

June 14, 1927.

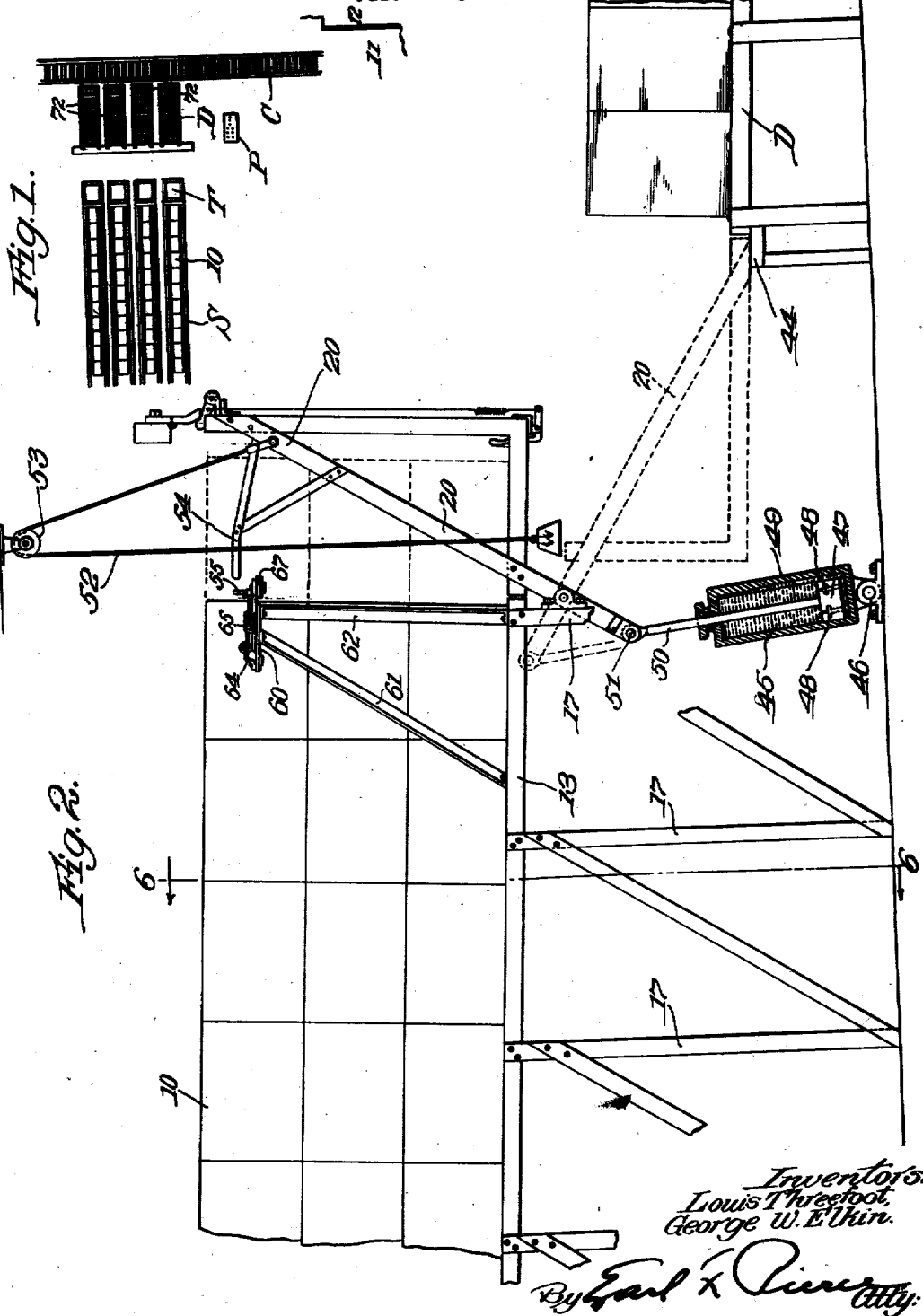
L. THREEFOOT ET AL

1,632,204

CONVEYER SYSTEM

Filed July 19, 1924

4 Sheets-Sheet 1



Inventor's:
Louis Threefoot,
George W. E. Thun.

By *Earl K. Riney* atty.

June 14, 1927.

