S. OLSON.

CONVEYER SYSTEM.

APPLICATION FILED APR. 4, 1913.

**1,135,316.**

Patented Apr. 13, 1915.

5 SHEETS—SHEET 1.

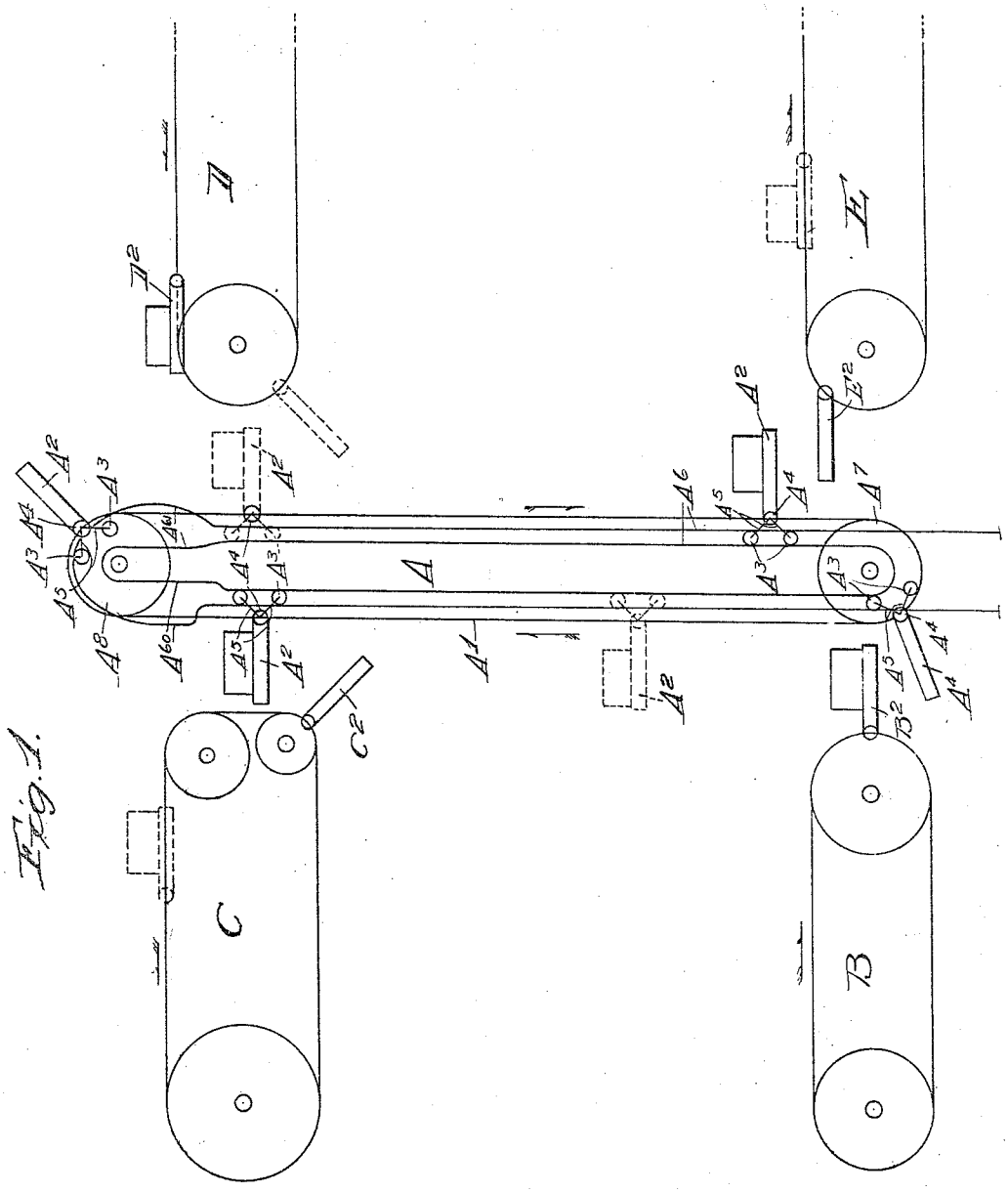



Fig. 1.

Witnesses:
Chas. Hunting
Robt. H. Burton.

Inventor
Samuel Olson
by Burton & Burton
his Attys

S. OLSON.

CONVEYER SYSTEM.

