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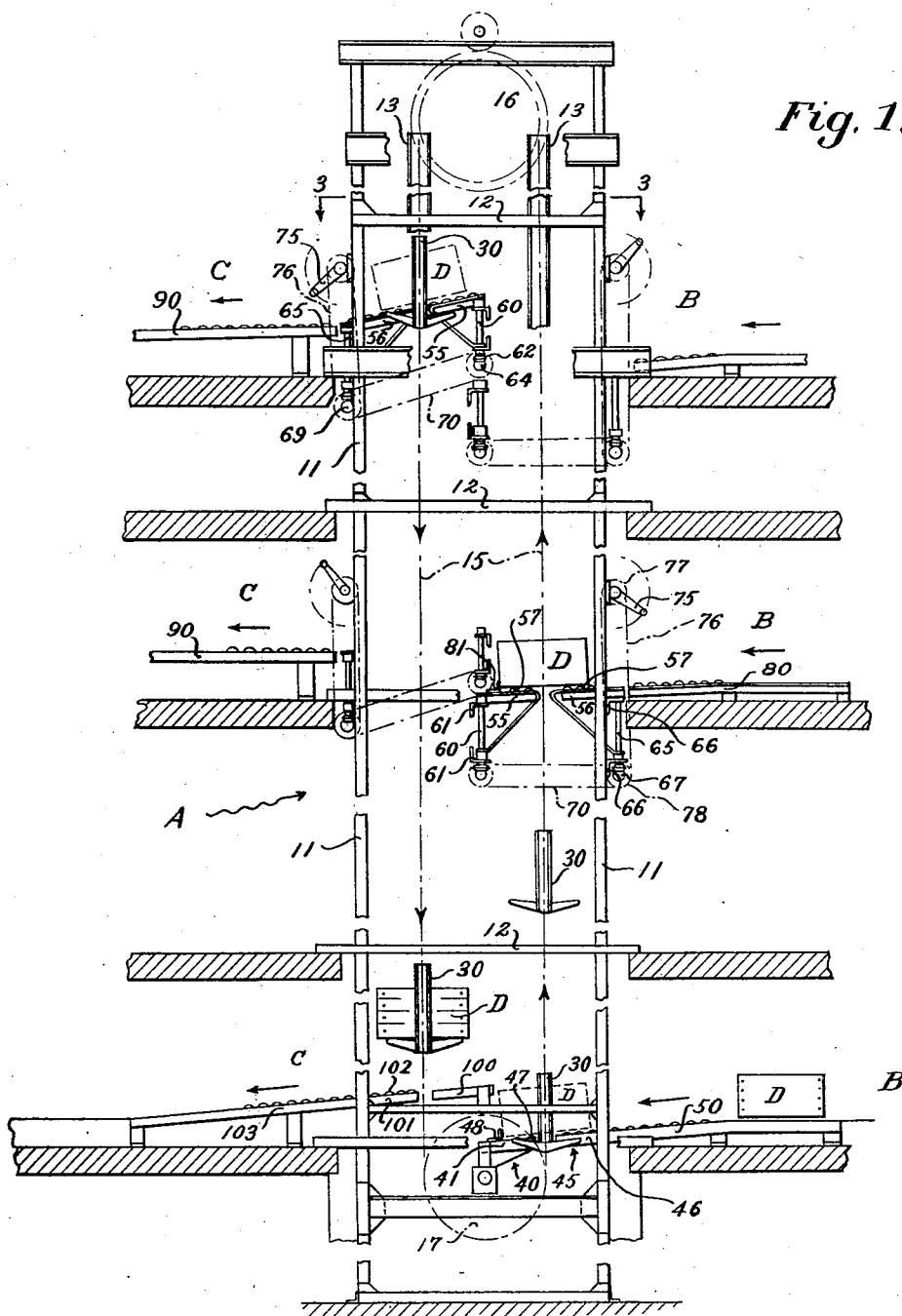
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1,794,331

