J. T. COWLEY.

CONVEYER.

APPLICATION FILED DEC. 14, 1918.

1,351,554.

Patented Aug. 31, 1920.

2 SHEETS—SHEET 1.

Fig. 1.

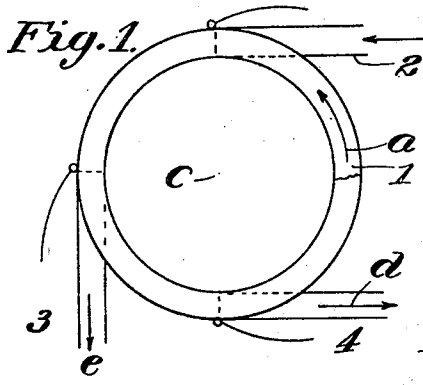


Fig. 4.

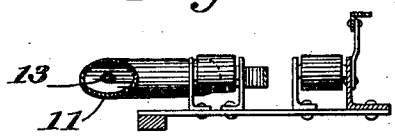


Fig. 2.

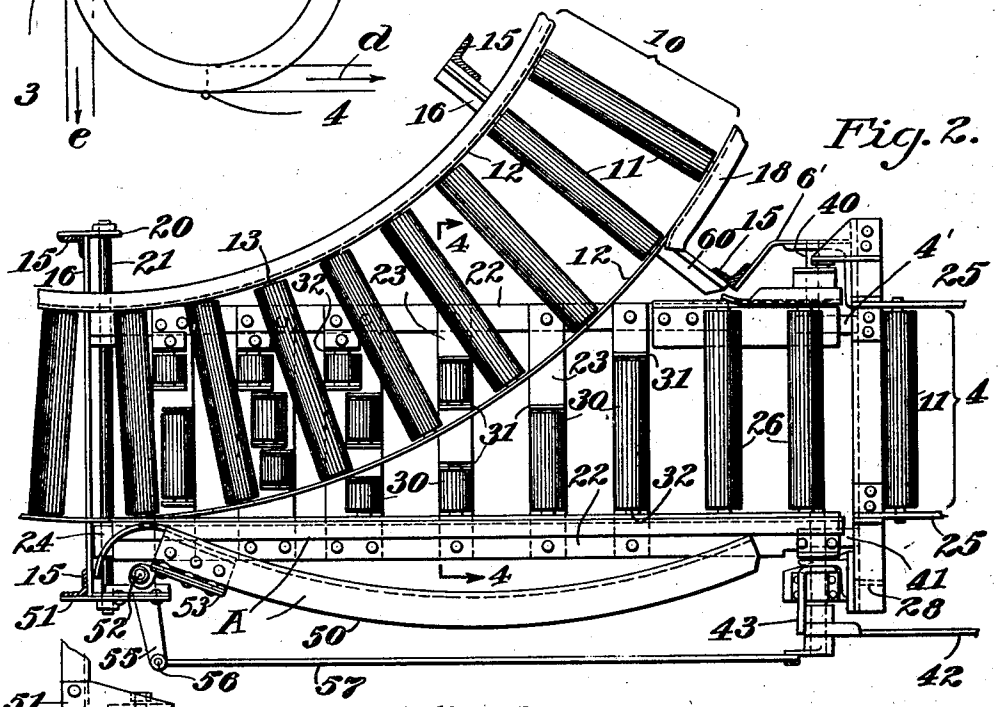
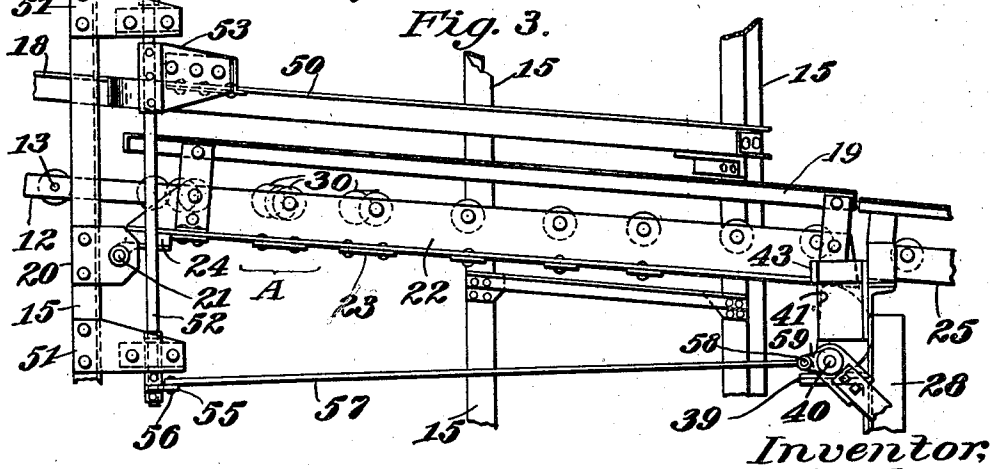


