Sept. 23, 1958 H. E. ENGLESON ET AL 2,853,177

CONVEYER LOADING MECHANISM

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FIG. 1

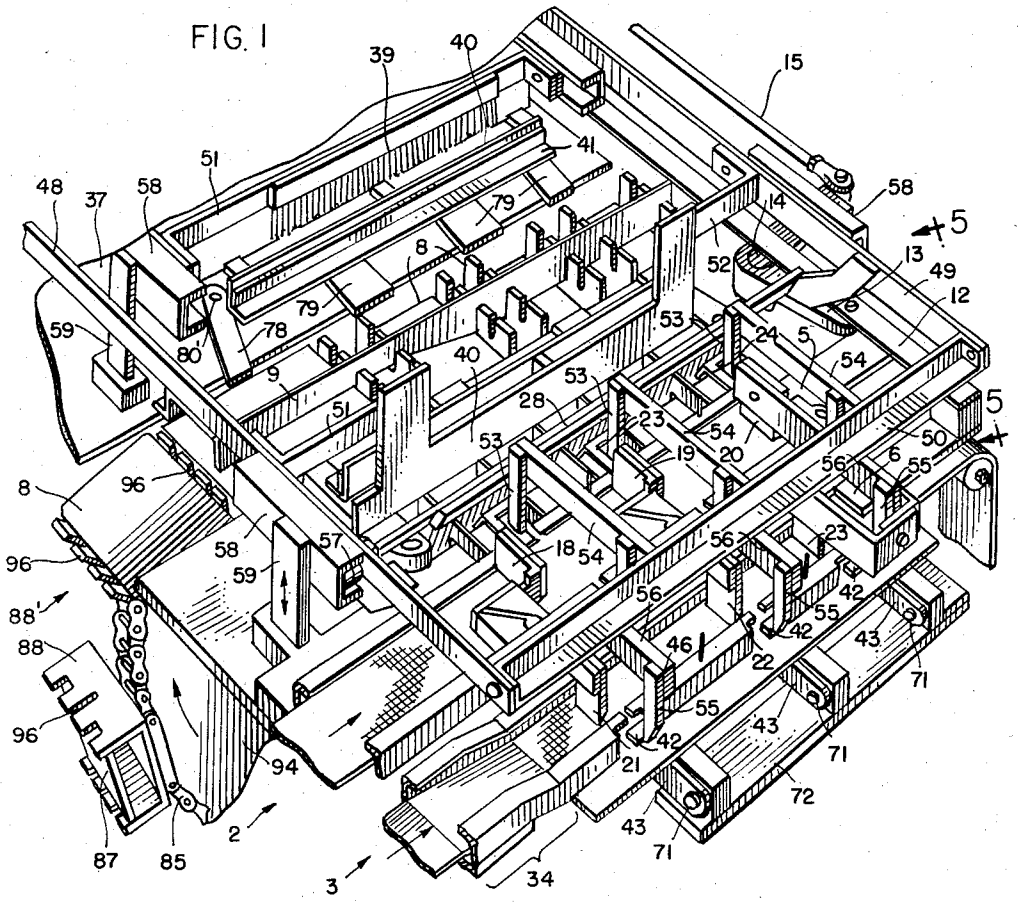
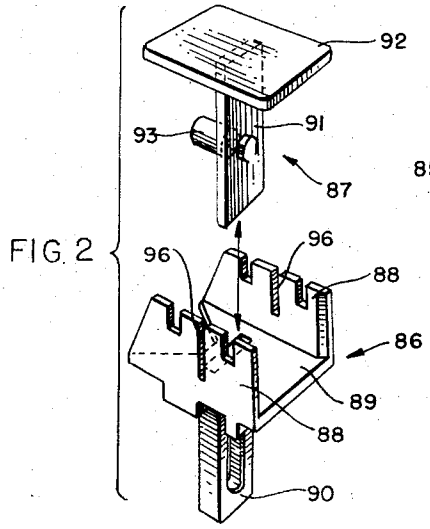


FIG. 2



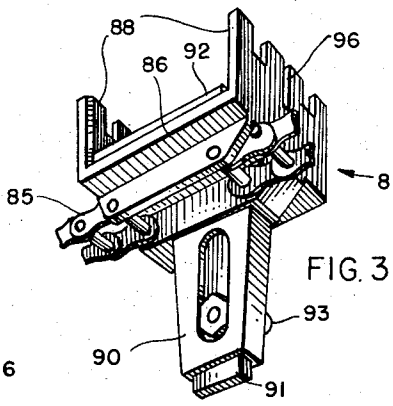


FIG. 3

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CONVEYER LOADING MECHANISM

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FIG. 5

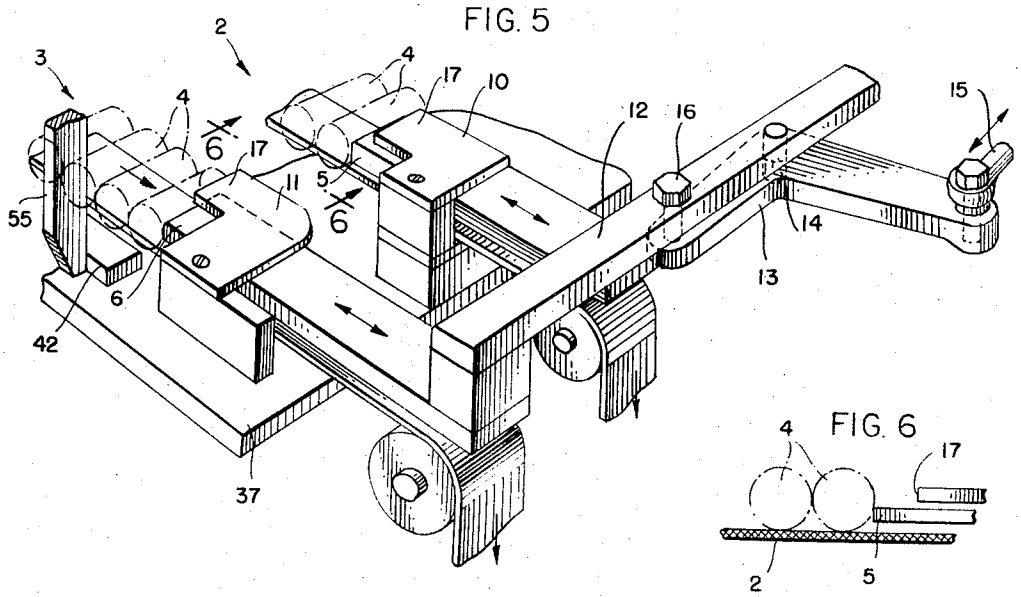
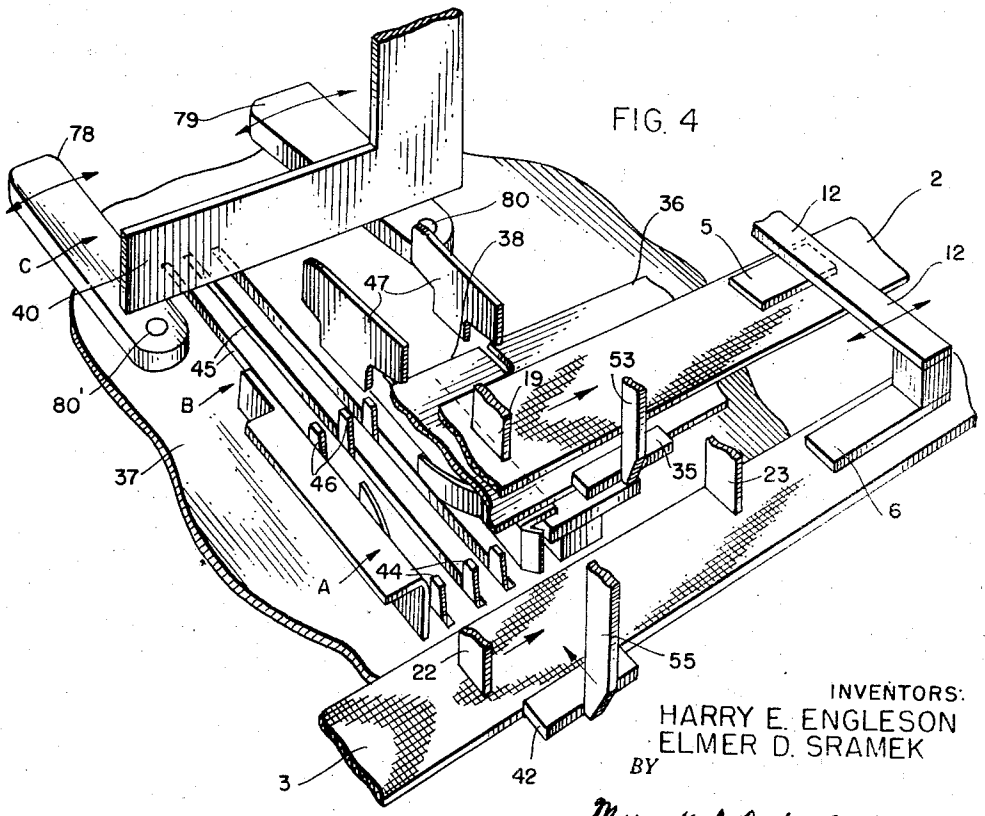


