July 14, 1959 C. W. MUSSETT 2,894,648

STACKING DEVICE

Filed April 11, 1957 2 Sheets-Sheet 1

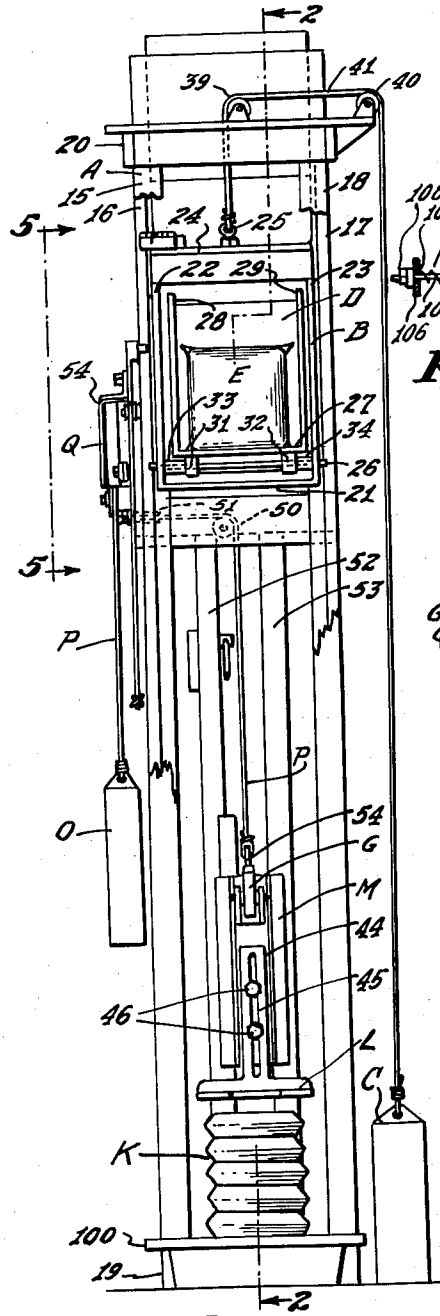


FIG. 1.

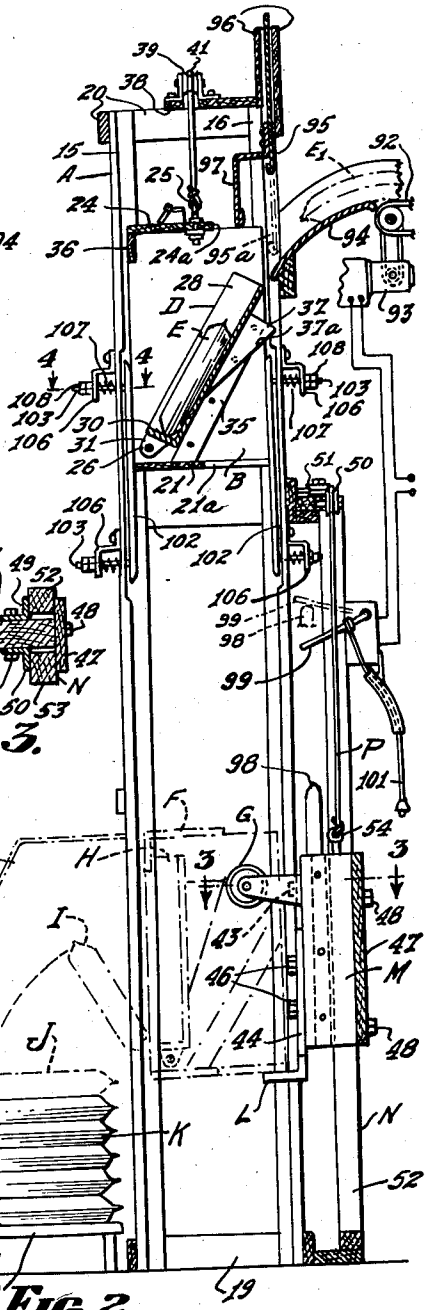


FIG. 2.

