This invention relates to continuous belt conveyors, and has for one of its immediate objects the provision of a conveyor which is particularly well suited for use as an adjunct to a bag sealing machine, although not restricted in its utility to any specific application.

Tall bags which have been filled and are to be transported by a belt conveyor to a bag sealing machine must be held in upright posture on the belt; and in order to prevent the bags tipping over enroute it is necessary to provide supporting means on the belt, such as individual pockets into which the filled bags can be placed.

In a sense, this would be feasible for the operators who fill the bags or attend the bag-filling machines to place them manually in conveyor pockets; but it has been found to be a serious impediment to a bag filler's output capacity to require him to divert his attention from the bag-filling operations in order properly to place the bags, after filling, on the conveyor belt. And this is especially true where several operators are placing bags on the conveyor belt at different points therealong, because in those cases each operator, except the one farthest from the sealing machine, would have to exercise caution to avoid placing bags in pockets already occupied, or attempting to do so.

With a view to simplifying to the greatest possible extent the operation of placing filled bags in empty conveyor pockets and thereby increasing each operator's output, the present invention contemplates the provision of feed hoppers or chutes, one for each operator, into which the operators place the bags as they are filled; and it further contemplates the provision of mechanism which operates automatically to release the bags from the hoppers so that they fall only into empty pockets on the conveyor.

Additional objects and novel features of the subject invention will be apparent as the ensuing detailed description progresses.

Referring to the drawings which accompany this specification:

Figure 1 is an elevational view of a belt conveyor in accordance with the invention, the view being broken into two parts the lower of which is a continuation of the right end of the upper part, four receiving stations wherein filled bags are placed upon the conveyor being illustrated;
tioned adjacent a sealing machine, shown fragmentarily and identified by the reference numeral 26. The present invention is not
considered with the sealing machine, per se, and, for that reason, there is no occasion to do more than to indicate its position, as has been done
in Fig. 1, except to mention that as the bags are taken from the belt by the sealing machine they travel in a horizontal path, as clearly indicated.

Each block 28 is of rectangular form, having a sloping edge 220 and is secured at the bottom to a metal strip 29 which extends transversely of the belt and is provided with countersunk bolt holes 30 to receive bolts by means of which attachment to the belt is effected. A metal plate 32 is secured to one side of the block 28, along the lower edge thereof, by means of woodcrews 33 and 34, and the said plate 32 may be removed to the conveyor belt.

The several blocks 28 are located on the belt in zig-zag fashion, as clearly depicted in Figs. 6 and 7, being so spaced as to form two parallel series of pockets extending lengthwise of the belt. The pockets of one series are identified by the reference numerals 36 while those of the other series are identified by the reference numerals 38. The blocks form, conjointly, three sides of each pocket, while the fourth side is formed by a stationary guide rail 40, 42, placed at either side of the two series of blocks. These guide rails may be strips of wood secured to the framework of the conveyor and they overlie the two edge portions of the upper run of the belt. The pockets are proportioned in conformity with the size of the bags to be handled, being large enough to receive the bags freely and small enough to ensure that the bags will be held upright.

The four stations 22-25, inclusive, as well as such additional stations as may be placed at the opposite side of the conveyor, usually are situated adjacent bag filling machines from which an operator takes the bags, as they are filled, and transfers them one at a time to the conveyor belt.

It is important that the operator be able to devote his entire attention to the bag-filling operation, without having to divert attention to seeing to it that the filled bags are each placed in an empty pocket on the conveyor. The task of so doing, without mechanical assistance, would be additionally complicated and hampered where several operators are using the same conveyor, because all the operations, except one, would be obliged to make sure, in each instance, that a selected pocket is an empty one. Even when only one operator is using the conveyor, there would be a material loss of time involved, in placing the bags in the pockets, manually; and where several operators are involved, simultaneously, the loss of time would be greatly increased, due to the necessity of distinguishing empty pockets from those already filled.

