear portions of the pawls 67, 68 overlie abutments 71 formed on opposite sides of the lever 65, and said pawls are formed with shoulders 72, in substantially vertical planes, but inclined slightly to the rear from such planes, which shoulders are adapted to engage forward faces of the abutments 71 and exert pressure thereon at times. The pawls 67, 68 are turned upwardly at their rear ends and have the rear faces of such upturned portions formed on planes inclined somewhat to the rear. A stop 73 is carried by the cross member of the lower truck frame 10 and is vertically adjustable on the forward face thereof, being formed with a vertical slot through which extends a bolt 74 or other securing member also extending through said frame member. The stop 73 is beveled or inclined on its forward face to correspond to the inclination of the rear end of the pawls 67, 68 and is adapted for contact thereby. The stop 73 may be adjusted vertically and thereby, because of its inclination, determine the position of the pawls 67, 68 on their pivots, and consequently the degree of contact of the shoulders 72 with the lever abutments 71. When the lowering operation of the mechanism is initiated, the first movement of the wheel 27, under the influence of the pawl 36, causes a slight rearward movement of one or the other of the pawls 67, 68, depending upon which of said pawls is then in position for engagement of its tooth 69 with a tooth of the said wheel. Such movement of the pawls is transmitted to the lever 65 through contact of the shoulder 72 with an abutment 71, and the upper end of the lever exerts rearward pressure on the top frame 12 to cause it to start rearwardly and reach the inclined ways 14. When the upper end of the lever 65 has moved sufficiently to accomplish this result the shoulder or shoulders 72 slip over the tops of the abutments 71, and further movement of the cam wheel has no effect upon the said lever. A coil spring 75 is fixed to the forward member of the lower frame 10 and to the lever 65 and is adapted normally to hold said lever rearwardly and prevent forward movement of the upper end thereof. The arm 66 is formed near its rear end with a rearwardly projecting lug 76 extending within the bifurcation of the lever 65 and adapted to engage the upper end of said bifurcation to limit forward oscillation of the arms and pawls 67, 68. When the top frame 12 is elevated it engages the upper end of lever 65 and moves it forwardly, putting the spring 75 under tension, and throwing the pawls 67, 68 forwardly to position for engagement with the teeth of the cam wheel when the same is revolved for the lowering operation.

On the rear portions of the brackets 15, 16 are formed shoulders 78 which are adapted for engagement by the forward member of the upper truck frame 12, and serve as stops to limit forward movement of the said frame in the elevating operation. Lugs 77 are formed on side margins of the lower truck frame 10 and extend upwardly within the upper truck frame 12, to prevent lateral movement of the upper relative to the lower frame.

The sleeve 50 prevents friction between the hub of the cam wheel 27 and the adjacent arm of the yoke 18, such as might overcome the effect of the spring 59, particularly where there is a side pull on the cable 43 as where the truck is on an inclined surface.

Particular attention is drawn to the fact that the load is always under perfect control of the operator, and will not descend with a jolt even if his hands should be removed from the handle. The spring-pressed cam wheel 27, which may be termed a locking as well as a lowering wheel, serves to force the brake devices against the cam of the lifting wheel 26 in such manner as to prevent downward movement of the load except at such times as positive pressure is exerted to turn said wheel 27 forwardly. The operator is enabled to lower the load as slowly and as gently as he pleases, or he can let it down with one swift movement of the tongue, and little exertion is required. The lifting operation also is facilitated by the provision for employing several strokes of the handle, starting at favorable angles, if desired.

While I have illustrated and described this mechanism as being applied to elevating trucks and employed in the operation of raising and lowering such devices, I do not wish to be understood as limited to its use in this connection, as I consider this invention an automatic safety clutch which may be used in many devices where the raising and lowering operations are employed; and many modifications and alterations from the form herein shown and described may be employed, within the scope of the appended claims, without departing from my invention.