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 5.

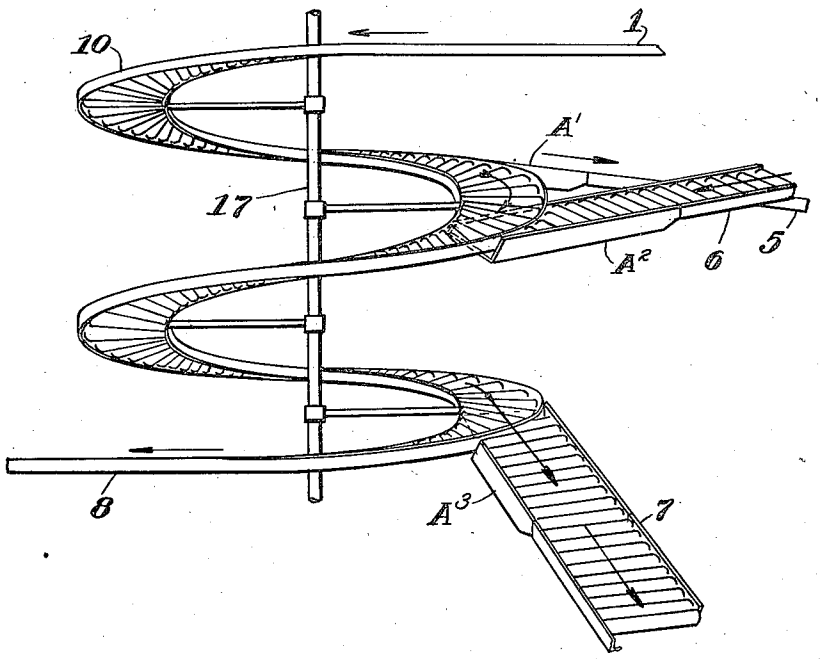
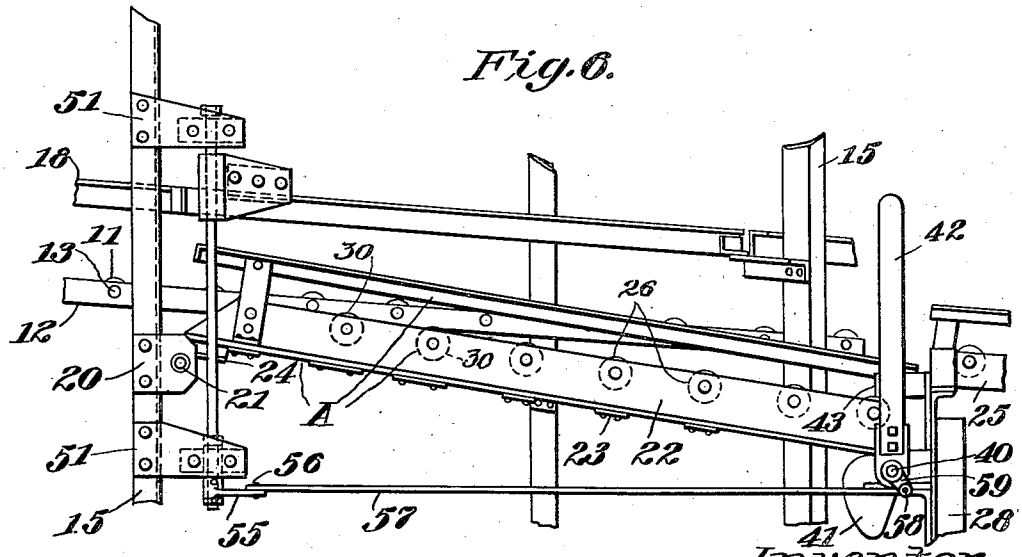


Fig. 6.



