J. A. ALVEY.

AUTOMATIC PACKAGE ELEVATOR.

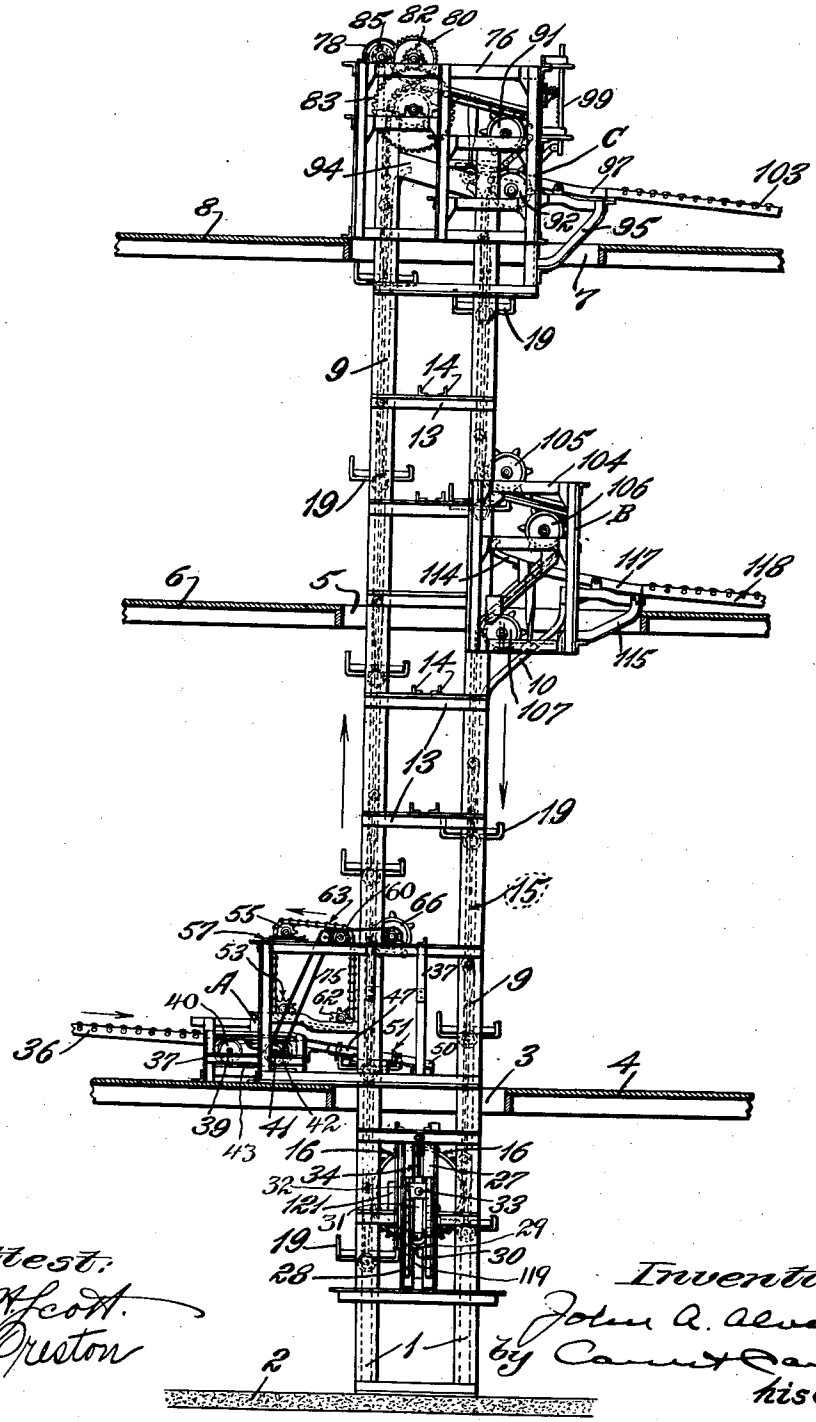
APPLICATION FILED JUNE 1, 1914.

1,219,898.

Patented Mar. 20, 1917.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

Wm. H. Scott.

W. S. Preston

Inventor:

John A. Alvey,

by Cameron & Cameron

his Attys.

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4 SHEETS—SHEET 2.

Fig. 2.

