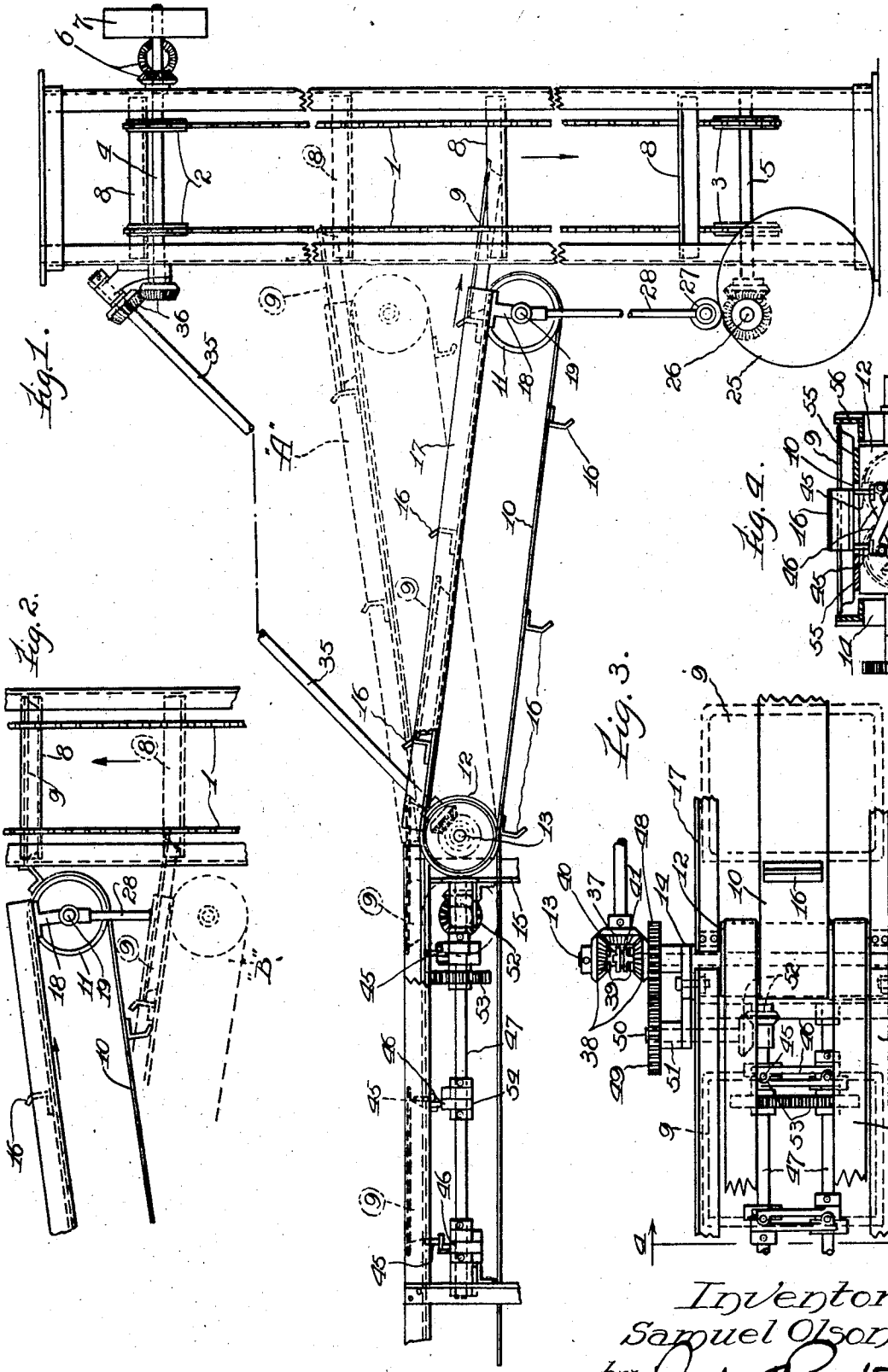
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AUTOMATIC TRANSFER MECHANISM FOR CONVEYERS

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AUTOMATIC TRANSFER MECHANISM FOR CONVEYERS

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The purpose of this invention is to provide means for transferring loads, such as trays, boxes, packages and the like, of fairly uniform size, from a substantially horizontal conveyer to a vertical conveyer or elevator; and it is especially adapted for use with vertical conveyers capable of operation upwardly or downwardly or alternatively in both directions. It consists of the features and elements of construction and their combination hereinafter described and shown in the drawings as indicated by the claims.

