Jan. 3, 1928.

1,654,689

T. S. KNAP

CONVEYER SYSTEM

Original Filed July 26, 1921 3 Sheets-Sheet 1

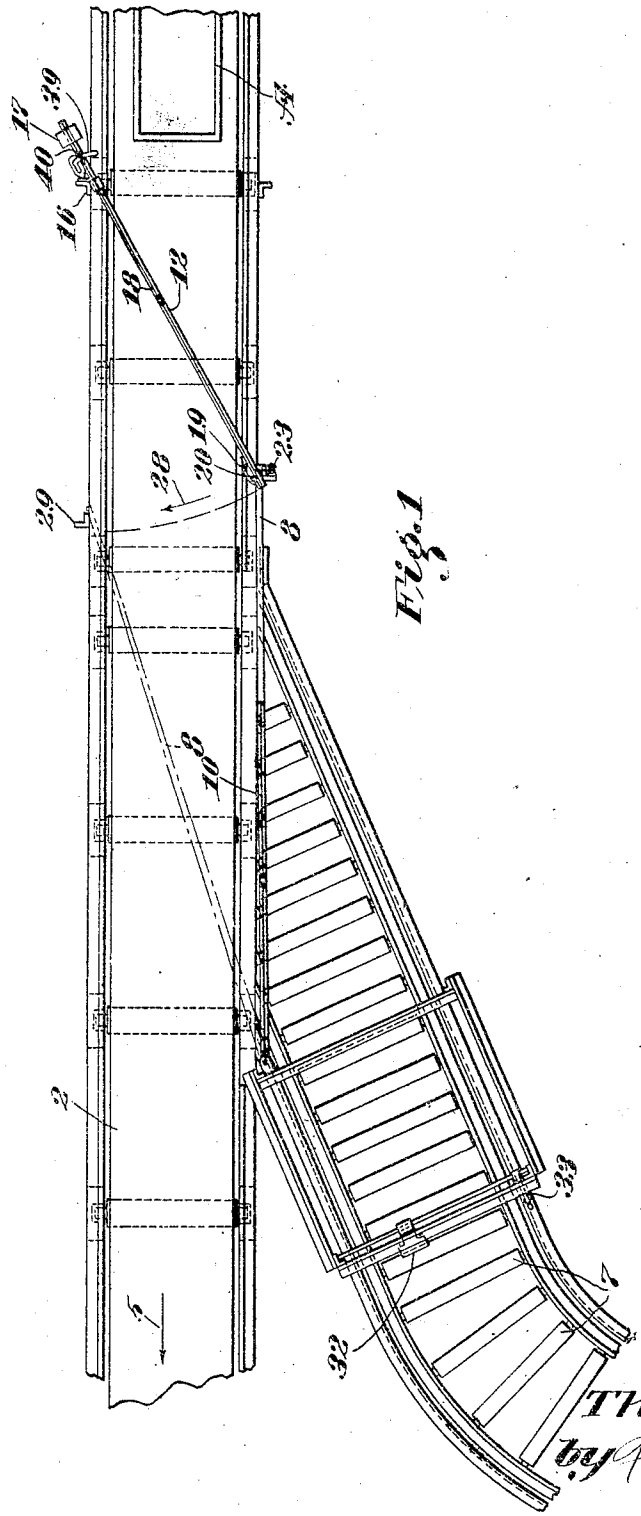


Fig. 1

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Original Filed July 26, 1921 3 Sheets-Sheet 2