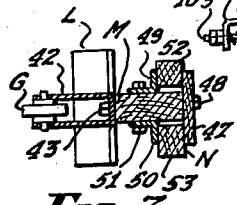


FIG. 3.



FIG. 4.

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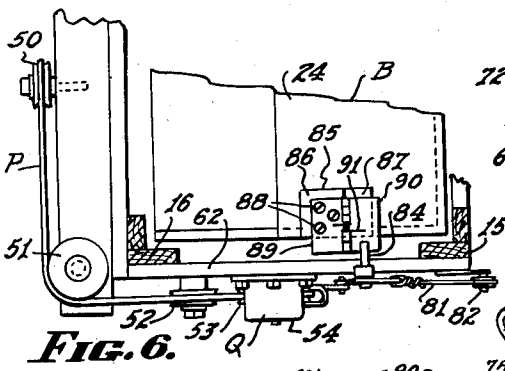


FIG. 6.

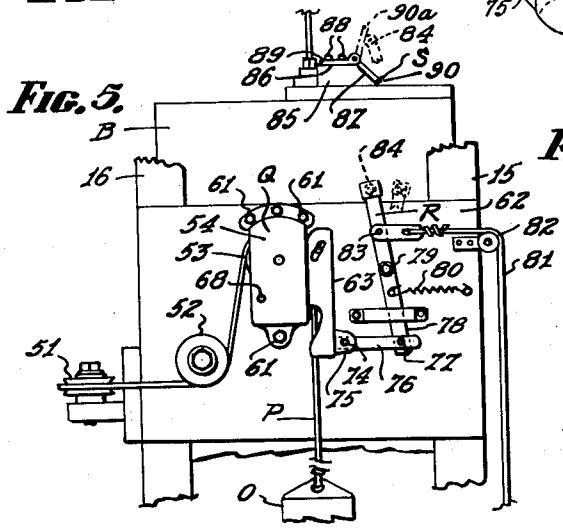


FIG. 5.

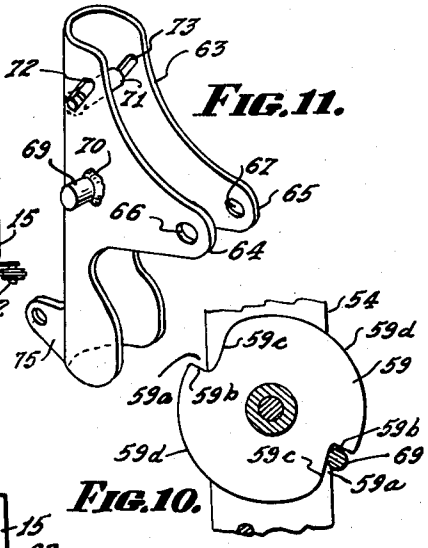


FIG. 11.

FIG. 10.

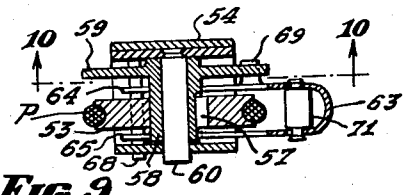


FIG. 9.

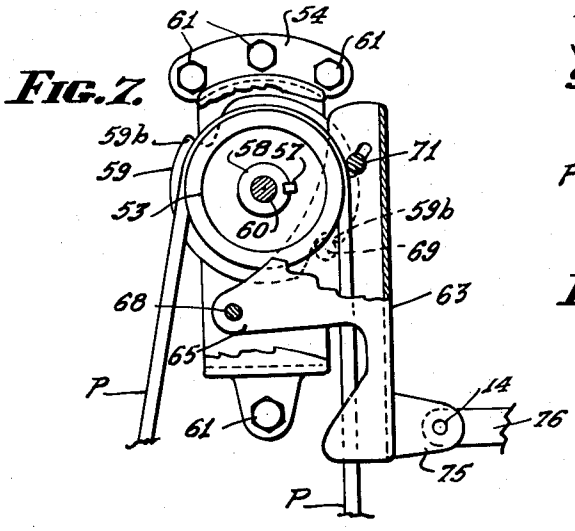


FIG. 7.