Inventor,
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his Attorneys

UNITED STATES PATENT OFFICE.

JAMES T. COWLEY, OF MINOT, MASSACHUSETTS, ASSIGNOR TO THE LAMSON COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF NEW JERSEY.

CONVEYER.

1,351,554. Specification of Letters Patent. Patented Aug. 31, 1920.

Application filed December 14, 1918. Serial No. 266,712.

To all whom it may concern:

Be it known that I, JAMES T. COWLEY, a citizen of the United States of America, and resident of Minot, in the county of Plymouth and State of Massachusetts, have invented new and useful Improvements in Conveyers, of which the following is a specification.

This invention relates to conveyers and especially to that type of conveyer comprising tracks, ways or chutes along which the load to be conveyed is propelled by gravity, momentum or the action of an impressed force.

Heretofore the art has comprised such structures as smooth slides or chutes, various arrangements of propelled or traveling surfaces, and tracks or ways made up of rollers having an upper surface exposed to receive a load resting and traveling upon them. For use as a gravity conveyer in which the energy of propulsion is the weight of the thing propelled, slightly inclined tracks made up of rollers have advantages; for instance those due to the tendency of rollers to direct the travel of the thing resting upon them along the central axis when the way or track is provided with such rollers rotating on axes at right angles to the desired direction of progress. Such gravity conveyers are particularly useful for moving divers objects from place to place in commercial and industrial establishments. A system of such conveyers may comprise means for receiving at (or for lifting to) a high point the things to be conveyed, and roller tracks or ways thence proceeding to the places of delivery at a gradual incline. But exigencies of space and of direction of travel for the things to be conveyed may compel more or less vertical travel of the object, and it is often necessary to provide for the delivery of objects alternatively in different directions or at different levels. Heretofore, in order to absorb without lateral progress the energy of position of an object sent from a relatively high point in such a system, it has been customary to install spiral ways or tracks adapted to receive the thing to be conveyed at the top and to deliver it on a tangent continuation of the spiral at the bottom.

To avoid too much speed of progress and consequently too much momentum such spirals must slope gently, and this has resulted in the turns or spires of the spiral being close together, the turns frequently being separated at points 360° apart by only sufficient head room for the object to be conveyed. These limitations of slope and head room have prevented such spirals, otherwise well adapted for use as distributing centers for such systems, from being used for such purpose, since it has been believed to be impracticable to provide switches capable of delivering from or to such a spiral in different directions and at different levels objects desired to be entered upon or removed from the spiral and sent along different paths having their origin at points on the spiral.

The devices of the prior art for switching loads from or to the branch tracks or ways or such conveyers, whatever their construction, are not satisfactory in many usual and desired situations. So far as I am aware, prior entering or leaving switches have all necessitated providing a vertical displacement or break in the track or way wide enough for the object to pass through. There is not head room in such a spiral as that above mentioned, for instance, for a vertically displaceable section of the main track, and lateral movement of a section is mechanically impracticable. In either case, the main track would be made discontinuous while the switch is in use. In many situations, such as when much change in the level of the way or track at the switch is undesirable, these disadvantages also apply to other known forms of switch mechanism for straight conveyers. I am not aware of any prior means for efficiently changing the direction of the load applicable to a continuous way or conveyer.