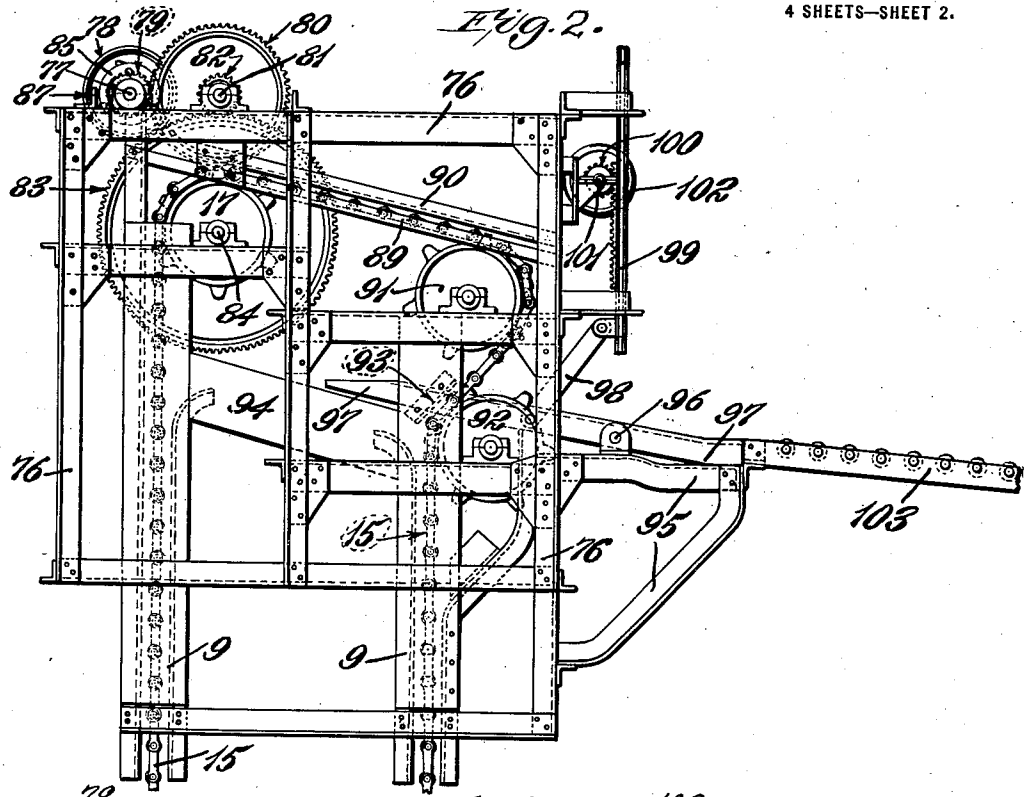
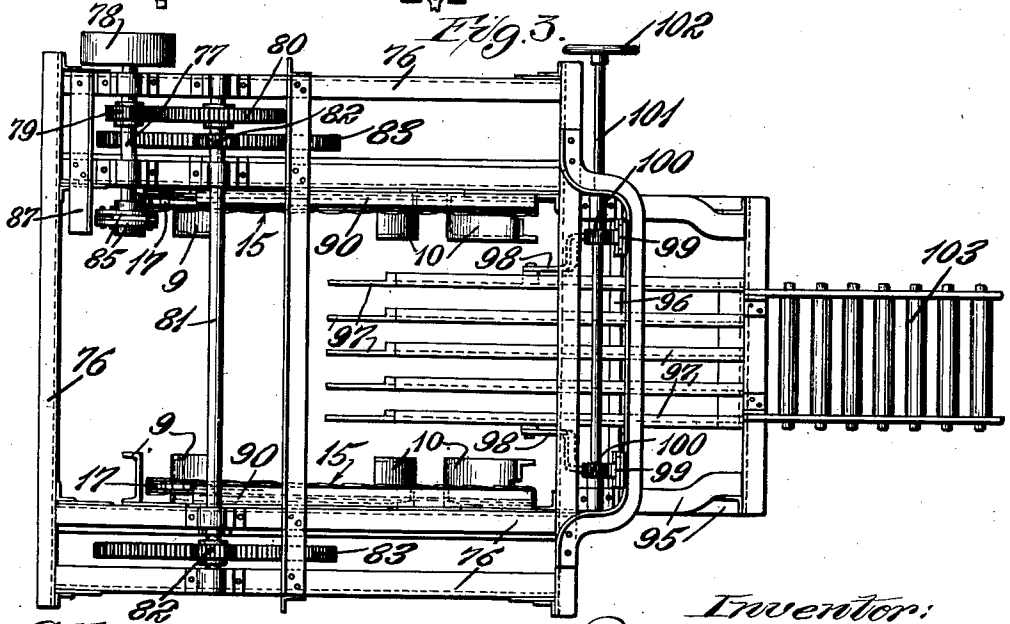


Fig. 3.



Attest:

W. M. Scott.

W. S. Preston

Inventor:

John A. Alvey,

by Cameron & Cameron

his Attys.

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4 SHEETS—SHEET 3.

Fig. 4.

