April 25, 1933. J. H. MacLAUCHLAN 1,905,924

CONVEYER

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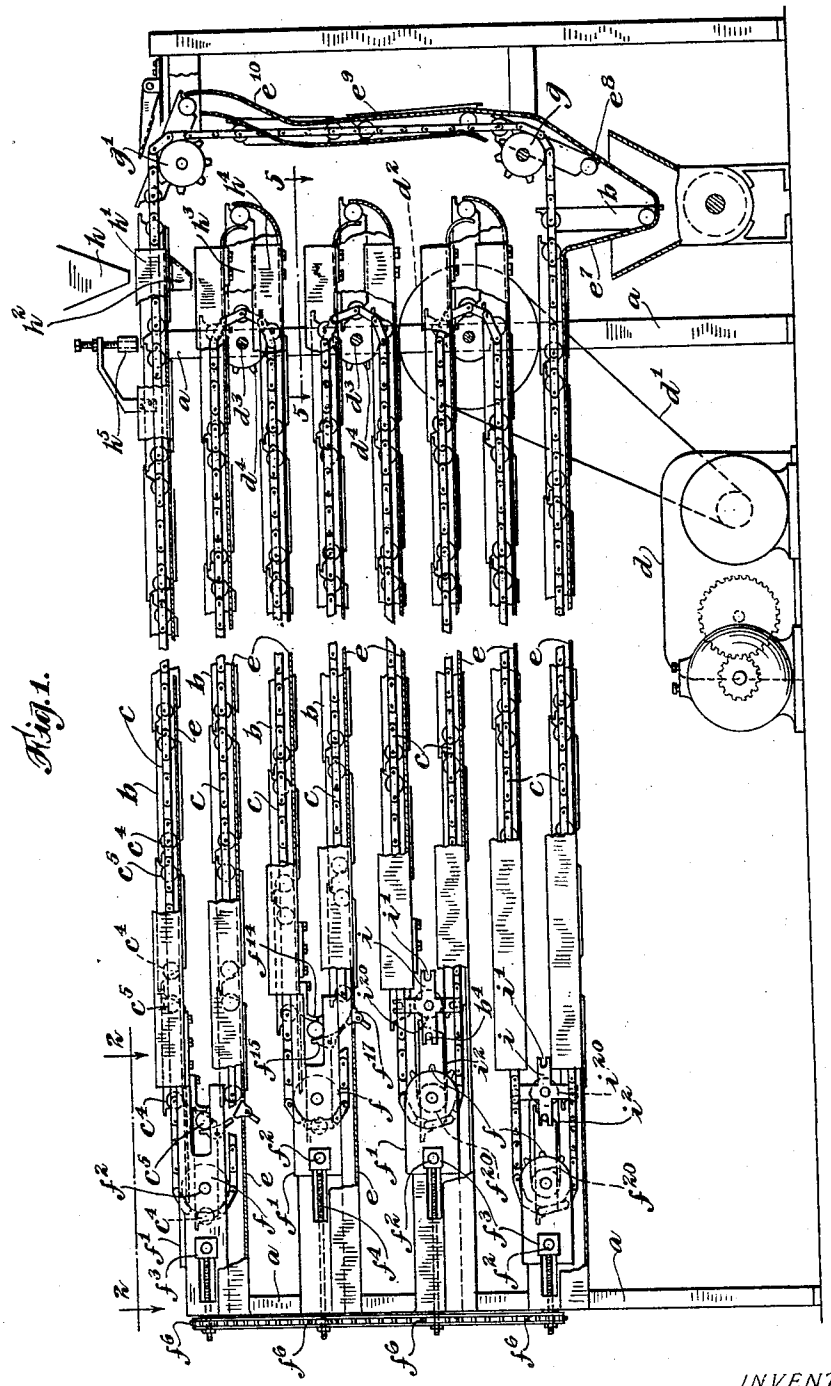


Fig. 1.

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Fig. 2.