By virtue of the electro-mechanical provisions about to be described, each operator has only to take each bag, as it is filled, and place it in a hopper, paying no attention to the conveyor; and the mechanism automatically determines when an empty pocket is about to come into position to receive a bag, and automatically releases the bag from the hopper at the proper time, so that it falls into the empty pocket, per se, and for being right and left hand, when they are disposed on both sides of the conveyor, and it will be necessary to describe only one of them. Station 22 is the one selected for description because the sections with Fig. 2 is taken immediately adjacent that station, as indicated by the position of line 2-2 on Fig. 1.

Referring more especially to Figs. 2-5, inclusive, a sheet metal funnel-like hopper 44 having a vertical chute 44a is suspended by means of a suitable supporting structure so that a discharge opening at its lower extremity overlies the row of pockets 38; and it is so positioned, lengthwise of the conveyor belt, that a pocket will be in position to receive each bag upon being released from the hopper. The operator drops the filled bags, one at a time, into the open upper end of the hopper, which, as will be seen, is flared at the top, or on three sides, so as to facilitate insertion of the bags. The passageway through the chute portion 44a is so dimensioned as to afford a fairly close match for the filled bag 26 resting therein. Upon being released, the bag drops by gravity, as depicted in Fig. 3.

A metal plate 45, normally positioned below the hopper discharge opening, as shown in Figs. 2 and 4, functions as a trap to retain each bag within the lower end of the chute 44a until an empty conveyor pocket 38 is in position to receive the same. The plate 45 normally is positioned as shown in Fig. 2, but is movable, as indicated by the double-headed arrow on that figure to an alternate open position, as shown in Fig. 3, to release the chute 44a is so dimensioned as to afford a fairly close match for the filled bag 26 resting therein. Upon being released, the bag drops by gravity, as depicted in Fig. 3.

Mounted on the hopper and pivoted at 46 is an arm 48 which projects through an opening in the front of the hopper and normally is positioned, as per Fig. 2, so that its lower end portion will intercept each bag as it descends through the chute. Arm 48 normally is held in that position by a leaf spring 49 which is resilient enough to allow the arm 48 to swing out of the way under the weight of a single filled bag. A contact spring 50 is secured at its upper end to the arm 48 so as to be movable therewith and has a contact 51 at its lower end which is adapted to engage a fixed contact 52 when the arm 48 is deflected under the weight of a bag, as per Fig. 3. The aforementioned contacts are normally open, and the purpose hereof is to condition the energizing circuit of a plunger solenoid, to be described later, which controls operation of the trap. Were it not for said contacts the trap would open each time an empty pocket 38 passed the station 42, irrespective of the presence or absence of a filled bag in the hopper; and that, of course, would be objectionable because of the useless wear and tear and current consumption involved.

The trap 45 is riveted at one end to an upright arm 54 which is fulcrumed on a pin 56 carried by a bracket 57 secured to the frame machine, said arm being bent, as shown, to clear the conveyor belt and other parts of the mechanism. A leaf spring 58 serves to return the arm 54 and trap 45 to their normal positions (Fig. 2) and suitable stop means are provided to limit the movements of said arm in either direction.
The conveyor belt runs continuously, and it will be clear enough, assuming a filled bag in the hopper, that if the trap is opened at precisely the right instant the bag will drop into a pocket on the conveyor belt. But inasmuch as some of the pockets may already be occupied when they reach the station 22, it is essential to make sure that the trap will be opened only when an empty pocket is at hand to receive the bag, and that must be accomplished automatically.

The arm 64 is actuated by the rocker member 60, which is shown isometrically in Fig. 5, and in plan view in Figs. 6 and 7. This member is pivotally mounted on a Z-shaped bracket 62 secured to the frame of the machine and carrying an upright pin 63 which extends through the bore of a sleeve 64 forming an integral part of the rocker member. Welded to the sleeve 64 are two arms 65 and 66, disposed substantially in quadrature, and the latter includes a bent portion 66a which functions as a "feeler" and also as a cam follower, as presently will be explained. If the make of the rockers is such that free end of the bent portion 66a of the arm 66, and integral therewith, is a lug 67.