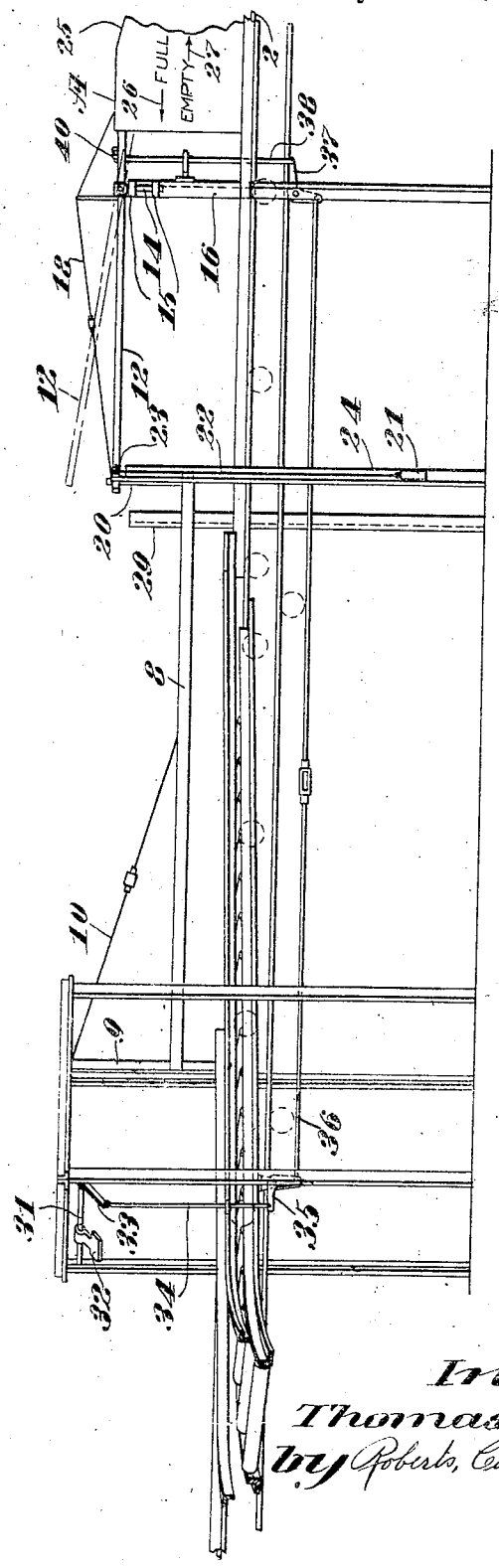


Fig. 2

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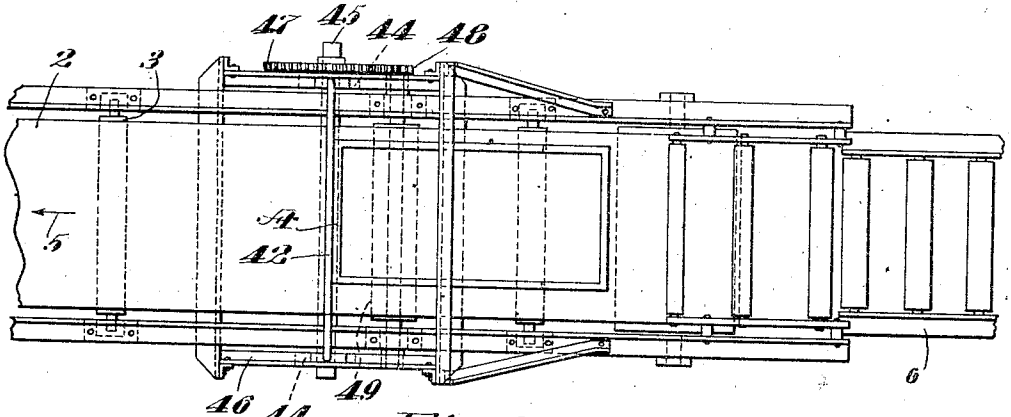