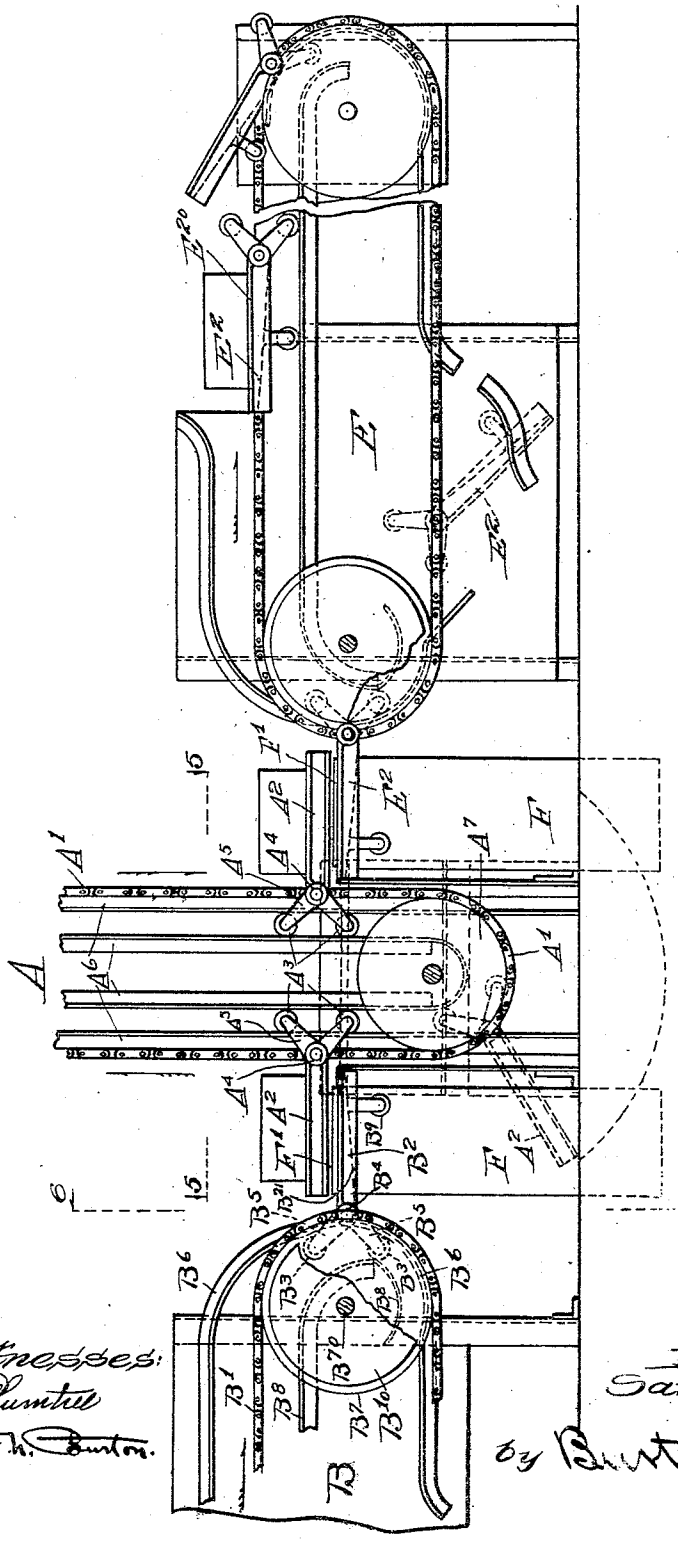
APPLICATION FILED APR. 4, 1913.

1,135,316.

Patented Apr. 13, 1915.

5 SHEETS—SHEET 2.

Fig. 2.




Witnesses:
C. Sumter
Robt. L. Sumter.

Inventor
Samuel Olson
by Burton & Burton
his Attys.

S. OLSON.

CONVEYER SYSTEM.

APPLICATION FILED APR. 4, 1913.

1,135,316.

Patented Apr. 13, 1915.