The rocker member 60 is spring-biased clockwise, as viewed in Figs. 6 and 7, by means of a coil spring 68 which bears against the arm 63; and the bent portion 66a of the arm 66 is adapted to enter each of the pockets, under the impetus of said spring, as said pockets move into registration therewith. But if a pocket is occupied by a filled bag, the arm portion 66a is prevented from entering. As the belt moves forward, the blocks 29 successively strike the inclined surface 68, and, in the manner ofcams acting upon cam followers, are effective to rotate the rocker member counterclockwise, as clearly illustrated in Fig. 7. This movement of the rocker member is effective to move the arm 54 out of its normal position (Fig. 2) to the "open trap" position of Fig. 3, provided a certain condition precedent obtains, dependent upon the pocket 38 (which has just previously passed the rocker member) being unoccupied. If the pocket in question is already occupied, it obviously would not be permissible to open the trap and dislodge another bag onto the existing occupant. Hence, some provision is needed which will preclude the rocker member 60 being effective upon the arm 54 in event of the pocket being occupied. The provision here made to that end includes a vertical bar 70 which is pivotally connected at 71 to the arm 54 and carried thereby. From inspection of Figs. 4, 6 and 7 it will be seen that the bar 70 is laterally offset from the arm 54, and it normally is so postured that the lower end portion thereof (see Fig. 4) is disposed out of the path of the adjacent end of the lug 67. The upper end of the bar 70 is frictionally engaged by a leaf spring 72 attached to the arm 54 and effective yieldably to retain the bar 70 in any posture of rotation until it is forcibly rotated to another posture. In other that the arm 54 may be actuated to open the trap, it is necessary that the bar 70 be so postured that its lower end portion is in the path of the lug 67. Were it otherwise, a counter-clockwise rotation of the rocker member 60 would be a nullity. The upper end portion of the bar 70 is dowelled accurately to receive a pin 73 which is affixed to the arm 54 and serves to limit the rotation of the bar 70 in both directions while permitting sufficient rotation thereof to enable its lower end to be moved into and out of the path of the lug 67.

The arm 65, forming an integral part of the rocker member 60, is provided with a contact 78 which is adapted to engage a fixed contact 79 when the rocker member 60 is postured as per Fig. 6; but if there is a bag in the pocket 38 in registration with the "feeler" portion of the rocker member, the latter is thereby prevented from rotating clockwise sufficiently to close the contacts 78 and 79. The latter contacts are in series with the contacts 51 and 52 and with the winding of a plunger solenoid 78 which the function of which is to rotate the bar 70 from its normal full-line posture of Fig. 4 to the posture thereof indicated in dot-dash outline in the same figure, so that its lower end portion stands in the path of the lug 67, thereby pre-conditioning the arm 54 for rotation by the rocker member 60. The solenoid 78 has a plunger 79, normally retracted by a spring 80 and provided at its forward end with a flange or head 81 which is positioned to strike the edge of the bar 70 near the upper end thereof when the solenoid is energized, thereby rotating said bar so that its lower end portions is moved into the path of the lug 67.

Now it will be apparent that if there is a bag in the hopper holding the contacts 51 and 52 closed, and the pocket 38 engaged by the rocker member 60 is empty so as to bring about a closure of the contacts 78 and 79, the solenoid 78 will be energized and the bar 70 will, resultantly be so postured that when the rocker member is subsequently rotated counter-clockwise by the succeeding block 29, as depicted in Fig. 7, the lug 67 will contact the bar 70 and thus rotate the arm 54 and move the trap 45, carried by said arm, to the open position (Fig. 3). Thereupon, the bag will drop from the chute 44 into the empty pocket.

If, on the other hand, the pocket 38 is occupied, the contacts 78, 79 will not close and the solenoid will not be energized. Likewise, if there is no bag in the hopper, the contacts 51, 52 will be open and, again, the solenoid will not be energized. Therefore, under either or both of the latter conditions the arm 54 will not be actuated.

Following each opening of the trap, it is necessary to restore the bar 70 to its normal posture which is that indicated in full lines in Fig. 4; but it also is necessary to keep the trap open long enough to ensure that the bag is completely clear thereof before the arm 54 is allowed to return to its normal posture, as per Fig. 2. And those conditions have given rise to a problem the solution of which has demanded the exercise of very considerable ingenuity, as will now be pointed out and explained.