FIG. 6

FIG. 4



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CONVEYER LOADING MECHANISM

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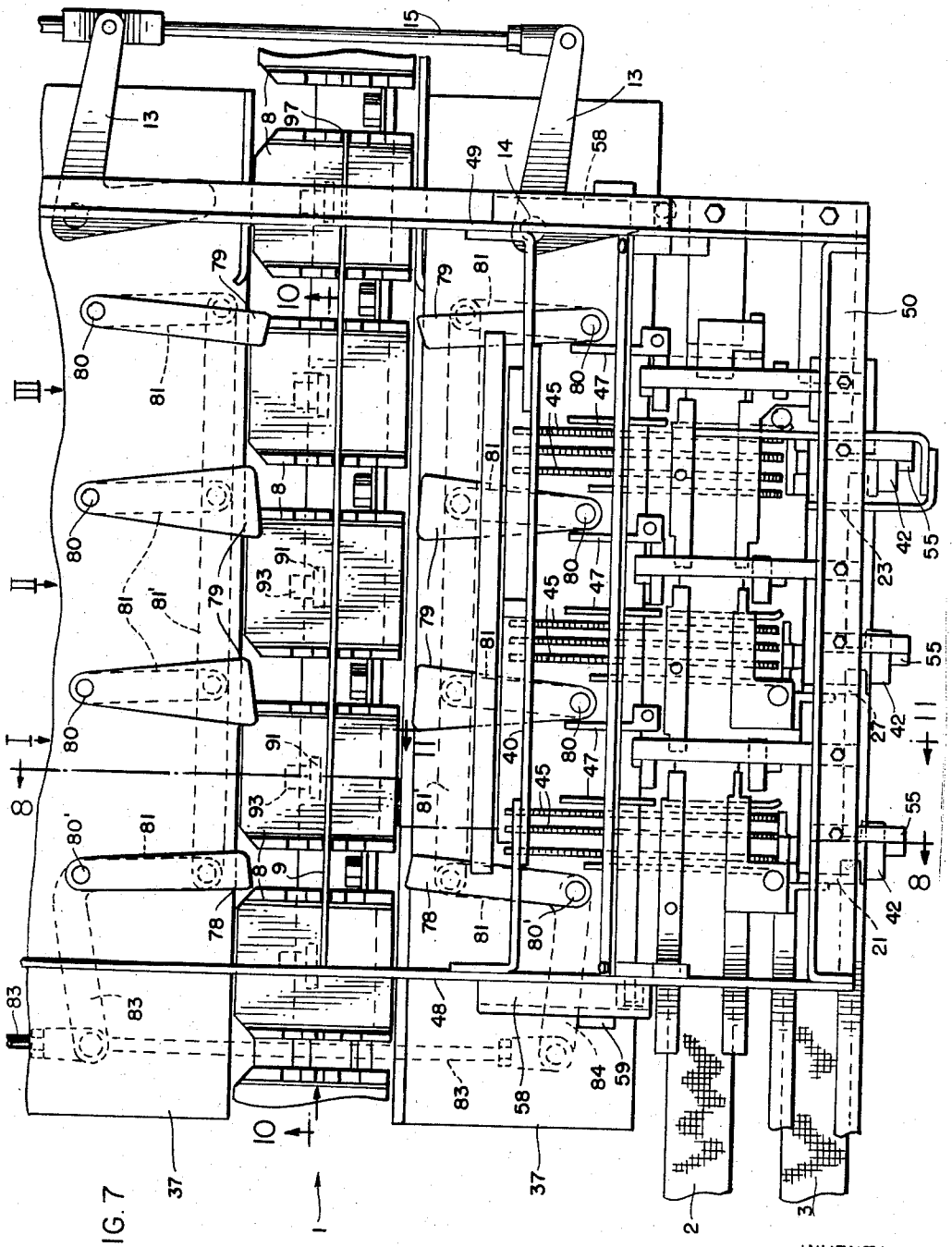