5 SHEETS—SHEET 3.

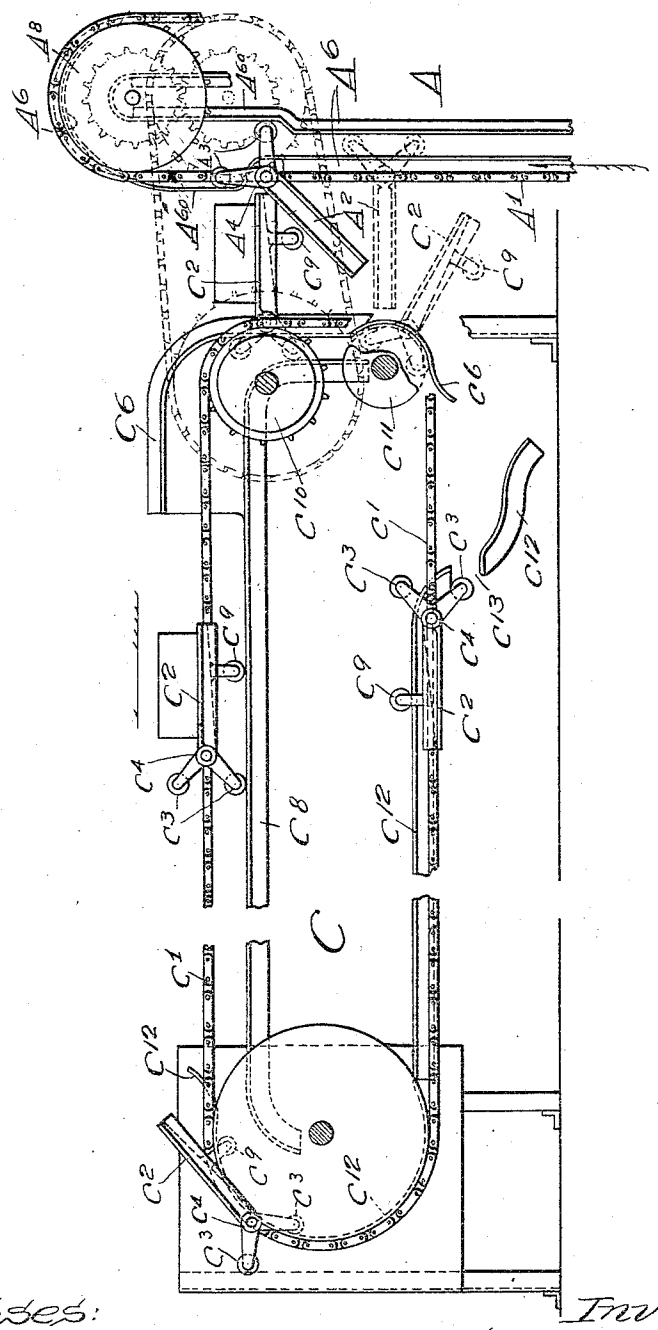


FIG. 3.

Witnesses:

Inventor,
Samuel Olson.

by Burton & Burton
his Attys.

S. OLSON.

CONVEYER SYSTEM.

APPLICATION FILED APR. 4, 1913.

1,135,316.

Patented Apr. 13, 1915.

5 SHEETS—SHEET 4.

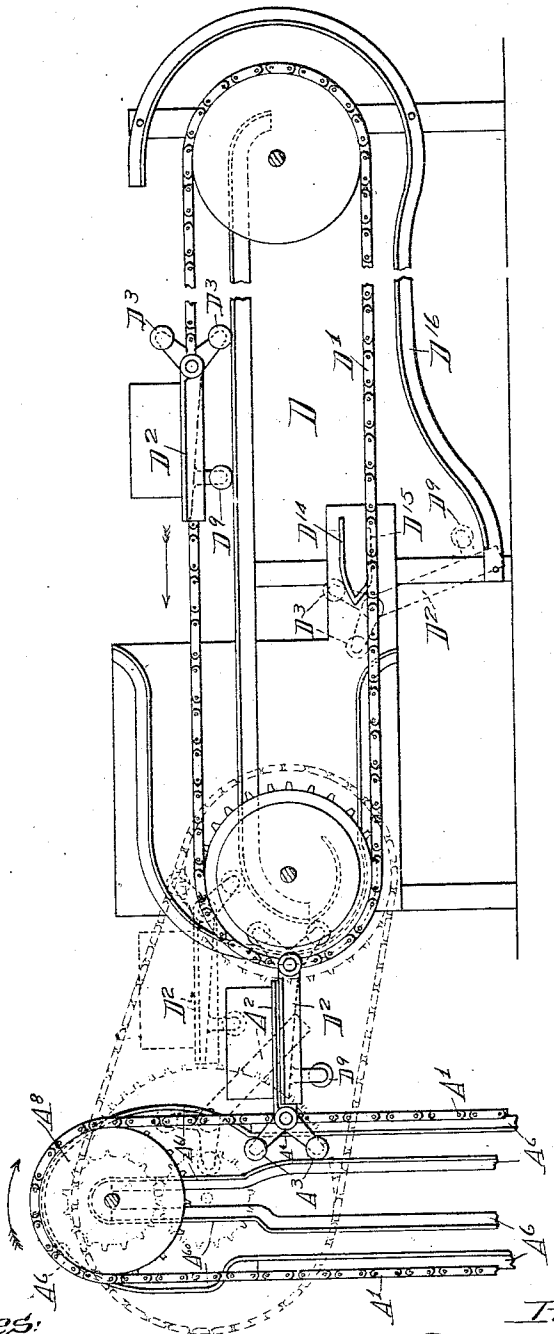


Fig. 4.