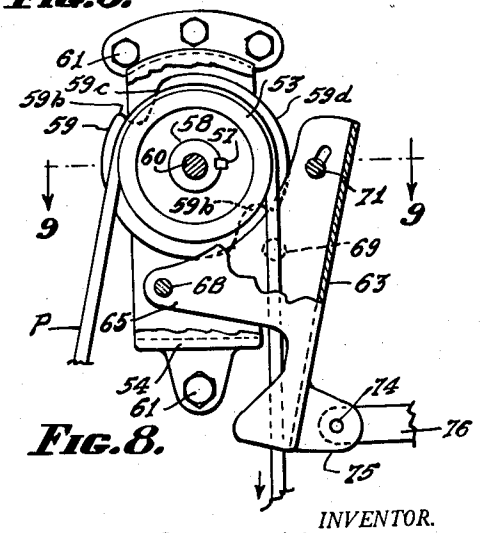


FIG. 8.

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STACKING DEVICE

Clarence W. Mussett, Paris, Ky.

Application April 11, 1957, Serial No. 652,193

7 Claims. (Cl. 214—6)

My invention relates to stacking devices such as employed for stacking or piling bags of cement, boxes or other parcels of break resistant character upon a pallet or platform.

A principal object of my invention is to provide a stacking device embracing a simple but effective arrangement of parts, this being primarily advantageous in that economies of construction are effected.

Another object of my invention is to provide a stacking device wherein movements of the parts are induced only by gravitational force, this being advantageous in that economies of operation are effected.

Another object of my invention is to provide a stacking device as above set forth embracing a novel, vertically movable parcel bearing member which is adapted, at an elevated position, to receive a parcel and which is actuable by discharge means at a lower position to discharge and to deposit the parcel onto a pallet or stack, this arrangement permitting space saving and other advantageous adaptations of the device.

A further object of my invention is to provide a stacking device as above set forth and wherein the discharge means effecting deposit of each parcel onto the stack is intermittently elevated or repositioned upwardly in increments comparable to the increased height of the stack as each parcel is added thereto, this being advantageous in that discharge of each succeeding parcel occurs in like relation to the top of the stack and hereby each parcel is subjected to like stresses during the stacking procedure.

Still another object of my invention is to provide a novel means whereby gravitational force is employed to induce the upward repositioning of the discharge means.

Yet another object of my invention is to provide novel control means effecting intermittent repositioning of the discharge means in upward increments comparable to the growing height of the stack as each parcel is deposited thereon.

Other objects and advantages of my invention will become apparent during the course of the following description.

In the accompanying drawings forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same:

Figure 1 is a front elevational view, with parts broken away, showing an exemplary embodiment of my invention.

Figure 2 is a vertical sectional view taken along the line 2—2 of Figure 1.

Figure 3 is a fragmentary horizontal sectional view taken along the line 3—3 of Figure 2.

Figure 4 is a similar view taken along the line 4—4 of Figure 2, the view being on an enlarged scale.

Figure 5 is an enlarged fragmentary view taken from the left of Figure 1 or, as indicated by the line 5—5 thereon.

Figure 6 is a fragmentary horizontal view taken along the line 6—6 of Figure 5.

Figure 7 is an enlarged side elevational view, with parts broken away and with certain parts in section, illustrating details of a control mechanism.

Figure 8 is a view similar to Figure 7 but with the parts in an alternate position.

Figure 9 is a detailed horizontal sectional view taken along the line 9—9 of Figure 8.

Figure 10 is a detailed sectional view taken along the line 10—10 of Figure 9, and

Figure 11 is a perspective view illustrating the control lever.