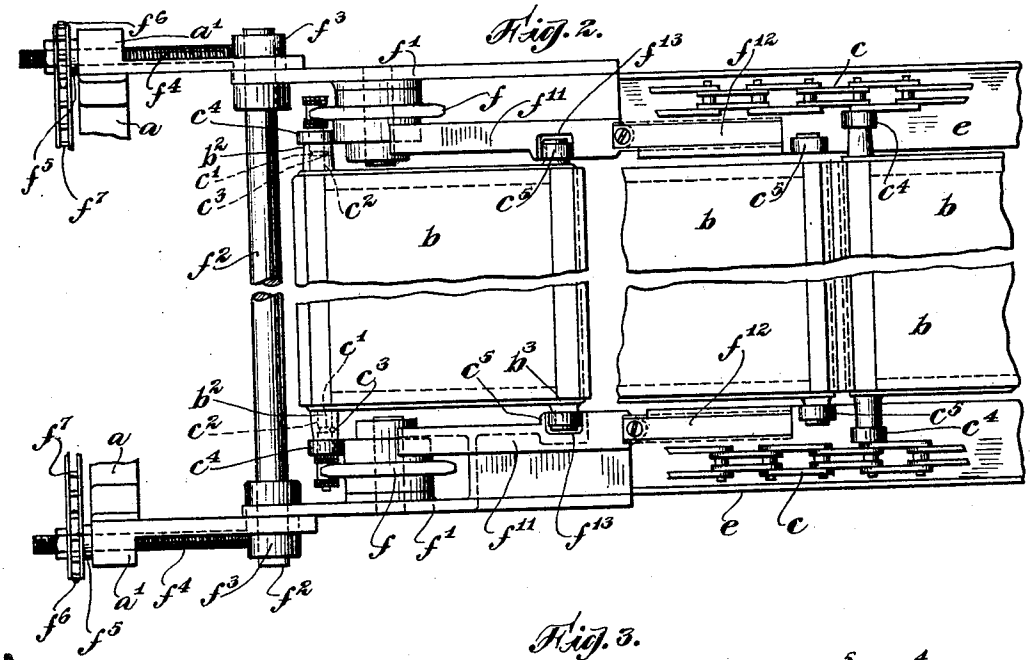


Fig. 3.

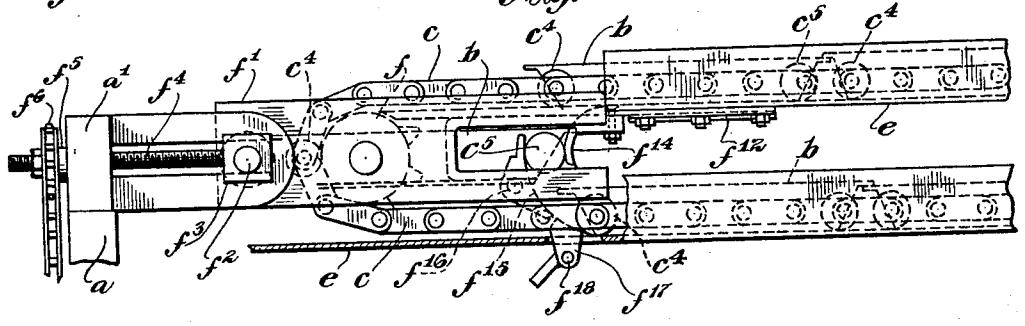
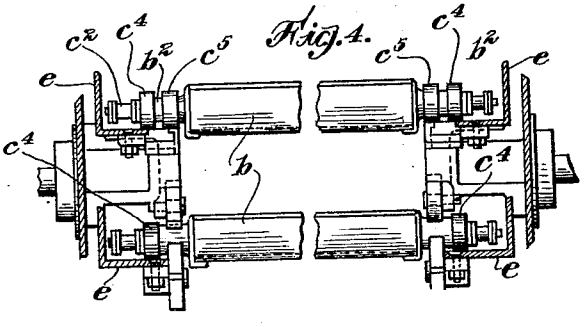


Fig. 4.



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Fig. 5.

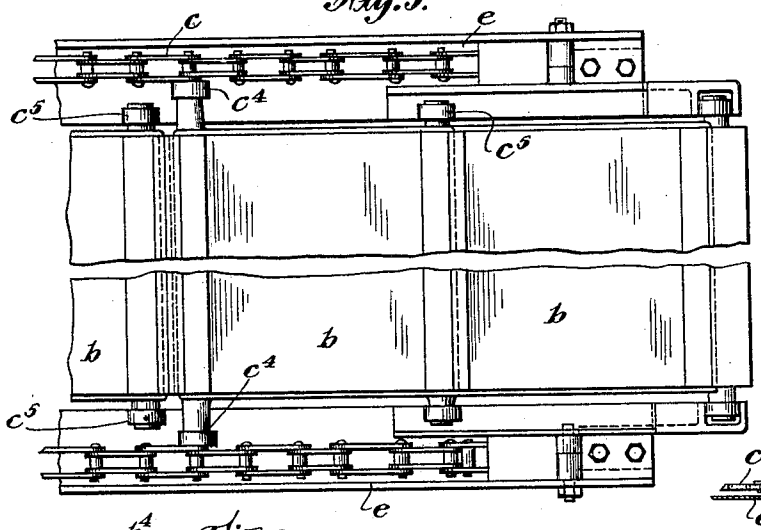


Fig. 8.