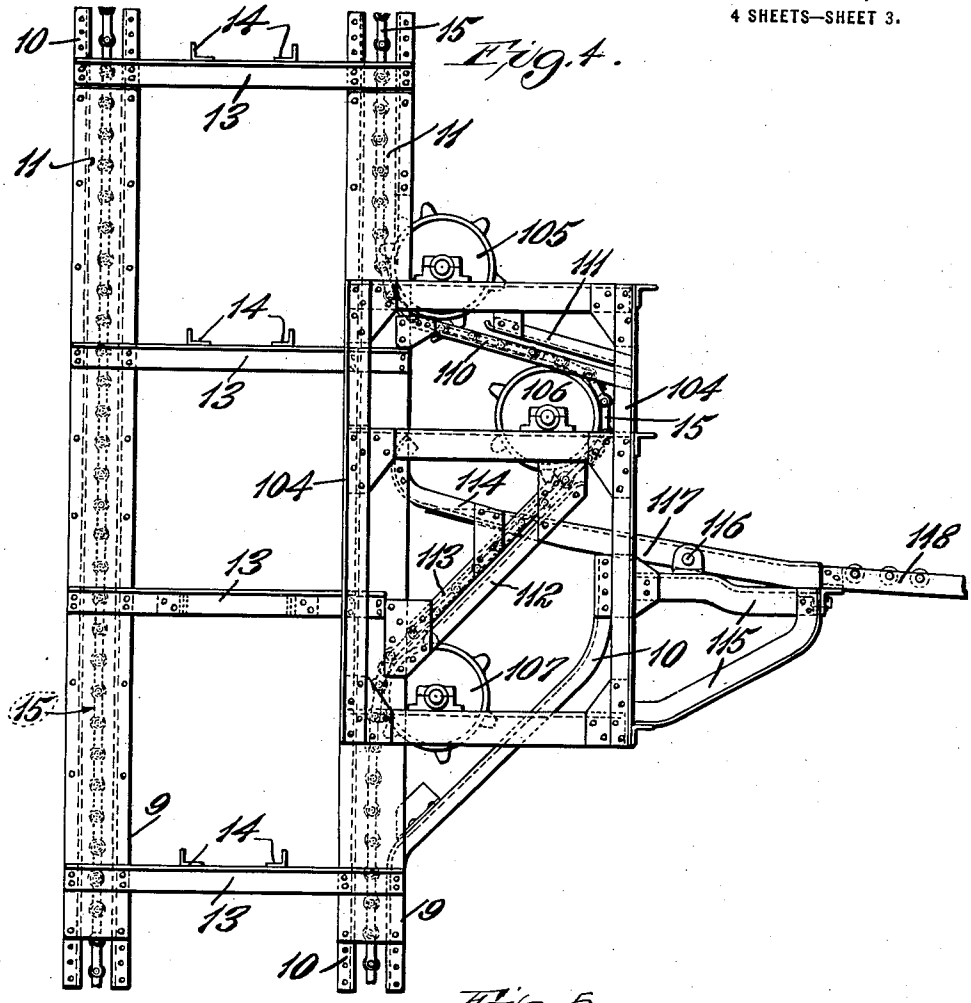
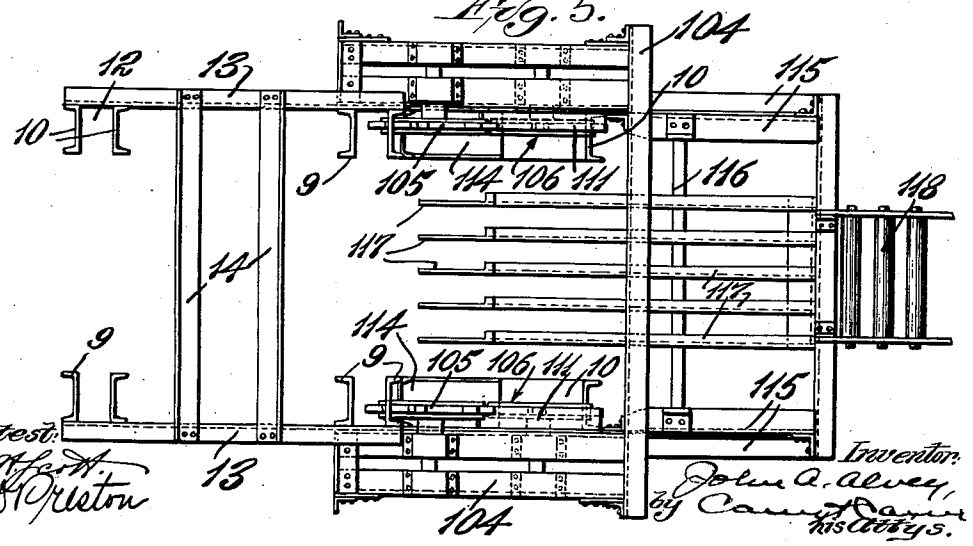


Fig. 5.



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4 SHEETS—SHEET 4.

Fig. 6.

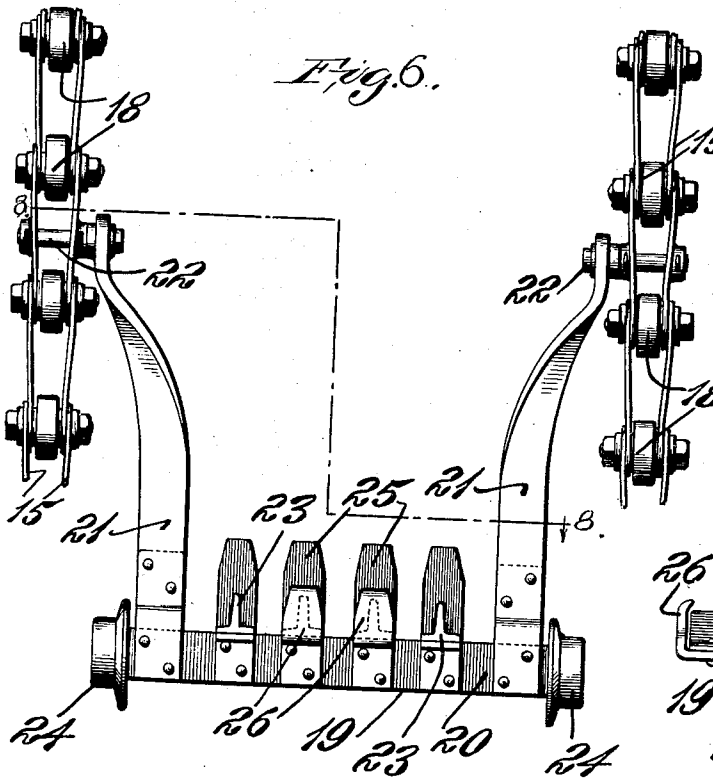


Fig. 7.

