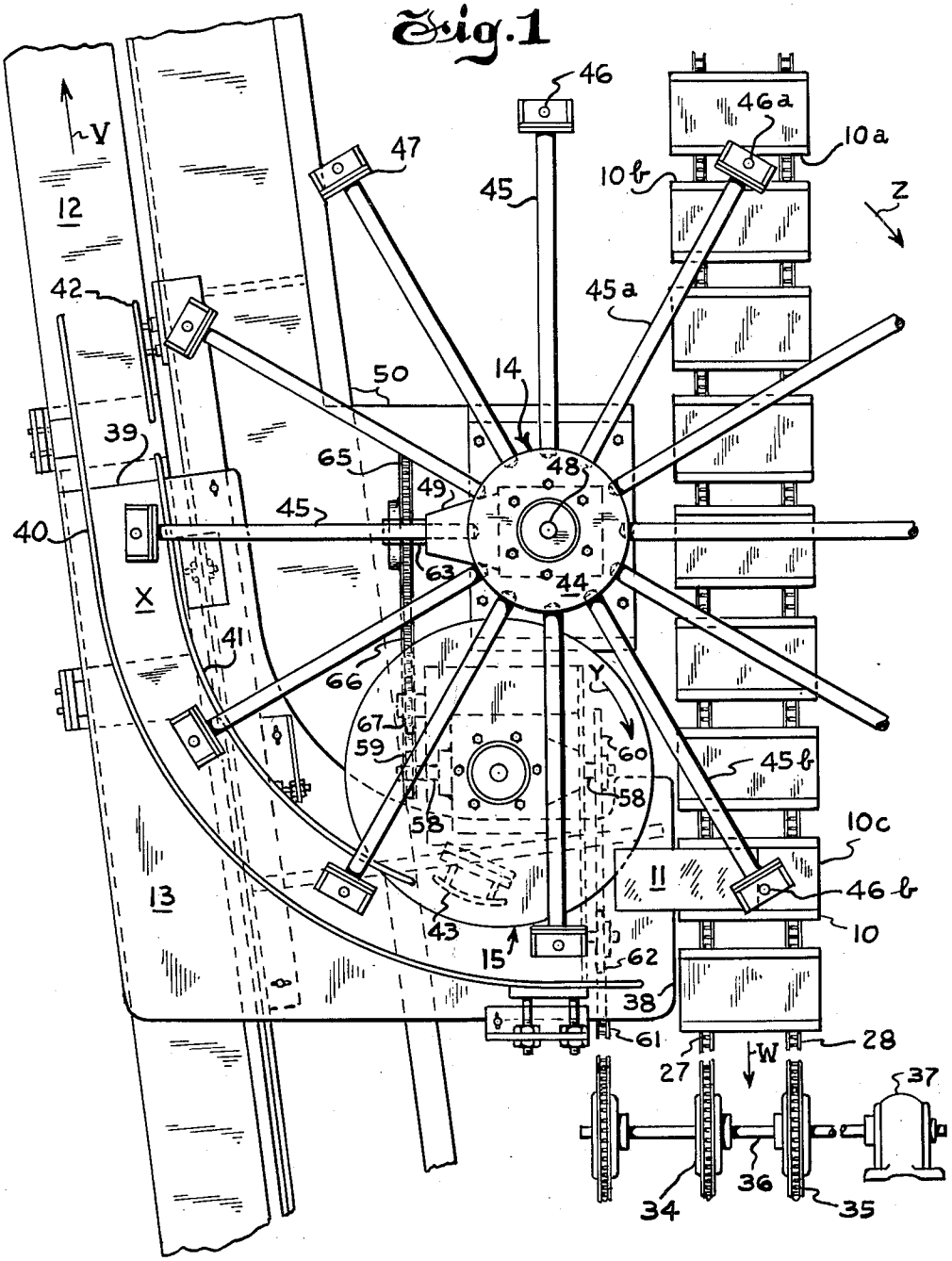
Jan. 5, 1965 C. T. BANKS 3,164,240

TRANSFER CONVEYER FOR A PAPERMAKING MACHINE

Filed Nov. 16, 1962 5 Sheets-Sheet 1

Fig. 1



TRANSFER CONVEYER FOR A PAPERMAKING MACHINE

Filed Nov. 16, 1962 5 Sheets-Sheet 2