Principal objects of the present invention are to provide in connection with a chute, way or conveyer means adapted to direct the load carried when desired in a changed direction from that of the chute, way or conveyer; to provide for switching the load from or to progress around a curve or from or to a straight section of such a conveyer by adjustment through a small distance only of coöperating main and branch sections of track and preferably without interrupting the continuity of the part of the conveyer from or to which the loads are removed, or upon which they are entered, at the switch. Other objects are to provide a system of

gravity conveyers having branches adapted to deliver or not to deliver, or to receive or not to receive loads at will at points in the progress downward of a main track or way. In pursuit of these and other objects the invention provides a switching means for branched conveyer tracks applicable in any situation and operating upon principles utilizing the force propelling the load to direct it from or to the main or branch track or way in such a way as to avoid more than a minimum motion of the movable or adjustable part of the switch mechanism, and preferably so as to avoid breaking the continuity of the track or way from or to which the load is to be switched.

Referring to the accompanying drawings, I have therein illustrated the broader aspects of the invention by reference to specific instances of constructions within the genus constituting the invention as set out in the claims herein. In the drawings,

Figure 1 is a diagram in plan illustrating a type of spiral conveyer track having two receiving or entrance branches and two delivering or departure branches;

Fig. 2 is a detail plan of a switch section adapted to constitute the juncture of the spiral track and a receiving or a delivering branch;

Fig. 3 is a side elevation of the devices of Fig. 2 as arranged at a delivery branch;

Fig. 4 is a section on the line 4—4 of Fig. 2;

Fig. 5 is an elevation in the nature of a diagram illustrating components of a system utilizing the devices herein described; and

Fig. 6 is a view similar to Fig. 3 illustrating the parts in their idle position.

Referring now to Fig. 1, a conveyer, way or track 1, which may be a spiral about a vertical axis at *c*, may be made up of sections such as illustrated at 10 in Fig. 2 and comprising preferably a number of like cylindrical rolls 11 running on antifriction bearings of any known or desired kind, as on spindles 13, which may be radial to concentrically curved sections of preferably metallic side rails 12, in bores in which the spindles 13 are seated. The radius of curvature may be relatively short so that about six such segments as are illustrated in Fig. 2, for instance, may comprise a complete spire of the spiral, as illustrated in Fig. 5. The construction of the track 10 may vary with good engineering practice, this invention being more concerned with means for altering the travel of objects moving upon such a track than with details of construction. I have illustrated as an instance of good practice angle-iron verticals 15 arranged within and without the track 10 upon which are suitably fastened angle iron girts 16 upon which the side rails 12 may be installed at proper slope longitudinally and transversely to form the track or way comprised of the upper surfaces of the rolls 11. If desired such a spiral may, as suggested in Fig. 5, be built on radial ties supported by an internal column 17. While I have herein mentioned a spiral and curved track in order to explain the invention it will be understood that the specific mechanism herein shown and described is illustrative of one instance only of the invention, which is well adapted to use with sections of track or way of many different kinds for entering or removing objects at an angle thereto or therefrom.

As shown in Fig. 1, the upper or lower reaches of the spiral track 1 may be designed to receive the things to be conveyed either in the direction of curvature, as shown by the arrow *a*, or at a tangent, as illustrated by arrow *b*. Loads received in direction *a* may arrive on a straight or curved continuation of the track sections 10, or be first placed on a topmost section 10, and will by reason of the directive action of the surfaces of the divergently placed rolls 11 follow the track 1 throughout the spiral unless switched therefrom, finally being delivered at the bottom, for instance in direction *e* on a straight continuation 3 of the spiral 1. In order to provide for progress of objects down the spiral, it is necessary to provide that means for the entrance of other objects received from any other direction *b*, as from a tangent track 2, shall not break the continuity of the track 1. And in case delivery is desired in any direction at any height intermediate of the top and bottom of the spiral, it is desirable to provide for deflecting to tangent delivery tracks, as at 4, loads desired to proceed in any divergent direction *d*, without causing any break in the continuity of the track 1.

The sections 10 representative of the spiral 1 may be and desirably are provided with guard rails 18 suitably supported above the rails 12 and adapted to prevent an object from being thrown off the track 1 from any cause, such as collision or centrifugal force.