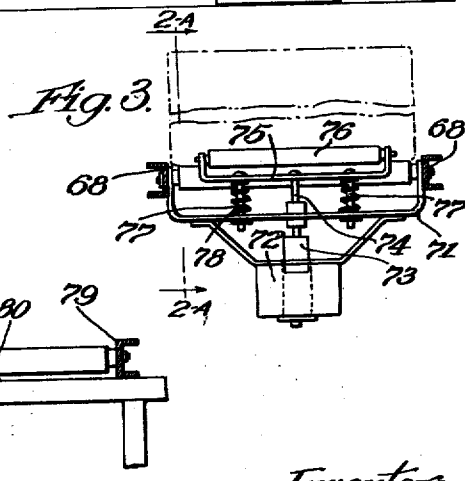
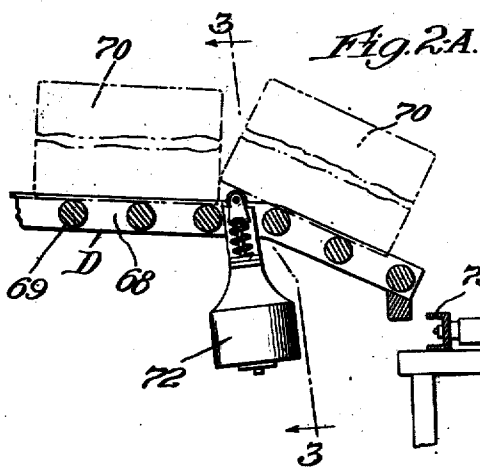
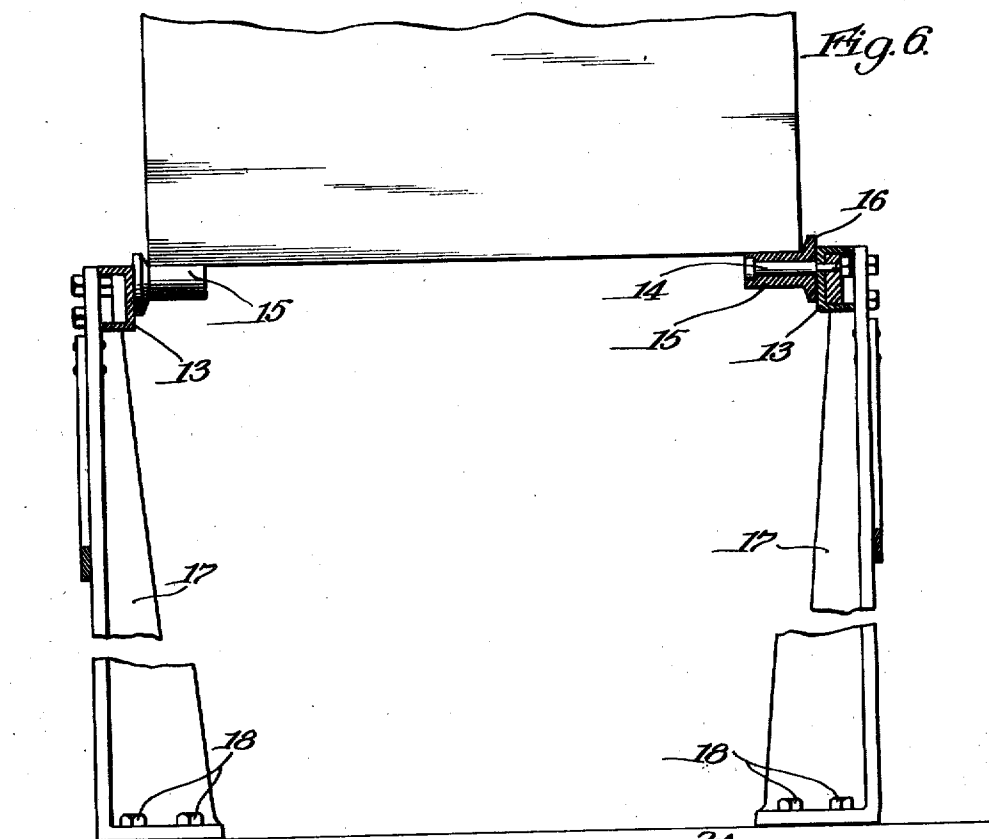
L. THREEFOOT ET AL

1,632,204

CONVEYER SYSTEM

Filed July 19, 1924

4 Sheets-Sheet 2



Inventors:
Louis Threefoot
George W. Elkin
By *Earl & Pierce*
Att'y.

June 14, 1927.