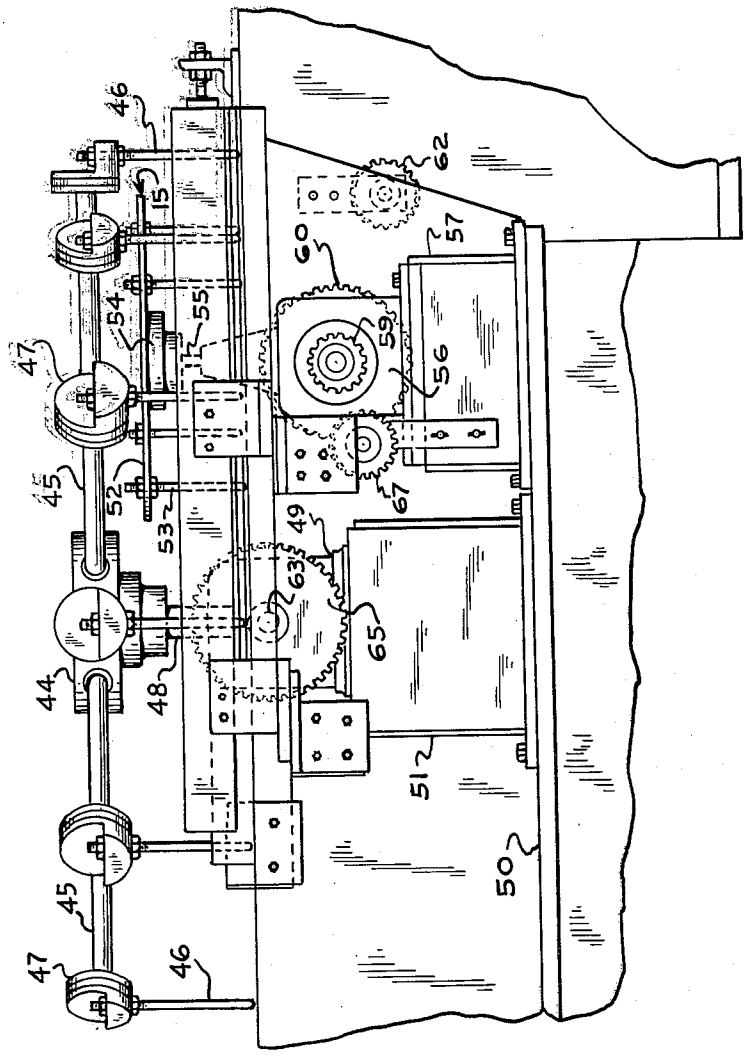


Fig. 2

TRANSFER CONVEYER FOR A PAPERMAKING MACHINE

Filed Nov. 16, 1962 5 Sheets-Sheet 3

Fig. 3

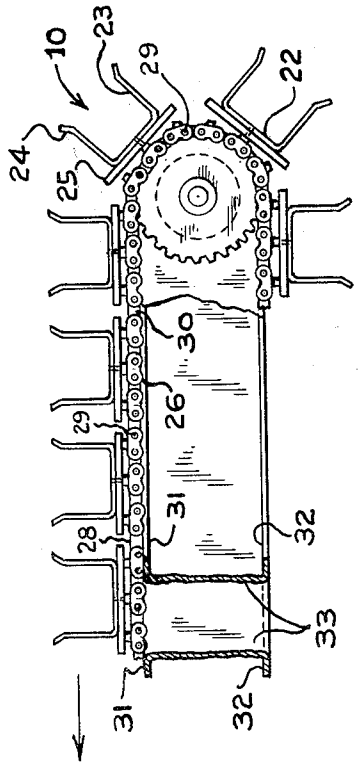


Fig. 4

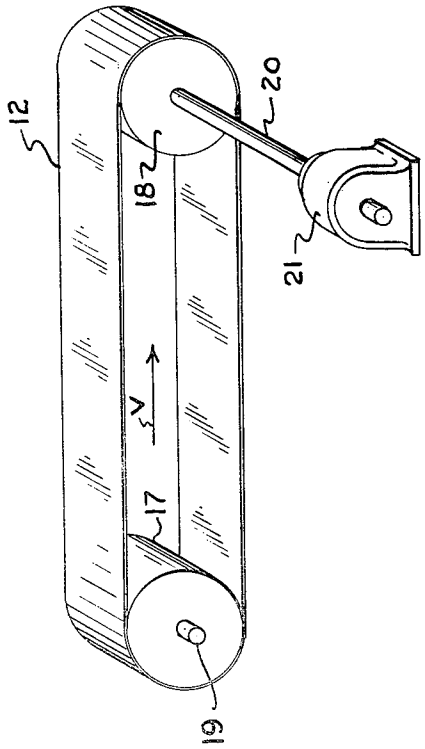
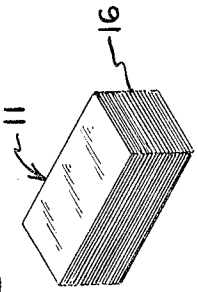