Witnesses:

Inventor:
Samuel Olson.

by Burton & Burton
his Attys.

S. OLSON.

CONVEYER SYSTEM.

APPLICATION FILED APR. 4, 1913.

**1,135,316.**

Patented Apr. 13, 1915.

5 SHEETS—SHEET 5.

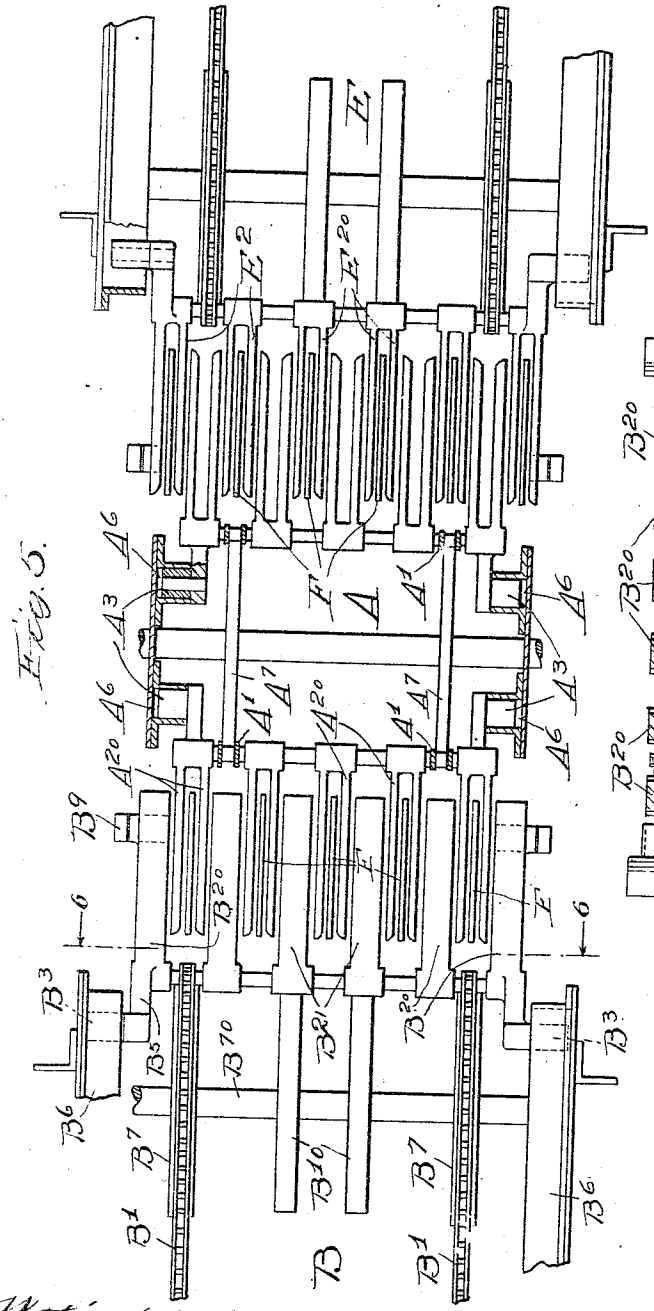


Fig. 5.

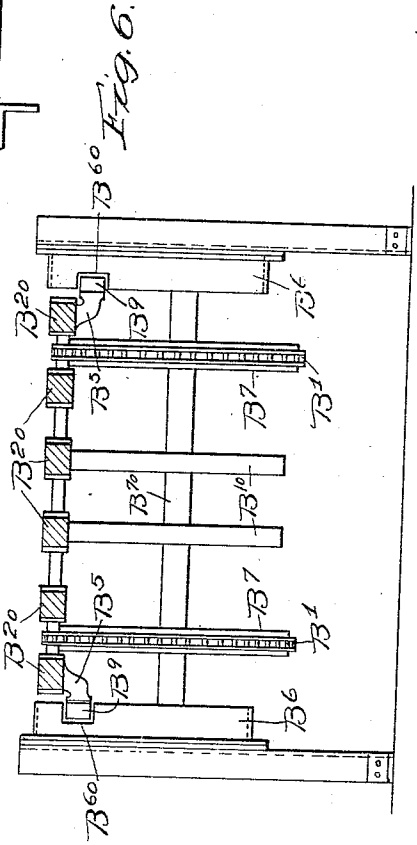


Fig. 6.

Witnesses,
C. F. Burton
Robt. H. Burton.

Inventor
Samuel Olson,
by Burton & Burton
his Attys.

# UNITED STATES PATENT OFFICE.

SAMUEL OLSON, OF CHICAGO, ILLINOIS.