Fig. 3

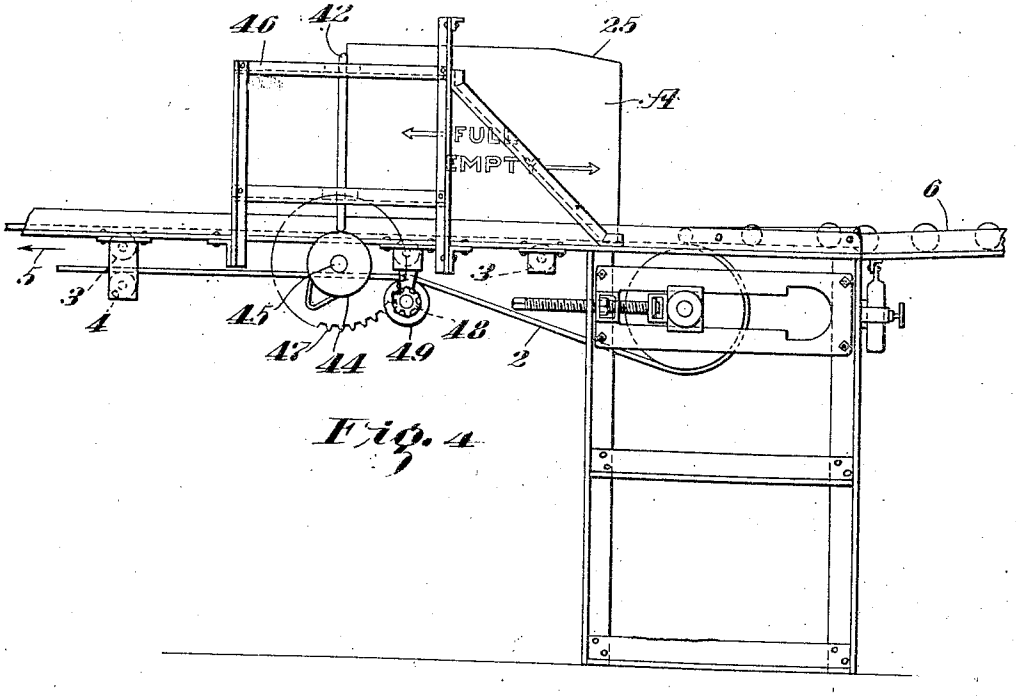


Fig. 4

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UNITED STATES PATENT OFFICE.

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CONVEYER SYSTEM.

Original application filed July 26, 1921, Serial No. 487,610. Divided and this application filed December 23, 1926. Serial No. 156,552.

This invention relates to conveyer systems and is especially concerned with systems in which mechanism is employed for automatically switching or diverting the articles conveyed from one part of the system to another. It is the chief object of the invention to devise a system in which the switching or diverting of conveyers in a predetermined manner can be performed without interruption or attention, and especially to provide means for preventing the bunching or jamming of the carriers at the switching points. The invention involves both a novel organization of conveyer system and also a novel mechanism for spacing the carriers in the system and is a division of my application Serial No. 487,610, filed July 26, 1921.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

Referring now to the drawings,

Fig. 1 is a plan view of a portion of a conveyer system including features embodying the present invention;

Fig. 2 is a side elevation of the switching mechanism shown in Fig. 1;

Fig. 3 is a plan view of a carrier spacing mechanism forming part of the conveyer system; and

Fig. 4 is a side elevation of the mechanism shown in Fig. 3.

The system shown comprises a conveyer belt 2 having upper and lower reaches, as best shown in Fig. 4, the upper reach being supported on a series of rolls 3, and the lower reach on similar rolls 4. The upper reach of the belt travels in the direction indicated by the arrow 5, Fig. 4, and in the arrangement shown the carriers A are delivered to this belt by a roller conveyer 6.

The belt 2 delivers carriers to one or more stations, one of such stations being designated at 7, Fig. 1, and consisting of a conveyer of the roller type which diverges from the main conveyer 2. For the purpose of diverting carriers into the station, a switch mechanism is provided comprising a switch bar 8 secured fast to an upright rod 9 which preferably is mounted at its upper and lower ends in ball bearings that are supported in a suitable frame work. This construction enables the divertor arm or switch bar 8 to swing freely from the full line position, Fig. 1, to the dotted line position and back again. A truss rod 10, Fig. 2, connects the divertor arm with the upper part of the rod 9 and steadies the arm. Another arm or bar 12, hereinafter designated the operating arm or actuator bar, is pivoted at 13, Fig. 2, in the forked upper end of a post 14 which is mounted in bearing brackets 15—15 secured to a stationary support 16 so that the post can rotate about its vertical axis. The arm 12 thus is enabled to swing both in a horizontal plane about the pivot 14 and also in a vertical plane about the pivot 13. This arm is extended beyond the pivot 13 and has a weight 17, Fig. 1, adjustably secured thereto and of such a mass as to nearly counterbalance the weight of the arm 12 so that the tipping movement about the pivot 13 will require very little effort. A truss rod 18 is also connected with the rod 12 to steady it.

The operating arm 12 is connected with the switch arm 8 through a strap 19, Fig. 1, and a post 20, the post being secured rigidly to the arm 8 and projecting into the slot formed between the parts 12 and 19, as clearly shown in Fig. 1. Normally the operating arm 12 is held in the position in which it is shown in full lines, Fig. 1, by means of a weight 21, Fig. 2, connected to this arm through a cord or chain 22 running over a pulley 23 supported on the upper end of the frame piece 24.