It should be noted particularly that the weight of the load, acting through the cable 43 and applying strain rearwardly on the cam wheel 26, tends to make a wedge out of the wheels 26 and 27 which acts between the brake shoes 52 and 53, the friction between the inner face of the wheel 28 and the inner face of wheel 27 compels the latter wheel to turn rearwardly with wheel 26. Pressure of the cam of wheel 26 on the shoe 52, acting through the sliding brake member 51, causes the shoe 53 to press on the cam of wheel 27 in such manner as to tend to turn said wheel forwardly; but the friction between wheels 28 and 27, together with the action of spring 59, is great enough to prevent such forward turning of wheel 27 unless additional force is applied through the handle to turn the wheel 27 forwardly in order to accomplish lowering of the load. In other words the parts are so arranged that the load cannot be lowered without a mentally selected act on the part of the operator in properly positioning the control device 34 and then moving the handle forwardly through an arc to accomplish such end.

The wheel 28 preferably is beveled on one margin and fits within an inclined flange 79 on cam wheel 27, to provide additional frictional engagement between said wheels, so that the cam wheel 27 will not be turned forwardly under the pressure of heavy loads.

I claim as my invention—

1. An elevating truck, comprising a wheeled truck frame formed with inclined ways, an elevating frame formed with rollers adapted to travel on said ways, a rotary lifting member carried by said truck frame, a flexible member secured to said elevating frame and also secured to and adapted to be wound on said lifting member, said lifting member being formed with a wedge-shaped cam on one of its faces, a brake member slidably carried by said truck frame and adapted for engagement with said cam, and means for normally maintaining said brake member in frictional engagement with said cam, to prevent reverse rotation of said lifting member.

2. An elevating truck, comprising a wheeled truck frame formed with inclined ways, an elevating frame provided with rollers adapted to travel on said ways, a rotary lifting member carried by said truck frame, a flexible connecting member secured to said elevating frame and adapted to be wound on said lifting member, said lifting member being formed with a wedge-shaped cam on one of its faces, a brake member slidably mounted on said truck frame and adapted for engagement with said cam, and a rotary lowering member carried by said truck frame, said lowering member being formed with a wedge-shaped cam in engagement with said brake member and normally tending to hold the same in frictional engagement with the cam of the lifting member.

3. An elevating truck, comprising a wheeled truck frame formed with inclined ways, an elevating frame on said truck frame and adapted to be elevated by forward travel over said ways, a rotary lifting member carried by said truck frame, a flexible connecting member secured to said elevating frame and adapted to be wound on said lifting member, said lifting member being formed with a wedge-shaped cam on one face, a rotary lowering member carried by said truck frame and formed with a wedge-shaped cam opposite to the first-named cam, a brake device slidably carried by the truck frame and embracing said lifting and lowering members and adapted for simultaneous contact with both of said cams, and yielding pressure devices tending to turn said lowering device in such manner as to apply pressure of its cam on said brake device and thereby produce braking effect on the cam of the lifting member.

4. An elevating truck, comprising a wheeled truck frame formed with inclined ways, an elevating frame on said truck frame adapted to be elevated by forward travel on said ways, a rotary lifting member carried by said truck frame, a flexible connecting member secured to said elevating frame and adapted to be wound on said lifting member, said lifting member being formed with a wedge-shaped cam on one face, a rotary lifting member carried by said truck frame and formed with a wedge-shaped cam, a brake device slidably carried by the truck frame, embracing said lifting and lowering members and adapted for simultaneous contact with said cams, yielding pressure devices tending to turn said lowering device in such manner as to apply pressure of its cam on said brake device and thereby produce braking effect on the cam of the lifting member, a handle member adapted for oscillation on a horizontal axis, and manually controlled devices on said handle member for selectively engaging and imparting rotation to said lifting and lowering members.

5. An elevating truck, comprising a wheeled truck frame formed with inclined ways, an elevating frame on said truck frame adapted to be elevated by forward travel on said ways, a rotary lifting member at the forward end of said truck frame, a flexible connecting member secured to said elevating frame and to said lifting member and adapted to be wound on the latter, said lifting member being formed with a cam on its outer face, a rotary lowering member mounted beside said lift-

ing member and formed with a cam on its outer face, a brake device slidably carried by said truck frame, embracing said lifting and lowering members and adapted for simultaneous contact with the cams thereof, yielding pressure devices tending to turn said lowering device in such manner as to apply pressure of its cam on said brake device and thereby produce braking effect on the cam of the lifting member, said lifting and lowering members being formed with peripherally projecting lugs, a handle member mounted at the forward end of the truck frame and adapted for oscillation on a horizontal axis, and pawls carried by said handle member and adapted for selective movement under manual control to positions for engaging the lugs of said lifting and lowering members, whereby said members may be rotated by forward and downward movement of said handle member.