A cam plate or wedge 82 has an oblique surface 83a which is positioned to intercept and engage the protruding edge of the bar 70, and is thereby effective to rotate said bar back to its normal posture as the arm 54 continues to move fully toward open position. But such rotation of the bar 70 displaces it from the path of the lug 67 and would result in the bar 54 being released too soon, thereby closing the trap prematurely.

In order to avoid that circumstance, there is provided a latch bar 84 pivoted at 85 and having a detent 86 which is adapted, by virtue of a swinging spring 87, to latchingly engage the arm 54 before the bar 70 has been rotated sufficiently to clear the lug 67. Thus, the arm 54 is latched in open posture beyond the time when it otherwise would be released by virtue of the rotation of the bar 70 out of the path of the lug 67.

However, it is necessary to release the arm 54 as soon as possible after the bag has been fully discharged from
the chute, so that the trap will be in position to intercept the next bag to be dropped into the hopper.

Retraction of the latch bar 54 and consequent release of the arm 56 is effected by means of a link 68 which is pivotally connected at 69 to the latch bar 54, and threaded to receive a nut 50. The link 68 passes through an opening in the arm 56 of the rocker member 65 and the nut 50 is so positioned therein that, when the rocker member has assumed the posture in which it is shown in Fig. 7, the arm 67 is in barely in contact with the nut 50. Manifestly, a further counter-clockwise rotation of the rocker member 65 will result in the link 68 being pulled to the right by the arm 65; and that, in turn, will cause the latch bar 54 to be retracted sufficiently to release the arm 56.

The further rotation of said rocker member needed to retract the latch bar is effected by a lateral projection on the side of the block 28, and is so positioned that it will engage the arm 56 of the rocker member 65 and cause the latter to be rotated counter-clockwise through a small, additional angle—just enough so that the arm 65 will move the link 68 to the right (Figs. 6 and 7) sufficient to disengage the deft 56 from the edge of the bar 54. The lateral projection, of which there is one on each block 28, may conveniently be the head of a round head screw 34 which, as shown in Fig. 8, is one of the two screws by which the block 28 is secured to the plate 32. The other screw, identified by the numeral 33 (Fig. 6) may have a flat head and be countersunk into the plate so that it does not project beyond its surface.

It will be self-evident that the arm 47 and the contacts 51 and 52 could be omitted so that the energizing circuit of the solenoid 78 would include only the contacts 75 and 76 and a source of current, and that the only consequence of so doing would be to cause the trap 45 to open regardless of the presence or absence of a bag in the hopper. The only objection to such an omission is that the arm 34, together with the trap, would be oscillated unnecessarily and without useful purpose. However, such unnecessary movements of the aforementioned components is of no major significance, and I do not intend that my invention shall be regarded as limited by the fact that my disclosure includes provisions for preventing such unnecessary movements.

It is, of course, essential that only one bag be placed in the hopper at one time; but the operation of the conveyor and feed mechanism ordinarily is so fast that the bags can be passed to the hopper as rapidly as they are filled.

Although my improved conveyor and feed mechanism was conceived primarily as the solution of a problem which obtained in the feeding of filled bags to a seating machine, its potential usefulness clearly is not limited to that application, nor even to the conveying of bags. The term "belt," as used in this specification and the appended claims, is to be construed broadly and includes link-belts or chains as well as leather and fabric belts, such as I have chosen to illustrate.

It is obvious that various changes may be made in the specific embodiment set forth for purposes of illustration without departing from the principles of the invention. Accordingly, the invention is not to be limited to the precise details disclosed herein, but includes all modifications thereof within the spirit and scope of the appended claims.