The carriers A each consists of a box having dissimilar ends, one end being square while the upper part of the box at the opposite end is bevelled, as indicated at 25, Fig. 2. The full boxes are placed on the conveyer belt 2 in the direction indicated by the arrow 26, while the empty boxes are placed in the direction indicated by the arrow 27. In other words, the full boxes travel on the conveyer belt with their square ends foremost, while the empty boxes travel with their bevelled ends foremost. Consequently, when a full box reaches the operating arm 12 it will swing this arm across the conveyer belt 2, as indicated by the direction of the arrow 28, Fig. 1, carrying the switch arm 8 with it, and thereby moving this arm into such a position that it will divert the carrier A into the station 7. The movement of the

switch arm produced in this manner is limited by a stop 29. As soon as this operation has been completed, the counter-weight 21 swings both the arms 8 and 12 back again to their original or normal positions.

When an empty box is carried to the switch mechanism by the conveyer belt 2, the inclined face 25 which, as above stated, is foremost, will strike the arm 12 and tip this arm upwardly into the position indicated in dotted lines in Fig. 2, and the box then will pass under this arm and continue its travel along the conveyer belt 2. The empty boxes, therefore, will not be diverted. Since the divertor arm 8 is positioned only a relatively short distance above the surface of the belt 2, its action on the carriers is very positive.

It is desirable at certain times to render this diverting mechanism inoperative, as for instance, when the station 7 is filled with carriers, and also immediately after a box has entered this station and during which time it is desired that other full boxes be allowed to travel along the belt to supply other stations. For this purpose a horizontal rock shaft 31 is mounted in a part of the frame work and has rigidly secured thereto a plate or arm 32 in position to be struck and lifted by the edge of a box or carrier immediately after it has entered the station. The movement thus imparted to the rock shaft 31 is transmitted through an arm 33, Fig. 2, fast on this rock shaft, a link 34, a bell crank 35, a rod 36, and a bell crank 37 to an upright rod 38, the upper end of which is turned over as indicated at 39, Fig. 1, and passes through a staple 40 secured to the rearward end of the arm 12. The direction of this movement is such as to tip the operating arm 12 into its raised or inoperative position, as indicated in dotted lines in Fig. 2, and it will be held in this position until the carrier has moved out of engagement with the plate 32. During this period, therefore, succeeding carriers will travel uninterruptedly along the conveyer belt 2 whether they are full or empty.

It is desirable for several reasons that the carriers be separated from each other on the conveyer belt by at least certain minimum space intervals. For instance, if a full box follows immediately behind an empty one, the operating arm 12 may not drop in time to catch it. For this purpose an automatic spacing mechanism of novel construction is provided which is best shown in Figs. 3 and 4. This mechanism comprises a gate 42 which is substantially U-shaped and straddles the conveyer belt, its two vertical legs, one of which is shown at 43, Fig. 4, resting, respectively, on the surfaces of two cams 44 positioned at opposite sides of the conveyer. Both of these cams are fixed to a shaft 45 which is supported in suitable bearings. The gate is guided in the frame 46 for up and down movement. A gear 47 secured fast to the shaft 45 is driven by a pinion 48 secured to another shaft which carries a roll 49 that runs in contact with the lower reach of the belt and is driven thereby. This mechanism thus imparts a relatively slow rotative movement to the cams 44.

It will be observed from the shape of the cams that the gate 42 is normally in its lowermost position, and that in this position it will catch each carrier A and stop it for a length of time depending upon the angular position of the cams 44 at the moment that the carrier strikes the gate. When the cam raises the gate 42, the belt moves the carrier along under the gate and the gate descends again in time to catch the next adjacent carrier and retain it for a certain length of time. This mechanism thus operates automatically to space the carriers along the conveyer belt and prevent any bunching of them at the switching mechanism, it being understood, of course, that this spacing mechanism is placed in front of the first switch so that it acts on the carriers before they reach the switch. By using a gate 42 of the proper height, the mechanism will operate to space only full boxes and will allow the empty boxes to travel along the conveyer, the bevel 25 raising the gate 42 in the same way that it raises the operating arm 12 of the switch mechanism. Usually, however, it is preferable to space both the full and empty boxes.

It will now be appreciated that this invention provides a conveyer system which will operate with great certainty and reliability, which is of very simple construction, and which is entirely automatic in operation. The construction is such that wear and depreciation are very slow indeed, and attention is required at only very infrequent intervals.