## CONVEYER SYSTEM.

1,135,316. Specification of Letters Patent. Patented Apr. 13, 1915.

Application filed April 4, 1913. Serial No. 758,759.

*To all whom it may concern:*

Be it known that I, SAMUEL OLSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Conveyer Systems, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

This invention relates to improvements in conveying machinery and has to do particularly with devices for rendering the transfer of material from one conveyer to the other entirely automatic, and further includes an arrangement of horizontal conveyers with a single vertical traveling conveyer or elevator adapted to make the maximum use of such vertical conveyer.

The invention consists in the various features and elements and their combinations hereinafter described and illustrated in the drawings as indicated by the appended claims.

In the drawings: Figure 1 is a diagrammatic side elevation of a vertical conveyer and various horizontal conveyers associated therewith in accordance with this invention. Fig. 2 is a side elevation illustrating various related features of the conveyers, A, B and E. Fig. 3 is a detail elevation illustrating the inter-related features of the conveyers A and C. Fig. 4 is a detail elevation illustrating the inter-related features of the conveyer A and the conveyer D. Fig. 5 is a plan view partly in section taken as indicated at the line 5—5 on Fig. 2. Fig. 6 is a detail section taken as indicated at the line, 6—6, on Fig. 5.

Fig. 1 illustrates a vertical conveyer or elevator, A, indicating the principal details of construction of this elevator, and showing only in diagram the relative positions of certain associated horizontal conveyers, designated as B, C, D and E. From this figure, however, it will be seen that the vertical conveyer, A, is designed to be utilized both for elevating packages at one ply of its traveling belt, $A^1$, and for lowering packages at the other ply of said belt. The cars or carriers for this purpose are in the form of trays, $A^2$, which are pivotally engaged with the belt or chain, $A^1$, and guided so as to project horizontally therefrom for supporting their loads. The guide means consists of a pair of rollers, $A^3$, symmetrically positioned with respect to the pivotal axis of engagement of the tray with the belt at $A^4$, and supported by oppositely extending arms, $A^5$. As indicated in the plan view in Fig. 5, each tray, $A^2$, is provided with two pairs of guide rollers, $A^3$, which travel in guide channels, $A^6$, formed in any convenient manner and positioned at the extreme sides of the conveyer, that is, outside the carrying belts or chains, $A^1$, and just beyond the lateral limits of the trays, $A^2$. At the end of its downward travel each tray, $A^2$, passes radially around the foot-wheels, $A^7$, and is thus inverted for use in its upward travel at the other side. The stresses in the arms, $A^5$, transmitting the reactions of the loaded trays to the opposite walls of the guide channel, $A^6$, are thus reversed, but by virtue of their symmetrical arrangement these arms are equally adapted to transmit tension or compression, while the upper and under sides of the trays are exactly similar and are both arranged for supporting a load.

It will be understood that the trays do not retain their loads in passing around the head wheels or foot wheels of the vertical conveyer, A, but merely transfer such loads from lower to higher positions or vice versa, at one side of the vertical conveyer. Fig. 2 shows one end of a horizontal conveyer, B, designed to deliver material to the vertical conveyer, A, at its ascending side. The trays, $A^2$, of the conveyer, A, are of fingered construction and the trays, $B^2$, of the horizontal conveyer are similarly formed, and so mounted that their fingers, $B^{20}$, see Fig. 5, will intermember with the fingers, $A^{20}$, of the trays, $A^2$. The carrying chains, $B^1$, pass around wheels which revolve about horizontal axes, and, as shown, these wheels, $B^7$, are mounted adjacent to the vertical conveyer so as to bring the trays, $B^2$, into position to intermember with the trays, $A^2$. The belt, $B^1$, is driven in the opposite direction to the belt, $A^1$, so that as the loaded tray, $B^2$, passes downwardly around the wheels, $B^7$, its load will be transferred to the ascending tray, $A^2$, of the vertical conveyer, and for maintaining the horizontal position of the tray, $B^2$, until it has thus delivered its load there are provided guide tracks, $B^6$ and $B^8$, positioned to engage guide rollers, $B^3$, carried on symmetrical arms, $B^5$, which extend from the point of engagement of the tray with the chains at $B^4$, this construction being similar in appearance to that of the trays, $A^2$. As it ap-