VERTICAL CONVEYER

Filed Dec. 30, 1929

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

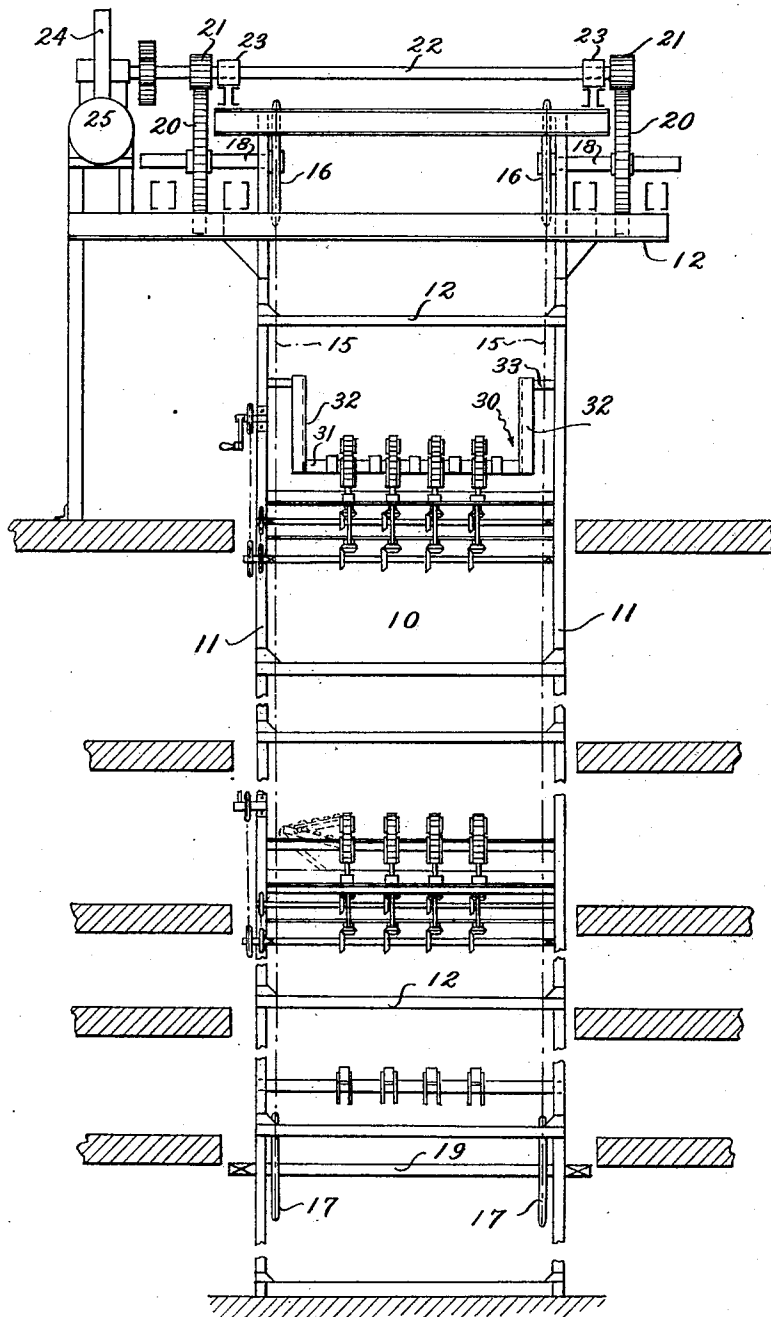


Fig. 2.