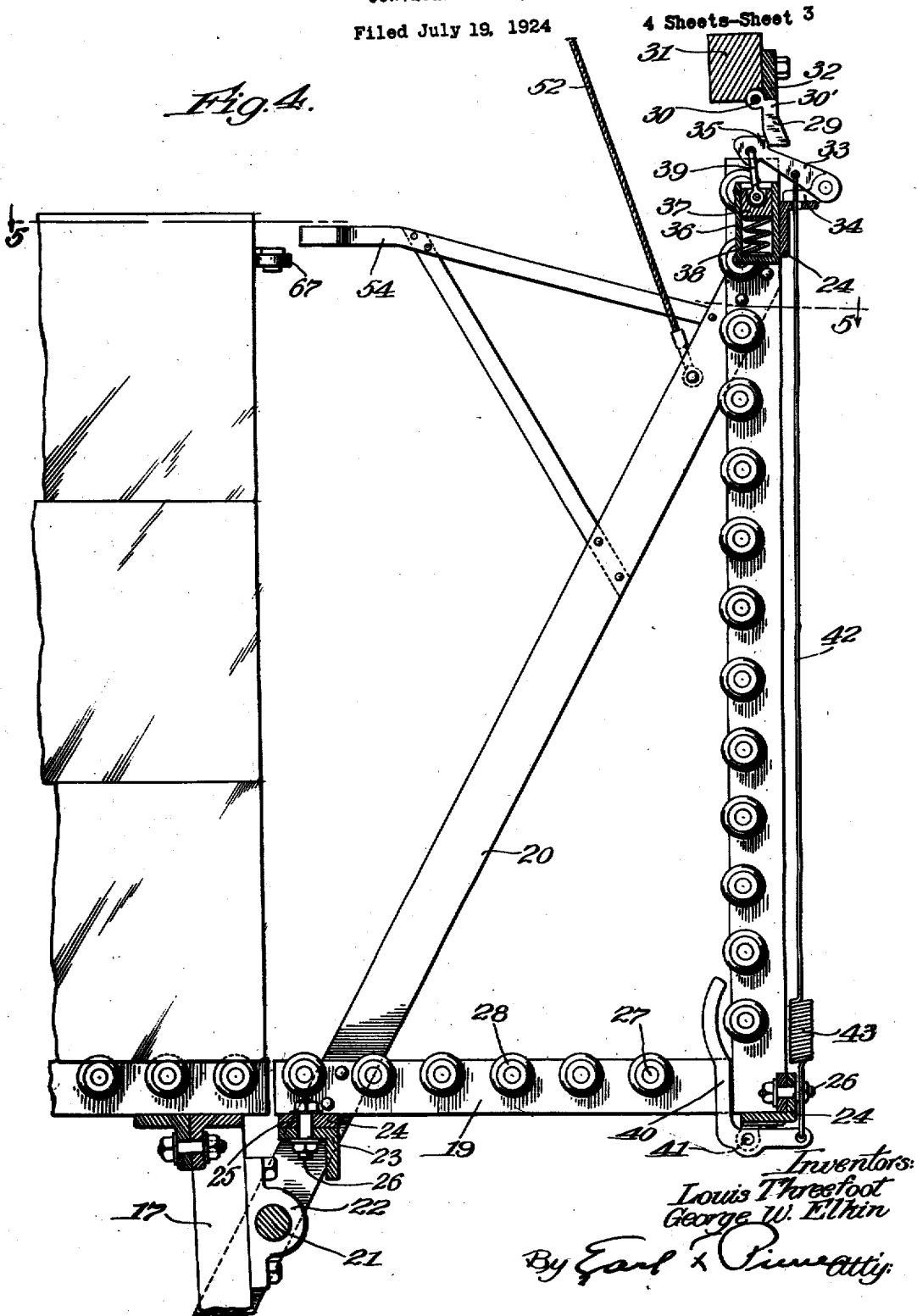
L. THREEFOOT ET AL

CONVEYER SYSTEM

Filed July 19, 1924

1,632,204

Fig. 4.



June 14, 1927.

L. THREEFOOT ET AL

1,632,204

CONVEYER SYSTEM

Filed July 19, 1924

4 Sheets-Sheet 4

Fig. 5.