FIG. 7

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CONVEYER LOADING MECHANISM

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FIG. 8

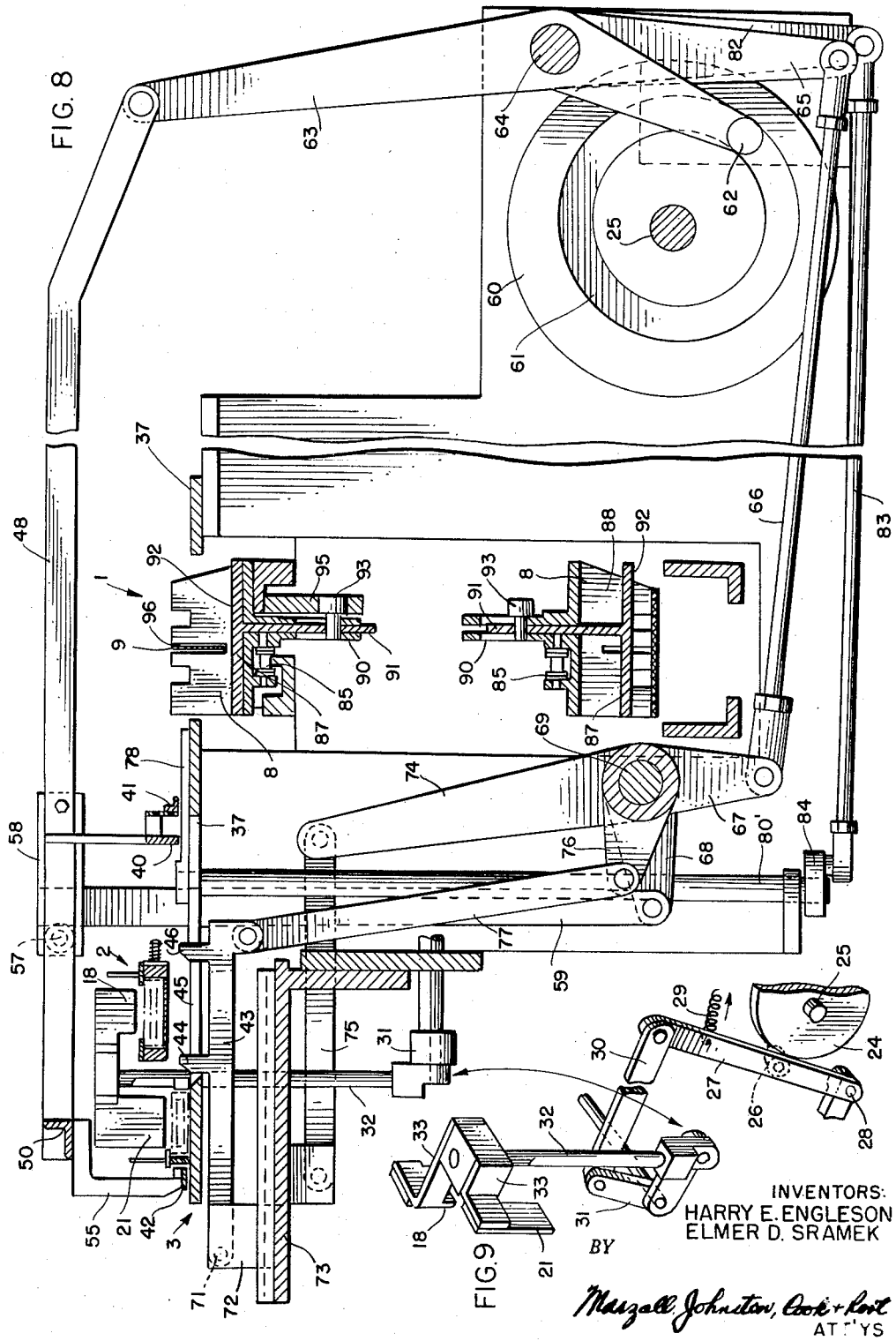

FIG. 9

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CONVEYER LOADING MECHANISM

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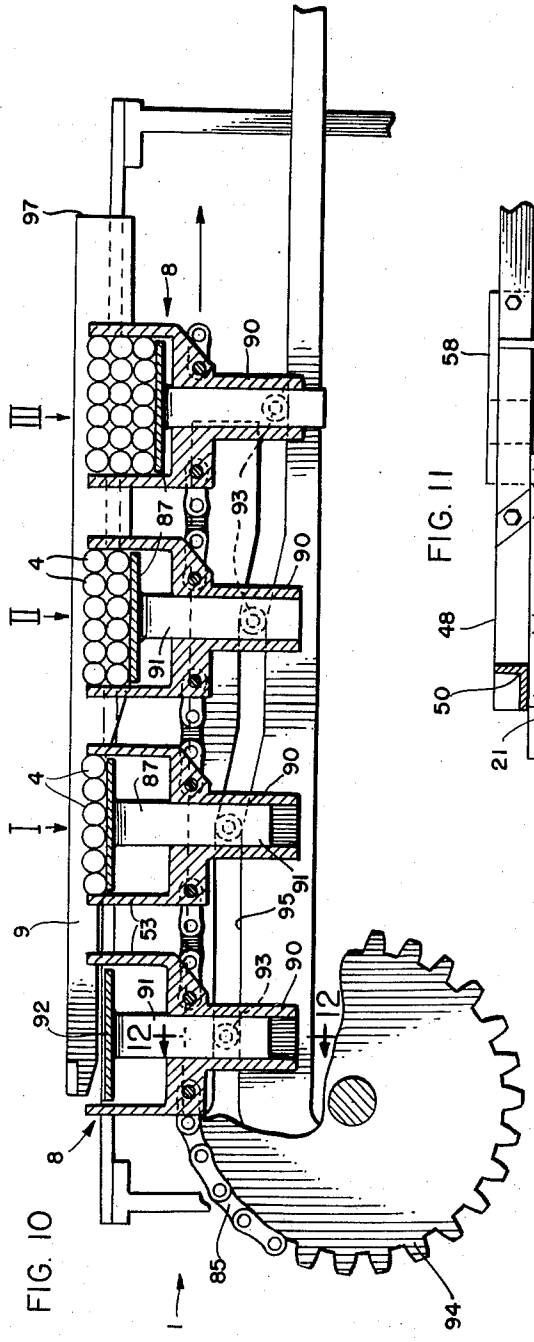

FIG. 10

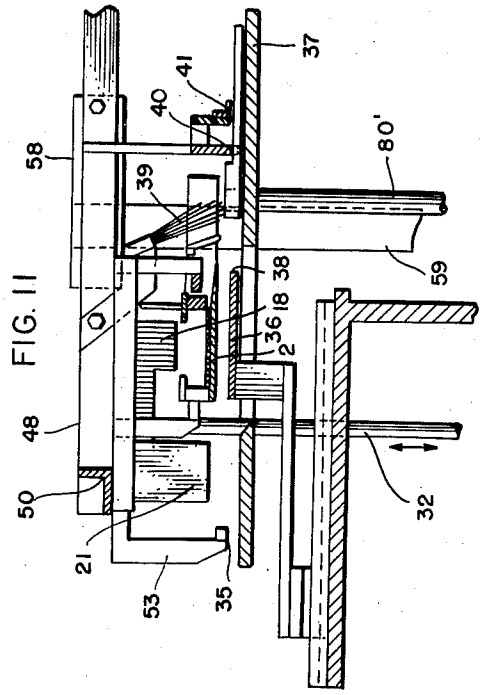

FIG. 11

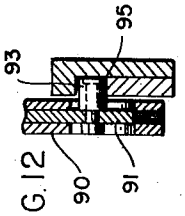

FIG. 12

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CONVEYER LOADING MECHANISM

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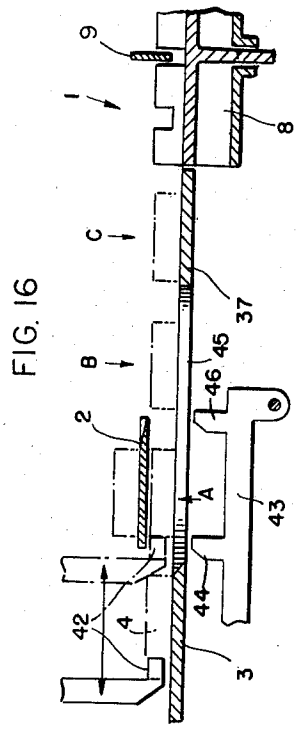

FIG. 16

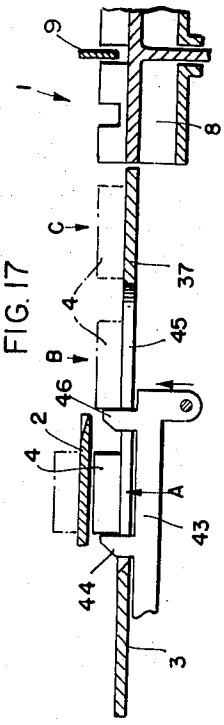

FIG. 17

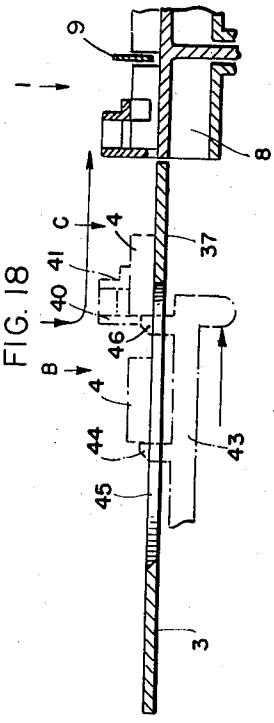

FIG. 18

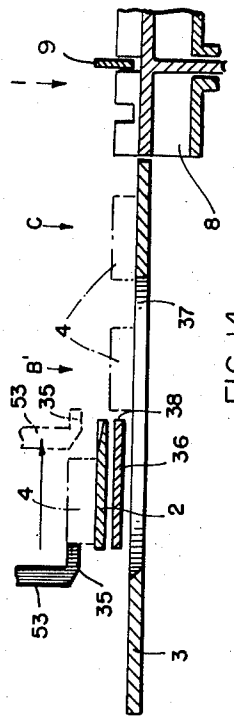

FIG. 13

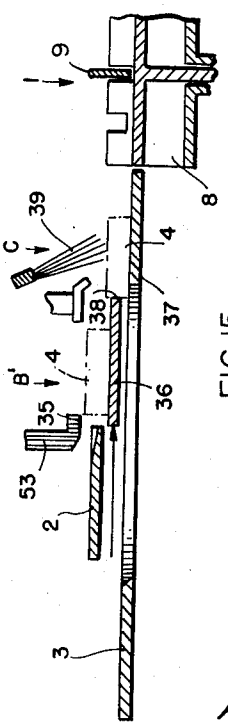

FIG. 14

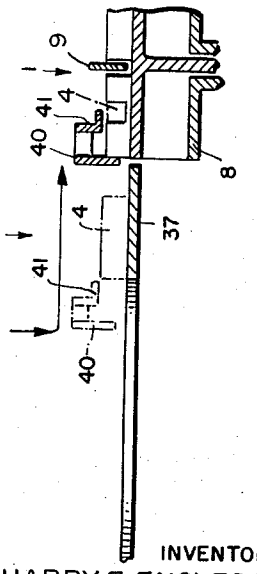

FIG. 15

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Sept. 23, 1958 H. E. ENGLESON ET AL 2,853,177

CONVEYER LOADING MECHANISM

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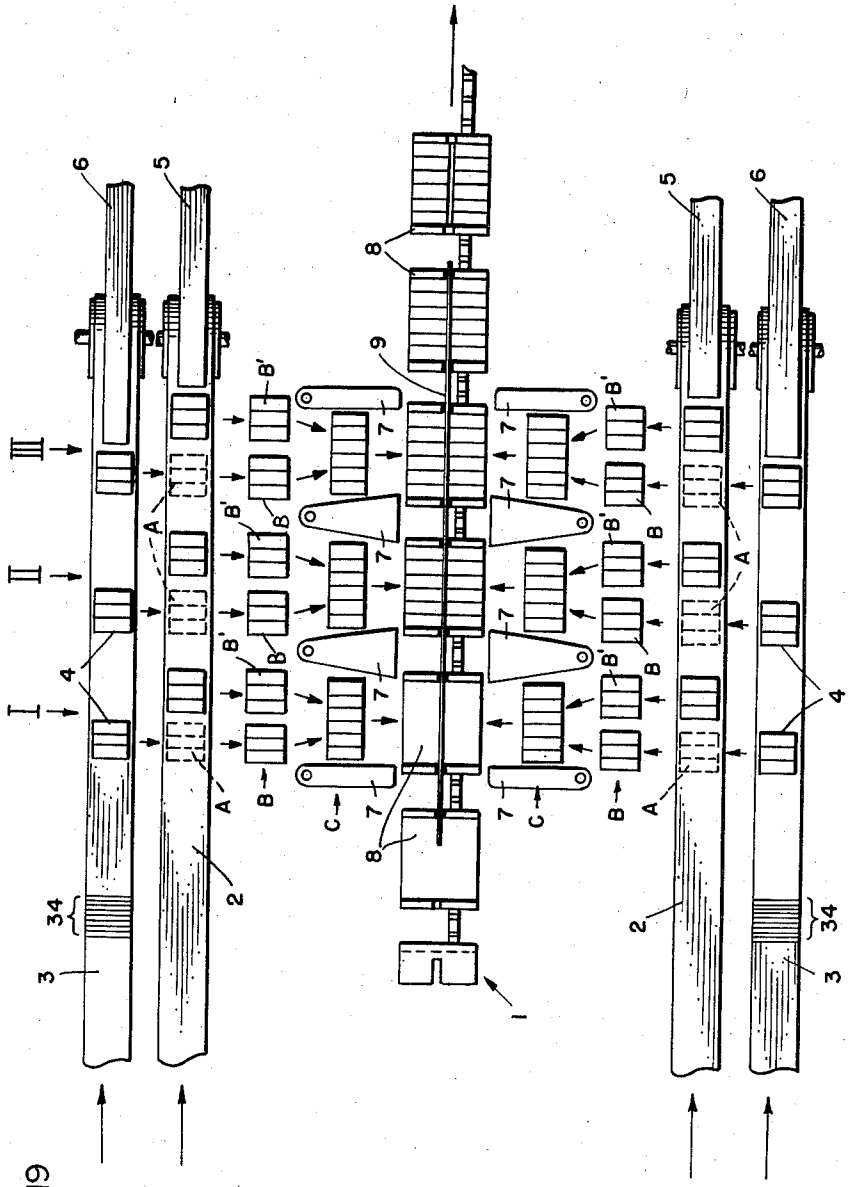