Fig. 5

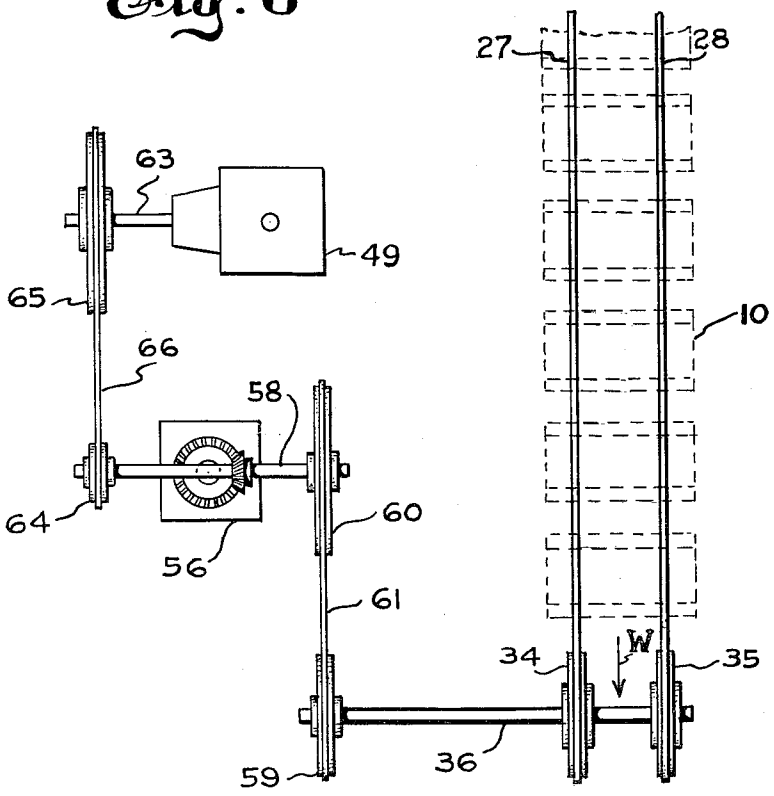


Jan. 5, 1965 C. T. BANKS 3,164,240

TRANSFER CONVEYER FOR A PAPERMAKING MACHINE

Filed Nov. 16, 1962 5 Sheets-Sheet 4

Fig. 6



Jan. 5, 1965 C. T. BANKS 3,164,240

TRANSFER CONVEYER FOR A PAPERMAKING MACHINE

Filed Nov. 16, 1962 5 Sheets-Sheet 5

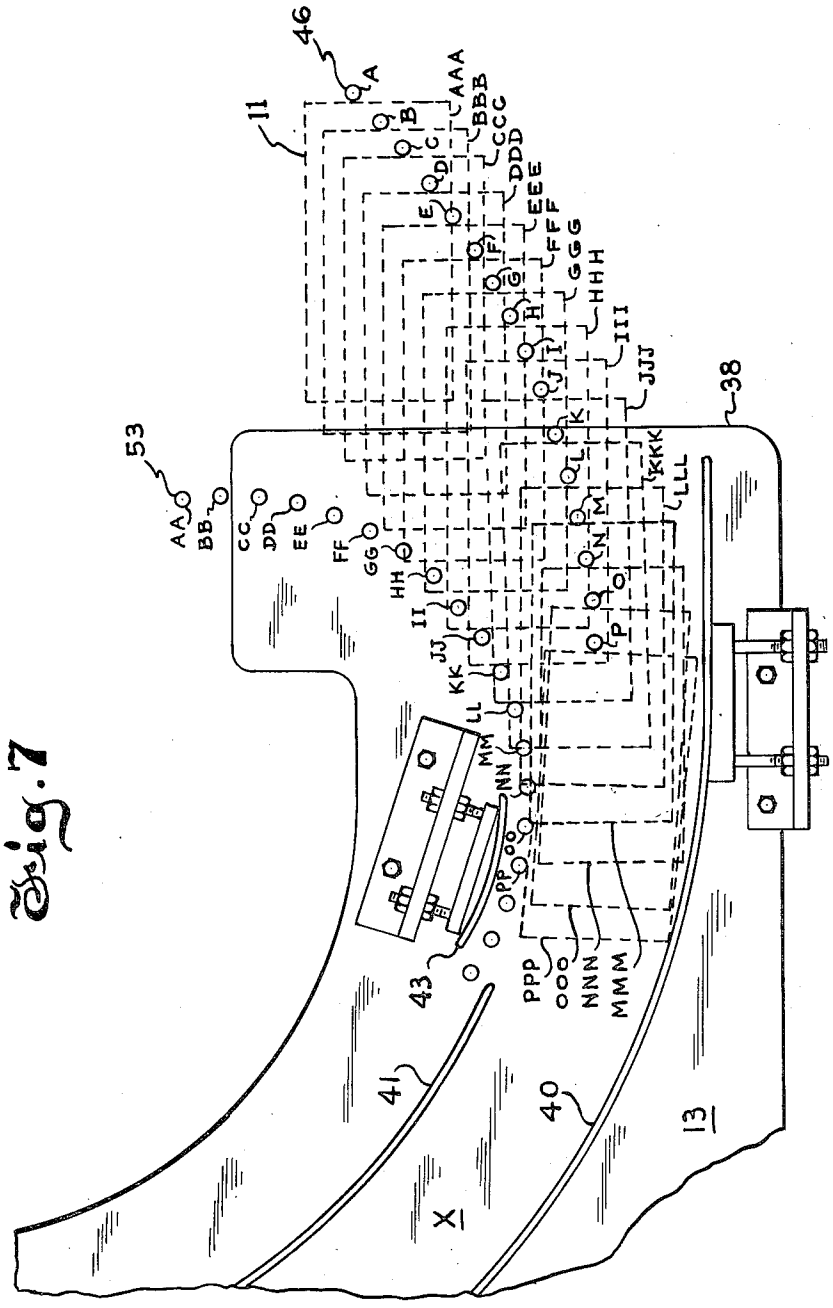


Fig. 7

United States Patent Office

3,164,240

Patented Jan. 5, 1965

3,164,240

TRANSFER CONVEYOR FOR A PAPER-MAKING MACHINE

Charles T. Banks, Neenah, Wis., assignor to Kimberly-Clark Corporation, Neenah, Wis., a corporation of Delaware

Filed Nov. 16, 1962, Ser. No. 238,149

6 Claims. (Cl. 198—25)

My invention relates to papermaking machines and, more particularly, to machines for transferring stacks of folded paper tissues from one line of travel to another.