A preferred form of switch mechanism applicable to such situations as the entrance to branch conveyer 4 is shown in Figs. 2, 3, 4 and 6. At one pair of the uprights 15, for instance, bearing brackets 20, 20, carrying a pivot shaft 21 may be fastened securely to support the shaft 21 in a position crosswise of the track 1 and near the under sides of the rails 12. A frame preferably comprising angle-iron side rails 22, 22, cross-ties, 23 riveted or otherwise fastened to rails 22, a guard rail 19, and bearing-brackets 24 hung on shaft 21, and hereinafter referred to as switch-section A, is arranged so that there may be a limited relative vertical movement between track 1 and switch section A. In the form shown, section A is movable

slightly about the shaft 21 as a center in respect to a fixed section 10 of track 1. When in its upper position, Fig. 3, the switch-section A is in line with the branch conveyer 4, which may comprise angle-iron side-rails 25 and rolls 11 like those of the main track or way 1. The pivoted frame 22, 23 at the end contiguous to the branch track 4 is provided with rolls, including rolls 26 like the rolls 11, similarly mounted on spindles crosswise of the frame. The switch section A is provided with other rolls 30 defining, with the rolls 26, an upper surface adapted to swing with the frame 22, 23 about the center 21. The rolls 30 may be arranged to rotate on axes parallel to the axes of rolls 26 and rolls 11 of the branch 4, and the arrangement is such that a plurality of the rolls 30 occupy the space between and adjacent to the rolls, rails and other parts of the main conveyer 1. As shown, bearing brackets 31 for short spindles 32 are fastened on the frame 22, 23 by any suitable fastening so as to support the spindles 32 and short rolls 30 thereon in the free spaces between the rolls 11 and inside and outside of the rails 12 at the intersection of conveyer 1 and switch section A, there to rotate on axes substantially parallel to a radius of section 10. When the switch section is active, such of the rolls 30 as are within the lateral boundaries of the conveyer track 1, and preferably all of the rolls 30, define a surface slightly elevated above the plane tangent to the upper surfaces of rolls 11 of conveyer 1, as shown in Fig. 3. When so positioned, a load traveling on conveyer 1 from the left of Figs. 2 and 3 will by its gravity or other propulsive force be transferred from support by rolls 11 to support by rolls 30 upon entering the segment occupied in common by rolls 11 and 30, and thereby be lifted from operative contact with rolls 11. A load supported by one or more rollers and moving in response to their rotation being strongly directed at right angles to the axis of rotation of such a roll or rolls, the result is to cause a load traveling on conveyer 1, when transferred to the rolls 30, to change its direction to that of the longitudinal axis of switch section A and branch conveyer 4, which in the instance shown is a direction tangent to the spiral 1.

In order to secure a transfer of load from conveyer 1 to switch section A, the surface defined by rolls 30 may be lifted above the surface defined by rolls 11 through a sufficient distance only, which in practice may be a fraction of an inch or more. Or if desired, and with the same effect, the surface defined by rolls 11 may in some cases be depressed in relation to the surface defined by rolls 30. In order to prevent the rolls 30 from receiving the load, the section A may be moved downward about center 21 to lower the rolls 30 through a similar distance only beneath the upper surface defined by the rolls 11. It will be apparent that the necessary motion of the switch section at its intersection with the main track is very small. While in some cases I may secure the upward, or active, and downward, or inactive, displacement of the switch-section by the mere flexure of an integral or attached end of a branch track such as 4, I prefer the arrangement illustrated in which the directing rolls 30 at and near the intersection of main track and switch-section are carried upon a pivoted frame such as the frame 22, 23.

Such a switch section may be supported and operated in any convenient manner, but I prefer to provide, as on the supports 28 for the branch-track 4 bearing-brackets 39 for a rock-shaft 40 and cams 41 upon which the rails 22 of the frame 22, 23 may be strongly supported. Shaft 40 may be worked by a handle 42 rigid therewith; a stop 43 for the handle may be provided to limit one position of the handle, as at the position for an open switch shown in Fig. 6.