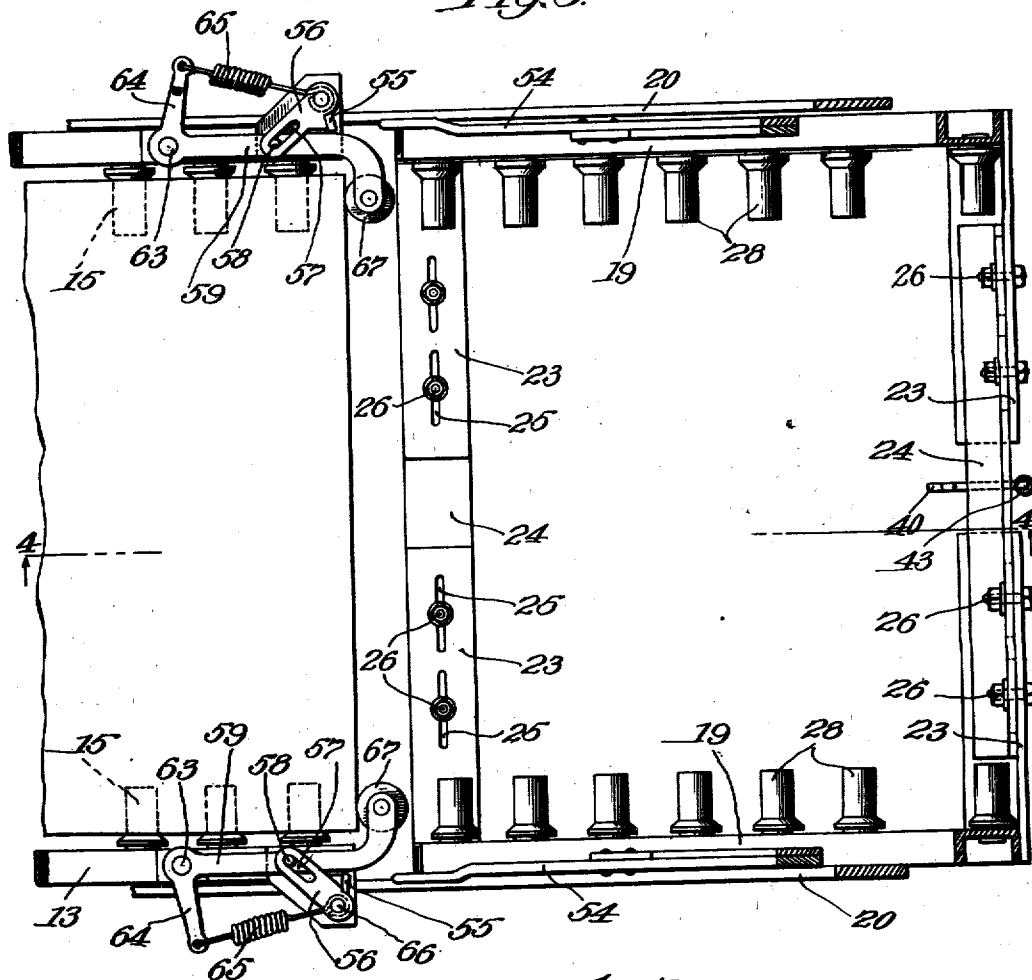
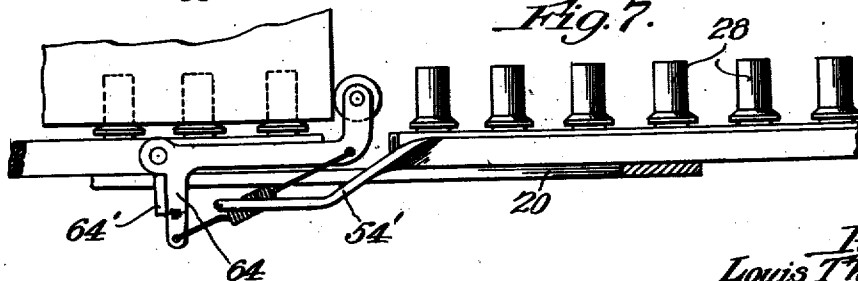


Fig. 7.



Inventors:
Louis Threefoot
George W. Elkin

By *Earl X. Pierce*
Att'y.

UNITED STATES PATENT OFFICE.

LOUIS THREEFOOT AND GEORGE W. ELKIN, OF MERIDIAN, MISSISSIPPI, ASSIGNORS OF ONE-TENTH TO LOUIS THREEFOOT, ONE-TENTH TO GLADYS LOUISE THREEFOOT, ONE-TENTH TO FREDERICK MARSHALL THREEFOOT, ONE-TENTH TO GLADYS LENORA THREEFOOT, ONE-TENTH TO HENRY MARSHALL THREEFOOT, ONE-SIXTH TO GEORGE W. ELKIN, ONE-SIXTH TO CATHERINE HOLMAN ELKIN, AND ONE-SIXTH TO MARY ELKIN.

CONVEYER SYSTEM.

Application filed July 19, 1924. Serial No. 727,004.

Our invention relates to improvements in conveyer systems, and is particularly concerned, though not necessarily limited, to improvements in conveyers of the gravity type.

The objects of our invention are:

First, to provide a conveyer particularly adapted for use in stores, storage and warehouses, and in any other place where it is desirable or necessary to deliver, from time to time, one or more articles, packages, or cases from a stock of such articles, packages, cases, etc.

Second, specifically speaking, our invention contemplates the provision of means for removing from a stack of articles, packages, or cases, arranged in ranks and files, any predetermined number of such articles, packages, cases, etc., and delivering them to a desired point.

A still further object of our invention is to provide conveyers and conveyer systems of the character referred to which are simple in construction, economical to manufacture and easy to operate.

Figure 1 is a more or less diagrammatic view, illustrating, in a general way, a system embodying our invention;

Figure 2 is a side elevation of a portion of our improved conveyer system, parts thereof being broken away for the purpose of better illustration;

Figure 2^a is a section showing certain details of construction of that portion of the conveyer shown in the extreme right hand side of Figure 1, and showing, also, in cross section, a portion of the common conveyer;

Figure 3 is a vertical, transverse section, taken on line 3—3 of Figure 2^a.

Figure 4 is a vertical, longitudinal section, taken on line 4—4 of Figure 5;

Figure 5 is a transverse section, taken on line 5—5 of Figure 4;

Figure 6 is a transverse section, taken on line 6—6 of Figure 2; and

Figure 7 is a sectional detail of a modified form of our invention.

Throughout the several views, similar reference characters are used for referring to similar parts, and the several sections are

taken looking in the directions of the small arrows.

Figure 1 illustrates, in a general way, a system embodying our invention, wherein a plurality of storage conveyers S are arranged side by side in parallel relation for receiving a plurality of boxes or containers 10, stacked in ranks and files. The reference character C indicates the common conveyer for receiving the containers from the storage conveyers S. At the end of each storage conveyer S is a transfer device or conveyer T for delivering the containers or articles from the corresponding storage conveyer S to a short delivery conveyer D. Suitable means are provided for controlling the delivery of the articles or containers from the conveyer D to the common conveyer. The articles are conveyed by the common conveyer to a common destination, which may be a loading platform 11 adjacent a driveway 12.