Briefly and in general an exemplary embodiment of my invention as illustrated in the drawings comprises an upright frame or guideway A within which a carriage or cab B is arranged for vertical movements, the cab being urged to an elevated position by means of a counterweight C. A parcel bearing member comprising a tilting tray D or parcel carrier is pivotally mounted between the sidewalls of the cab and is adapted to receive a parcel E at the elevated position of the parts as shown. The stability of the system is such that the added weight of a parcel introduced into the tray dominates the counterweight C and the cab with parcel E carried in the tiltable tray moves downwardly, the counterweight thus being lifted to an elevated position gains potential energy for later returning the cab to its upper position. As the downwardly moving cab approaches the lower limit of its movement as indicated at F, the tray is engaged by an actuating element G which effects sudden forward tilting of the tray as indicated at H. The momentum thus imparted to the parcel causes it to be ejected from the tray as indicated at I whereupon it is deposited as at J upon the stack K or upon an empty pallet or other receiving means. As the parcel is ejected from the tray a cab abutment element L halts downward movement of the cab which, having been relieved of its cargo, starts to move upwardly by virtue of the counterweight C.

The tray actuating element G and the cab abutment L are mounted on a block M slidably arranged in a guideway N and urged upwardly by means of a counterweight O connected by a cable P to the block. Upward movement of the block, however is restrained by reason of braking means Q (Figure 5) engaging the cable P and adapted, upon actuation of a control lever R, to permit passage of a predetermined length of the cable to thus effect measured upward repositioning of the elements G and L, the counterweight O coacting in the operation.

As the cab B moves upward a cam element S, mounted on the cab, actuates the control lever R which, as just above described, releases the brake means whereby the elements G and L are upwardly repositioned in readiness for the succeeding stacking operation.

Proceeding now in more detailed manner and with reference to Figures 1 and 2 of the drawings, the frame or guideway A is formed by vertical corner elements **15**, **16**, **17**, and **18**, which may be held in suitable spaced relation in various manners or, as shown, by means of cross members generally indicated at **19** at the base and at **20** at the top of the structure.

The cab B comprises a bottom member **21** joined by sidewall panels **22** and **23** which in turn are affixed to a top member **24** mounting an eyebolt **25**. For the purpose of clearance with the actuating element G the bottom member has a cut-out portion **21***a* while the top member **24**, as best indicated in Figure 2, terminates as at **24***a* to permit loading of parcels into the tray D as will later be further described.

Extending between the sidewalls **22** and **23** of the cab a rod **26** provides pivoted mounting for the tray D which comprises a bottom panel **27** and sidewall panels **28** and **29**, including an end wall **30** mounting bearing elements **31** and **32** by means of which the tray is pivotally affixed

to the rod, short tubular spacing elements 33 and 34 being employed to position the tray in operative relation between the sidewalls of the cab.

As best illustrated in Figure 2 the mounting of the tray is such that it normally tilts about the rod 26 to rest in the rearwardly inclined position shown, suitable stop members, such as the member 35, being affixed to the sidewalls of the cab to limit this rearward tilting while forward tilting, as occurs during ejection of a parcel, is limited by an abutment comprising a cross member 36 extending between the sidewalls of, and adjacent to the top panel of the cab. Fixed to the bottom panel of the tray a triangular element 37 provides a cam surface 37*a* which coacts with the actuating element 6 to effect forward tilting of the tray as above described.

At the top of the frame a cross member 38 mounts pulleys 39 and 40 which serve to guide a cable 41, which at one end is affixed to the eyebolt 25 comprising the cab, and at its other end is affixed to the counterweight C. From previous description it will readily be apparent that the amount of the weight C is such as to over-balance the weight of the cab B including the tray D, but is dominable by reason of the added weight of a parcel received in the tray whereby the cab moves downwardly to a parcel discharging position as determined by vertical location of the actuating element G, and the stop element L, hereinabove mentioned and which are repositioned upwardly during each cycle of the upward return movements of the cab.

The actuating element G comprises a rubber tired roller mounted in a bracket 42 which is affixed to the block M as by bolts or screws 43 while the stop element L has an upwardly bent portion 44 providing an adjustment slot 45 through which bolts or screws 46 extend to clamp the element securely to the block, the block having a plate 47 affixed by screws 48 and having angle elements 49 and 50 held by bolts 51 to effect a slidable engagement with the upright members 52 and 53 comprising the guideway N.