When the switch is installed at a sharp curve or spiral, it is desirable to maintain the continuity of the guard-rails 18 of the main track as well as of the track proper, and the device may include a gate 50 continuing the guard rail when the switch section A is inactive, and means to open and close this gate when the switch is closed or opened respectively. On one of the uprights 15, for instance, carrying the brackets 20 and shaft 21, bearing brackets 51, 51 may be arranged to support a vertical shaft 52 rigidly carrying a bracket 53 to which the gate 50 is fastened, preferably near a curved portion 54 of the gate adapted substantially to maintain continuity with the rail 18 as the gate is swung open on shaft 52 as a center.

Shaft 52 may be operated by any convenient connection to shaft 40, as shown by an arm 55 rigid with shaft 52 pivoted at 56 to a link 57 in turn pivoted at 58 to an arm 59 fast on shaft 40.

Gate 50 may be supported in closed position by a bracket 60 on one of the uprights 15, which may be part of any suitable connection 60, 61 joining the uprights 15 of the main track to the supports 28 for the branch track 4.

It will now be understood that the same arrangement of branch and main conveyers and switch-sections having parts included in a common region or area of juncture, one of the parts being movable in respect to the other so as to bring the supporting and directing surfaces (such as the rolls 30) into and out of supporting contact with the movable load, may be employed without change in other situations for instance, for entering upon the main conveyer 1 objects from a

branch conveyer. The branch conveyers are arranged to slope toward the main conveyer. As shown in Fig. 5, such a system of conveyers may comprise a main track 1 entering a spiral 10, a switch A′ controlling the entrance of a branch 5 taking from the spiral; a branch 6 delivering to the spiral at lower level at a switch section A^2; a branch 7 at a still lower level receiving its loads from the spiral as determined by the switch-section A^3, and a continuation 8 of the spiral 10 adapted to receive loads traveling on the spiral which have been allowed to pass the entrance to the branches 5 and 7 by inactive positions of the switch sections A′, A^3, the switch sections A′, A^2, A^3 being constructed and operating as above described.

It will be obvious that the principle involved is applicable without change to switching loads to or from chutes, tracks, conveyers, or ways of many different constructions, and I am not to be understood to limit my invention to switching loads to or from a roller-track conveyer only.

What I claim is:

1. A conveyer having therein a track or way adapted to contact with, support and direct loads moving thereon by the action of a force on the load, in combination with a branch track or way, and means adapted to contact with, support and differently direct the load adjustable into and out of position to coact with the load at a number of different places distributed throughout the region of juncture of said main and a branch track or way to remove the load at said region from operative contact with said main track or way and direct the load to or from the main track or way.

2. A conveyer comprising a main track or way and a branch track or way, each of said tracks or ways comprising transverse rollers adapted to contact with, support and direct loads resting on any lateral part of the track for movement in respective different directions, said main and branch tracks or ways each having rollers distributed throughout a common region of juncture, and one of said tracks or ways being adapted to be moved in respect to the other to bring into contact with the load at the region of juncture supporting and directing parts of the main or of the branch track or way, respectively, lying in the direction of travel of the load.

3. A conveyer having therein a track or way having rollers adapted to contact with, support and direct throughout the width of the track loads moving thereon by the action of a force on the load, in combination with means coacting with a load contacting with any part of the width of the track for causing the force acting on the load to separate the load and the track or way from operative contact at a predetermined part of said track or way, said means comprising rollers acting in the spaces between the rollers of the track or way for causing motion of the load in a new direction.

4. A conveyer having therein a laterally continuous track or way defined by a series of transverse rollers and having means for supporting the series of rollers in permanent longitudinal continuity, and thereby adapted to support and direct loads traveling thereon by the action of a force, such as gravity on the load, in combination with means for causing the energy of a moving load traveling in any lateral position on the track or way to lift the load from said track or way and to move said load in another direction.

5. A conveyer having therein a track or way comprised of a succession of rollers as wide as the track or way for supporting and directing loads moving thereon under gravity, in combination with means adapted to be positioned between said rollers to coact with a load moving on said track or way to receive, support and direct said load in another direction.

6. A conveyer having therein a track or way comprised of a succesion of rollers as wide as the track for supporting and directing loads moving thereon under gravity, in combination with means coacting at the interstices between said rollers with a load moving on said track or way and having rollers rotating on axes inclined to those of the track, and adapted to receive, support and direct said load in another direction.