While we have shown the conveyers S as occupying a common plane, our invention contemplates arranging any number of such conveyers on superposed planes and providing a suitable conventional conveyer for conveying the articles or containers to any desired point.

Each of the storage conveyers comprises a pair of side rails 13, which are here shown as being channel-shaped in cross section (see Figure 6). Stud shafts 14 project inwardly from each of the rails 13 and support the rollers 15, having the beveled flanges 16 at their outer ends. These rollers support the cases and the rails 13 are supported by vertical brackets or pedestals 17 that decrease in height toward the common conveyer C, whereby gravity is effective in advancing the containers toward the common conveyer C.

It will be noted that the brackets or pedestals 17 are secured to the floor by means of screws 18, so that the latter can be removed and the supporting pedestals and rails adjusted toward or away from each other to adapt each storage conveyer to packages, containers or articles of different dimensions. By omitting any cross bracing or

connections between the opposed brackets 17, we have provided a construction permitting an attendant to walk between the opposed rails in stacking the containers or articles upon the rollers, and thus have made it possible to arrange the several parallel storage conveyers and appurtenant apparatus in closely spaced relation, as shown in Figure 1, thereby reducing to a minimum the amount of floor space required by a system of the character described herein.

The transfer device or conveyer T comprises a pair of oppositely disposed L-shaped frame members 19, the free ends of which are secured together by the braces 20, the lower ends of which extend past the horizontal portion of the frame members 19, and are supported by the shaft 21 carried by suitable bearings 22. These bearings are supported by one of the pedestals 17.

The frame members 19 are connected by cross bars, as shown in Figures 4 and 5, comprising the two end members 23 and the central members 24. The ends of the central members 24 are connected with the members 23 by means of the elongated slots 25 and the bolts 26, thereby permitting adjustment of the frame members of the transfer device toward and away from each other to accommodate the transfer device to different sized articles.

The horizontal and vertical portions of the frame members 19 are provided with studs 27, similar to those carried by the rails 13, and these studs support rollers 28, similar to the rollers 15 carried by the rails 13. When the transfer device is in the position shown in Figures 2 and 4, it is in position to receive the file of articles or containers as soon as the latter is released from the retaining mechanism, about to be described, and we have provided suitable means for holding the transfer device in the position shown in these figures until the transfer of cases from one of the storage conveyers to its transfer conveyer has been completed. This means comprises the catch 29 that is pivotally mounted at 30 upon a suitable support 31 adjacent the top of the transfer device, so that it can swing freely in a clockwise direction but is held against counter-clockwise movement by means of the shoulder 30' abutting against the bar 32. A latch 33 is pivotally mounted upon a suitable bracket 34, carried by the adjustable cross members 24 at the top of the transfer device, and comprises a head 35 that is adapted to contact with the lower end of the catch 29, as shown in Figure 4.

The contacting edges or faces of the catch 29 and the head 35 are beveled outwardly and downwardly, so that when a file of containers or articles rolls upon the transfer device, there is a tendency for the head of the latch 33 to move downwardly to a posi-

tion where it disengages from the catch 29. In order to delay the disengagement of the latch 33 from the catch 29 sufficiently to permit the containers or articles to have completely moved onto the transfer device, we prefer to provide a restraining device in the shape of a dashpot comprising a cylinder 36, having the piston 37 fitting therein in a comparatively loose manner and held in its outer position by means of the spring 38. The piston 37 is connected with the head 35 by means of a link 39.

As a file of containers or articles moves onto the transfer device, the pressure tending to disengage the latch 33 from the catch 29 gradually increases, but the movement of the latch 33 is restrained by the dashpot arrangement so as to give the file of containers ample time to complete its movement. The arrangement just described is sufficient to control the release of the transfer device so as to permit it to move downwardly about the axis of the shaft 21, but if more positive means are desired for releasing the transfer device, the means disclosed in Figure 4 may be used for supplementing the action of the parts just described. This means comprises a bell crank lever 40 that is pivotally mounted upon a bracket 41, carried by one of the cross members 24. The vertical leg of this lever extends upwardly into the path of a file of containers moving onto the transfer device, and the horizontal leg thereof is connected, by means of the link 42, with the latch 33 in such manner as to depress the latter when the lower one of a file of cases encounters the vertical portion of the bell crank lever 40. If desired, the link 42 may include a tension spring 43 that is placed under tension when the file of cases engages the vertical leg of the bell crank lever 40 and causes a gradual depression of the latch 33.