At its upper end the block M mounts an eyebolt 54 to which is affixed one end of the cable P, which cable extends over guide pulleys 50 and 51 and, continuing now with reference to Figures 5 and 6, pulley 52 and a a pulley 53 which pulley 53 comprises the braking mechanism Q, arranged within a housing 54 and serving to inhibit movement, or to permit movement in measured increments, of the cable P. After passing over the pulley 53 the other end of the cable is affixed to the counterweight O which, as also previously disclosed, coacts with the cable P to reposition the block M, and elements G and L, upwardly as required.

With reference now to Figures 7, 8 and 9, the pulley 53 comprising the cable braking and control mechanism is fixedly mounted by means of a key 57 to the hub 58 of a cam wheel 59 (Figure 10) the cam 59 as herein shown having diametrically opposed notches 59*a* comprising shoulder portions 59*b* and inclined portions 59*c* joined by radially arcuate portions 59*d*. The cam 59 is rotatably arranged on a pin 60 fixed in the housing 54 which in turn is affixed as by screws 61 to a panel 62 extending between the upright frame members 15 and 16.

A brake lever 63 which, as clearly shown in Figure 11 is of generally U-shaped cross sectional contour, has arms 64 and 65 which are perforated at 66 and 67 for pivotal mounting upon a pin 68 fixed in the housing 54. A locking element comprising a stout pin 69 is securely affixed as by welding 70 to the arm 64 and also serves as a cam follower by riding on the arcuate portions 59*d* of the cam and holding the brake lever in non-locking position until an inclined portion 59*c* allows the pin 68 to move in to become engaged with a shoulder 59*b*, the brake lever being urged to locking position by a spring as will presently be described. A pin 71 is mounted in slots 72 and 73 formed in the arms of the brake lever.

By reason of its pivoted mounting 68 the brake lever 63 is adapted to rock from the braking position of Figure 7 to the non-braking position of Figure 8. In the locking position (Figure 7) the locking pin 69 engages the shouldered portion 59*b* of the cam thus inhibiting clockwise rotation of the cam and of the pulley 53 while the pin 71 presses the cable P into firm frictional engagement within the groove of the pulley 53, the mechanism thus locking the cable from movement. In Figure 8 the brake lever has been rocked to non-locking position and it will be apparent that the locking pin 69 has been removed from locking engagement with the shoulder 59*b* and the pin 71 retracted from engagement with the cable thus allowing rotation of the pulley and lineal movement of the cable, whereby the counterweight O, acting through cable P, moves the block M upward to reposition the elements G and L, the upward movement being halted as the pin 68 moves into engagement with a shoulder 59*b* of the cam as above described.

As perhaps best illustrated in Figure 5 and for actuating purposes involving rocking of the brake lever 63, the lever is provided with a lug 74 having pivotal attachment 75 to a link 76 which in turn is pivotally connected at 77 to the lower end 78 of the actuating lever R which is pivotally mounted at 79 to the panel 62, a tension spring 80 engaging the lever R as shown urges the parts 78, 76 and 63 to the locking position.

A pull cord 81 running over a guide pulley 82 is connected to the upper end of the lever R as at 83, the other end of the pull cord being arranged conveniently accessible to an attendant may thus, if desired, be employed for manually shifting the parts including the brake lever 63 to non-locking position.

However, and for the purpose of automatic actuation of the braking and cable control mechanism, the extreme upper end of the actuating lever R (Figure 6) mounts a roller 84 extending inwardly toward the path of movement of the cab B. Mounted on the top panel 24 of the cab a block 85 comprises a horizontally disposed surface 86 and an inclined surface 87. Fixed to the surface 86 as by screws 88 is a hinge element 89, its coacting hinge element 90 being urged by a spring 91 to an inclined position as defined by the surface 87 of the block, the hinge element 90 being positioned to engage the roller 84 during vertical movements of the cab.

It will now be clear that as the cab moves downward by reason of a parcel the hinge element 90 striking the roller 84 will merely be lifted upward, against tension of the spring 91, to the position 90*a* as indicated in broken lines.