It will also be understood that while I have herein shown and described the best embodiment of the invention of which I am at present aware, that this embodiment may be modified in many particulars without departing from the spirit or scope of this invention.

I claim:

1. A conveyer system comprising a main track, means for moving articles along said track, a branch track diverging from the main track, a switch member normally closing the entrance to said branch track, means engageable by articles of a certain class approaching along the main track for setting the switch member to divert such articles into the branch track, and an automatically acting gate for spacing articles upon the main track as they approach the switch setting means.

2. A conveyer system comprising a main track and a divergent branch track, a switch

bar pivoted at one end adjacent to one side of the main track, said bar normally standing in inoperative position parallel to the side of the main track, and means actuable by an article of a predetermined character, moving along the main track, for setting the switch bar diagonally across the main track to divert such articles into the branch track and an automatically acting gate for spacing articles upon the main track as they approach the switch setting means.

3. A conveyer system comprising a main track and a branch track diverging from the main track, means for moving articles along the main track, a switch bar pivotally supported at one end adjacent to the junction of the branch track with the main track and normally extending across the entrance to the branch track, a movable actuating member disposed across the main track in advance of the entrance to the branch track, and means connecting said actuating member to the switch bar, the actuating member responding to engagement by articles of a certain kind moving along the main track to move the switch bar from its normal position thereby to divert such articles into the branch track and an automatically acting gate for spacing articles upon the main track as they approach the switch setting means.

4. A conveyer system comprising a main track and a divergent branch track, means for moving articles along the main track, a switch bar pivoted at one side of the main track adjacent to the junction of the branch track with the main track and normally positioned across the entrance to the branch track, an actuator bar pivoted at the opposite side of the main track from the switch bar, and means connecting the free ends of said bars and an automatically acting gate for spacing articles upon the main track as they approach the switch setting means.

5. A conveyer system comprising a main track and a divergent branch track, a switch bar pivotally supported at one end at a point adjacent to the junction of the branch track with the main track and at that side of the branch track remote from carriers approaching along the main track, means normally holding the switch bar in inoperative position across the entrance to the branch track, and means actuable by articles of a predetermined class, moving along the main track to move the switch bar to operative position thereby to divert such articles into the branch track and an automatically acting gate for spacing articles upon the main track as they approach the switch setting means.

6. A conveyer system comprising a main track and a divergent branch track, a switch bar pivoted at one end to swing in a plane substantially parallel to the plane of the main track, the fulcrum point of the switch bar being adjacent to one side of the main track at the junction of the branch track therewith, means normally holding the switch bar in inoperative position, an actuator bar supported to swing in a plane substantially parallel to the plane of the main track and also perpendicularly to said plane, and means connecting the actuator bar to the switch bar and an automatically acting gate for spacing articles upon the main track as they approach the switch setting means.

7. A conveyer system comprising a main track and a divergent branch track, a switch bar pivotally supported adjacent to one side of the main track, and an actuator bar pivotally supported to swing substantially parallel to the plane of the main track and also perpendicularly to said plane, one of said bars having a guide opening at its free end and the other having an elongate finger extending freely through said guide opening, the actuator bar normally extending transversely across the main track and an automatically acting gate for spacing articles upon the main track as they approach the switch setting means.

8. A conveyer system comprising a main track and a divergent branch track, a switch bar pivoted at one end at a point adjacent to the junction of the branch track with the main track, means normally holding said bar in inoperative position parallel to one side of the main track, and means actuable by an article moving along the main track for setting the switch bar in operative position diagonally across the main track and an automatically acting gate for spacing articles upon the main track as they approach the switch setting means.

9. A conveyer system comprising a main track and a divergent branch track, a switch bar pivoted at one end at a point adjacent to the junction of the branch track with the main track, and an automatically acting gate for spacing articles upon the main track as they approach the switch setting means, said bar normally extending across the entrance to the branch track, an actuator bar pivoted at the opposite side of the main track and normally extending diagonally across the latter, means connecting the free ends of said bars, the actuator bar being free to lift when engaged by articles of one configuration thereby allowing such articles to continue along the main track and swinging when engaged by articles of another kind thereby setting the switch bar in operative position to divert such articles into the branch track.

Signed by me at New York city, N. Y., this fifteenth day of December, 1926.

THOMAS S. KNAP.