When the latch 33 finally becomes disengaged from the catch 29, the transfer device tips downwardly about the axis of the shaft 21 until its upper end rests upon the support 44 extending parallel with the common conveyer C, as shown in Figure 2. The downward movement of the transfer device may be controlled by a dashpot arrangement, such as shown in Figure 1, comprising the cylinder 45, pivotally mounted upon a suitable support 46, and having the piston 47 slidably mounted therein. This piston is provided with suitable valves 48 that close upon the upward movement of the piston 47, but open upon the downward movement. The area of these valves, and the ports controlled thereby, is made sufficiently large to permit a practically unrestrained return of the piston 47. We also prefer to provide the inner wall of the cylinder 45 with a groove 49, the cross sectional area of which decreases toward the top of the

cylinder, so as to gradually decrease the velocity of the descent of the transfer device. For this purpose the piston 47 is connected with the lower ends of the braces 20 that are bent inwardly toward each other, by means of the piston rod 50 and the pivotal connection 51.

The transfer devices move to a position such that the vertical portions become inclined to the horizontal, as shown in Figure 2, to such an extent that the containers or articles carried thereby tend to move onto the delivery conveyers D.

When all of the containers or articles have moved from one of the transfer devices onto the corresponding delivery conveyer D, a counter-weight W, operating through the cable 52, that passes over a sheave 53 and secured to one of the braces 20, causes the transfer device to move upwardly to its receiving position. In doing this, the transfer device acquires a certain momentum that causes it to move past the position shown in Figure 2, and thus bring the inner ends of the trip rods 54 into contact with the lugs 55 extending from the sides of the levers 56. These levers are provided, at their inner ends, with slots 57 for receiving the pins 58 that project upwardly from the longer arms of the bell crank levers 59. These levers are pivotally mounted upon the plates 60, carried by the brackets 61 and 62 that extend upwardly from each of the side rails 13, pivot pins 63 being used for this purpose. The shorter arm 64 of the bell crank lever 59 is connected, by means of a tension spring 65, with the pin 66 that pivotally supports the corresponding lever 56.

The longer arm of each bell crank lever 59 is turned inwardly, as shown in Figure 5, and carries a roller 67 for engaging the uppermost container or article of the file of containers or articles that is about to pass onto the transfer device. When the trip rods 54 engage the lugs 55, they cause the levers 56 to rotate about their pivot points, and thus cause the longer arms of the bell crank levers 59 to move outwardly to a position wherein the rollers clear the box or container at the upper end of the file of cases adjacent the transfer device, and thus permit the entire stack of cases to move outwardly toward the common conveyer, until this file of boxes or containers occupies substantially the position shown in dotted outline in Figure 2. In this position of the forward file of containers, the parting plane between it and the next adjacent file is somewhat to the rear of the rollers 67, so that when the transfer device begins to tilt downwardly, the rollers will have an opportunity to pass in between the file that is carried by the transfer device and the next succeeding file, and thus arrest the movement of the entire stack of cases still remaining

upon the storage conveyer. If found desirable, a plurality of restraining devices, just described, may be used so that there will be one restraining device for each container or article in a file. This will entirely prevent any rank of cases from being pushed forwardly ahead of any other rank of cases, but ordinarily a single restraining mechanism, such as described, will be sufficient.

It should be noted that when the transfer device returns to the position shown in Figures 2 and 4, and swings past this position to bring the trip rods 54 into engagement with the lugs 55, the catch 29 will be engaged by the head 35 of the latch 33 and moved in a clockwise direction about its pivot point to permit the head 35 to pass by it. The catch 29 will then drop downwardly to the position shown in Figures 2 and 4, so as to engage the head 35 when the transfer device returns to the position shown in these figures, and thus hold the latter in position to receive the next file of cases.

In Figure 7 we have illustrated a slightly modified form of the releasing mechanism, in which the push rods 54' engage a lug 64' upon the shorter arm 64 of the bell crank lever, and thus directly actuate the latter in place of actuating it through the intermediary of a second lever, such as the lever 56 of Figure 5. Otherwise, the operation of the modified form is substantially the same as that described above.

The delivery conveyer D comprises a pair of side rails 68 that support rollers 69, similar to the rollers 15 and 28, these side rails being supported by any suitable means permitting them to be adjusted toward and from each other to accommodate the delivery conveyers to the dimensions of the containers handled by the storage conveyers and the transfer devices. For controlling the discharge of containers or articles from the delivery conveyers, we prefer to increase the inclination of the end portions of the side rails 68, adjacent the common conveyer C, so that when a container 70 moves upon this inclined portion it will be tilted to the position shown in Figure 2^a. This permits the use of the following mechanism for controlling the discharge of the containers or articles from the delivery conveyers to the common conveyer. A yoke 71 depends from the two side rails 68 and supports a solenoid 72, in which the armature or magnetic plunger 73 is reciprocable. This plunger carries the plunger rod 74 that is connected with a second yoke 75. A roller 76 is supported by the yoke 75. Two guide rods 77 are carried by the yoke 75 and reciprocate in suitable openings in the yoke 71. Springs 78, surrounding these guide rods, and confined between the yoke 71 and the yoke 75, provide means for yieldingly holding the

roller 76 in the position shown in Figure 2^a, so as to prevent the movement of containers or articles from the delivery conveyer onto the common conveyer.