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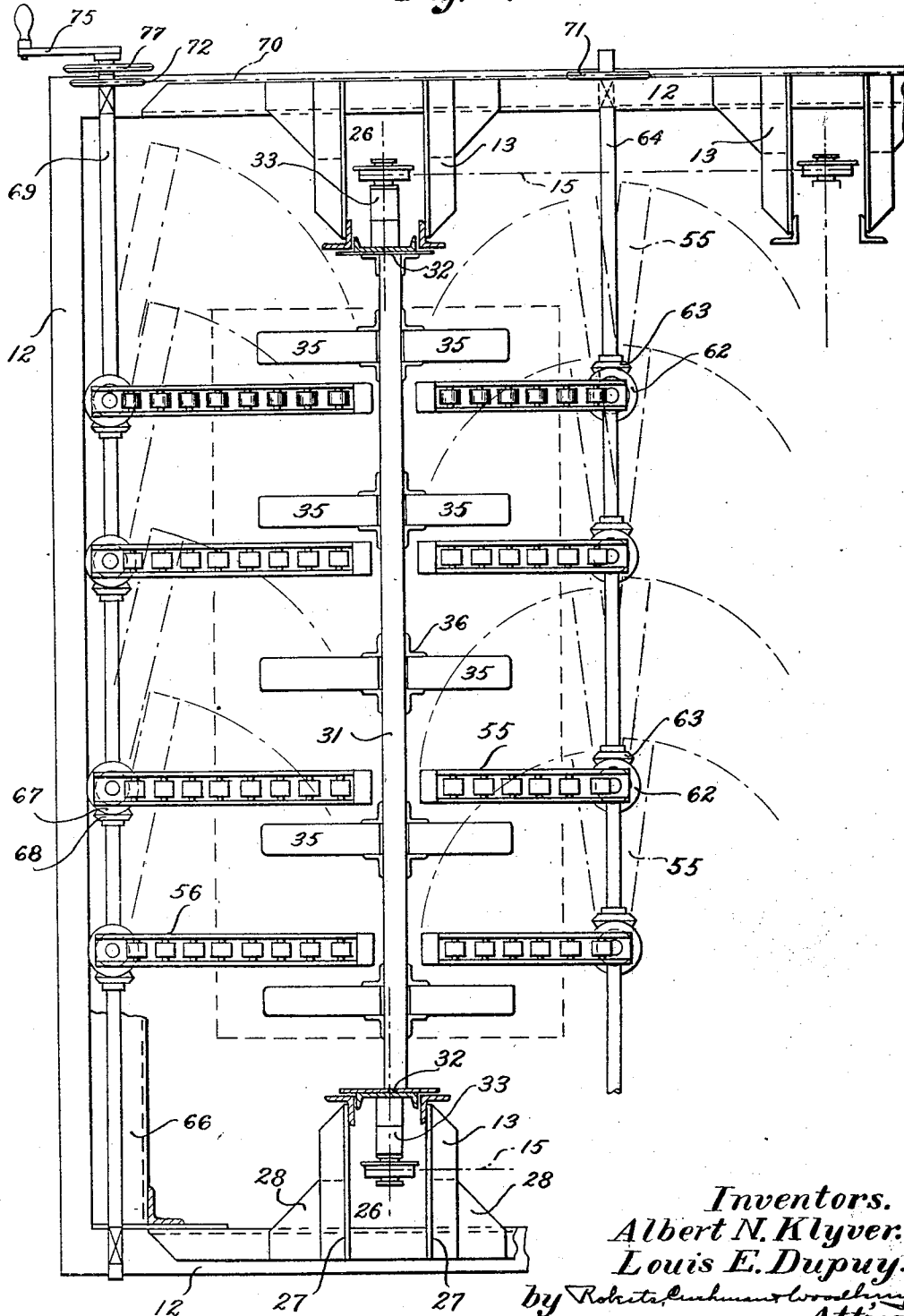
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Fig. 3.



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UNITED STATES PATENT OFFICE

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VERTICAL CONVEYER

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This invention relates to an improvement in a vertical conveyer of the type adapted to receive loads and to deliver them at various stations, and more particularly in the platform mechanism at certain of the stations by which the load is positioned for transfer to the conveyer and by which the load is removed from the conveyer at the unloading stations.

While conveyers of this general type are old and well known, the platforms at certain of the stations comprise fingers which are movable into and out of their functioning position. Such fingers have been mounted upon horizontally extending shafts or pivots and are raised or lowered as required. It has been found that such mounting of the fingers presents considerable difficulty due to the fact that since the loads handled are often heavy, the platform fingers must be rigidly supported both in the loading and unloading positions. This requirement necessitated the use of counterbalance weights and other complications.