proaches the conveyer, A, along the upper course of the chain, $B^1$, the tray, $B^2$, is supported horizontally by the lower guide rollers, $B^3$, and supplemental carrying wheels or rollers, $B^9$, mounted on the under side of the tray and traveling on the tracks, $B^8$; but, after passing the point at which the tracks, $B^8$, curve downwardly, the supplemental rollers, $B^9$, would fail to maintain the horizontal position of the tray, $B^2$, and for this purpose there are provided the wheels, $B^{10}$, journaled on the shaft, $B^{70}$, of the chain wheels, $B^7$, and positioned to support the tray by rolling engagement with the under sides of certain of its fingers, $B^{21}$, which are especially formed with such under surfaces parallel to the upper or load-supporting surface of the tray. In this manner the tray is carried from the position in which the rollers, $B^9$, fail to support it to a position at which the rollers, $B^3$, can act horizontally against the downwardly curving tracks, $B^6$ and $B^8$, and thus prevent the tray from tipping until its load has been transferred to the tray, $A^2$, of the vertical conveyer. From the point of such transfer the guide tracks form a mere groove which is concentric about the axis of the chain wheels, $B^7$, and thus causes the tray to swing radially about the remaining quarter of the turn.

It will be noted that as the tray travels around the upper quarter of the chain wheels, $B^7$, the rollers, $B^9$, must pass outside the tracks, $B^6$; to permit this, these supplemental rollers, $B^9$, are formed to extend only about half as far laterally as do the guide rollers, $B^3$, so that notches, $B^{60}$, may be cut in the tracks, $B^6$, to permit the passage of these short rollers, $B^9$, without completely depriving the rollers, $B^3$, of the support of the tracks. This construction is indicated in detail in Fig. 6.

In view of the fact that the transfer of the load from the conveyer, B, to the conveyer, A, involves a compartively sudden reversal of the direction of movement of such load, it is found desirable to provide a stationary landing upon which the load may be deposited momentarily by the conveyer B, before it is picked up by the conveyer A, whereby the resultant shock is divided in half. Such a landing is illustrated as composed of series of plates, F, standing on edge in position to intermember with the fingers of both the conveyers, A and B. These plates, F, may be supported in this upstanding position in any convenient manner, but it will be seen that the support provided must necessarily engage the plates at some distance from their upper edges, $F^1$, which are designed to receive the load; to prevent these comparatively slender plates, F, from vibrating laterally to such an extent as to fail to register properly with the fingers of the conveyer trays, the fingers, $A^{20}$, of the trays, $A^2$, are bifurcated so as to positively engage the said plates, F, near their point of support as the said trays pass around the foot wheels, $A^7$, and start upward; see dotted position of tray, $A^2$, in Fig. 2. In this way the bifurcated fingers, $A^{20}$, will assume control of the plates, F, to prevent any lateral swaying thereof before the fingers of the trays, $B^2$, arrive at the plane of transfer, and will retain such control until after the transfer has been completed.

The load having been elevated from the platform plates, F, to the position of the conveyer, C, it is removed from the elevator, A, by said conveyer, C, and carried away in a horizontal direction. The trays of the conveyer, C, are similar in construction to those of the conveyer, B, and auxiliary supporting wheels, $C^{10}$, corresponding in function and operation to the wheels, $B^{10}$, are provided on the chain wheel shaft. By means of an extra set of idler pulleys, $C^{11}$, the belt, $C^1$, is given a short vertical run parallel to the belt, $A^1$, of the elevator and adjacent thereto, so that in this distance there will be afforded sufficient time for effecting the transfer of the load from the elevator to the tray, $C^2$, since in this case the trays of the two conveyers are traveling parallel in the same direction. In entering upon this vertical portion of its travel the tray, $C^2$, swings radially about the pulleys, $C^{11}$, so that by gearing together the conveyers, A and C, and properly timing the tray, $C^2$, with respect to the tray, $A^2$, the former may be caused to intermember with the latter in such a way that as it assumes a horizontal position in its upward travel its carrying surface will come slightly above the carrying surface of the tray, $A^2$, and will thus remove the load therefrom, even though the linear velocities of the two trays be substantially equal. But, as the tray, $C^2$, recedes from the elevator, A, in passing over the wheels, $C^{10}$, the vertical component of its velocity rapidly decreases, and to prevent the tray, $A^2$, from overtaking the said tray, $C^2$, and assuming the load, the guide channels, $A^6$, are specially widened at $A^{60}$, to cause the tray, $A^2$, to rock downwardly about the point, $A^4$, and thus avoid contact with the load on the tray, $C^2$, without varying its own rate of upward travel. From the wheels, $C^{10}$, the tray travels horizontally along the supporting track, $C^8$, and its load may be removed in any manner not shown, after which the said tray traverses the lower ply of the belt, $C^1$, and returns to the idler pulleys, $C^{11}$, for further service. As indicated in Fig. 3, it is suspended in inverted position by engagement of its carrying wheels, $C^9$, with the track, $C^{12}$, until just ahead of the pulleys, $C^{11}$, it is permitted

to swing downward about its point of connection with the belt at $C^4$, through an arc of about 90 degrees, so that its rollers, $C^3$, may engage the guide track, $C^6$, in proper order to bring the carrying surface uppermost. To render this action smooth and avoid the pendulous swinging of the tray the track, $C^{12}$, is sloped downwardly to its termination, but is necessarily interrupted at $C^{13}$, to permit the passage of the lower rollers, $C^3$.