6. An elevating truck, comprising a wheeled truck frame formed with inclined ways, an elevating frame on said truck frame adapted to be elevated by forward travel on said ways, cam wheels mounted for rotation side by side at the forward end of said truck frame and adapted for use respectively in the lifting and lowering operations, said wheels being formed with wedge-shaped cams on their outermost faces, a brake device slidably carried by said truck frame, embracing said cam wheels and adapted for simultaneous contact with the cams thereof, yielding pressure devices tending to turn the lowering cam wheel rearwardly so as to apply pressure of its cam on said brake device and thereby produce frictional contact of said brake device with the cam of the lifting cam wheel, the lowering cam wheel being formed with a peripheral projecting lug and the lifting cam wheel being formed with a plurality of spaced projecting lugs, a handle member mounted at the forward end of the truck frame and adapted for oscillation on a transverse horizontal axis, and pawls carried by said handle member and adapted for selective engagement with the lugs of the respective cam wheels, whereby said members may be rotated by forward and downward movement of said handle member, the cam of the lowering cam wheel having a considerably steeper pitch than the cam of the lifting wheel.

7. An elevating truck, comprising a wheeled truck frame formed with inclined ways, an elevating frame provided with rollers adapted to travel on said ways, cam wheels mounted for rotation side by side at the forward end of the truck frame and adapted for use respectively in the lifting and lowering operations, said wheels being formed with wedge-shaped cams on their outermost faces, a brake device slidably carried by said truck frame, embracing said cam wheels and adapted for simultaneous contact with the cams thereof, a grooved wheel fixed to the lifting cam wheel, a cable fixed to the elevating frame and also fixed to and adapted to be wound on said grooved wheel, a handle mounted for oscillation at the forward end of said truck frame, and means carried by said handle for selective engagement with and rotation of said cam wheels.

8. An elevating truck, comprising a wheeled truck frame formed with inclined ways, an elevating frame on said truck frame and adapted to be elevated by forward travel on said ways, cam wheels mounted for rotation side by side at the forward end of the truck frame and adapted for use respectively in the lifting and lowering operations, said wheels being formed with wedge-shaped cams on their outermost faces, a brake device slidably carried by said truck frame, embracing said cam wheels and adapted for simultaneous contact with the cams thereof, a grooved wheel secured to the lifting cam wheel, a cable fixed to the elevating frame and also fixed to and adapted to be wound on said grooved wheel, the connections of said grooved wheel to said lifting cam wheel being circumferentially adjustable to adjust the effective length of said cable relative to said cam wheel, a handle mounted for oscillation at the forward end of said truck frame, and means carried by said handle for selective engagement with and rotation of said cam wheels.

9. An elevating truck, comprising a wheeled truck frame formed with inclined ways, an elevating frame on said truck frame and adapted to be elevated by forward travel on said ways, cam wheels mounted for rotation side by side at the forward end of said truck frame and adapted for forward rotation respectively for the lifting and lowering operations, said wheels being formed with wedge-shaped cams on their outermost faces, a brake device slidably carried by said truck frame and embracing said cam wheels, said brake device being formed with opposed brake shoes adapted for simultaneous contact with the cams of said wheels, connections between the lifting cam wheel and the elevating frame, and manually controlled means for selectively rotating said cam wheels.

10. An elevating truck, comprising a wheeled truck frame, an elevating frame on said truck frame and arranged to be elevated by forward movement relative thereto, cam wheels mounted for rotation side by side at the forward end of said truck frame and adapted for forward rotation respectively for the lifting and lowering operations, said wheels being formed with wedge-

shaped cams on their outermost faces, a brake device slidably carried by said truck frame and embracing said cam wheels, said brake device being formed with removable and replaceable inclined brake shoes adapted for engagement with the cams of said wheels, connections between the lifting cam wheel and the elevating frame, and manually controlled means for selectively rotating said cam wheels.