One object of this invention is to provide a vertical conveyer with platforms comprising fingers which are pivotally mounted upon vertically extending shafts or pivots whereby the fingers may be swung laterally into and out of their functioning position. Other objects of the invention will appear from a consideration of the following descriptions taken in connection with the drawings which form a part thereof and in which

Fig. 1 is a front elevation of a vertical conveyer embodying this invention, certain parts thereof being broken away and other parts being shown in section or omitted in order to disclose more clearly the essential features of the invention;

Fig. 2 is a side elevation partly in section taken from the left in Fig. 1; and

Fig. 3 is an enlarged plan view taken along the line 3—3 of Fig. 1.

The vertical conveyer A here shown is of the type by which loads are taken at various loading stations B during the upward travel of the car and discharged at various unloading stations C during the downward travel of the car. The conveyer A operates in a well 10

defined by a plurality of upright frame members 11 suitably joined and supported by a plurality of cross members 12. Secured to the cross members 12 at the front and rear of the conveyer are a plurality of vertically extending guides 13.

Travelling in the well 10 are chains 15 which pass around sprockets 16 at the top of the frame and sprockets 17 at the bottom of the frame. The sprockets 16 are mounted upon stub shafts 18 suitably supported on the upper cross members 12 of the well frame while the sprockets 17 are mounted upon a shaft 19 extending from one side to the other of the frame and supported in suitable journals not shown. The shafts 18 carry gears 20 which mesh with gears 21 on a cross shaft 22 suitably supported in bearings 23 and driven through gearing 24 from a motor 25. The guides 13 carried by the cross members 12 of the well 10 provide vertically extending channels 26 through which the chains 15 travel. As shown in Fig. 3, the guides 13 are here formed by a pair of spaced beams 27 suitably supported by brackets 28.

Carried by the chains 15 are a plurality of cars 30 suitably spaced apart, each car comprising a base bar 31 and posts 32 at each end of the bottom of the base bar 31 and from which extend pinions 33 by which the cars 30 are secured to the chains 15. Projecting outwardly from the base bar 31 are a plurality of arms 35 preferably arranged in pairs and secured in position by brackets 36. The channels 26 receive the posts 32 as shown in Fig. 3 and act to hold the cars 30 in such a position that the arms 35 are horizontal at all times and adapted to receive a load. The channels 26 terminate short of the axes of the sprockets 16 and 17 as shown particularly in Fig. 1 so that the car is transferred by the chains from one channel to the other.

The lowest loading platform B comprises an inner section 40 made up of a plurality of fingers 41 so located that the arms 35 of the cars will pass freely therebetween. The outer portion 45 of the loading station is formed by fingers 46 preferably constituting a continuation of the fingers 41, but spaced therefrom to permit the bottom bars 31 of the cars

to pass therebetween without difficulty. The sections are fixed in position and the fingers 46 carry spaced rollers 47 on which the load here shown in the form of a case D can travel freely to the inner end of the fingers 41 where it is checked from further movement by one or more stops 48. The fingers 46 are a continuation of a roller gravity conveyer 50, and the fingers 41 and 46 together with the conveyer 50 are inclined downwardly and inwardly so that the case D travels onto the station arms by gravity.

The upper loading stations B, two of which are here shown, comprise spaced fingers 55 which form the inner section of the station platform and fingers 56 which form the outer section of such platform. These arms carry freely rotatable rollers 57 which correspond to the rollers 47 at the first station described. Each finger 55 is mounted at one end upon a vertically extending shaft 60 carried in bearings by cross angle bars 61, and each shaft 60 has at its lower end a bevel gear 62 which meshes with a bevel gear 63 on a shaft 64 which extends transversely of the well frame and is suitably supported in journals on that frame. The fingers 56 are each supported at one end upon a shaft 65 which is carried in angle bars 66 and has at its lower end a bevel gear 67 which meshes with a bevel gear 68 on a transversely extending shaft 69 suitably supported on the frame 10. The shafts 64 and 69 rotate in unison being joined by a cross chain 70 which runs over sprockets 71, 72 on the shafts 64 and 69 respectively. The shaft 69 is rotated by a crank arm 75, through a chain 76 and sprockets 77 and 78. Suitable means, not shown, are provided to stop the rotation of the shafts when the fingers 55 and 56 take the position shown in full lines in Fig. 3 with the fingers of each section parallel. The cases are fed onto the station platforms by gravity roller conveyers 80, the inner end of the conveyers and the fingers 55 and 56 being inclined downwardly and inwardly. The fingers 55 carry one or more stops 81 by which the case D is brought into the proper position.