The elevator trays, $A^2$, having completed their work at the ascending side of the belt, $A^1$, pass over the head wheels, $A^8$, and descend past the horizontal conveyer, D, which is designed to feed them with material to be transferred to the lower horizontal conveyer at that side denoted as E. In general construction the conveyer, D, is exactly similar to the conveyer, B, already described, but since it transfers material to the vertical conveyer while traveling in the same direction as the latter, the combination involves a problem not met in the former case. As the loaded tray, $D^2$, approaches the vertical conveyer, A, its load would block the intermembering of the fingers of the tray with those of the tray, $A^2$, if the latter projected in its descent, as it must after receiving the load; but such conflict is prevented by widening the guide channel, $A^6$, at $A^{61}$, so as to cause the tray, $A^2$, to descend in tilted position, as indicated in dotted lines, and thus to pass under the tray, $D^2$, before assuming a horizontal position. Then by proper timing of the two trays the upper surface of the tray, $A^2$, may be made to assume a horizontal position slightly above the carrying surface of the tray, $D^2$, and thus remove the load therefrom, even though the two trays be traveling in the same direction at substantially equal speeds. After the instant of transfer the tray, $D^2$, is carried about the chain wheels in radial position and thus automatically avoids the load on the descending tray, $A^2$.

In order to right the tray, $D^2$, so as to cause it to return with the proper end forward, there is provided a wedge-like cam guide whose upper surface $D^{14}$, engages the first roller, $D^3$, as the tray approaches the wedge in depending position, while the lower surface, $D^{15}$, engages the other roller, $D^3$, an instant later, with the result that the depending end of the tray is swung upward bringing the supplemental rollers, $D^9$, on to the guide track, $D^{16}$, by which the tray is thereafter retained in proper relation to its direction of travel. The remaining transfer of the load from the tray, $A^2$, to the conveyer, E, involves no new principles and no new construction over what has already been described, though it may be noted that in this case the supplemental landing plates, F, are first engaged and are controlled against lateral vibration by the fingers, $E^{20}$, of the trays, $E^2$, said fingers being bifurcated for this purpose and engaging the plates, F, near their support.

I claim:—

1. In combination, a continuously traveling vertical conveyer comprising a belt, trays extending horizontally and outwardly from both its ascending and descending plies, and guide devices for maintaining such horizontal position of such trays; and two horizontal conveyers associated with such vertical conveyer at each side thereof, and each comprising a belt traveling over a pulley adjacent to the vertical conveyer together with a tray engaged by said belt, and guide devices for maintaining such tray in horizontal position as it passes around said pulley adjacent to the vertical conveyer; the two horizontal conveyers at each side of the vertical conveyer being adapted to travel in opposite directions with respect to each other, and the trays of the vertical conveyer being formed to intermember with those of the horizontal conveyers for transferring loads from one to the other of them at either side of said vertical conveyer.

2. In combination, a continuously traveling vertical conveyer comprising a belt, and trays extending horizontally and outwardly from both its ascending and descending plies, guide devices for maintaining such horizontal position of said trays, and a plurality of horizontal conveyers associated with such vertical conveyer, and each comprising a belt traveling over pulleys which rotate about horizontal axes, a tray engaged by said belt, a track for supporting said tray in horizontal position at the upper ply of the belt, guide devices for maintaining such horizontal position of the tray as it passes vertically around the pulley adjacent to the vertical conveyer, all the trays of said conveyers being of fingered construction, and the trays of the horizontal conveyers being adapted to intermember with those of the vertical conveyer for automatic interchange of loads.

3. In combination, a conveyer comprising a belt mounted for vertical travel, a tray engaged by said belt and extending horizontally to one side of the point of engagement, and guide devices for maintaining such horizontal position of said tray, and a second conveyer, comprising a belt mounted for horizontal travel and passing around a pulley adjacent to the vertical conveyer, a tray engaged by said belt, and guide devices for maintaining said tray in a horizontal position as it passes adjacent to the vertical conveyer, the trays of both conveyers being of fingered construction adapted to intermember one with the other for transferring a load from one to the other.

4. In combination, two conveyers, each

comprising a continuously traveling belt, said belt being mounted to pass adjacent to each other in opposite directions, a tray carried by each belt extending horizontally therefrom, and guide devices for maintaining such horizontal position at the adjacent portions of the belts, said trays being of fingered construction adapted to intermember with each other for transferring a load from the descending to the ascending tray.