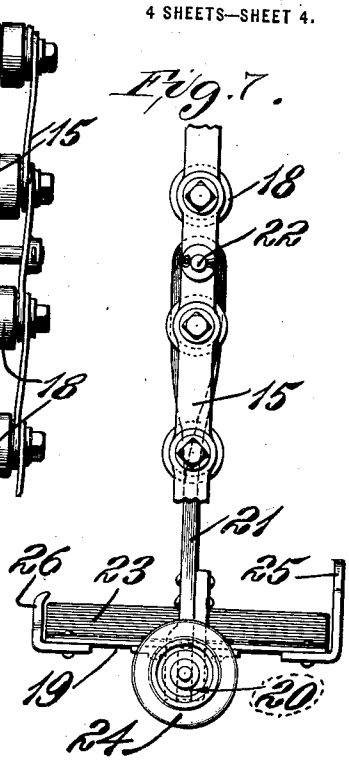
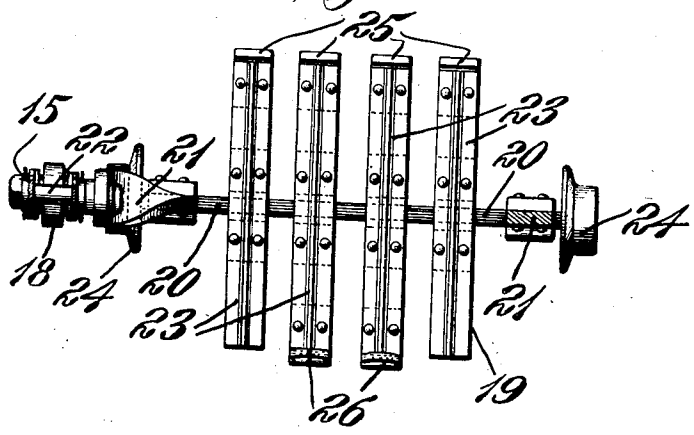


Fig. 8.



Attest:

Inventor:

John A. Alvey,

by Cauert Cauert,

Attys.

UNITED STATES PATENT OFFICE.

JOHN A. ALVEY, OF ST. LOUIS, MISSOURI, ASSIGNOR TO ALVEY MANUFACTURING COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

AUTOMATIC PACKAGE-ELEVATOR.

1,219,898. Specification of Letters Patent. Patented Mar. 20, 1917.

Application filed June 1, 1914. Serial No. 842,036.

To all whom it may concern:

Be it known that I, JOHN A. ALVEY, a citizen of the United States, and a resident of the city of St. Louis and State of Missouri, have invented a new and useful Improvement in Automatic Package-Elevators, of which the following is a specification.

My invention relates to elevators for automatically transferring packages from one floor of a building to another floor.

One of the principal objects of my invention is to provide an elevator which will automatically transfer packages, such as cans, boxes, barrels and the like, from one floor of a building to another floor. Another object is to provide an elevator in which the packages will be loaded and unloaded positively, without danger of crushing or injuring the packages. Further objects are to attain certain advantages which will more fully appear hereinafter.

The invention consists in the parts and in the arrangements and combinations of parts as will more fully appear hereinafter.

In the accompanying drawings, which form part of this specification, and in which like reference characters refer to like parts throughout the several views,—

Figure 1 is a side elevation of an elevator embodying my invention;

Fig. 2 is a side elevation of the top part of the elevator showing the unloading mechanism for the third floor, one of the large gears being removed;

Fig. 3 is a plan view of the top part of the elevator as shown in Fig. 2;

Fig. 4 is a side elevation of part of the elevator showing the unloading mechanism for the second floor;

Fig. 5 is a plan view of the part of the elevator shown in Fig. 4;

Fig. 6 is an end elevation of a carrier;

Fig. 7 is a side elevation of a carrier;

Fig. 8 is a section taken on the line 8—8 on Fig. 6.

In general the elevator comprises an upright frame which extends through openings in several floors of a building. Guided in this upright frame are two parallel endless sprocket chains which extend from the bottom to the top of the upright frame. Between these endless sprocket chains at equal intervals are connected carriers which travel up one side of the upright frame and down the other side thereof. The packages are conveyed by a conveyer to a loading mechanism located on one of the floors, and this loading mechanism delivers the packages one at a time to the carriers as they move upwardly. As the carriers descend on the other side of the upright frame, the packages on them are automatically removed at one of the floors and delivered to another conveyer. The elevator is constructed to unload at any one of several floors.