The upper unloading stations C are similar in construction and operation to the loading stations B, and hence the same reference characters are applied thereto. The fingers 55 and 56, however, are downwardly and outwardly inclined as shown particularly in Fig. 1, so that any load, such as a case D, delivered to a station C will travel by gravity over the platform fingers onto a suitable platform on roller conveyer 90. The lowest unloading platform C similar to the lowest loading platform is formed by sections 100 and 101 comprising spaced fingers, each of them being provided with rollers 102 and acting to feed the cases D of the station platform onto a roller conveyer 103, or other suitable receiving means.

Referring to Fig. 1, it will be noted that the fingers forming the platforms of certain loading and unloading stations B and C are swung into the path of the travelling cars while the fingers forming other platforms are swung back out of the path so that loaded cars may pass without interference. Since these movable fingers are fixed on vertical shafts and are properly braced, they will support the loads without difficulty and due to the inclination of the load supporting surfaces of the fingers the loads thereon will tend to advance in the desired direction of travel at each platform.

The operation will now be described with particular reference to Fig. 1 wherein is shown a case D on the conveyer 50, a second case D resting on the lowest loading station platform B from which it is about to be raised by a car 30, a third case D on the intermediate loading station platform B awaiting the arrival of an empty car 30 which is now below that platform, a fourth case D at the upper unloading station C to which it has just been delivered onto the extended platform arms from a car 30, and a fifth case D on a car 30 approaching the lowest unloading platform C. The platform arms at the upper loading station B and intermediate unloading station C are swung into the inoperative position so that the cars 30 with their load pass through such station.

When it is desired to load a case onto a car of the conveyer at one of the upper stations B the fingers forming the platform at that station are swung into the path of an empty car 30 by operating the handle 75. The case is then located on the platform and will be lifted therefrom by the first car arriving at such station. The fingers of these stations are normally swung into the inoperative position to permit a free passage of the conveyer cars. The fingers of the unloading station C to which the load on an approaching car is to be delivered are swung into the path of the car which transfers its load to the station fingers. The fingers of these stations are swung into the inoperative position except when loads are to be delivered thereto by a conveyer car. The fingers forming the platform of the lower station C remain in the path of the car so that any loads not transferred to any other platform will be removed thereby from the cars. Similarly the fingers forming the platform of the lower station B are fixed so that articles may be placed thereon and delivered to a car at any time. The inclination of the fingers forming the various platforms are such as to facilitate the movement of any loads thereon in the direction in which they should move. Thus the fingers of the platforms at stations B are so inclined that the loads thereon will advance against the stops 48 into the path of the con-

veyer cars while the fingers of the platform at stations C are so inclined that the loads thereon will tend to advance toward the receiving platforms or conveyers out of the path of the conveyer cars.

In Fig. 3 the platform fingers at the unloading station C on the upper floor are shown in full lines in the extended position and in dotted lines in the inoperative position. That figure also shows in dotted lines the inner set of arms 55 of the loading station B on that floor, such arms being in the inoperative position. While the cranks for the platform arms are shown adapted to be operated manually, it will be understood that they may be operated automatically or by any suitable means.

It will be noted that one feature of this invention is the mounting of the station fingers so that they move into and out of the path of travel of the cars with a lateral swinging movement instead of a vertical swinging movement or any other movement of translation. As a result the operating space required for the conveyer is more compact both longitudinally and transversely and the conveyer is more economical to build. Practically no space is required for the operation of the conveyer outside the well and the station fingers remain at all times in the same plane.