I claim:

1. In combination, a continuous belt conveyor having means defining a series of pockets distributed lengthwise of the belt and spaced apart lengthwise thereof, dispensing means located adjacent the conveyor and operative in response to each actuation to release a single unit-to-be-convoyed for delivery into one of said pockets, mechanism controlled by said conveyor and responsive to the presence or absence of one of said units in each one of said pockets passing a given point to actuate said dispensing means each time an empty pocket is positioned to receive a unit from the dispensing means, the first mentioned means comprising a series of blocks attached to the belt and spaced apart lengthwise thereof, and the conveyor-controlled mechanism comprising a rocker member which is biased to bear against the sides of said blocks and adapted to enter the passing pockets between said blocks, and means actuable by said rocker member to pre-condition said dispensing means for action, said rocker member being effective to actuate said dispensing means only upon entering an uncoupled one of said pockets, said rocker member being effective upon emerging from an empty pocket to actuate said dispensing means following a pre-conditioning thereof as before specified.

2. In combination, a continuous belt conveyor having means defining a series of pockets distributed lengthwise of the belt and movable therewith, dispensing means located adjacent the conveyor and operative in response to each actuation to release a single unit-to-be-convoyed for delivery into one of said pockets, mechanism controlled by said conveyor and responsive to the presence or absence of one of said units in each one of said pockets passing a given point to actuate said dispensing means each time an empty pocket is positioned to receive a unit from the dispensing means, the first mentioned means comprising a series of blocks attached to the belt and spaced apart lengthwise thereof, the conveyor and the mechanism comprising a rocker member which is biased to bear against the sides of said blocks and adapted to enter the passing pockets between said blocks, the dispensing means including a fulcrumed arm which is effective upon being moved from its normal posture to an alternate posture to release a unit-to-be-convoyed, said arm being actuable by said rocker member when the latter, in turn, is rotated by one of said blocks, means actuable by said rocker member to pre-condition said dispensing means for action, said rocker member being effective to actuate said pre-conditioning means only upon entering an uncoupled one of said pockets, said rocker member being effective upon emerging from an empty pocket to actuate said dispensing means following a pre-conditioning thereof as before specified, and an element carried by said arm and engageable by said rocker member only when in a given position, a solenoid forming a part of said pre-conditioning means and operable, when energized, to move said element into said given position.

3. In combination, a continuous belt conveyor having a series of blocks mounted on the belt and movable therewith and spaced lengthwise of the belt to form a series of spaced pockets each of which is adapted to receive an article for conveyance, dispensing means associated with said conveyor and operative upon being actuated to deposit an article in an empty one of said pockets, said dispensing means including a first
member which is movable from a normal posture to an alternate posture to effect release of an article, and which is then returnable to its normal posture, a rocker member operative upon being rotated in a certain direction to move said first member from its normal posture to its alternate posture, provided said first member has been conditioned for engagement by said rocker member, conditioning means operative to condition said first member so that it is engageable by said rocker member, said rocker member having a part which contacts said blocks as they pass thereby and which is adapted to enter, successively, all passing pockets which are unoccupied, means biasing said rocker member so that it rotates oppositely to said certain direction each time said part registers with an unoccupied one of said pockets, thereby causing said part to enter the empty pockets, said blocks being effective, in passing, to rotate said rocker member in said certain direction, said conditioning means being actuable by said rocker member to condition said first member in response to each rotation of said rocker member which is occasioned by said part entering an empty pocket, the arrangement being such that when said part registers with an occupied pocket it is blocked from entry thereto by the article in the pocket, said rocker member being consequently prevented from actuating said conditioning means.

4. The combination in accordance with claim 3 wherein said first member is a fulcrumed arm, and which combination includes a bar pivotally mounted on and carried by said arm, said bar being rotatable between two alternate postures, in only one of which it is engageable by said rocker member, an electromagnetic means operative, upon energization, to move said bar to the posture in which it is engageable by said rocker member, and an energizing circuit for said electromagnetic means, including a switch which is adapted to be closed by said rocker member when said part enters an unoccupied pocket, and means operative to move said bar to its alternate posture following de-energization of said electromagnetic means in response to movement of said arm to its alternate posture, said electromagnetic means and said circuit, including said switch, constituting said conditioning means.