5. In combination, two conveyers, each comprising a continuously traveling belt, said belts being mounted to pass adjacent to each other in opposite directions, a tray carried by each belt extending horizontally therefrom, and guide devices for maintaining such horizontal position at the adjacent portions of the belt, said trays being of fingered construction adapted to intermember with each other for transferring a load from the descending to the ascending tray, and a stationary landing comprising a series of upstanding flat-ended fingers positioned to intermember with the fingers of both conveyer trays at the plane of transfer of the load for momentarily supporting said load to reduce the shock thereto resulting from the reversal of its direction of motion.

6. In combination, two conveyers, each comprising a continuously traveling belt, said belts being mounted to pass adjacent to each other in opposite directions, a tray carried by each belt extending horizontally therefrom, and guide devices for maintaining such horizontal position at the adjacent portions of the belt, said trays being of fingered construction adapted to intermember with each other for transferring a load from the descending to the ascending tray, and a stationary landing comprising a series of plates standing on edge and separated by intervals adapting them to intermember with the trays of both conveyers, the tray fingers of the ascending tray being bifurcated to engage the respective plates of said platform in their upward movement to the plane of transfer for steadying said plates laterally.

7. In combination, two conveyers each comprising a continuously traveling belt, said belts being mounted to pass adjacent to each other in approximately parallel directions, and a tray carried by each belt extending horizontally therefrom toward the other belt, said trays being of fingered construction adapted to intermember with each other for transferring a load from one conveyer to the other.

8. In combination, two conveyers, each comprising a continuously traveling belt, said belts being mounted to pass adjacent to each other in approximately parallel directions, a tray carried by each belt extending horizontally therefrom toward the other belt, said trays being of fingered construction adapted to intermember with each other, and means for propelling said belts at such relative speeds that the tray of one belt will pass the tray of the other in the parallel portions of their courses for transferring a load from one to the other.

9. In combination, two conveyers, each comprising a continuously traveling belt, said belts being mounted to travel approximately parallel to each other in the same direction, a tray carried by each belt extending horizontally therefrom toward the other belt in the parallel portions of their courses, said trays being of fingered construction adapted to intermember with each other, and driving means for said conveyers adapted to propel one of them at a higher rate of speed than the other for transferring a load from the slower to the faster conveyer.

10. In combination, two conveyers, each comprising a continuosly traveling belt, said belts being mounted to pass adjacent to each other in approximately parallel directions, a tray carried by each belt extending horizontally therefrom toward the other belt, said trays being of fingered construction adapted to intermember with each other, and guide devices controlling the angular position of one of said trays and adapted to cause said tray to swing downwardly from horizontal position for releasing its load to the tray of the other conveyer.

11. In combination, a conveyer comprising a belt mounted for vertical travel, a tray engaged by said belt extending horizontally to one side of the point of engagement, guide rollers associated with said tray, and a guide track for the rollers for maintaining the tray normally in horizontal position, and a second conveyer comprising a belt mounted for horizontal travel and having a limited vertical run adjacent to the ascending side of the vertical conveyer, a tray engaged by said belt, and guide devices for maintaining said tray in horizontal position as it passes adjacent to the vertical conveyer, the trays of both conveyers being of fingered construction adapted to intermember with each other for transferring a load from the vertical to the horizontal conveyer, and the guide track of the vertical conveyer being formed to permit the tray of said conveyer to swing downwardly and away from the load as said load is assumed by the tray of the horizontal conveyer.

12. In combination, a conveyer comprising a belt mounted for vertical travel, a tray engaged by said belt extending horizontally to one side of the point of engagement, guide rollers associated with said tray, and a guide track for the rollers for maintaining the tray normally in horizontal position, and a second conveyer comprising a belt mounted for horizontal travel and passing down-

wardly around a pulley adjacent to the descending side of the vertical conveyer, a tray engaged by said belt, and guide devices for maintaining said tray in horizontal position as it approaches the vertical conveyer, the trays of both conveyers being of fingered construction adapted to intermember one with the other for transferring a load from the horizontal to the vertical conveyer, the guide track of the vertical conveyer being formed to permit its tray to depend obliquely from the belt as it approaches the point of such transfer, and said track being further formed to bring the tray to horizontal position at the point of transfer for receiving the load from the horizontal conveyer.

In testimony whereof I have hereunto set my hand at Chicago, Illinois, this 25th day of March, 1913.

SAMUEL OLSON.

Witnesses:
ROBT. N. BURTON,
EDNA M. MACINTOSH.