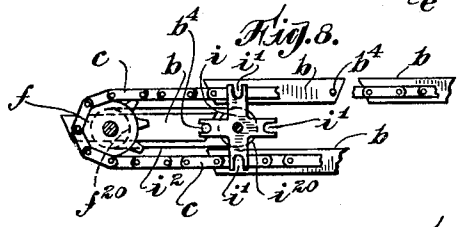


Fig. 9.

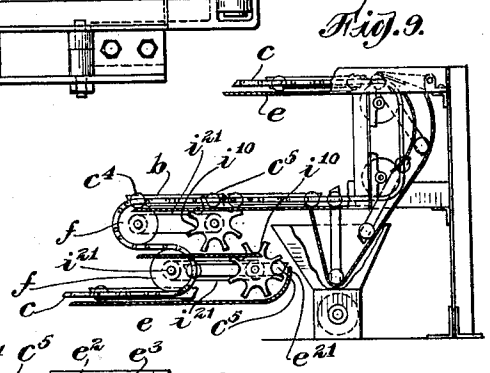


Fig. 6.

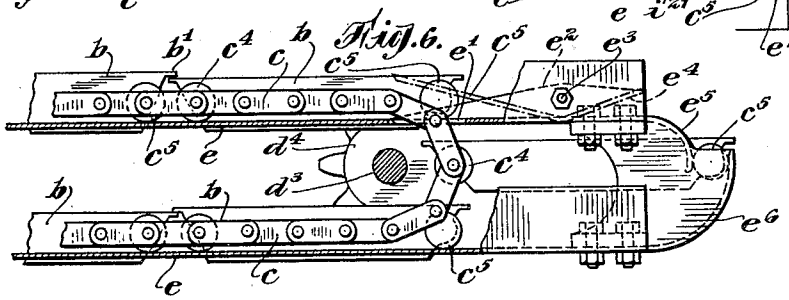
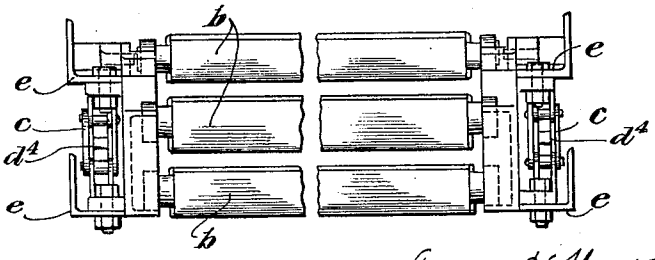


Fig. 7.



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UNITED STATES PATENT OFFICE

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CONVEYER

Application filed December 20, 1928. Serial No. 327,258.

This invention relates to what may be called process conveyers by which material of one kind or another is subjected to treatment, as by heat, for example, while being transported by the conveyer and in which each carrier, such as a platform, pan or other support or receptacle for the material, must be maintained in horizontal or substantially horizontal position during its movement, except when the material is to be discharged therefrom, notwithstanding the fact that such supports or receptacles may be caused to travel to and fro at different levels. The invention is particularly concerned with the means whereby each such carrier or receptacle is supported during its travel and is connected to the endless chain or chains by which its movement is effected, with the means by which horizontal position of each receptacle is maintained while it moves from one level to another, with the means by which each such receptacle is caused to discharge the material thereon at the point of unloading and is returned to position for reloading, with the means for taking up slack in the conveyer chains, and with details of construction and arrangement to be referred to more particularly hereinafter.

The invention will be more fully explained hereinafter with reference to the accompanying drawings in which it is illustrated as embodied in a suitable structure, and in which:

Figure 1 is a view partly in side elevation and partly in vertical section of a conveyer which embodies the invention, partly broken out to save space.