In the elevator shown in the accompanying drawings, an upright frame 1 extends from the basement 2 through an opening 3 in the first or loading floor 4, an opening 5 in the second floor 6, and an opening 7 in the third floor 8. On the first or loading floor 4 adjacent to the upright frame 1 is a loading mechanism, which is designated as a whole by the letter A. For convenience in description, the side of the upright frame 1 which faces the loading mechanism A will be termed the front, the side opposite to the front will be termed the rear, and the other two opposite sides will be termed the sides. Located on the second floor adjacent to the rear of the upright frame 1 is the discharging or unloading mechanism, which is designated as a whole by the letter B. Located on the third floor adjacent to the rear of the upright frame 1 is another discharging or unloading mechanism which is designated as a whole by the letter C.

The upright frame 1 consists of four standards 9 arranged in the form of a rectangle. Each standard 9 consists of two channels 10 which have a space 12 between them and which are fastened together flatwise by a plate 11 which extends along one edge of each channel 10 (Figs. 4 and 5). The standards 9 are substantially U-shaped in cross-section, and at the front and rear of the upright frame 1, the open spaces 12 in the standards 9 face each other. At intervals across each side of the upright frame 1 are cross members 13 which are fastened to the standards 9. To these cross members 13 are fastened other members 14 which extend from side to side of the upright frame 1.

In the spaces 12 in the two standards 9 located on each side of the upright frame 1

is guided a sprocket chain 15. Each sprocket chain 15 passes over a large idle sprocket wheel 16 located near the bottom of said upright frame, and over a smaller driving sprocket wheel 17 located near the top of said upright frame. The sprocket chains 15 are driven so that they move upwardly at the front of the upright frame 1, and downwardly at the rear of said upright frame, as indicated by the arrows in Fig. 1. The sprocket chains 15 are preferably provided with rollers 18 between each pair of links.

Pivotally secured to the sprocket chains 15 at equal distances apart are carriers 19. As shown in Figs. 6, 7 and 8, each carrier 19 comprises a cross bar 20, to each end of which is rigidly fastened a hanger bar 21. Each hanger bar 21 is pivotally connected by a pin 22 to a pair of links of one of the sprocket chains 15. Rigidly fastened to the cross bar 20 are T bars 23 which extend at right angles to said cross bar 20 in a plane at right angles to the plane of the hanger bars 21, and which are spaced equally from each other along said cross bar. The T bars 23 of each carrier 19 constitute a platform upon which the package is supported while it is transferred by the carrier 19. At each end of the cross bar 20 is journaled a flanged wheel 24. The wheels 24 on each carrier 19 enter the spaces 12 in the opposing standards 9 at the front and the rear of the upright frame 1, the flanges of the wheels 24 engaging the edges of the channels 10. To one end of each T bar 23 is riveted an angle member 25, one end of which projects a short distance above the top face of the T bar 23. To each of the two intermediate T bars is riveted a second angle member 26 which is located at the end opposite to the end to which the angle members 25 are riveted. One end of each second angle member 26 projects a short distance above the top faces of the T bars 23.

Near the bottom of the upright frame 1 at each side thereof are fastened two spaced angle irons 27. On each of the angle irons 27 is secured a guide 28 which has a row of holes 29 therein. In the two corresponding guides 28 on each side of the upright frame 1 is mounted a frame 30 which has therein a slot 31 and holes adapted to register with the holes 29 in the guides 28. In the slot 31 of each frame 30 is slidably mounted a block 32 in which is journaled one end of a shaft 33. The shaft 33 has fixed thereto near each end the large idle sprocket wheel 16, over which is guided one of the sprocket chains 15. Screw-threaded in each frame 30 is a screw 34 which engages the block 32. The screws 34 have heads for turning them. Through the holes in each frame 30 and the holes 29 in the corresponding guides 28 passes a removable bolt. By the construction described, the shaft 33 may be adjusted vertically to take up the wear of the sprocket chains 15 and keep them taut. To tighten the sprocket chains 15, the screws 34 are turned to move the blocks 32 downward in the slots 31 of the frames 30. When the blocks 32 cannot be moved any farther in the slots 31 of the frames 30, the frames 30 can be moved downwardly in the guides 28 by placing the bolts in other holes 29 in the guides 28.

The packages are conveyed to the loading mechanism A by a roller conveyer 36, as shown in Fig. 1. The parts of the loading mechanism A are supported upon a frame 37 which is preferably constructed of angle irons and plates riveted together. Journaled in the frame 37 are shafts 39 and 41 to which are attached sprocket wheels 40 and 42, respectively. Over the sprocket wheels 40 and 42 are guided roller sprocket chains 43. Adjacent to the sprocket chains 43 and extending into the path of movement of the carriers 19 are the loading fingers 47 and 50 and the stop 51. Passing over sprocket wheels 53, 55, 60 and 62 is a sprocket chain conveyer 63. By means of the sprocket wheel 66, the sprocket chain 75, and intermediate connections, the sprocket chain 15 operates the roller chains 43 and the sprocket chain conveyer 63.

At the top of the upright frame 1 is secured a frame 76, preferably made of angle irons and plates riveted together, upon which is supported the driving mechanism for the elevator and the unloading mechanism C for the third floor 8, as shown in Figs. 2 and 3. On the frame 76 is journaled a shaft 77 which has fixed thereto at one end a pulley 78. The pulley 78 is driven by suitable power, preferably by an electric motor, belted thereto. To the shaft 77 is fixed a pinion 79 which meshes with a gear 80 fixed on a shaft 81. A pinion 82 is fixed to the shaft 81 near each end, and each pinion 82 meshes with a large gear 83 which is fixed on a shaft 84. The shafts 84 are journeled in the frame 76 on each side of the upright frame 1, and to each shaft 84 is secured one of the driving sprocket wheels 17.