5 When it is desired to discharge a container from one of the delivery conveyers onto the common conveyer, the operator, seated at the switchboard or panel P (see Figure 1), operates a switch in a circuit including the solenoid 72, and thus causes the
10 plunger 73 to be pulled downwardly. This causes the roller 76 to move out of the path of the adjacent container 70, so that it may pass forwardly onto the common conveyer C. The operator maintains the closed condition of the circuit long enough to permit one of the containers to roll onto the roller 76 and then releases the switching mechanism so as to open the circuit and de-ener-
15 gize the solenoid 72. This permits the springs 78 to operate when the package 70 has reached the inclined position shown in Figure 2^a to move the roller 76 upwardly into the path of the next container or article, and thus prevent its discharge onto the com-
20 mon conveyer.

The common conveyer C may be of any desired construction. It may comprise a pair of spaced rails 79, supporting a plu-
25 rality of parallel rollers 80, the rails 79 being inclined to deliver the packages to the desired destination.

It will be noted, from an inspection of Figures 2 and 4, that the shaft 21 is located
30 somewhat below the level of the rollers forming parts of the storage conveyers and the transfer devices. This is to permit the containers on a transfer device to separate from the containers on a storage conveyer by a substantially horizontal movement and
35 thereby prevent any cramping action that might otherwise take place between the separating containers in the event the separating containers should overlap each other to a slight extent, as it is possible they may do.

While we have described the preferred embodiment of our invention, and while we have described it in connection with a conveyer system of the gravity type, it is to be
40 clearly understood that our invention is not limited to these details of construction, nor to use in connection with gravity operated conveyers, but is capable of other adaptations and modifications within the scope of the appended claims.

Having thus described our invention, what we claim is:

1. The combination with a first conveyer for holding cases in ranks and files, and a
45 third conveyer, of means for transferring said cases from said first conveyer to said third conveyer, comprising a second conveyer, means for transferring said cases, by files, from said first conveyer to said second
50 conveyer, and means for controlling the

transfer of cases, one by one, from said second conveyer to said third conveyer.

2. A conveyer system comprising an inclined conveyer for holding stacks of containers in contiguous ranks and files, a tilt-
55 able conveyer pivotally mounted adjacent one end of said inclined conveyer for receiving successive files of containers from said inclined conveyer, a third conveyer positioned at the free end of said tiltable
60 conveyer when tilted away from said inclined conveyer and extending at an angle thereto, a latch for holding said tiltable conveyer in substantial alignment with said inclined conveyer, stop mechanism for preventing movement of said stack toward said tilt-
65 able conveyer, means actuated by the movement of said tiltable conveyer for rendering said stop mechanism inoperative, means actuated by the passage of a file of containers upon said tiltable conveyer, for releasing said
70 latch, said last named means including a delayed action means for insuring the complete arresting of the movement of said stack before said latch is released, means
75 for counter-balancing said tiltable conveyer, and means for controlling the rate of movement of said tiltable conveyer.

3. A conveyer system comprising an inclined conveyer for holding stacks of containers in contiguous ranks and files, a tilt-
80 able conveyer pivotally mounted adjacent one end of said inclined conveyer for receiving successive files of containers from said inclined conveyer, a third conveyer positioned at the free end of said tiltable
85 conveyer when tilted away from said inclined conveyer and extending at an angle thereto, a latch for holding said tiltable conveyer in substantial alignment with said inclined conveyer, stop mechanism for preventing movement of said stack toward said tiltable
90 conveyer, means actuated by the movement of said tiltable conveyer for rendering said stop mechanism inoperative, means, actuated by the passage of a file of containers upon said tiltable conveyer, for releasing
95 said latch, means for moving said tiltable conveyer into receiving position when empty.

4. A conveyer system comprising an inclined conveyer for holding stacks of containers in contiguous ranks and files, a tilt-
100 able conveyer pivotally mounted adjacent one end of said inclined conveyer for receiving successive files of containers from said inclined conveyer, a third conveyer positioned at the free end of said tiltable
105 conveyer when tilted away from said inclined conveyer and extending at an angle thereto, a latch for holding said tiltable conveyer in substantial alignment with said inclined conveyer, stop mechanism for preventing movement of said stack toward said tiltable
110 conveyer, means for rendering said stop
115

mechanism inoperative, means for releasing said latch, and means for moving said tiltable conveyer into receiving position when empty.

5 5. A conveyer system comprising a first conveyer for holding stacks of containers in contiguous ranks and files, a tiltable conveyer pivotally mounted adjacent one end of said inclined conveyer for receiving successive files of containers from said first conveyer, a third conveyer positioned at the free end of said tiltable conveyer when tilted away from said conveyer and extending at an angle thereto, a latch for holding said tiltable conveyer in substantial alignment with said first conveyer, stop mechanism for preventing movement of said stack toward said tiltable conveyer, means for rendering said stop mechanism inoperative, means for releasing said latch, and means for moving said tiltable conveyer into receiving position when empty.