11. An elevating truck, comprising a wheeled truck frame, an elevating frame on said truck frame and arranged to be elevated by forward movement relative thereto, cam wheels mounted side by side at the forward end of said truck frame and adapted for forward rotation respectively for the lifting and lowering operations, said wheels being formed with wedge-shaped cams on their outermost faces, a brake device slidably carried by said truck frame and embracing said cam wheels, said brake device being formed with inclined brake shoes contacting the respective cams of said wheels, one of said brake shoes being adjustable to vary the distance between them, connections between the lifting cam wheel and the elevating frame, and manually controlled means for selectively rotating said cam wheels.

12. An elevating truck, comprising a wheeled truck frame, an elevating frame on said truck frame arranged to be elevated by forward movement relative thereto, cam wheels mounted side by side at the forward end of said truck frame and adapted for forward rotation respectively for the lifting and lowering operations, said wheels being formed with wedge-shaped cams on their outermost faces, a brake device slidably carried by said truck frame and embracing and adapted for simultaneous contact with the cams of said wheels, connections between the lifting cam wheel and the elevating frame, said cam wheels being formed with projecting lugs, a handle member pivoted to the forward end of said truck frame, spring-pressed pawls carried by said handle member, each of which is adapted for engagement at times with lugs of one of said cam wheels, a cam plate mounted for oscillation on said handle member and serving to hold one or both of said pawls out of operative engagement, and means for manually controlling said cam plate.

13. An elevating truck, comprising a wheeled truck frame, an elevating frame on said truck frame arranged to be elevated by forward movement relative thereto, cam wheels mounted at the forward end of said truck frame and adapted for forward rotation respectively for the lifting and lowering operations, said wheels being formed with cams on their outermost faces, a brake device carried by said truck frame and held in frictional contact with the cam of the lifting wheel by pressure of the cam of the lowering wheel, flexible connections between the lifting cam wheel and the elevating frame, said cam wheels being formed with projecting lugs, a handle member pivoted to the forward end of said truck frame, spring-pressed pawls carried by said handle member, each of said pawls being adapted for engagement with lugs of one of said cam wheels, a shaft mounted for oscillation in said handle member, a cam plate on said shaft engaging and serving to hold one or both of said pawls out of operative engagement, and a thumb piece on said shaft.

14. An elevating truck, comprising a wheeled truck frame, an elevating frame on said truck frame arranged to be elevated by forward movement relative thereto, spaced brackets fixed to and projecting forwardly from the front end of said truck frame, a rod carried by said brackets, a handle member formed with a yoke pivoted on said rod, a pair of cam wheels mounted on said rod within said yoke, a brake device carried by said truck frame and acted upon by one of said cam wheels to apply pressure to the other, connections between the latter cam wheel and the elevating frame, pawls carried by said yoke and adapted for selective engagement with said cam wheels, and means carried by said handle member for manipulating said pawls.

15. An elevating truck, comprising a wheeled truck frame, an elevating frame on said truck frame arranged to be elevated by longitudinal movement relative thereto, spaced brackets fixed to and projecting forwardly from one end of said truck frame, a rod carried by said brackets, a handle member formed with a yoke pivoted on said rod, a pair of cam wheels mounted on said rod within said yoke, a brake device slidably carried by said truck frame and acted upon by one of said cam wheels to apply braking pressure to the other thereof, connections between one of said cam wheels and the elevating frame, pawls carried by said yoke and adapted for selective engagement with the cam wheels, a shaft extending lengthwise through said handle member and between said pawls, a cam plate on said shaft adapted for engagement with said pawls to hold one or both out of operative engagement, and means on the opposite end of shaft for manually oscillating the same.