In the drawings:

Figure 1 is a side elevation showing a substantially horizontal conveyer, arranged to discharge loads to a downwardly travelling vertical conveyer, and a horizontal feeding conveyer, provided with timing mechanism for regulating the supply of loads to the horizontal conveyer.

Figure 2 is a fragmentary side elevation, showing a horizontal conveyer arranged to discharge loads to an upwardly travelling vertical conveyer, showing in dotted outline the commencement of the discharge.

Figure 3 is a fragmentary plan view, showing the relation of the horizontal feeding conveyer and timing mechanism to the horizontal conveyer, together with the drive connections therefor.

Figure 4 is a vertical section taken through the horizontal feeding conveyer taken on line 4—4, Figure 3.

In transferring loads, such as trays and the like, from a horizontal conveyer to a vertically movable conveyer, it is desirable to have the transfer made automatically. In conveying apparatus for restaurants, hotels, etc., it is essential that the load or tray be automatically and positively transferred from one conveyer to another in a smooth and easy manner, to prevent unnecessary jarring of the dishes and foodstuffs carried on the trays.

In Figure 1 of the drawing the vertical conveyer is illustrated more or less diagrammatically, and it will be understood to consist of two pairs of endless chain belts, 1, only one pair appearing in the drawing. These chain belts are trained over head and foot wheels, 2 and 3, mounted on their respective head and foot shafts, 4 and 5. The head shafts, 4, are interconnected by mitre gears, 6, for operating the belts at equal speeds. One of said head shafts may be driven from any suitable source of power through gears, sprockets, or as herein shown, a pulley 7. Each pair of belts, 1, is provided with flights or load supporting members, 8, spaced at regular intervals, the flights of the respective pairs of belts being in horizontal alignment with each other, so as to carry a load such as a tray indicated at, 9, in a substantially horizontal position.

The arrangement herein described is for transferring loads from a substantially horizontal conveyer to a vertically travelling conveyer at a point intermediate its head and foot wheels, during the operation of both conveyers, which is the converse of the arrangement disclosed in my Patent No. 1,636,429, dated July 19, 1927, of which this application is a continuation in part.

A transverse, substantially horizontal conveyer is adapted to transfer loads such as trays and the like onto the respective pairs of flights or load supporting members, 8, of the vertical conveyer as will now be described. Transfer of loads may be made to a vertically travelling conveyer adapted to carry loads upwardly or downwardly, in similar manners, except that in reversing the drive pulley, 7, by any suitable mechanism, not shown, it becomes necessary to reverse the connected drive gearing for the transverse conveyer for operating the latter always in the same direction, as will hereinafter appear. The transverse conveyer, as illustrated in the drawing, is of the continuous type, comprising an endless belt, 10, trained over head and foot pulleys, 11 and 12, respectively. The foot pulley, 12, is relatively widefaced and is mounted on a drive shaft, 13, which is supported in suitable bracket bearings, 14, secured to framing, 15, partially shown. It will be understood that the foot end of this conveyer pivots about this drive shaft, 13. The belt, 10, is provided with pusher flights, 16, corresponding to the intervals of spacings of the load supporting members, 8, on the belts of the verti-

cal conveyer. The flight, 16, is adapted to engage the rear end or edge of the load (herein, a tray, 9) for positively pushing the same forwardly, on over the head pulley, 11, and thence onto a pair of timed load supporting members, 8, of the vertical conveyer. A pair of longitudinally extending frames or angle iron guards, 17, are disposed adjacent the edges of the belt, 10, so as to guide the loads or trays, 9, to the transfer point. These angle iron guides, 17, may be pivoted at the foot end to the frame, 15, their forward ends being carried on suitable bearing brackets, 18, which are loosely journaled on opposite ends of the shaft, 19, of the head pulley, 11.