Attached to the shaft 77 is a detent mechanism 85, consisting of two spaced disks, between which are pivoted a plurality of dogs 86 so weighted that while a dog 86 is moving through the upper portion of the revolution of the disks, the tooth of that dog 86 will be projected and in position to engage the stop bar 87. This mechanism permits the shaft 77 to rotate in its normal or clockwise direction, but prevents it from rotating in the opposite direction.

Secured to the frame 76 on each side thereof is an inclined guide bar 89, (Figs. 2 and 3), upon which the sprocket chain 15

is supported as it runs across the top of the upright frame 1. Above each guide bar 89 parallel thereto is another guide bar 90. At the rear of the top frame 76 on each side is journaled an idle sprocket wheel 91 over which the sprocket chain 15 passes. The sprocket wheels 91 are lower than the sprocket wheels 17. Below each sprocket wheel 91 is journaled an idle sprocket wheel 92. Each sprocket chain 15 is guided over the rear edge of one sprocket wheel 91 and over the front edge of the corresponding sprocket wheel 92. The front edge of each sprocket wheel 92 is over the space 12 in the corresponding rear standard 9. A guide 93 holds the chain in engagement with each sprocket wheel 92.

The rear or inner channel 10 of each front standard 9 terminates at a distance below the top edge of the sprocket wheel 17 about equal to the height of a carrier 19 and curves rearwardly for the short distance. The front or inner channel 10 of each of the rear standards 9 also terminates at a distance below the top edge of the sprocket wheel 91 about equal to the height of a carrier and curves forwardly a slight distance. The rear or outer channel 10 of each of the rear standards 9 is bent rearwardly below the sprocket wheel 92 so as to engage the wheels 24 of the carriers 19 as they descend and guide them into the spaces 12 in the rear standards 9. A plate 94 is fastened to the standards 9 across each side of the upright frame 1 and substantially parallel to the guide bar 89 over which the sprocket chain 15 runs.

Projecting rearwardly from the rear of the frame 76 on each side thereof is a triangular bracket 95. On these brackets 95 is pivoted a rock shaft 96, to which are fastened the unloading fingers 97. The unloading fingers 97 project forwardly and upwardly and extend beyond the sprocket wheels 91 and 92 to a point about half way between the front and rear standards 9. The front end portions of the unloading fingers 97 are beveled. The unloading fingers 97 are located so that they pass between the T bars 23 of each carrier 19, the cross bar 20 of each carrier 19 passing below them. Pivoted to the outside fingers 97 near each side of the upright frame 1 is a link 98 which extends upwardly. Each link 98 is pivotally connected to the lower end of a vertically slidable rack 99. Meshing with the racks 99 are gears 100 fixed to a shaft 101. The shaft 101 is journaled on the frame 76 and has fixed thereto at one end a hand wheel 102. The fingers 97 lead to a roller conveyer 103.

The unloading mechanism B for unloading the packages at the second floor 6 is similar in many respects to the unloading mechanism C for unloading the packages at the third floor 8. As shown in Figs. 4 and 5, the parts of the intermediate unloading mechanism are secured to a frame 104 which is preferably composed of angle irons and plates riveted together and which is fastened securely to the rear standards 9 of the upright frame 1. At the top of this frame 104, and on each side thereof, is journaled an idle sprocket wheel 105. Located rearwardly and downwardly from each sprocket wheel 105 is a second idle sprocket wheel 106 journaled on the frame 104. Located directly below each sprocket wheel 105 and at the bottom of the frame 104 is a third idle sprocket wheel 107 journaled on the frame 104. The sprocket chains 15 pass over the front edges of the first sprocket wheels 105, around the rear edges of the second sprocket wheels 106 and thence over the front edges of the third sprocket wheels 107. The rear or outer channel 10 of each of the rear standards 9 is removed between the first sprocket wheel 105 and the third sprocket wheel 107. The rear channel 10 of each of the rear standards 9 below the third sprocket wheels 107 curves rearwardly and upwardly and is fastened to the rear of the frame 104. Fixed to the frame 104 near each side thereof is a downwardly and rearwardly inclined guide bar 110, upon which is supported the sprocket chain 15 between the first sprocket wheel 105 and the second sprocket wheel 106. Above each guide bar 110 and parallel thereto is a second guide bar 111. Secured to the frame 104 near each side thereof is an upwardly and rearwardly inclined guide bar 112, upon which is supported the sprocket chain 15 between the second sprocket wheel 106 and the third sprocket wheel 107. Above each guide bar 112 and parallel thereto is a second guide bar 113. Between each guide bar 113 and the corresponding rear standard 9 is secured a curved guide 114 which is located below the guide bar 110 a distance about equal to the height of a carrier 19. The wheels 24 of a carrier 19 hung from the sprocket chains 15 while they are supported upon the guide bars 110 will engage the lower edges of the guides 114. Secured to the frame 104 on each side thereof is a triangular bracket 115; and on these brackets 115 is journaled a rock shaft 116. Fastened to the rock shaft 116 are the unloading fingers 117 which incline rearwardly and downwardly. The unloading fingers 117 lead to the roller conveyer 118.