5. In combination, a continuous belt conveyor having a series of blocks mounted on the belt and movable therewith and spaced apart lengthwise of the belt to form a series of spaced pockets each of which is adapted to receive and support in upright posture a filled bag, bag dispensing means disposed above said conveyor and including a trap having a normal posture and an alternate position, said trap being effective in its normal position to prevent discharge of a bag from the dispensing means, but not effective so to do when in its alternate position, and mechanism operative to move said trap to its alternate position to release a bag from the dispensing means, said mechanism being operative under control of the conveyor to release bags from said dispensing means in such timed relation to the travel of the conveyor belt that the released bags are deposited in said pockets, individually, said mechanism being further controlled by the presence of bags in the conveyor pockets so as to prevent the release of bags from the dispensing means except in those instances when there are empty pockets in position to receive them, said mechanism including a member positioned adjacent the conveyor and which is biased to bear against said blocks consecutively and to enter such of said pockets, consecutively, and individually, as are unoccupied, by bags, means operable by said member, upon entering an unoccupied pocket, to condition said mechanism whereby to render the same operable to move said trap to its alternate position, and a device, controlled by the conveyor, for actuating said mechanism when the same has been conditioned for operation.

6. The combination in accordance with claim 5 wherein said mechanism includes a fulcrumed arm which carries said trap at its distal end, wherein said member is rotatable and has a first arm which bears against the blocks and enters the unoccupied pockets and is spring-biased toward said blocks and has a second arm which carries a contact, and wherein said means comprises an electromagnetic device and an energizing circuit therefor including said contact and a second contact, said contacts being normally separated but adapted to be engaged in response to rotation of said member resulting from said first arm entering an unoccupied pocket, said electromagnetic device being effective and then energized, to condition said mechanism for operation by said member.

7. The combination in accordance with claim 5 wherein said mechanism includes a fulcrumed arm which carries said trap at its distal end, wherein said member is rotatable and has a first arm which bears against the blocks and enters the unoccupied pockets and is spring-biased toward said blocks and has a second arm which carries a contact, and wherein said means comprises an electromagnetic device and an energizing circuit therefor including said contact and a second contact, said contacts being normally separated but adapted to be engaged in response to rotation of said member resulting from said first arm entering an unoccupied pocket, said electromagnetic device being effective, when energized, to condition said mechanism for operation by said member, characterized by the inclusion of a bar pivotally mounted on said arm and having two limiting positions in one of which it is engageable by said rotatable member whereby to enable said rotatable member to actuate said arm and thereby move said trap to its alternate position, said electromagnetic device being operative, when energized, to move said bar into position to be engaged by said rotatable member.

8. The combination in accordance with claim 5 wherein the dispensing device comprises a normally open switch included in circuit with said electromagnetic device, said switch being adapted to close in response to the presence of a filled bag in the dispensing device, the function of said switch being to prevent said trap being moved to its alternate position when said bag is not a filled bag in the dispensing device and ready to be discharged onto the conveyor.

9. In combination, a continuous belt conveyor having a series of blocks mounted on the belt and movable therewith and spaced apart lengthwise of the belt to form a series of spaced pockets each of which is adapted to receive and support in upright posture a filled bag, bag-dispensing chute disposed above said conveyor and having a discharge opening, a trap normally closed said opening, a fulcrumed arm supporting said trap and movable about its fulcrum, said arm being movable about its fulcrum, periodically, in response to the movement of
said belt whereby to open said trap each time a pocket is in position to receive a bag from said chute, latching means operative to retain said arm temporarily in its open-trap position whereby to prevent premature closing of the trap, and means operable by the conveyor for de-actuating said latching means whereby to release said arm following the lapse of sufficient time for a filled bag normally to be fully discharged from the chute.

GREGORY H. KELLER.

REFERENCES CITED

The following references are of record in the file of this patent:

- Lawrence 806,884 Dec. 12, 1905
- Wight 945,558 Jan. 4, 1910
- Levalley 1,028,751 June 4, 1912
- Bohn 1,013,015 Mar. 1, 1917
- Koerner 1,690,024 Aug. 7, 1928
- Meyer 1,941,043 Dec. 26, 1933
- Newman 2,192,503 Mar. 5, 1940
- Earp 2,382,619 Aug. 14, 1945