It is an object of the present invention to provide an improved apparatus for transferring articles, such as stacks of folded paper tissues, from a conveyor traveling in one direction to one traveling in another direction. It is contemplated that the first conveyor may be a series of buckets, for example, for holding individual articles and that the second conveyor, for example, may be a moving belt onto which the articles are transferred from the buckets.

More particularly, it is an object of the present invention to provide an improved transfer mechanism of this type which includes means for controlling both ends, the article being transferred so that control over the article is maintained at all times during its transfer.

The invention consists of the novel constructions, arrangements and devices to be hereinafter described and claimed for carrying out the above stated objects, and such other objects, as will be apparent from the following description of a preferred form of the invention, illustrated with reference to the accompanying drawings, wherein:

FIG. 1 is a plan view of a transfer mechanism embodying the principles of the invention for transferring paper articles from moving buckets onto a moving belt;

FIG. 2 is a side view of the transfer mechanism;

FIG. 3 is a side view of the buckets;

FIG. 4 is a perspective view of the belt;

FIG. 5 is a perspective view of one of the paper articles;

FIG. 6 is a plan view of a drive for the transfer mechanism; and

FIG. 7 is a plan view of a portion of the mechanism illustrating various positions of a paper article proceeding through the mechanism.

Like characters of reference designate like parts in the several views.

Referring now to the drawings, the illustrated transfer mechanism may be seen to comprise, in general, a series of movable buckets 10 for receiving paper articles 11, a belt 12, a table 13 across which the articles 11 may be slid from the buckets 10 onto the belt 12, a pusher wheel 14 for the articles 11 and a guide wheel 15 for the articles 11.

Each of the paper articles 11 (see FIG. 5) may constitute a stack of folded paper tissues 16, and each of the stacks may, for example, be about 9¾ inches long, 4½ inches wide, and from 2 to 4 inches high. The tissue stacks may be folded from individual tissues by any suitable mechanism (not shown), and the tissue stacks may be placed in the buckets 10 either manually or automatically for transfer by the mechanism onto the belt 12.

The belt 12 is preferably one of flexible material having a smooth face, such as a strip of thin sheet steel, for example, and is mounted on a plurality of spaced pulleys, such as the pulleys 17 and 18. The pulleys 17 and 18 are suitably supported by any suitable standards (not shown) and are rotatable, being journalled by means of central shafts 19 and 20 extending through the pulleys 17 and 18, respectively. The pulley 18 is driven from any suitable

prime mover, such as the electric motor 21, for thereby driving the belt 12 in the direction V.

Each of the buckets 10 is formed of a single piece of a sheet metal and each has a bottom 22, vertically extending sides 23 and outwardly flared top edge portions 24. Each of the buckets is mounted on a metal strip 25 which in turn is fixed to a pair of connecting links 26 of a pair of chains 27 and 28 that carry the bucket 10. The chains 27 and 28 are of a conventional type and comprise the usual pins 29 and connecting links 30 in addition to the links 26. A pair of tracks 31 and 32 for each chain 27 and 28 are provided on which the pins 29 may slide for supporting the chains and thereby the buckets 10 carried by the chains. The tracks 31 and 32 for each chain are suitably fixed with respect to each other and may constitute the upper and lower flanges of an I-beam 33.

The chains 27 and 28 are suitably supported by sprockets and guide wheels, including the sprockets 34 and 35. The sprockets 34 and 35 are mounted on a shaft 36 which is suitably driven, as from a motor 37, so that the buckets move in the direction indicated by the arrow W.