Near the bottom of the upright frame 1 is secured a vertical plate 119, which has the lower end portion thereof bent rearwardly. Secured to the front face of the plate 119 are two guides 121 which extend up and down with their lower ends farther apart than their upper ends. The rear or inner channel 10 of each of the front standards 9 is cut away from the bottom of the upright

frame, to a point about opposite the guides 121, and the lower end portion of each of said rear channels 10 is curved rearwardly. The front or inner channel 10 of each of the rear standards 9 is cut away from the bottom of the upright frame 1 to a point a little above the shaft 33 in its highest position.

Referring to the operation of the elevator, the elevator is driven by applying power to the pulley 78 at the top of the elevator (Figs. 2 and 3), and the power is transmitted through the pinion 79, the gear 80, the shaft 81, and the pinions 82 to the large gears 83. The large gears 83 drive the shafts 84 and the sprocket wheel 17. The sprocket wheels 17 drive the sprocket chains 15, together with the carriers 19 secured to said sprocket chains.

By means of the roller conveyer 36 and the loading mechanism A a package is placed on the loading fingers 50 in the position to be engaged by a carrier a short time before a carrier passes the loading fingers.

The carriers 19 are carried by the sprocket chains 15 up the front of the elevator with a package on each one until they reach the top of the elevator. At the top of the elevator, (Figs. 2 and 3), after the sprocket chains 15 leave the sprocket wheels 17 they are guided rearwardly and downwardly between the guide bars 89 and 90 to the sprocket wheels 91. The plates 94 secured to the standards 9 guide the wheels 24 of the carriers 19 as these carriers travel rearwardly with the sprocket chains 15 and prevent the carriers from swinging sidewise. As each carrier 19 travels rearwardly, the unloading fingers 97 pass between the T bars 23 of the carrier 19 and above the cross bar 20 of the carrier, until the unloading fingers 97 extend the full length of said T bars 23 under the package upon the carrier. From the sprocket wheels 91 the sprocket chains 15 move downwardly over the rear edges of said sprocket wheels 91, thence forwardly over the front edges of the sprocket wheels 92 and thence downwardly into the spaces 12 in the rear standards 9. As each carrier 19 descends with the sprocket chains 15, the package thereon is left on the unloading fingers 97. The fingers 97 incline downwardly and under normal conditions the package will slide down the fingers 97 upon the roller conveyer 103. It may happen, however, that the package will remain upon the fingers 97 in the way of the succeeding carrier 19. The carriers 19 do not descend vertically to the fingers 97, but first move lengthwise of the fingers 97 until they are positioned above said fingers, and then commence their downward movement. As a consequence of this movement which the carriers take lengthwise of the fingers 97, a package which may be left upon the fingers 97 by a carrier 19 will be pushed along the fingers 97 out of the way by the angle members 25 riveted on the T bars 23 of the succeeding carrier 19 instead of being crushed by said succeeding carrier.

The unloading mechanism C on the third floor 8 at the top of the elevator removes the package from each of the carriers 19, and in order that some or all of the packages may be carried down to a second floor 6, it is necessary to elevate the unloading fingers 97 out of the position where they remove the packages from the carriers 19. This elevating of the unloading fingers 97 is accomplished by turning the handwheel 102, which operates the shaft 101 and the pinions 100 to raise the racks 99. The racks 99, being connected by links 98 to the unloading fingers 97, swing these unloading fingers 97 on the brackets 95 which support them, until the inner or front ends of the unloading fingers 97 are above the plane of the top edges of the sprocket wheels 91. In this raised position, the unloading fingers 97 are out of the way of the carriers 19 and the carriers 19 will descend with the packages on them to the second floor 6 below.

The operation of the unloading mechanism B at the second floor 6 is substantially the same as that of the unloading mechanism C at the third floor 8 hereinbefore described. After the sprocket chains 15 leave the sprocket wheels 105 (see Figs. 4 and 5) they are guided rearwardly between the guide bars 110 and 111 to the sprocket wheels 106 and thence downwardly and forwardly between the guide bars 112 and 113 over the sprocket wheels 107 into the spaces 12 in the rear standards 9. The carriers 19 move with the sprocket chains 15 and consequently they move rearwardly and then downwardly. The curved guide 114 engages the upper edges of the flanged wheels 24 on each carrier 19 and prevents the carrier from swinging sidewise, and also prevents the carrier from dragging back and tilting. The unloading fingers 117 engage between the T bars 23 of each carrier 19 and above the cross bar 20 thereof, and the carrier in descending leaves the package on the unloading fingers 117, the same as in the unloading mechanism C at the third floor 8. The packages slide along the fingers 117 to the roller conveyer 118, by which they are conveyed to any desired part of the second floor 6.

The carriers 19, after they leave the unloading mechanism B at the second floor 6, descend at the rear of the elevator and across the bottom and up the front of the elevator. As the carriers 19 move across the lower part of the upright frame 1 they hang freely, and as they commence their upward movement, the flanged wheels 24 on the carriers 19 engage the plate 119 and the guides 121, and are guided into the spaces 12 in the front standards 9.