We claim:

1. The combination with a vertically traveling conveyer having load supporting cars secured thereto at suitably spaced intervals of a load supporting platform, said platform comprising a plurality of fingers adapted to swing upon vertical axes and means for swinging said fingers relative to the path of the conveyer cars whereby said fingers cooperate with a conveyer car in the transfer of a load therebetween when in one position and permit the free travel of loaded conveyer cars when in another position.

2. The combination with a vertically traveling conveyer having load supporting cars secured thereto at suitably spaced intervals of a load supporting platform, said platform comprising a plurality of fingers, vertical shafts upon which said fingers are supported, and means for rotating said shafts and swinging said fingers relative to the path of the conveyer cars whereby said fingers cooperate with a conveyer car in the transfer of a load therebetween when in one position and permit the free travel of loaded conveyer cars when in another position.

3. The combination with a vertically traveling conveyer having load supporting cars secured thereto at suitably spaced intervals of a load supporting platform, said platform comprising a plurality of fingers independently spaced from each other, each finger being adapted to swing upon a vertical axis, and means for swinging said

fingers simultaneously upon their axes relative to the path of the conveyer cars whereby said fingers cooperate with a conveyer car in the transfer of a load therebetween when in one position and permit the free travel of loaded conveyer cars when in another position.

4. The combination with a vertically traveling conveyer having load supporting cars secured thereto at suitably spaced intervals of a load supporting platform, said platform comprising a plurality of fingers independently spaced from each other, a plurality of vertical shafts, each finger being supported by a shaft, and means for rotating said shafts and swinging said fingers simultaneously relative to the path of the conveyer cars whereby said fingers cooperate with a conveyer car in the transfer of a load therebetween when in one position and permit the free travel of loaded conveyer cars when in another position.

5. The combination with a vertically traveling conveyer having load supporting cars secured thereto at suitably spaced intervals of a platform over which a load tends to travel, said platform comprising a plurality of fingers adapted to swing upon vertical axes and inclined downwardly in the direction of travel of the load, and means for swinging said fingers relative to the path of the conveyer cars whereby said fingers cooperate with a conveyer car in the transfer of a load therebetween when in one position and permit the free travel of loaded conveyer cars when in another position.

6. The combination with a vertically traveling conveyer having load supporting cars secured thereto at suitably spaced intervals of a platform over which a load tends to travel, said platform comprising a plurality of fingers, vertical shafts upon which said fingers are supported with the load supporting surfaces inclined downwardly in the direction of travel of the load, and means for rotating the shafts and swinging said fingers relative to the path of the conveyer cars whereby said fingers cooperate with a conveyer car in the transfer of a load therebetween when in one position and permit the free travel of loaded conveyer cars when in another position.

7. The combination with a vertically traveling conveyer having load supporting cars secured thereto at suitably spaced intervals of a platform over which a load tends to travel, said platform comprising a plurality of fingers independently spaced from each other, each finger being supported upon a vertical axis, with its load supporting surface inclined downwardly in the direction of travel of the load, and means for swinging said fingers simultaneously on their axes relative to the path of the conveyer cars whereby said fingers cooperate with a con-

veyer car in the transfer of a load therebetween when in one position and permit the free travel of loaded conveyer cars when in another position.

- 5 8. The combination with a vertically traveling conveyer having load supporting cars secured thereto at suitably spaced intervals of a platform over which a load tends to travel, said platform comprising a plurality
10 of fingers independently spaced from each other, a plurality of vertical shafts, each shaft supporting a finger thereon with its load supporting surface inclined downwardly in the direction of travel of the load, and
15 means for rotating the shafts and swinging said fingers relative to the path of the conveyer cars whereby said fingers cooperate with a conveyer car in the transfer of a load therebetween when in one position and per-
20 mit the free travel of loaded conveyer cars when in another position.

Signed by us at Syracuse, N. Y., this 29th day of November, 1929.

ALBERT N. KLYVER.
LOUIS E. DUPUY.

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