The head end of the transverse conveyer is vertically movable, so that a load being transferred therefrom to the vertical conveyer will be moved vertically to maintain it in registration with a pair of the load supporting members, 8, for a sufficient distance to permit the complete transfer of the load on to the vertical conveyer. The vertical movement of the head end of the transverse conveyer may be accomplished by a pair of spaced cams, 25, mounted on a transverse shaft, 26, which is driven through suitable gearing from the foot shaft, 5, of the vertical conveyer, so that said cams may be rotated in positive relation corresponding to the intervals of the spacing of the flights or load-supporting members, 8, on the chain belts, 1. Follower rollers, 27, engage the outer periphery of the cams, 25, and are carried on the ends of a pair of pusher rods, 28, extending vertically upward, which are thus raised and lowered as the cams revolve. The upper ends of said pusher rods are pivotally connected to opposite ends of the head shaft, 19, of the transverse conveyer so as to raise and lower the head end of said conveyer upon rotation of the cam, 25, causing said head end to be moved upwardly or downwardly in timed relation with load supporting flights, 8, of the vertical conveyer. These cams are so mounted on the shaft, 26, that the head end of the transverse conveyer will be lowered to the dotted position indicated at "A" in Figure 1, during the initial part of the discharge or transfer of the load while the vertical conveyer is travelling downward, and will reach the position indicated in full lines when the transfer is almost completed. When the vertical conveyer is travelling upward, the dotted position indicated at "B", Figure 2, shows the commencement of the transfer, while in full lines the head end of the transverse conveyer is shown completing the transfer. It will be understood that one complete revolution of the cam raises and lowers the head end of the transverse conveyer through a complete load transferring cycle.

The cams, 25, which are illustrated diagrammatically in the drawings, are so designed as to permit their rotation in either direction to effect uniform vertical reciprocation of the pusher rods, 28. Frequently it is desirable to elevate instead of lower loads, or vice versa, and the arrangement herein permits the vertical conveyer to be operated in either direction by the mere reversal of the driving pulley, 7. The transverse and vertical conveyers may be independently operated, but it is preferable to have an interconnection for driving one by the other to insure a positive timing of the conveyers with each other. As shown in the drawing, the transverse conveyer is driven from one of the head shafts, 4, of the vertical conveyer through an inclined operating shaft, 35, and bevel gears, 36. The lower end of shaft, 35, is provided with a bevel gear, 37, interposed between and meshing with a pair of oppositely disposed bevel gears, 38, loosely mounted on the drive shaft, 13, of the foot end of the transverse conveyer. The inner faces of the pair of gears, 38, are provided with clutch jaws, 39, adapted to be selectively engaged by corresponding clutch jaws, 40, of a sliding clutch member, 41, feathered to the drive shaft, 13, intermediate said gears, 38. The clutch member, 41, may be actuated by any suitable shifting means, not shown. It will now be seen that the gearing including the bevel gears, 37, and 38 provides a reversible drive connection from operating shaft, 35, to the drive shaft, 13, of the transverse conveyer, so that when the vertical conveyer is reversed in direction, said gearing may reverse the drive from the operating shaft, 35, to permit the transverse conveyer to always be driven in a direction toward the vertical conveyer.

The transverse conveyer may be loaded either manually or automatically. It is desirable in most instances to automatically load it for the sake of economy and for this purpose a horizontal feeding conveyer is provided with mechanism for timing the release of loads to the horizontal conveyer. The conveyer includes several pairs (preferably three) of timing stops, 45, which may be automatically actuated for timing the loads as fully disclosed in my Patent, No. 1,469,329, issued October 2, 1923. The timing mechanism herein shown operates on the same general principles as in my patent, and is modified only for adaptation to the arrangement herein described. The timing stops, 45, are carried in the outer ends of rocker arms, 46, which are loosely mounted in pairs on the oppositely disposed longitudinally extending cam shafts, 47. The timing mechanism is preferably driven from the transverse conveyer to insure positive timed relations of the loads to the flights, 16. A spur gear, 48, mounted on the drive shaft, 13, meshes with a second gear, 49, carried on the outer end of a stub shaft, 50, which is supported in a bearing, 51, connected to the bearing bracket, 14,