The table 13 has an edge 38 that is opposite and on the same level as the bottoms 22 of the buckets 10 and has another edge 39 that is adjacent to and overlies the belt 12. Circular guides 40 and 41 are anchored with respect to the table so as to form a circular channel X for the paper products 11 on the upper surface of the table 13. It will be noted that the guide 40 is considerably longer than the guide 41 in the vicinity of the buckets 10, and the guide 40 also extends considerably farther along the belt 12 than does the guide 41. An auxiliary guide 42 is provided opposite the end of the guide 40 over the belt 12, and an auxiliary guide 43 is provided opposite the end of the guide 40 adjacent the buckets 10.

The propelling wheel 14 comprises a central hub 44, a plurality of spokes 45, a downwardly extending pusher rod 46 for each of the spokes and a connecting member 47 for supporting each of the rods 46 with respect to its respective spoke 45. The hub 44 is fixed on a shaft 48 that is rotatably mounted in a miter gear unit 49. The unit 49 is in turn supported with respect to a fixed base 50 by means of a pedestal 51 fixed to the base 50. The table 13 also, incidentally, is supported with respect to the base 50 by suitable connections.

The wheel 15 comprises a disk 52 which carries a plurality of spaced downwardly extending guide rods 53. The disk 52 is mounted on a hub 54 that is in turn mounted on a shaft 55 carried by a miter gear unit 56. The miter gear unit 56 is supported with respect to the base 50 by means of a pedestal 57.

The miter gear units 49 and 56 and thereby the wheels 14 and 15 are driven in timed relation with respect to the buckets 10. The miter gear unit 56 has a shaft 58 that extends all the way through it (see FIG. 6), and a pair of sprockets 59 and 60 having a chain 61 extending around them are respectively fixed to the shafts 36 and 58, so that the shaft 58 is driven from the motor 37 and the shaft 36. An idler sprocket 62 (see FIG. 2) is provided for maintaining the chain 61 taut.

The miter gear unit 49 is provided with an input shaft 63, and sprockets 64 and 65 connected by a chain 66 are fixed respectively on the shafts 58 and 63 for driving the miter gear unit 49. An idler sprocket 67 is provided for maintaining the chain 66 taut.

In operation, the motor 37 drives the chains 37 and 28 through the shaft 36 and the sprockets 34 and 35 and thereby drives the buckets 10 so that they travel in the direction indicated by the arrow W as the buckets pass the edge 38 of the table 13. The miter gear unit 56 is driven through the sprockets 59 and 60 and the chain 61 from the shaft 36, so that the small guide wheel 15

is rotated in the clockwise direction indicated by the arrow Y. The miter gear unit 49 is driven through the sprockets 64 and 65 and the chain 66, so that the large pusher wheel 14 is also driven in the clockwise direction indicated by the arrow Z. It is contemplated that the speed s of the parts shall be such that each of the downwardly depending pusher rods 46 shall pass between adjacent buckets 10 as the ends of the spokes 45 pass from the inside of the line of travel of the buckets to the outside, such as is indicated by the particular buckets 10*a* and 10*b* having a pusher rod 46*a* carried by a spoke 45*a* passing between them. The parts are also so synchronized that each of the pusher rods 46 pass through one of the buckets 10 as the ends of the spokes 45 return across the line of travel of the buckets from the outside to the inside, the particular pusher rod 46*b* being illustrated, for example, as passing through the bucket 10*c* as the end of the spoke 45*b* has its end passing over the line of travel of the buckets from the outside to the inside.

The miter gear unit 49 is so located with respect to the buckets 10 that the rods 46, the rods 46*a* and 46*b* for example, as they pass across the center line of the path of travel of the buckets have approximately the same velocity in the direction of movement of the buckets as do the buckets themselves. For example, assuming that the buckets move past a given point along their line of travel at the rate of 180 per minute, for a certain embodiment of the machine, the chains 27 and 28 have a speed of 112½ feet per minute, and the spokes 45 have such a length that the rods 46 have a tangential velocity of 225 feet per minute, with the spokes extending at an angle of about 30 degrees with respect to the direction of travel of the buckets as the rods 46 pass over the center line of the path of bucket travel.