FIG. 19

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United States Patent Office 2,853,177
Patented Sept. 23, 1958

2,853,177

CONVEYER LOADING MECHANISM

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Application June 19, 1956, Serial No. 592,433

13 Claims. (Cl. 198—35)

This machine relates to machines for packaging articles of manufacture and, more particularly, to such machines having conveyors with specially adapted pockets or buckets for holding and carrying articles in a predetermined configuration to facilitate the insertion of such articles into a package or carton.

It is an object of this invention to provide a new and improved machine embodying a conveyer arrangement permitting articles to be loaded into buckets thereon from both sides of the conveyer simultaneously.

Another object of this invention is to provide an improved arrangement for loading the buckets of a centrally positioned conveyer with articles received from a plurality of belt conveyers, a pair of belts being arranged on each side of the central conveyer and passing the articles to positions wherein transfer members operating in synchronism with the movement of the central conveyer may transfer groups of predetermined numbers of the articles from the side conveyers through one or more rest stations and ultimately into the predetermined configuration in the buckets of the central conveyer.

A further object of this invention is to provide an improved means for loading the buckets on a continuously moving conveyer with articles which may be pushed from a rest station between a pair of guide rails which move synchronously with the conveyer and thence on to the buckets of the conveyer.

Another object is to provide an improved conveyer pocket or bucket for receiving several layers of articles one on top of another, the bottom of the bucket being arranged to lower after each layer of articles has been received and thereby to provide space for subsequent layers of articles.

Another object of this invention is to provide an improved arrangement for separating and dividing the articles received continuously on a moving belt into predetermined groups to facilitate the transfer of the groups from the moving belt through one or more rest stations and onto a conveyer bucket at a predetermined location or quadrant whereby each group constitutes a part of a predetermined general configuration of articles carried on the bucket.

A more complete understanding of the present invention, its mode of operation and its advantages may be gathered from further reading of this specification, together with an inspection of the accompanying drawings in which:

Fig. 1 is a perspective view of a part of the packaging machine employing the teachings of this invention;

Fig. 2 is an exploded view of a single bucket of the centrally located bucket conveyer, the individual parts of the bucket each being shown in perspective;

Fig. 3 is a perspective view of a bucket as viewed from below and illustrating the manner in which the bucket is attached to the conveyer chain and the manner in which a bottom support is mounted to move vertically in the body of the bucket;

Fig. 4 is an enlarged fragmentary perspective view of a portion of Fig. 1, but with parts broken away and other parts removed to show the underlying pusher mechanism for transferring articles from the outer belt conveyer to the bucket loading station;

Fig. 5 is an enlarged fragmentary perspective view looking along the plane 5—5 of Fig. 1 and particularly illustrating a movable stop mechanism for engaging and holding the articles on the belt conveyers;

Fig. 6 is a vertical section looking along the plane 6—6 of Fig. 5;

Fig. 7 is a horizontal plan view of the portion of the packaging machine generally illustrated in perspective by Fig. 1;

Fig. 8 is a vertical section along the broken line 8—8 of Fig. 7;

Fig. 9 is a schematic diagram illustrating the working parts and the mode of operation of the divider structure for separating and grouping articles received on the belt conveyers;

Fig. 10 is a vertical section along the plane 10—10 of Fig. 7;

Fig. 11 is a vertical section along the plane 11—11 of Fig. 7;

Fig. 12 is a vertical section along the plane 12—12 of Fig. 10;

Figs. 13, 14 and 15 are vertical sections generally along the line 11—11 of Fig. 7 but with only pertinent elements shown to illustrate progressively the movement of groups of articles being transferred from the inside belt conveyer through two rest stations and ultimately to a position or quadrant of the buckets of the bucket conveyer;

Figs. 16, 17 and 18 are vertical sections generally along the line 8—8 of Fig. 7 but with only pertinent elements shown to illustrate progressively the movement of groups of articles which are transferred from the outside belt conveyer through several stations and ultimately to a position on a bucket of the bucket conveyer; and

Fig. 19 is a plan view of the part of the packaging machine shown generally in Figs. 1 and 7, but with only pertinent elements shown to illustrate the manner in which groups of articles are transferred from the several belt conveyeres through rest stations and ultimately into the buckets of the central conveyer.

The machine of this invention is particularly adapted to package manufactured articles which are uniform in size and shape. For purposes of illustration, the drawings show a particular machine designed for packaging rolls of candy or medicinal tablets that may be received either as single rolls or in groups of rolls which may be wrapped in any suitable material such as cellophane. This machine arranges the articles into three layers, each layer consisting of twelve articles arranged, with six articles side-by-side and with two articles end-to-end, and thirty-six such articles are therefore arranged for insertion into each carton. If the articles have been previously wrapped, three to a cellophane package, then twelve such packages will be inserted into a carton. The machine is further adaptable to handle some articles singly and other articles in three packs such that the final product inserted into a carton may be composed of both articles singly and three packs of articles.

General arrangement and mode of operation

As may be seen in Figs. 1, 7 and 19, the conveyer arrangement comprises generally a bucket conveyer 1 and belt conveyers 2 and 3. Fig. 19 shows the arrangement of all of the conveyers but, since the structure of each side of the machine is substantially the same, Figs. 1 and 7 are broken away to show only a single side thereof.

The articles are conducted into the machine of this

invention by the belt conveyers 2 and 3 which may move somewhat faster than the operation of the subsequent transfer parts of the machine thereby causing the articles 4 to bunch, one behind the other, against the stop members 5 and 6 at the end of the belt conveyers 2 and 3, Fig. 5. The bunched articles are separated at spaced intervals by apparatus, to be described later, and thence groups of articles are moved transversely from the belt conveyers by several pusher members each adapted to engage and push against a predetermined or selected number of the articles 4. The articles 4 are transferred through several rest stations or positions on a flat supporting table structure and ultimately are pushed onto the buckets of the conveyer 1.

Fig. 19 shows the articles 4 initially on the belt conveyers 2 and 3. During normal operation of the machine, the belt conveyers 2 and 3 will be filled with articles abutting against each other in a side-by-side relation; and there will be no spaces between the groups of articles 4. However, for the sake of clarity, Fig. 19 shows only those articles 4 on the belt conveyers 2 and 3 which are grouped at those positions where they will be transferred from the belts. Pusher members, to be described later, first move the articles 4 in groups from the outer belt conveyers 3 to a station A positioned beneath the moving belt of the conveyer 2. In a second transfer operation, further pusher members move the articles from the station A to a station B positioned between the belt conveyers 2 and the central conveyer 1. Simultaneously, further groups of articles are moved from the conveyer 2 to a station B' beside the articles in station B. In a third transfer operation, the articles from stations B and B' are both moved to a station C, wherein six of the articles (three from each belt conveyer) appear in a side-by-side configuration.

A plurality of guide rails 7 oscillate or reciprocate such that in a forward stroke in the reciprocation, the guide rails 7 become alined and move in synchronism with the sides of the buckets 8 on the conveyer 1. Thus, the space or guideway between the rails 7 likewise reciprocates and during an interval of time moves in alinement with each bucket 8. During this synchronous motion, further pusher members, to be described later, push against and transfer the combined group of six articles onto the bucket 8 from each side of the conveyer. Similar bucket loading apparatus is positioned on each side of the conveyer and, thus, each bucket simultaneously receives a layer of twelve articles—six from each side.