Figure 2 is a partial view of the same as seen from above along the line 2—2 of Figure 1, also partly broken out.

Figure 3 is a view of the parts shown in Figure 2 as seen in side elevation.

Figure 4 is a view in elevation of some of the parts shown in Figures 2 and 3, as seen from the left hand, the casing being shown in section.

Figure 5 is a partial view as seen from above along the line 5—5 of Figure 1, partly broken out.

Figure 6 is a view in side elevation of the parts shown in Figure 5, with some parts in section.

Figure 7 is a view in elevation, partly broken out, of some of the parts shown in Figures 5 and 6 as seen from the right hand, some parts of the casing being shown in section.

Figure 8 is a detail view illustrating particularly a form of device which may be employed in shifting the carrier from one level to another.

Figure 9 is a detail view illustrating a slightly different form of device which may be employed in shifting the carrier from one level to another.

It will be understood that the design of the conveyer will be suited in each instance to the nature of the material to be treated and the nature of the treatment. In the embodiment of the invention illustrated in Figure 1 of the drawings the carriers by which the material is transported are arranged to receive the material at a loading point at the upper right hand portion of the structure and to travel in successive horizontal paths until they reach the lower right hand portion where each carrier is made to discharge its load, being then returned to the loading point. For convenience one form of means by which each carrier is shifted from one level to another and is maintained in a horizontal or substantially horizontal position, is illustrated, such means being shown in detail in Figures 3 and 6. In Figures 8 and 9 are shown other forms of such means which are particularly advantageous for use when the carrier is to be moved in a horizontal position upward from one level to a higher level or when the material transported is liquid in character so that it is necessary to preserve with greater

certainty the horizontal position of each carrier as it is moved from one level to another, whether upward or downward.

In the embodiment of the invention illustrated in Figure 1 the conveyer is supported by a suitable frame work parts of which are indicated at a. The carriers in this instance are shown as shallow pans b with their ends overlapping, as shown in Figure 1 and on a larger scale in Figure 6. The pans are connected to endless chains c, one at each side of the pans and movement is imparted to the chains from any suitable source of power, such as that indicated at d in Figure 1. The chains and the carriers are supported during movement on tracks which are indicated generally at e in Figure 1. If the track is made with a continuous surface, it is sufficiently wide to afford two courses in different vertical planes. Elements such as those mentioned are common to conveyers of the class referred to. Various details of construction and arrangement with which the present invention is more particularly concerned will now be described in their relations to the primary elements mentioned and to each other.

Each carrier b is shown as having at its head or leading end, in the construction shown, at each side of the pan, a socket b^2 which receives rotatably a stud c^2 which may be an extended hinge pin of the chain c, the stud being grooved, as at c^1 (Figure 2), to receive a cotter pin c^3 to prevent separation of the carrier and chain. The stud or pin c^2 receives a roller c^4 for cooperation with the track e. The forward or leading end of the carrier is thus not only connected to the chains but is supported upon the track in its movement. At the rear or following end of each carrier, and at each side thereof, the carrier has a stud b^3 which receives a roller c^5, also for cooperation with the track e but preferably in a different longitudinal plane from the corresponding roller c^4 on the same side. The rollers c^5 are free of the chains c. As the rollers c^4 have a fixed relation with the chains, the rollers c^4 may be conveniently referred to as fixed rollers, while the rollers c^5 may be referred to as free rollers.

The chains c are shown as actuated from the source of power d through a chain or belt d^1 and a wheel d^2 on a shaft d^3 which is shown (see Figures 6 and 7) as armed with sprocket wheels d^4. It will be understood that only one of the shafts d^3 has power applied to it, the other shafts d^3, shown in Figure 1, being mounted, like the first shaft d^3, in fixed bearings in the frame and having sprocket wheels d^4 mounted thereon.

The chains c pass about the sprocket wheels d^4 and at the other end of each loop or change of level they pass about sprocket wheels f which are carried by take-ups so that the initial tension of the chains can be adjusted and so that compensation for wear and stretching can be made. As shown in Figures 2 and 3 the sprocket wheels f are mounted on a frame f^1 which is engaged with a shaft f^2. The latter has at each end a block f^3 which is engaged by a threaded rod f^4 extended through a block a^1 on the frame a. Outside of the block a^1 the threaded rod f^4 receives an adjusting nut f^5 by which the position of the shaft f^2 may be adjusted to regulate the tension of the chains. To insure uniform tension of both chains the two adjusting nuts f^5 are provided with sprocket teeth f^6 and the two sprockets thus formed are connected by a chain f^7 so that both nuts shall be rotated together.