for support on the framing, 15. Said stub shaft drives one of the cam shafts, 47, through a pair of bevel gears, 52, and the cam shafts, 47, are interconnected by a pair of spur gears, 53, for actuating the timing stops, 45, through cams, 54, mounted thereon, engaging the rocker arms, 46, in an obvious manner. This timing conveyer includes a pair of longitudinally extending tapes or narrow belts, 55, spaced on opposite sides of the timing mechanism, and trained over the foot pulley, 12, of the transverse conveyer on opposite sides of the belt, 10. The narrow belts, 55, and belt, 10, of the transverse conveyer, travel in the same direction; the narrow belts are adapted to carry the load toward the transverse conveyer, under regulation by the timing stops, so as to engage the flights, 16, of the transverse conveyer, at proper intervals. A pair of guard angles, 56, extend longitudinally adjacent the outer edges of the narrow belts, 55, to serve as guides to the load and maintain it in proper alignment with the timing stops, as it is advanced to the transverse conveyer.

I claim:

1. The combination of a vertically travelling conveyer with load supporting means disposed at intervals thereon, a transversely travelling conveyer adjacent thereto, provided with flights at regular intervals for positively discharging the load to the load supporting means of the vertical conveyer, means interconnecting the two conveyers for timing said flights in relation to said load supporting means of the vertical conveyer, and means for moving said transverse conveyer for a limited distance in substantially vertical direction in correlation with the load supporting means of the vertical conveyer during transfer of the load.

2. In the combination defined in claim 1, timing mechanism associated with said transverse conveyer adapted for delivering loads thereto at intervals corresponding to the spacing of the flights thereon.

3. The combination of a reversible vertically travelling conveyer with load supporting means disposed at intervals thereon adapted for carrying loads in either direction, a transversely travelling conveyer adjacent thereto, provided with flights at regular intervals for positively discharging individual unit loads to the load supporting means of the vertical conveyer, means interconnecting the two conveyers for timing said flights in relation to such load supporting means of the vertical conveyer, and including reversible gearing, adjustable at will, to permit the transverse conveyer to operate always in its original direction of travel, while the vertical conveyer operates in either direction.

4. The combination of a reversible vertically travelling conveyer with load supporting means disposed at intervals thereon, a transversely travelling conveyer associated therewith and having flights at regular intervals for positively discharging individual unit loads to the vertical conveyer, means interconnecting the two conveyers for timing the flights in relation to said load-supporting means, and including gearing, adjustable for operating said transverse conveyer in its original direction of travel, while the vertical conveyer operates in either direction, together with means for raising and lowering said transverse conveyer through a limited distance in respectively equal time intervals for maintaining its registration with the load supporting means of the vertical conveyer during the transfer of a load thereto, when the latter operates in either direction.

5. In the combination defined in claim 4, the reversible vertical conveyer being arranged to travel at a uniform speed in either direction, and the means for raising and lowering the transverse conveyer being designed to cause such movement at substantially the same speed as that of the vertical conveyer.

6. In the combination defined in claim 1, the foot end of the transverse conveyer being designed to provide pivotal support for said conveyer throughout the entire range of raising and lowering the discharge end thereof.

7. The combination of a reversible vertically travelling conveyer with load-supporting means disposed at intervals thereon adapted for carrying loads in either direction, a transversely travelling conveyer associated therewith and arranged for continuously advancing its load, means for moving the transverse conveyer through a limited range of vertical movement in correlation with the supporting means of the vertical conveyer during transfer of the load from one conveyer to the other, and driving connections between said conveyers arranged to permit operation of the transverse conveyer in the same direction, while permitting operation of the vertical conveyer in either direction.

8. The combination of a vertically traveling conveyer with load-supporting means disposed at intervals thereon, a transversely traveling conveyer adjacent thereto and arranged for discharging loads onto the vertically traveling conveyer, and means for moving said transverse conveyer for a limited distance in substantially vertical direction at a rate to maintain registration of the surface from which the load is discharged with the surface which is to receive the load, during transfer of the load to the vertical conveyer.

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