6. A conveyer system comprising a first conveyer for holding stacks of containers in ranks and files, a tiltable conveyer pivotally mounted adjacent one end of said first conveyer, a third conveyer positioned adjacent said tiltable conveyer when tilted away from said first conveyer, releasable means for holding said tiltable conveyer in receiving position, means, controlled by the movement of said tiltable conveyer, for permitting successive files of containers to move upon said tiltable conveyer, means, controlled by the movement of a file of containers upon said tiltable conveyer, for releasing said releasable means, and means for returning said tiltable conveyer to receiving position.

7. A conveyer system comprising a first conveyer for holding stacks of containers in ranks and files, a tiltable conveyer pivotally mounted adjacent one end of said first conveyer, a third conveyer positioned adjacent said tiltable conveyer when tilted away from said first conveyer, releasable means for holding said tiltable conveyer in receiving position, means for permitting successive files of containers to move upon said tiltable conveyer, means for releasing said releasable means, and means for returning said tiltable conveyer to receiving position.

8. A conveyer system comprising a first conveyer for holding a stack of containers arranged in successive ranks and files, a second conveyer for receiving successive files from said first conveyer and separating said successive files from said stack by a substantially horizontal movement, means for completely arresting the forward movement of said stack of containers, and means for receiving containers from said second conveyer and delivering said containers, one by one.

9. A conveyer system comprising a first

conveyer for holding a stack of containers arranged in successive ranks and files, a second conveyer for receiving successive files from said first conveyer and separating said successive files from said stack by a substantially horizontal movement, and means for receiving containers from said second conveyer and delivering said containers, one by one.

10. A conveyer system comprising a first conveyer for holding a stack of containers in contiguous files, means for successively tilting said files away from said stack, and means for controlling the discharge of individual containers from said last named means.

11. A conveyer for holding containers in contiguous files, and means for receiving said files from said conveyer and delivering them one by one, said conveyer and means comprising means adjustable toward and away from each other for accommodating containers of different sizes.

12. A conveyer system comprising a storage conveyer for holding articles stacked in contiguous ranks and files, a second conveyer for transmitting a single rank of articles, an automatic transfer device for receiving the front file from said stack, turning said file on its side and delivering it as a rank to said second conveyer, means actuated by the weight of the articles for guiding said transfer device, and means controlled by the weight of the articles in the turned file for returning said device to get another file as soon as the last article in the turned file has been taken by said second conveyer.

13. The method of automatically delivering articles one by one from a stack of articles arranged in ranks and files, which comprises automatically separating one file from the rest of the stack, tipping the file as a whole over on its side, separating the articles in the file one by one beginning with what was formerly the top, and when the file is exhausted separating another file.

14. The method of automatically delivering articles one by one from a stack of articles arranged in ranks and files, which comprises separating one file from the rest of the stack, tipping the file as a whole over on its side, separating the articles in the file one by one beginning with one end, and when the file is exhausted separating another file.

15. The method of automatically delivering articles one by one from a stack of articles arranged in ranks and files, which comprises separating one file from the rest of the stack, tipping the file as a whole over on its side, separating the articles in the file one by one, and when the file is exhausted separating another file.

16. The method of automatically delivering articles from a stack of articles arranged

in ranks and files, which comprises separating one file from the rest of the stack, tipping the file as a whole over on its side, and separating the articles in the file one by one.

17. The method of automatically delivering articles from a stack of articles arranged in ranks and files, which comprises separating one file from the rest of the stack, tipping the file as a whole over on its side

by movement in the plane of the stack, separating the articles in the file one by one beginning with what was formerly the top, and when the file is exhausted separating another file.

In witness whereof, we hereunto subscribe our names this 5 day of July, 1924.

LOUIS THREEFOOT.
GEO. W. ELKIN.

in ranks and files, which comprises separating one file from the rest of the stack, tipping the file as a whole over on its side, and separating the articles in the file one by one.

17. The method of automatically delivering articles from a stack of articles arranged in ranks and files, which comprises separating one file from the rest of the stack, tipping the file as a whole over on its side

by movement in the plane of the stack, separating the articles in the file one by one beginning with what was formerly the top, and when the file is exhausted separating another file.

In witness whereof, we hereunto subscribe our names this 5 day of July, 1924.

LOUIS THREEFOOT.
GEO. W. ELKIN.

CERTIFICATE OF CORRECTION.

Patent No. 1,632,204.

Granted June 14, 1927, to

LOUIS THREEFOOT ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 5, line 13, claim 5, after the word "said" insert the word "first"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 12th day of July, A. D. 1927.

Seal.

M. J. Moore,
Acting Commissioner of Patents.

CERTIFICATE OF CORRECTION.

Patent No. 1,632,204.

Granted June 14, 1927, to

LOUIS THREEFOOT ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 5, line 13, claim 5, after the word "said" insert the word "first"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 12th day of July, A. D. 1927.

Seal.

**M. J. Moore,
Acting Commissioner of Patents.**