It may happen for some reason that power to turn the shaft 77 will not be applied and some of the carriers 19 will be loaded. In order to prevent the weight of the packages upon the ascending carriers from moving the carriers 19 in the direction opposite to the direction of their normal movement, the detent mechanism, comprising the disks 85, the dogs 86 and the stop bar 87, is provided. When the shaft 77 starts to turn in the direction opposite to the direction of its normal rotation, the tooth of the top dog 86, which is projected, will engage the stop bar 87 and arrest the reverse rotation of the shaft 77. The dogs 86 do not engage the stop bar 87 unless the shaft 77 rotates in the reverse direction, and consequently the detent mechanism is noiseless.

The operation of the elevator is automatic, and both the loading and the unloading of the packages are performed without manual aid. The loading mechanism operates positively and the packages cannot stick or catch and interrupt the operation of the elevator. Packages, such as milk cans, barrels and the like, which have projections on the bottom can be handled by the loading mechanism and the unloading mechanism as well as packages having smooth bottoms. Also, the unloading mechanism operates positively, and each carrier pushes the package left by the preceding carrier on the unloading fingers out of the way, as hereinbefore described.

The particular construction which is shown and described may be considerably modified without departing from my invention, and I do not wish to be limited to the details of the construction shown and described.

What I claim is:

1. A package elevator comprising a frame, sprocket chains guided in said frame, carriers supported from said sprocket chains at fixed distances apart, means for moving said sprocket chains up one side and down the opposite side of said frame, spaced fingers extending across the path of downward movement of said carriers, guide bars for guiding said sprocket chains downwardly and longitudinally of said fingers, and sprocket wheels for guiding said sprocket chains downwardly from the ends of said guide bars.

2. A package elevator comprising a frame, sprocket chains guided in said frame, carriers supported by said sprocket chains, means for moving said sprocket chains up one side and down the opposite side of said frame, spaced fingers supported in said frame in the downward path of movement of said carriers, and means for guiding said sprocket chains and said carriers supported thereby first lengthwise of said fingers and then downwardly relative to said fingers.

3. A package elevator comprising a frame, a plurality of spaced fingers pivotally mounted on said frame to swing across the path of movement of said elevator, vertically movable racks mounted on said frame adjacent to said fingers, links pivoted at one end to said fingers and at the other end to said racks, and manually operable means for moving said racks to tilt said fingers up and down, whereby they may be swung across and withdrawn from the path of movement of said elevator.

4. A package elevator comprising a frame, moving sprocket chains guided by said frame up one side thereof and down the opposite side, carriers connected to said sprocket chains at fixed intervals, the bottom of each of said carriers having openings therein, fingers supported by said frame and extending into the path of downward movement of said carriers, said fingers being arranged to pass through the openings of said carriers, fixed guide bars adapted to support said sprocket chains and extending lengthwise of said fingers and substantially parallel therewith, and means for guiding said sprocket chains downwardly from the lower ends of said guide bars.

5. A package elevator comprising a frame, moving sprocket chains guided by said frame up one side thereof and down the opposite side, carriers connected to said sprocket chains, the bottom of each of said carriers having openings therein, fingers supported by said frame and extending into the path of downward movement of said carriers, said fingers being arranged to pass through the openings of said carriers, means for guiding said sprocket chains lengthwise of said fingers and then downwardly relatively thereto, and means engaging said carriers near the lower ends thereof as they move lengthwise of said fingers and preventing upward movement of the lower ends of said carriers.

6. A package elevator comprising a frame, two sprocket chains guided in said frame, carriers supported between said sprocket chains, means for moving said sprocket chains up one side of said frame and down the opposite side thereof, two pairs of sprocket wheels arranged one above the other at the side of said frame where said sprocket chains move downwardly, an intermediate pair of sprocket wheels arranged between said pairs of sprocket wheels and out of line therewith, guides for said sprocket chains extending from said upper pair of sprocket wheels to said intermediate pair of sprocket wheels, other guides extending from said intermediate pair of sprocket wheels to said lower pair of sprocket wheels, and fingers arranged under said intermediate pair of sprocket wheels and extending substantially parallel with said first-mentioned guides.

7. A package elevator comprising a frame, sprocket chains guided by said frame, carriers supported by said sprocket chains, said carriers having openings therein, fingers located in the path of downward movement of said carriers and arranged to pass through the openings therein, and means for guiding said sprocket chains and the carrier supported thereby lengthwise of said fingers and then transversely thereof.

8. A package elevator comprising a frame, sprocket chains guided by said frame, means for moving said sprocket chains up one side of said frame and down the opposite side, carriers supported by said sprocket chains, each of said carriers having a cross-bar and spaced carrier bars secured to said cross-bar, fingers located in the path of downward movement of said carriers, and means for guiding said sprocket chains lengthwise of said fingers and then downwardly relatively thereto, said fingers being narrower than the distance between the top edges of said carrier bars and said cross-bar of each carrier.

Signed at St. Louis, Missouri, this 30th day of May, 1914.

JOHN A. ALVEY.

Witnesses:
ANDREW KESSLING,
MARTHA A. SHELTON.