The carriers and the chains are supported in longitudinal movement by tracks e, which may be arranged at levels or in different positions suited to the nature of the material and of the treatment to which it is to be subjected. During such movement both the fixed rollers c^4 and the free rollers c^5 travel on the tracks. At the time of change from one level to another, whether downward or upward, the head ends of the carriers move with the chains which support them about the axes of the sprocket wheels f in arcs determined by the diameter of the sprocket wheels, it being understood that the end of each carrier which was forward during the movement of the carrier in one direction, becomes the rearward end when the carrier has passed from one level to another and moves in the opposite direction. Provision must be made, therefore, for guiding the free end of each carrier during its movement from one level to another. In the treatment of solids it is not always necessary that the carriers be maintained in exactly horizontal positions as they pass from one level to another. The means for guiding and supporting the free ends of the carriers which are illustrated in Figures 1–7 of the drawings answer for such uses and will now be described.

It will be understood that the devices employed for supporting the free ends of the carriers when the carriers change direction from left to right, as in the construction shown in Figure 1, differ from the means for supporting and guiding the free ends of the carriers when they change direction from right to left. The means employed when the carriers change direction from left to right are shown at the left hand in Figure 1 and in detail and on a larger scale in Figures 2, 3 and 4. That portion of each track e on which the corresponding roller c^5 travels is interrupted at a distance from the end of the track equal to the distance between the fixed roller and the free roller in

order to permit the free roller to pass downward from the upper track to the lower. When a take-up is employed, as shown in the several figures referred to, the upper part f^{11} of the take-up frame f^1 forms a continuation of the track e on that side, being provided with an extension f^{12} for the purpose of bridging any gap which might be left, by the operation of the take-up, between the end of the track e and the track portion of the frame f^1. The track portion f^{11} of the frame f^1 is formed with a gap f^{13} in the line of travel of the free rollers c^5 so that as each free roller c^5 reaches the gap it will pass downward into the gap, the roller c^4 meanwhile passing through the arc determined by the coaction of the chain c and the sprocket wheel f. Below the gap f^{13} the frame f^1 is provided with a convex curved guide f^{14} having the same arc of curvature as that through which the roller c^4 moves and with a concave curved guide f^{15} which is pivoted on the frame at f^{16} and is so balanced that it assumes normally the position shown in Figure 3. The concave guiding surface of the guide piece f^{15} is continued by the concave guiding surface of a guide piece f^{17}, pivoted at f^{18} and so balanced that it assumes normally the position shown in Figure 3. By these guiding devices the free roller c^5 is directed from the upper track to the lower track in the same arc of movement as that of the roller c^4 and substantially parallel therewith. Necessary freedom of fit may permit a slight deviation of the carrier from a horizontal position, but such deviation is not sufficient to cause the discharge of solids from the carrier. When the roller c^4 reaches the lower track and moves to the right the pivoted guiding devices f^{15} and f^{17} will yield to permit the passage of the roller c^4 and will return to normal guiding position as soon as it has passed.

At the other end of each chain loop, where the carriers pass from an upper track to a lower track and the direction of movement changes from right to left, the rollers c^4, supported by the chains, pass about the sprocket wheels d^4 as will be understood. The upper track is formed with a gap e^1 which permits the passage of the roller c^4 from the upper track to the lower track. Each upper track is provided with an overbalanced switch e^2 pivoted on a horizontal axis as at e^3 and extended rearwardly or to the left. When the free roller c^5 has passed through the gap e^1 the switch e^2 swings from the position shown by broken lines in Figure 6, down upon the track to cover the gap, so that the free roller c^5 of the next carrier will ride upon the switch e^2 across the gap e^1. As the roller c^5 reaches the other member e^4 of the switch it will tilt the switch to the position shown by broken lines in Figure 6 so that the roller c^4 shall pass under the elevated end of the member e^2 and through the gap e^1. As the free roller c^5 passes from the portion e^4 of the switch the switch will swing back to position to cover the gap and receive the free roller c^5 of the next carrier b. The upper track is provided with a convex guide piece e^5 by which the roller c^5 is guided as the roller c^4 passes with the chain about the sprocket wheel d^4 and the lower track is provided with a concave extension e^6 which receives the roller c^5 as it reaches its middle position and guides it downward to the lower track e in an arc parallel with the arc through which the roller c^4 moves, the carrier being maintained in a substantially horizontal position. Near but somewhat beyond the point at which the carrier is to be made to discharge its load the chains pass about guiding sprockets g and pass thence, vertically or otherwise, about other guiding sprockets g^1 somewhat in advance of the loading position. The roller c^4 and therefore the corresponding end of each carrier pass with the chains about the sprockets g and g^1, the rollers being thus restored to the uppermost track. The lowermost track, or that portion upon which run the rollers c^5, however, has a sharp drop, as at e^7 (Figure 1), followed by an inclined rise e^8, a substantially vertical portion e^9, and an outwardly inclined portion e^{10}. The free end of each carrier is thereby permitted to drop so that the carrier assumes at first a vertical position and then swings over through the vertical position so that the load of the carrier shall be completely discharged. Each carrier continues in a substantially vertical position until its leading end passes over the upper sprockets g^1 and the carrier is drawn back into a horizontal position in readiness to receive its load.