7. A conveyer having therein a track or way for directing and supporting loads moving by the action of an impressed force such as gravity, said track or way defining a surface lying laterally across the direction of the force acting on the load, and longitudinally sloping in the direction of motion, in combination with means for determining a different path for the load comprising a switch-section defining a surface coinciding in plan with a part of said track or way, said switch-section having rollers effective throughout the width of said last mentioned surface for receiving, supporting, and directing laterally of said track or way a load traveling thereon.

8. A conveyer having therein in combination a main track or way, a lateral branch track or way, and means at the region of juncture of said tracks or ways adapted to receive and support a load traveling on one of said tracks, said supporting means comprising rollers adapted to direct a load bearing on any part of the width of the track or way along the other track or way.

9. A conveyer having therein a laterally continuous track or way defined by a series of transverse rollers and having means for supporting the series of rollers in permanent longitudinal continuity in combination with movable switching means adapted to be posi-

tioned respectively to receive a load traveling on and in the direction of said continuous track or way, and out of contact with such loads; said switching means comprising rolls adapted to enter interstices between adjacent transverse rollers of the main track or way to direct a load received thereby in a different direction from that of said continuous track or way when positioned to receive such loads.

10. A conveyer having therein a continuous track or way for directing moving loads, in combination with a switch section for such loads comprising a series of rollers together extending the full width of the track or way and free to rotate about axes at an angle to the direction of said continuous track, and means for interposing said rolls in the path of loads moving on said continuous track or way, whereby to direct the moving load in a different direction from that of said continuous track or way.

11. A gravity conveyer having a main track or way defined by a laterally continuous surface tangent to a continuous succession of rollers, and a switch device for laterally deflecting a load traveling on said main track comprising a series of rollers mounted to rotate on axes at an angle to the axes of the rollers of said main track, and means for interposing and withdrawing said inclined rollers from intersection with said main track or way.

12. A gravity conveyer having a curved section of a main track or way, in combination with a switch-section having a plurality of rollers rotating on axes substantially parallel to the same radius of the curve, and means for interposing and for withdrawing said plurality of rollers from intersection with the path of a load traveling on said curved section, whereby respectively to direct a load on a tangent to said curve, and to leave said main track in an uninterrupted condition.

13. A system of conveyers having therein a spiral roller track or way, branch roller tracks or ways, and means adapted to deflect a load from a continuous part of said spiral to one of said branch tracks or ways comprising rolls rotating on axes parallel with a radius of the spiral adapted to be interposed between the rollers of the main track.

14. A system of conveyers having therein a spiral main track or way, a branch track or way, and means for delivering loads from said branch to a continuous part of said spiral, comprising rolls rotating on axes parallel with a radius of the spiral adapted to be interposed between the rollers of the main track.

15. A system of conveyers having therein a spiral track or way, a plurality of branch tracks or ways, means for delivering loads from one or more of said branch tracks or ways to said spiral, and means for lifting away from support by and deflecting loads from a continuous part of said spiral to one or more of said branch tracks or ways.

16. In a conveyer system having main tracks comprised of contiguous rollers as wide as the track, a switch-section having thereon a plurality of rollers adapted to be entered in and withdrawn from the path taken by a load traveling on said main track at the spaces between contiguous rollers of said main track to receive a load therefrom.

17. A roller conveyer having therein a main track having interstices therein between rollers extending across the track and a switch-section comprising a frame, rollers mounted on the frame and movable into said interstices adapted to receive, support and direct a load laterally of said main track, means for supporting said frame beneath said main track, and means for moving said frame to move said rollers into and out of the path taken by loads traveling on said main track.

18. A conveyer having therein a continuous main track having a curved portion, a guard rail for the curved portion, a gate forming a part of said guard rail, a switch-section adapted to be moved vertically into and out of operative relation to said main track, and means for laterally opening and closing said gate in accordance with the position of said switch-section.

Signed by me at Boston, Massachusetts, this ninth day of December, 1918.

JAMES T. COWLEY.