However, after discharge of the parcel and as the cab returns upwardly, the hinge element 90, resting on the inclined surface of the block, will upon striking the roller 84, effect a cam action to momentarily rock the lever R and by reason of the link 76 to also rock the brake and cable control lever 63 to the non-locking position thus initiating upward repositioning of the tray actuating element G and the cab stop element L. Instantly upon disengagement of the roller 84 the spring 80 urges the parts to locking position which as above described occurs subsequent to predetermined upward repositioning of the elements G and L.

With respect to the cable control mechanism as above described it will now be clear that in the arrangement described one half revolution of the pulley 53 will be permitted each time the brake and cable control lever 63 is rocked to lift the stop pin 69 from locking engagement with the cam. Thus, assuming the pulley employed to be of eight inches pitch circumference the cable will be permitted to advance through four inches of lineal movement with each actuation of the mechanism. It will be obvious that, by varying the size of the pulley and by varying the number of equally spaced notches formed in the cam, lineal movement of the cable may readily be predetermined and suitable pulleys and cams be substituted in lieu of those described to effect lineal

movement of the cable in diverse increments as may be desired.

From the foregoing it will now be obvious that upward repositioning of the elements G and L is automatically accomplished with gravitational forces being employed to induce movement of the parts and also that by design of the cable control mechanism the upward increments of movement may be predetermined as desired.

The parcels E may comprise bags of cement, boxes or other articles of break resistant character and may, if desired, be manually loaded into the parcel bearing tray or, as indicated in Figure 2, may be introduced into the tray by means of a suitable conveyor **92** powered by an electric motor **93** and including a suitable delivery chute **94** arranged to direct the parcels into the tray.

In conjunction with loading of the parcels into the tray a vertically slidable door **95** arranged within a suitable guideway **96** has an abutment element **97** engaged by the cab to lift the door upward to its open position shown as the cab arrives at its fully upward and parcel receiving position. Upon downward movement of the cab, the door descends to a closed position as indicated by the broken lines **95***a* whereby subsequently incoming parcels E^1 are restrained from entry into the open guideway until the cab again returns to its upward parcel receiving position.

With an understanding of the foregoing description it will now also be clear that as stacking of the parcels proceeds, the block M is intermittently moved upward until at the full height of the stack an upward extension **98** carried on the block shifts a switch actuating lever **99** which functions to open the power supply circuit to the motor **93** thus stopping movement of the conveyor **92** and halting movement of incoming parcels until an attendant removes the completed stack and supplies an empty pallet **100**, or other suitable means for receiving a stack of parcels. Thereupon by means of the pull cord **81** the attendant may release the braking means Q and manually lower the block M to its starting position at the base of guideway N, whereafter by use of the pull cord **101** the switch lever **99** may be shifted to closed position restarting the motor **93** and the conveyor **92** whereupon stacking of parcels upon the new pallet **100** proceeds.

As illustrated in Figures 2 and 4 the speed of the vertical movements of the cab B may be controlled by means of spring pressed buffer strips arranged to frictionally engage the cab and to retard movements thereof. As herein shown, buffer strips generally indicated at **102** are retained in operative relation by means of studs **103** extending through perforation **104** in the vertical corner members of the frame and through perforations **105** in bracket elements **106** which are affixed to the frame. Compression springs **107** are positioned between the strips **102** and the brackets **106** as shown, to urge the buffer strips into engagement with the cab while nuts **108** threadably received on the outer ends of the studs serve to limit inward movement of the strips. It will be obvious that similar buffer strips (not shown) may be employed in conjunction with the parcel discharging position of the cab or in other manners without departing from the scope of the appended claims.

As indicated in Figure 2, side guide members **109** such as illustrated by the broken lines may, if desired, be employed on opposite sides of the stack K to assure proper positioning of each parcel as it is deposited onto the stack.

It is to be understood that the arrangement of parts herewith shown and described, is to be taken as an exemplary embodiment of my invention, and that various changes in shape, size and arrangement of parts may readily be restorted to, without departing from the spirit of my invention, or the scope of the subjoined claims.