In the embodiment of the invention illustrated in Figure 1 a loading hopper, indicated at h, discharges the material upon each carrier as it passes under the hopper. Spill deflecting plates h^1 are located at the sides of the conveyer to direct upon the carrier of the next lower series such material as may spill over the edges of the first carrier, other deflecting plates being provided for each loop, as shown at h^2, h^3 and h^4. An adjustable wiper may be provided, as at h^5, for the purpose of leveling the load on each carrier as it passes from the loading device.

As has been stated above, in some cases, as when the material transported is more or less fluent, it is desirable to provide means whereby the horizontal position of each carrier shall be preserved with certainty when the carrier passes from one level to another. For this purpose, as shown in Figure 8, there may be provided at each side of the conveyer a toothed wheel or sprocket i pro-

vided at its periphery with notches i^{1} arranged to engage the roller c^{5} at the free end of the carrier b. The wheel or sprocket i is made to rotate synchronously with the sprocket wheel f, as by means of a driving chain i^{2}, which engages a chain wheel f^{20} fast to the sprocket f and a chain wheel i^{20} fast to the wheel i. As the head end of the carrier reaches the sprocket wheel f, the free end reaches the wheel i and its roller c^{5} is engaged by such wheel so that in the continued movement of the chains the free end of the carrier will move exactly with the head end and the horizontal position of the carrier will be maintained. It will be understood that such wheel i is provided at each side of the conveyer.

A device for insuring the horizontal position of the carrier similar to that just described, but arranged more particularly to insure the horizontal position of the carrier as it moves up from one level to a higher level, is shown in Figure 9 in relation with a dumping arrangement such as that already described. In this construction a toothed wheel i^{10} is shown as adapted to receive the free roller c^{5} of each carrier b as the roller c^{4} of the same carrier, at each side thereof, moves over the corresponding sprocket wheel f. The wheels i^{10} are respectively coupled to the sprocket wheels f, as by chains i^{21} as before, and the lower track e may be formed with a concave guiding extension e^{21} for cooperation with the roller c^{5} at each side. The dumping arrangement illustrated in Figure 9 is substantially the same as that illustrated in Figure 1 and requires no further description.

It will be understood that these devices for insuring the horizontal positions of the carriers as they move from one level to another and change direction, as shown in Figures 8 and 9, may be employed in place of or with the guiding and supporting devices shown in Figure 1 and are illustrated separately in order to avoid confusion.

It will also be understood that various changes in construction and arrangement can be made to suit different conditions of use and that the invention, except as pointed out in the accompanying claim, is not restricted to the particular constructions shown and described herein.

I claim as my invention:

A process conveyer having conveyer chains, guide wheels for the chains, carriers, and in which tracks are provided at each side of the conveyer forming a plurality of courses in different vertical planes, and each carrier is pivoted to the conveyer chains at one end only, and has at that end rollers supported upon certain of the courses and at its other end is free from the chains and has rollers supported upon other of the courses in different vertical planes, and in which the courses upon which the carriers are supported at their free ends are interrupted, and in which pivoted guiding devices are provided on the inner courses to facilitate the guiding of the free ends of the carriers as the chains supporting the other ends pass about the guide wheels.

This specification signed this 6th day of December A. D. 1928.

JAMES H. MacLAUCHLAN.