As is shown in Fig. 19, the bucket conveyer 1 moves past three loading points I, II and III. Each bucket 8 of the conveyer is constructed with a bottom support member, to be described later, which is movable vertically with respect the buckets and which lowers to a new elevation after the bucket moves past the loading points I and II. Thus, each bucket passes the loading station I with the bottom support member in a raised position to receive a first layer of articles. Thence, the bucket 8 is carried by the conveyer 1 to the loading point II, while the bottom support member, together with the first layer of articles, is lowered to a second level. At the loading station II, a second layer of articles is transferred on to the bucket and thence the bucket moves toward the loading point III, while the bottom support member descends to a third level whereby the first two layers of articles likewise descend and provide space for a third layer of articles. The buckets 8 receive a third layer of articles at loading point III and thence continue on the conveyer 1 to the right, as shown in Fig. 19. Therefore, a fully loaded bucket will contain thirty-six articles in three layers—twelve articles in each layer.

A stationary divider 9 is mounted over the bucket conveyer 1 and extends longitudinally therewith, Figs. 1, 7, 10 and 19. The divider forms an abutting plate against which the articles 4 may be moved as they are transferred onto the conveyer buckets 8. Thus, articles may be loaded from both sides of the bucket simultaneously and should the loading operation on one side be timed slightly ahead of that on the other side of the bucket, there will be no tendency for the articles to move beyond their intended position and to jam the loading operation from the other side of the bucket. As is shown in Fig. 19, the stationary divider 9 extends along the conveyer at the loading points I, II and III and subsequently the divider is terminated, since it is not needed after the three layers of articles have been received in the bucket.

Bunching and grouping of the articles on the belt conveyers

The articles 4 move along each of the belt conveyers 2 and 3 at a rapid rate until a leading article engages and is stopped by a stop member 5 and 6. Thenceforth, the succeeding articles 4 carried on the belt conveyers 2 and 3 pile up or bunch tightly against the foremost article such that the stop members 5 and 6 serve to hold a long series of articles in side-by-side relationship upon the moving belt conveyers 2 and 3, Fig. 5. The stop members 5 and 6 are slidably mounted in stationary brackets 10 and 11 and are rigidly attached to an end supporting arm 12, Fig. 5. A bell crank 13 is mounted to pivot about a point 14 and may be oscillated by a push-pull link 15 pivotally connected to one arm thereof. As the push-pull link 15 oscillates, the bell crank 13 rocks and the oscillating motion is transmitted to the end supporting arm 12 by a pivotal connection 16. Thus, the stop members 5 and 6 may be extended at the beginning of an article transfer operation and may thence be retracted to loosen the bunched articles as dividing plates are lowered for separating the articles 4. A stationary stop 17 will limit the amount in which the articles 4 are permitted to shift as the movable stop 5 retracts to loosen the articles, Fig. 6.

As shown in Fig. 1, a series of three divider members 18, 19 and 20 are positioned over the belt conveyer 2 and a second series of three divider members 21, 22 and 23 are positioned over the belt conveyer 3. At the beginning of the transfer operation and with the articles bunched on the conveyers 2 and 3, the divider members 18 and 21 descend downwardly upon the conveyers 2 and 3 and interpose between articles thereon at a predetermined distance or spaced relation from the stop members 5 and 6. The articles thenceforth being received on the belt conveyers 2 and 3 are stopped and held behind the divider members 18 and 21. Following the operation of the divider members 18 and 21, the divider members 19 and 22 next descend and separate the bunched articles on the conveyers 2 and 3; and thence the divider members 20 and 23 descend and separate the final group of bunched articles. As the divider members 18 through 20 and 21 through 23 descend in succession, the stop members 5 and 6 retract somewhat, thereby loosening the bunched articles and providing sufficient space for the divider members to interpose between the groups of articles.

The operation of the divider members and the drive means provided therefor, may be understood with reference to Figs. 8 and 9. As shown in Fig. 9, a cam 24 is rotatable with a drive shaft 25 and bears against a cam roller 26 to rock an arm 27 about a fixed pivot point 28. A spring 29 urges the rock arm 27 into engagement with the cam 24. A push-pull link 30 is pivotally connected between the rock arm 27 and a bell crank 31. A vertical link 32 connects the bell crank 31 to a pair of support brackets 33 to which are attached the divider members 18 and 21. Thus, the oscillatory motion developed in the rock arm 27 by the cam 24 is coupled to drive and oscillate the divider members 18 and 21. The other pairs of divider members 19 and 22, and 20 and 23, may be driven by an arrangement similar to that shown in Fig. 9.

A principal function of the divider members is to hold a series of articles bunched on the conveyer belts 2 and 3 such that the articles will not impinge upon those fur-

ther articles immediately behind the divider members. Thus, a transfer mechanism associated with each divider member may move those articles from the conveyer which are immediately behind the divider member without interference from subsequent articles on the conveyer. The subsequent articles are held back by the divider member and are prevented from impinging against those articles being transferred from the conveyer.

To permit groups of articles to be moved transversely from both of the conveyers 2 and 3 through rest stations toward the central conveyer 1, it is necessary that the belt conveyers 2 and 3 be at different levels. As shown in Fig. 1, the outer belt conveyer 3 passes across an incline 34 and descends to a level below that of the inner belt conveyer 2. As is shown in Figs. 8 and 9, the divider members 18 and 21 operate together from a comcon drive means, but are offset vertically, the divider member 21 extending downwardly a greater distance than the divider member 18, since it is associated with the conveyer 3 at a lower level.

As is shown in Fig. 9, the divider members 18 and 21 are also offset horizontally in the direction longitudinal with the belt conveyers. This is necessary since groups of articles are transferred from the belt conveyers 2 and 3 at positions just subsequent to the dividers 18 and 21, and that the groups of articles from the belt conveyers will move to side-by-side positions at rest stations B, B' and at rest station C. Since the two groups of articles coming from different conveyers 2 and 3 must be combined in station C, it is obvious that this combination may be best accomplished if the articles are initially transferred through stations which are somewhat offset horizontally, and therefore the dividers 18 and 21 are offset to provide an initial displacement longitudinal of the conveyers.

Transfer of the articles from the belt conveyers

As has been discussed in connection with Fig. 19, the articles 4 are transferred in groups from the belt conveyers 2 and 3 through several stations and ultimately to the conveyer 1. Since the physical layout of the conveyers is such that articles from the outer conveyer 3 must move a greater distance to the buckets of the conveyer 1 than do articles from the inner conveyer 2, it will be appreciated that these articles (from the outer conveyer 3) may more conveniently be transferred through a rest station A not used by the articles on the conveyer 2. Figs. 13, 14 and 15 illustrate progressively the transfer operation in shifting articles from the inner conveyers 2 to the bucket conveyer 1. As shown in Fig. 13, a group of articles 4 initially rest on the belt conveyer 2. During the transfer operation and after the articles 4 have been separated by divider members, a transfer mechanism includes a pusher member 35 which is dimensioned to engage a predetermined number of articles 4 as a group. The pusher member 35 moves transversely across the belt conveyer 2 to a position indicated by dashed lines in Fig. 13. Simultaneously, a movable support plate 36 moves transversely from beneath the belt conveyer 2 and receives the articles 4 thereon, as shown at the rest station B', Fig. 14. The pusher member 35, together with the support plate 36, thence retract to the initial position, as shown in Fig. 13, whereupon the articles drop off of the movable support plate 36 and rest on a table support 37, as shown at the rest station B', Fig. 13.

In the next transfer operation, the support plate 36 again moves forwardly to the position shown in Fig. 14 and the group of articles 4 are engaged by the leading edge 38 of the support plate 36 and are pushed across the table support 37 to the rest station C. A brush 39 is positioned over the support table 37 to resiliently engage and restrain the articles 4 such that the movement of the plate 36 will not impart excessive motion to the articles 4. Thus, the articles may be pushed into the rest station C without danger of overshooting that rest station and thereby causing a possible jam or malalinement prior to transfer onto the buckets 8 of the conveyer 1. As a final step in the transfer operations, another pusher member 40 having an article over-riding flange 41 associated therewith moves forward engaging the articles 4 and transferring them to a position on the bucket 8, as indicated in Fig. 15.