Having thus described my inventions, what I claim as new and desire to secure by Letters Patent is:

1. In a stacking device an upward extending guideway, a carriage arranged for vertical movements therein, resilient means comprising a counterweight operatively arranged to urge said carriage upwardly, a parcel receptacle tiltably arranged within said carriage, said parcel receptacle having an inclined surface, an actuating element adapted for coaction with the inclined surface of said parcel receptacle whereby said parcel receptacle will be tilted, a stop element arranged in the downward path of movement of the said carriage, an abutment mounting member adapted to be upwardly repositioned and mounting said actuating element and said stop element, a suspended weight suitable for lifting said abutment mounting member upward, an element operatively connecting said weight and said abutment mounting member, restraining means actuable to inhibit movement of said abutment mounting member and releasing means operative to deactuate said restraining means.

2. A device defined in claim 1 wherein said abutment mounting member comprises a block slidably arranged in a vertical guideway.

3. A device as defined in claim 1 wherein said element operatively connecting said suspended weight and said abutment mounting member comprises a cable.

4. In a stacking device comprising a vertical guideway having a cab arranged for movements therein; a parcel receiving platform tiltably arranged in said cab, an abutment arranged near the lower limits of said guideway and engageable to effect tilting of said platform, vertical guide means mounting said abutment, a counterweight, a cable operative over a guide pulley and connecting said counterweight and said abutment, a cam mounted adjacent and fixed to rotate with said guide pulley, said cam comprising a notched abutment engageable to inhibit rotation of said pulley, a brake lever pivotally arranged for rocking movement and mounted adjacent said guide pulley, a stop pin fixedly mounted in said brake lever and normally engaging said notched abutment comprising said cam, resilient means operatively connected to and serving to rock said brake lever to braking position whereby said stop pin is urged into engagement with said notched abutment, and means actuated and effective during movement of said cab to momentarily rock said brake lever to a releasing position whereby said stop pin is momentarily retracted from engagement with said notched abutment and a predetermined length of cable dispensed, said resilient means effecting return of said stop pin to engagement with said notched abutment.

5. A device as defined in claim 4 wherein said brake lever includes a brake element normally engaging and restraining movement of said cable.

6. In a stacking device, a vertical guideway, a cab arranged for movements therein, resilient means urging said cab to an elevated position, a parcel receiving tray tiltably arranged in said cab, a tray tilting element arranged near the lower end of said guideway, vertical guide means mounting said tray tilting element, a counterweight, a cable operable over a guide pulley and connecting said counterweight and said tray tilting element, said guide pulley including a notched abutment, a pivoted brake member having a brake element normally engaging said cable, a pin mounted in said pivoted brake member and normally engaging said notched abutment, a brake releasing lever pivotally mounted on said guideway and having a stud extending into said guideway, a link operably connecting said brake releasing lever and said pivoted brake member, and an element carried by said cab and extending therefrom to engage said stud as said cab moves vertically, said element extending from said cab and said stud comprising a yieldable mounting whereby actuation of said brake releasing lever is effected in response only to one direction of movement of said cab.

7. In a stacking device comprising a counterweighted

cab arranged for vertical movements in an upwardly extending guideway, an inclined parcel receiving platform tiltably mounted adjacent the lower end of said cab and comprising an inclined surface engageable to tilt said platform and eject a parcel therefrom, an actuating element arranged near the lower end of said guideway and coacting with said inclined surface during downward movement of said cab to tilt said platform, a block mounting said actuating element and including an abutment serving to terminate downward movement of said cab, said block being repositionally arranged in vertical guide means, resilient means comprising a counterweighted cable operating over a pulley and urging said block to an upward position, said pulley comprising an abutment engageable to restrain movement of said pulley, braking means comprising a brake lever having a brake element normally engaging said cable and having a pin normally

engaging said abutment comprising said pulley, brake releasing means comprising a lever operatively connected to said brake lever and mounting an extending element engageable to rock said lever and said brake lever whereby said brake element and said pin will be retracted from normal engagement respectively with said cable and said abutment comprising said pulley, and means comprising an inclined surface coacting with said extending element and vertical movement of said cab to actuate said brake releasing means.

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