16. An elevating truck, comprising a wheeled truck frame formed with inclined ways, an elevating frame provided with rollers adapted to travel on said ways and be elevated by forward movement relative to said truck frame, a rotary lifting member carried by the forward end of said truck frame, a flexible connecting member secured to said elevating frame and secured to and

adapted to be wound on said lifting member, a rotary lowering member carried by said truck frame, means acted upon by said lowering member for preventing reverse movement of said lifting member, and manually controlled means for selectively rotating said lifting and lowering members.

17. An elevating truck, comprising a wheeled truck frame formed with inclined ways, an elevating frame provided with rollers adapted to travel on said ways and be elevated by forward movement relative to said truck frame, a rotary lifting member carried by the forward end of said truck frame, a flexible connector secured to said elevating frame and adapted to be wound on said lifting member, a rotary lowering member carried by said truck frame, means acted upon by said lowering member for normally preventing reverse movement of said lifting member, manually controlled means for selectively rotating said lifting and lowering members, and means connected with and operated upon by said lowering member for initiating rearward movement of said elevating frame when said lowering member is manually rotated.

18. An elevating truck, comprising a wheeled truck frame formed with inclined ways, an elevating frame provided with rollers adapted to travel on said ways and be elevated by forward movement relative to said truck frame, rotary lifting and lowering members carried by the forward end of said truck frame, a flexible connector secured to said elevating frame and adapted to be wound on said lifting member, means acted upon by said lowering member for normally preventing reverse rotation of said lifting member, manually controlled means for selectively rotating said lifting and lowering members, a lever fulcrumed at the forward end of said truck frame and adapted to engage said elevating frame when in raised position, and a pawl pivoted to and adapted to impart rearward movement to said lever, said lowering member being formed with a series of teeth adapted for engagement by said pawl.

19. In a mechanism of the class described, lifting and lowering members mounted for rotation, means normally applying strain to tend to cause rearward rotation of said lifting member, yielding pressure devices tending to cause rearward movement of said lowering member, means acted upon by said lowering member tending to prevent rearward movement of said lifting member, and manually controlled means for selectively causing forward rotary movement of said lifting and lowering members.

20. In a mechanism of the class described, lifting and lowering members mounted for rotation, means normally acting to cause rearward rotation of each of said members, braking means acted upon by said lowering member tending to prevent rearward movement of said lifting member, and manually controlled means for selectively imparting forward rotary movement to said members, the last named means also acting to release said braking means.

21. In a mechanism of the class described, lifting and lowering members mounted for rotation side by side, said members being formed with inclined cams on their outermost faces, means normally acting to cause rearward rotation of each of said members, braking means embracing said rotary members and contacting the inclined cams thereof, forward movement of the respective cam wheels causing lateral sliding movement of said brake member in opposite directions, and manually controlled means for rotating said cam wheels in a forward direction.

22. In a mechanism of the class described, lifting and lowering members mounted for rotation side by side, said members being formed with inclined cams on their outermost faces, spring-pressure devices tending to cause rearward rotation of said lowering member, slidable brake devices embracing said rotary members and contacting the inclined cams thereof, forward movement of the respective rotary cam members causing sliding movement of said brake device in opposite directions, and manually controlled means for independently rotating said cam members in a forward direction.

23. In a device of the class described, a starting mechanism comprising a lever fulcrumed at one end, an arm pivoted on the fulcrum of said lever, a pawl pivoted intermediate of its ends on said arm and extending across said lever, said lever being formed with an abutment, said pawl being formed with a shoulder adapted to engage said abutment and cause oscillation of said lever, and means for engaging and moving said pawl, the shoulder of said pawl being adapted to slip off of said abutment after said lever has moved the desired distance.

24. In a device of the class described, a support, a lever fulcrumed at one end thereon, an arm pivoted on the fulcrum of said lever, a pair of pawls of unequal length pivoted on said arm and crossing said lever, said lever being formed with abutments on its opposite sides, said pawls being formed with shoulders adapted to engage said abutments and move said lever, means for engaging and moving said pawls, and a vertically adjustable inclined stop on said support adapted for engagement by one end of said pawls.

Signed at Kansas City, in the county of Jackson and State of Missouri, this 23rd day of July, 1919.

JOHN LOUCIEN CHESNUTT.