The operation of the transfer mechanism associated with the outer belt conveyers 3, likewise comprises a series of pusher members which move the articles transversely from the belt conveyer and through a series of stations. As shown in Fig. 16, a first pusher member 42 engages the predetermined number of articles 4 in a group and moves them transversely from the conveyer 3 to a rest station A located on the table support 37 below the inner belt conveyer 2. A second pusher member 43 is positioned beneath the table support 37 and includes a first purality of fingers 44 which may extend upwardly through elongated slots 45. The pusher member commences its operation by moving upwardly to a position shown in Fig. 17, wherein the fingers 44 protrude through the slots 45 above the table support 37 and into a position for engagement with the group of articles 4. The pusher member 43 thence moves transversely to the right, as is shown in Fig. 18, and the fingers 44 push the articles 4 to the rest station B. As may be seen in Fig. 19, the rest station B is located on the table support 37 and positioned beside the rest station B'. After the pusher member 43 completes the stroke of operation, shown in Fig. 18, it descends to a lower position retracting the fingers 44 below the table support 37 and thence moves to the left to assume the initial position for a subsequent cycle, as shown in Fig. 16.

In the next subsequent cycle of the pusher member 43, a second set of fingers 46 protrudes through the slots 45 in a position to engage the articles 4 resting in the station B, as is shown in Fig. 17. The pusher member 43 thence moves forwardly and the fingers 46 move the articles 4 to the station C where the articles of both belt conveyers are combined into a single group. The final step in the transfer of the articles from the outer belt conveyer 3 to the bucket 8 of the bucket conveyer 1 is accomplished by the pusher member 40 and the retaining flange 41 which move the articles to the bucket 8, as described above in connection with Fig. 15.

Fig. 4 shows generally the structure of the transfer mechanism for moving the articles from the belt conveyers 2 and 3. The pusher members 35 and 42 are suspended from above and are adapted to move transversely across the respective belt conveyers 2 and 3 behind the divider members 19 and 22. The movable support plate 36 is positioned beneath the belt conveyer 2 and over the table support 37 such that articles pushed from the belt conveyer 2 by the pusher member 35 will initially drop to a rest position on the support plate 36, and articles pushed from the belt conveyer 3 by the pusher member 42 will rest on the slotted portion of the table support 37 beneath the plate 36 and the belt conveyer 2. The retraction of the plate 36 will cause the articles to drop to a rest station B' between a pair of stationary guides 47. Thence, as the plate member 36 again moves forwardly, the articles will be moved to rest station C by engagement with the leading edge 38 of the plate 36. Articles from the outer and lower belt conveyer 3 are moved in two successive steps by the pusher member 43 having sets of fingers 44 and 46 protruding upwardly through the slots 45 in the table support 37. The pusher member 40 is suspended over the table and will engage the combined groups of articles at station C for transfer to the buckets 8 of the conveyer 1.

Fig. 1 shows the structure supporting the pusher members 35, 40 and 42. This structure comprises generally a pair of members 48 and 49 extending transversely over the conveyers and rigidly connected to a longitudinally

extending member 50. The pusher member 40 is suspended on a pair of brackets 51 and 52 and is thereby rigidly connected to the transverse members 48 and 49. Each of the pusher members 35 associated with the belt conveyer 2 are supported by brackets 53 which are rigidly supported to the member 50 by three transversely extending members 54. The pusher members 42 are suspended on a set of brackets 55 and are rigidly connected to the longitudinal member 50 by short transversely extending members 56. A pair of cam rollers 57 is slidably positioned within a pair of guideways 58 for supporting the transversely extending members 48 and 49. Each of the guideways 58 are mounted to move vertically on vertically extending bars 59.

As may be seen in Fig. 8, the drive shaft 25 is drivingly coupled for operation of the various elements of the machine heretofore described by means of a plurality of cams mounted thereon, one such cam 60 being shown with a grooved eccentric cam-way 61. A cam roller 62 is engaged with the cam 60 and is mounted on the arm of a bell crank 63 pivotal about a point 64. An upwardly extending arm of the bell crank 63 is pivotally connected to the transverse arm 48. Thus, as the cam 60 is rotated on the drive shaft 25, the bell crank 63 is caused to oscillate and the arm 48 moves with a reciprocatory motion carrying with it all of the suspended pusher members 35, 40 and 42. A further cam, not shown, is rotated by the drive shaft 25 which causes reciprocatory motion of a bell crank arm 65 and a link 66 pivotally connected thereto. Another bell crank 67, 68 is rocked about a shaft 69 by the reciprocation of the link 66. The vertical bar 59 is pivotally connected to the bell crank 67, 68 and thus the guideway 58 moves vertically. Since the vertical motion of the guideway 58 and the transverse motion of the member 48 are both controlled by the rotation of the same drive shaft 25, these motions will be synchronized with each other and with the movements of the buckets on the conveyer 1. Each of the suspended pusher members 35, 40 and 42 will therefore descend for engagement with the articles at the commencement of a transfer operation and will raise above the articles for return movement upon completion of the transfer operation.

Fig. 8 shows the mounting arrangement for the pusher member 43 having the upstanding fingers 44 and 46. The member 43 is pivotally mounted at 71 to a bracket 72 which is, in turn, slidably mounted on a fixed support member 73. The pusher member 43 is driven by cams, not shown, mounted on and rotatable with the drive shaft 25 and having a linkage which may comprise bell cranks operated by the cams and push-pull links connected to the bell crank and, in turn, connecting with further bell cranks pivotally mounted on shaft 69. The drive means thus associated with the pusher member 43 is essentially the same as the drive means for the suspended pusher members 35, 40 and 42. One arm 74 associated with a bell crank on the shaft 69 is operatively connected to the slide brackets 72 by a link 75 such that the bracket 72 will reciprocate transversely with the conveyer on its slide mounting as the drive shaft 25 turns and as the bell crank 74 rocks. Another bell crank having an arm 76 moves the pusher member 43 upwardly and downwardly by means of a connecting link 77. Thus, by means of a pair of bell cranks 74 and 76 drivingly coupled to a common drive shaft, the pusher member 43 is caused to move transversely across the conveyer and vertically for engagement and disengagement with the articles, both such motions being synchronized with each other, with the movements of the suspended pushers 35, 40 and 42, and with the movements of the buckets 8 on the conveyer 1.

Operation of the bucket synchronized guide rails

A plurality of reciprocating guide rails 78 and 79 are disposed horizontally on the support table 37, Fig. 4. The guide rails are each pivoted on vertical shafts 80, 80' and extend therefrom toward the conveyer 1 where the oscillating ends are disposed in close proximity with the buckets 8, Fig. 7. The pivot shafts 80, 80' extend below the table support 37 and further arms 81 are fixed to pivot thereon. On each side of the conveyer 1, a single connecting bar 81' is pivotally attached to each of the arms 81, Fig. 7. The connecting bars 81' cause all of the arms 81 and all of the guide rails 78, 79 to oscillate in unison; and since the connecting bars 81' are below the table support 37, there will be no interference with the movement of articles on the table 37.

The conveyer 1 moves continuously and as each successive bucket 8 moves past one of the loading stations I, II and III, the ends of the guide rails 78 and 79 move in alinement with the sides of the buckets. The space between each adjacent pair of guide rails forms the rest station C for the combined groups of articles 4 and is moved in synchronism with the buckets 8 of the conveyer 1. As the pusher member 40 moves the articles from the station C on the table support 37 onto each of the buckets 8, the oscillating guide rails 78 and 79 follow the movement of the bucket and guide the group of articles thereto.

The oscillating guide members are drivingly coupled to the drive shaft 25 with a linkage including a cam, not shown, a bell crank engaged with the cam, and having an arm 82 pivotally connected to a push-pull link 83, Fig. 8. An arm 84 pivotally connected to the link 83 rocks the shaft 80' which constitutes a pivotal point of one of the first guide rails 78. Since the guide rails 78, 79 are drivingly coupled to the main drive shaft 25, they oscillate in synchronism with movements of the pusher members and the conveyer buckets 8.

Conveyor buckets and movement of the bottom support thereof

The conveyor 1 includes a chain 85 to which are attached the buckets 8, as shown by Fig. 3. Each bucket 8 includes a body member 86 and a bottom support member 87 which is adapted to move vertically within the body member 86, as may be seen in Figs. 2 and 3. The body member 86 includes a pair of spaced apart sides 88 which are formed integrally with a horizontal lower portion 89. A downwardly extending part contains a guideway 90 into which is positioned a vertical slide bar 91 of the bottom support member 87. The bottom support member 87 includes a flat horizontal surface 92 and the vertically extending slide bar 91 adapted to fit in the guideway 90 of the body member 86. A cam engaging part or roller 93 is attached to the slide bar 91 as a means for raising and lowering the bottom support member 87 within the body member 86.

Fig. 10 illustrates the manner in which the buckets 8 move along the conveyer 1 and the manner in which the bottom support member 87 lowers progressively as the buckets pass the successive loading points I, II and III. As the conveyer chain 85 moves around an end sprocket 94, the bucket 8 moves to the top of the conveyer and the cam roller 93 enters a cam-way 95. The cam-way 95 constitutes a stationary cam extending longitudinally in spaced relation with the conveyer 1 such that the elevation of the supporting surface 92 of the bottom support member is determined by the cam and cam roller 93 as the bucket 8 moves along the conveyer. As each bucket passes the loading point I, the bottom support surface is in a raised position and a first layer of articles 4 are loaded into the bucket. As the bucket then passes to the loading point II, the cam-way 95 slopes downwardly causing the bottom support member 87 and the first layer of articles 4 to lower correspondingly, thus providing space for a second layer of articles 4 to be loaded on top of the first layer. The cam-way 95 causes the bottom support member 87 to lower to a third level as the bucket passes the loading point III where a third and last layer of

articles are placed thereon. The loaded bucket thence continues to move to the right, as shown in Fig. 10, where subsequent mechanisms may transfer the articles 4 from the bucket 8 into a cardboard carton.

As may be seen in Figs. 2 and 3, the vertical sides 88 of each bucket 8 contain a downwardly extending slot 96 centrally positioned. The stationary divider plate 9 positioned over the conveyer extends downwardly into the central slot 96 of the opposed spaced walls of the bucket 8. As has been previously described in connection with the general arrangement of the conveyers, the purpose of the divider plate 9 is to provide an abutting surface against which the articles 4 may be moved from each side of the bucket. As may be seen in Fig. 10, the divider plate 9 extends downwardly to a limited extent at the loading point I. Since the articles are transferred to the bucket at a level near the top of the divider plate 9, there is no need for this plate to extend downwardly at the loading point I where the first layer of articles are moved thereon; and clearance is thus provided between the supporting surface 92 of the bottom support member 87 during the time that said bottom support member is in the raised position. At loading station II, the bottom support member drops to a lowered elevation and the stationary dividing plate 9 likewise extends further into the bucket. As the bucket 8 passes to the loading point III, the bottom support member 87 again descends to a still lower elevation, but since the articles are transferred to the bucket at the top layer thereof, it is unnecessary that the dividing plate 9 be further extended downwardly—the lower layer of articles having arrived at a stable positioning wherein a dividing plate is no longer necessary. The dividing plate 9 terminates at 97 at which point the bucket loading operation is completed.

It will be appreciated from the foregoing description and with particular reference to Fig. 19, that the articles arrive at the transfer mechanism of this invention on four belt conveyers 2 and 3 arranged in pairs on both sides of the bucket conveyer 1. The articles may be rolls of candy or medicinal tables and may be arriving on the conveyer in single rolls or may be in packs of three, and the function of the transfer mechanism may be identical regardless of which manner of wrapping is used. It will be noted that the articles originally positioned on the outer conveyer belts 3 will be transferred to positions in the rear or trailing quadrants of each bucket 8 (the left side of the bucket as viewed in Fig. 19), while the articles from the inner conveyer belts 2 will be positioned in the leading quadrants of the buckets (the right side as viewed in Fig. 19). Because of the arrangement of the conveyers, the articles to be packaged in a single carton may be any of several combinations of three packs and singles. The combinations may be set up by feeding the articles in three packs on one or more particular belt conveyers and feeding other articles singly on the remaining belt conveyers. The three packs and singles will then occupy particular quadrants in the buckets 8 of the conveyer and ultimately will occupy particular positions as the articles are transferred from the buckets into cardboard cartons by subsequent mechanisms. Since the articles may be for retail sale to the public, it is advantageous to provide various arrangements of single articles and three packs in a display carton.

A further adaptation of this invention may be the packaging of rolls of candy of various flavors. If it were desired to package rolls of candy in cartons for retail sale such that different flavors of candy would appear in different parts of the cardboard display carton, the rolls of candy of each different flavor may be fed to the bucket loading mechanism of this invention along different belt conveyers 2 and 3. If each belt conveyer transported candy of each of four different flavors, the buckets 8 would be loaded with a different flavored candy in each quadrant thereof, and the cardboard carton would likewise be loaded with candy of different flavors in each quadrant. The machine of this invention is therefore capable of packaging rolls of candy having varied flavors in an orderly arrangement in a display carton.

Changes may be made in the form, construction and arrangement of the parts without departing from the spirit of the invention or sacrificing any of its advantages, and the right is hereby reserved to make all such changes as fall fairly within the scope of the following claims.

The invention is claimed as follows:

1. In a packaging machine, a bucket conveyer for carrying articles, said conveyer comprising a line of movable buckets, a stationary cam extending longitudinally in spaced relation with the line of buckets, and a stationary divider plate extending longitudinally in spaced relation with the line of buckets, each of said buckets including a body member and a bottom member, said body member having a pair of vertical walls in opposed spaced relation with each other and extending across the bucket transversely to the line of buckets and the movement thereof, each of said vertical walls having a downwardly extending slot positioned centrally with the buckets, said stationary divider being positioned over the line of buckets and extending downwardly into the slot in the vertical walls to provide an abutting surface for articles received from both sides of the conveyer, said bottom member having a flat article supporting surface mounted to move vertically between the vertical walls of the body member, said bottom member having a part for engaging the cam whereby the bottom member will be lowered in successive steps as the bucket moves and successive layers of articles may be received in the bucket.

2. In a packaging machine having a continuously movable conveyer with buckets thereon, apparatus for loading the buckets with articles, said apparatus comprising a stationary table positioned closely adjacent to and at the same elevation as the conveyer, a plurality of movable guide rails on the table, each guide rail having one end pivotally mounted and having the other end extending into close spaced relation with the conveyer buckets, a means drivingly associated with the guide rails for pivotally reciprocating the guide rails in synchronism with the movement of the conveyer buckets such that each adjacent pair of guide rails follows the movement of a bucket during one stroke of each reciprocation thereof, and an article pushing means for pushing articles between the pair of adjacent guide rails and onto the bucket.

3. In a packaging machine having a continuously movable conveyer with buckets thereon, apparatus for loading the buckets with articles in a plurality of layers, said apparatus comprising a stationary support positioned closely adjacent to the conveyer, a plurality of movable guide rails, each guide rail having one end pivotally mounted on the stationary support and having the other end extending into close spaced relation with the conveyer buckets, a means drivingly associated with the guide rails for pivotally reciprocating the guide rails in synchronism with the movement of the conveyer buckets, an article pushing means extending longitudinally with the conveyer and transversely of the guide rails, and a means for moving the article pushing means in synchronism with the movement of the conveyer and with the reciprocation of the guide rails, said article pushing means being operable to push a group of articles between each adjacent pair of guide rails onto the corresponding aligned bucket whereby the bucket is loaded with a layer of articles as the bucket moves past each pair of adjacent guide rails.

4. In a packaging machine having a continuously movable conveyer, apparatus for loading the conveyer with articles arranged in layers, said apparatus comprising a plurality of buckets mounted on the conveyer and movable therewith, each of said buckets having a body and a bottom support mounted to move vertically with respect to the body, a means operatively associated with the conveyer for lowering the bottom support as the buckets

move on the conveyer, a stationary table positioned in close spaced relation to the conveyer, a plurality of guide rails on the table each having a movable end extending into close spaced relation to the conveyer, a means drivingly coupled to the guide rails to reciprocate the ends thereof in synchronism with the movement of the buckets on the conveyer, and pusher means operatively associated with the table and with the guide rails for pushing articles between each adjacent pair of guide rails and into the buckets whereby successive layers of articles are loaded into each bucket as the bucket passes successive spaces defined by each adjacent pair of guide rails and as the bottom support of the bucket lowers.

5. In a packaging machine having a continuously movable conveyer, apparatus for loading the conveyer with articles arranged in layers, said apparatus comprising a plurality of buckets mounted on the conveyer and movable therewith, each of said buckets having a body and a bottom support mounted to move vertically within the body and having a cam engaging part thereon, a stationary cam extending in spaced relation with the conveyer for engaging the cam engaging part and for thereby lowering the bottom support as the bucket moves along the conveyer, a pair of stationary tables positioned in close spaced relation to the conveyer, one of said tables being on each side of the conveyer, a plurality of guide rails on each table, each guide rail being pivotally mounted at one end and having the other end extending into close spaced relation with the conveyer, a means drivingly coupled to the guide rails for reciprocating the rails about the pivotal mounting thereof, in synchronism with the movement of the buckets on the conveyer, a stationary dividing rail positioned over the conveyer and extending into the buckets to stop articles received from both sides thereof, and pusher means operatively associated with the tables and with the guide rails for pushing articles between adjacent pairs of guide rails as the guide rails move synchronously with the buckets such that successive layers of the articles will be received on each bucket from both sides thereof as the bucket passes successive spaces between adjacent guide rails.

6. In a packaging machine, apparatus for receiving articles from a continuously moving belt conveyer and for transferring groups of predetermined numbers of the articles transversely from the belt conveyer, said apparatus comprising a stop member positioned in spaced relation to the belt conveyer for engaging and holding a first article while further articles bunch together on the moving belt conveyer behind the first article, a plurality of divider members positioned over the conveyer, means drivingly coupled to each of the divider members for causing the divider members to descend between and separate the bunched articles at predetermined spaced intervals, a means drivingly coupled to the stop member for retracting the stop member as the divider members descend and for thereby loosening the bunched articles and permitting the divider members to interpose between and to separate the articles, and a plurality of pusher members mounted to move transversely across the belt conveyer, each of said pusher members being operable to engage and push a predetermined number of articles in a group from the belt conveyer.

7. In a packaging machine, apparatus for receiving articles from a continuously moving belt conveyer and for transferring groups of predetermined numbers of the articles transversely from the belt conveyer, said apparatus comprising a stop member positioned in spaced relation to the belt conveyer for engaging and holding a first article while further articles bunch together on the moving belt conveyer behind the first article, a plurality of divider members positioned over the conveyer, means drivingly coupled to the divider members to lower the divider members such that the divider member most remote from the stop member descends between and separates the bunched articles and thence the remaining divider members descend and separate articles in a sequence progressing ultimately to the divider member closest to the stop member, a means drivingly coupled to the stop member for retracting the stop member progressively as the divider members descend whereby the bunched articles are loosened to permit separation by the divider members, and pusher means mounted to move transversely across the belt conveyer in spaced relation with the divider members, said pusher means being operative to push a selected number of articles from positions adjacent to each divider member to a rest station apart from the conveyer.

8. In a packaging machine having a centrally positioned conveyer with buckets mounted thereon, apparatus for loading the conveyer with articles arranged in four quadrants of each bucket, said apparatus comprising two belt conveyers disposed on each side of the bucket conveyer, a table support positioned on each side of the bucket conveyer and between the belt conveyers and the bucket conveyer, a first transfer means for moving articles from a first belt conveyer on each side of the bucket conveyer to a rest station on the table support, a second transfer means for moving articles from the second belt conveyer on each side of the bucket conveyer to another rest station on the table support, said second rest station being closely adjacent to the first rest station on each side of the bucket conveyer, and a third transfer means on each side of the bucket conveyer for moving articles from both rest stations into each bucket of the conveyer wherein each of the four quadrants of the bucket receives articles from respective stations on respective sides of the conveyer.

9. In a packaging machine having a centrally positioned bucket conveyer, apparatus for loading the conveyer with articles arranged in four quadrants in each bucket moving along the conveyer, said apparatus comprising a table support positioned on each side of the bucket conveyer for providing rest stations for articles being moved thereto, four belt conveyers arranged in pairs on each side of the bucket conveyer, each pair of belt conveyers including an outer conveyer and an inner conveyer positioned more centrally and closer to the bucket conveyer than the outer conveyer, a transfer means operatively associated with each of the belt conveyers for moving a predetermined number of articles from each belt conveyer to rest stations on the table support, the articles from the outer conveyer being positioned to rest closely adjacent to the articles from the inner conveyer at corresponding rest stations on each side of the bucket conveyer, and another transfer means on each side of the bucket conveyer for moving the articles from the rest stations into the conveyer buckets wherein articles from each belt conveyer will be received in a respective quadrant of each bucket.

10. In a packaging machine having a centrally positioned bucket conveyer, apparatus for loading the conveyer with articles arranged in four quadrants in each bucket moving along the conveyer, said apparatus comprising a table support positioned on each side of the bucket conveyer for providing rest stations for articles being moved thereto, four belt conveyers arranged in pairs on each side of the bucket conveyer, each pair of belt conveyers including an outer conveyer and an inner conveyer positioned more centrally and closer to the bucket conveyer than the outer conveyer, a transfer means operatively associated with each of the belt conveyers for moving a predetermined number of articles on the table support, the articles from the outer conveyer being positioned to rest closely adjacent to the articles from the inner conveyer at corresponding rest stations on each side of the bucket conveyer, a stationary divider positioned longitudinally with and above the bucket conveyer, said stationary divider extending downwardly into the buckets on the conveyer and being operable to provide an abutting surface against which articles may be pushed

as the buckets are loaded from both sides thereof, and another transfer means on each side of the bucket conveyer for moving the articles from the rest stations into the conveyer buckets wherein articles from each belt conveyer will be received in a respective quadrant of each bucket.

11. In a packaging machine having a centrally positioned bucket conveyer, apparatus for loading the conveyer with articles in a predetermined configuration wherein the articles are carried in a plurality of layers and wherein each layer contains four quadrants with a selected number of articles in each quadrant, said apparatus comprising a plurality of buckets mounted on the conveyer and movable therewith, each bucket including a bottom support member mounted to move vertically with respect to the conveyer, a stationary cam positioned in spaced relation with the conveyer for lowering the bottom support member as the bucekt moves on the conveyer, a table support positioned on each side of the bucket conveyer for providing rest stations for articles being loaded thereon and for providing a plurality of loading points along the bucket conveyer, four belt conveyers arranged in pairs on each side of the bucket conveyer, each pair of belt conveyers including an outer conveyer and an inner conveyer positioned more centrally and closer to the bucket conveyer than is the outer conveyer, a plurality of transfer means operatively associated with each belt conveyer for moving groups of a selected number of articles from each belt conveyer to the plurality of rest stations on the table support and positioned at the plurality of loading points on each side of the bucket conveyer, and another plurality of bucket loading transfer means each associated with a loading point on each side of the conveyer for moving articles in combined groups from the outer and inner belt conveyers into buckets on the centrally positioned bucket conveyer, said stationary cam being operable to lower the bottom support member of each bucket as the bucket moves along the conveyer past the successive loading points wherein successive layers of articles are loaded into the bucket, and wherein each layer includes the selected number of articles from each belt conveyer arranged in four quadrants of the bucket.

12. In a packaging machine having a centrally positioned bucket conveyer, apparatus for loading the conveyer with articles in a predetermined configuration wherein the articles are carried in three layers and wherein each layer contains four quadrants with a selected number of articles in each quadrant, said apparatus comprising a plurality of buckets mounted on the conveyor and movable therewith, each bucket including a body member and a bottom support member mounted to move vertically within the body member, a stationary cam positioned in spaced relation with the conveyer for determining the vertical positioning of the bottom support member as the bucket moves on the conveyer, a table support positioned on each side of the bucket conveyer for providing rest stations for articles being loaded thereon at three loading points coadjacent to the bucket conveyer, four belt conveyers arranged in pairs on each side of the bucket conveyer, each pair of belt conveyers including an outer conveyer and an inner conveyer positioned more centrally with the packaging machine and closer to the bucket conveyer than is the outer conveyer, and three transfer mechanisms operatively associated with each belt conveyer for moving groups of a selected number of articles from each belt conveyer to the rest stations at the three loading points on the table support on each side of the bucket conveyer, and three bucket loading transfer mechanisms each associated with a loading point on each side of the conveyer for moving articles in combined groups from the outer and inner belt conveyers into buckets on the centrally positioned bucket conveyer, said stationary cam being operable to lower the bottom support member of each bucket as the bucket moves along the conveyer past the three successive loading points wherein three successive layers of articles are loaded into the conveyer and wherein each layer includes the selected number of articles from each belt conveyer and positioned in each of the four quadrants of the bucket.

13. In a packaging machine having a centrally positioned conveyer, apparatus for loading the conveyer with articles in a predetermined configuration, wherein the articles are carried in a plurality of layers and wherein each layer contains four quadrants with a selected number of articles in each quadrant, said apparatus comprising a plurality of buckets mounted on the conveyer and movable therewith, each bucket including a body member and a bottom support member mounted to move vertically within the body member, a stationary cam positioned in spaced relation with the conveyer for engaging and moving the bottom support member as the bucket moves along the conveyer, a table support positioned on each side of the bucket conveyer for providing article rest stations at a plurality of loading points along the bucket conveyer, four belt conveyers arranged in pairs on each side of the bucket conveyer, each pair of belt conveyers including an outer conveyer and an inner conveyer positioned more centrally with respect to the packaging machine than is the outer conveyer, said inner conveyers being at a level higher than the outer conveyers and higher than the support table, a plurality of transfer means operatively associated with each inner belt conveyer for moving articles transversely from the inner belt conveyer for dropping the articles to the level of the support table and for moving the articles to rest stations at each loading point on the support table, a plurality of transfer means associated with each outer belt conveyer for moving articles on the support table beneath the inner belt conveyer and to rest positions at the loading points on the support table, a plurality of bucket loading transfer means each associated with a loading point on each side of the conveyer for moving articles in combined groups from the inner and the outer belt conveyers into buckets on the centrally positioned bucket conveyer, said stationary cam being operable to lower the bottom support member of each bucket as the bucket moves along the conveyer past successive loading points wherein successive layers of articles are loaded into the bucket, each layer of articles including a quadrant of the selected number of articles from each of the belt conveyers.

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