Each of the guide rods 53 on the small guide wheel 15 cooperates with one of the pusher rods 46 on the large wheel 14; and, since there are a fewer number of rods 53 than rods 46, the wheel 15 is driven at a higher rotational speed than the wheel 14. In the particular arrangement shown, there are 12 spokes 45 and rods 46 and there are four guide rods 53; and the small wheel 15 thus has three times the rotational speed of the large wheel 14. Each of the pusher rods 53 begins cooperation in a manner to be hereinafter described with one of the rods 46 by contacting an article 11 pushed by the particular rod 46 when the rod 53 is on a radius from the center of the wheel 15 that is approximately at an angle of 35 degrees with respect to the direction of travel of the buckets 10 in the particular example given; and the rods 53 may have a tangential velocity of 225 feet per minute so that their velocity in the direction of travel of the buckets 10 is about 129 feet per minute. In the particular embodiment illustrated, in order to obtain these velocities, the sprockets 59 and 60 may respectively have 40 teeth and 48 teeth, and the sprockets 64 and 65 may have respectively 18 teeth and 54 teeth. Each of the miter gear units 49 and 56 are contemplated to be one to one speed ratio units.

The belt 12 is driven by the motor 21 connected to the shaft 20, so that the belt has a linear speed commensurate with the speed of the buckets 10, whereby when the paper articles 11 are lined up in end to end relationship on the belt 12, as will be hereinafter explained, there is a substantial spacing of a few inches between adjacent articles 11.

The paper articles 11 are deposited either by hand or by any suitable appartaus within the buckets 10 at some position at the upper path of bucket travel prior to the bucket positions shown in FIG. 1. The width of the buckets is approximately the width of the paper articles 11, so that the articles may easily slide longitudinally in the buckets. The large pusher wheel 14 rotates in the direction indicated by the arrow Z and as the buckets 10 move in the direction indicated by the arrow W, the downwardly depending pusher rods 46 pass between the buckets from the inside to the outside of the series of buckets as illustrated by the rod 46*a* passing between the buckets 10*a* and 10*b*. The pusher rods 46 in continuing their travel pass from the outside to the inside of the series of buckets and, in doing so, each passes through one of the buckets. The rods 46 in passing between and through the buckets have approximately the same linear speed in the direction of travel as do the buckets themselves. With a paper article 11 being positioned in each of the buckets, each of the pusher rods 46 strikes one of the paper articles 11 and moves it through its containing bucket 10 toward the inside and toward the table 13 as the rod passes from the outside to the inside of the path of bucket travel.

Successive positions of travel of a pusher rod 46 are illustrated in FIG. 7. In this figure, the rod 46 is illustrated as having positions A to P, inclusive. As has been hereinbefore described, the smaller guide wheel 15 is driven in timed relationship with the large pusher wheel 14 and with the buckets 10, and corresponding positions of one of the downwardly depending guide rods 53 of the wheel 15 are illustrated as positions AA to PP, inclusive. Successive positions of one of the paper articles are also illustrated as AAA to PPP, inclusive, which correspond respectively to the positions A to P and AA to PP of the rods 46 and 53. As one of the rods 46 strikes one of the paper articles 11, the rod 46 has the position A as illustrated in FIG. 7, and the paper article 11 is within a bucket 10 and has the position AAA. One of the guide rods 53 on the small wheel 15 has the position AA, but, as will be observed, it is out of contact with the particular paper article 11.

As the buckets 10 continue their movement, the large pusher wheel 14 continues its rotation, and the pusher rod 46 successively takes its illustrated positions B, C, D, E, F, G, and H. The paper article 11 is moved out of its bucket onto the table 13 by the pusher rod 46 and successively takes the corresponding positions BBB to HHH, respectively. During this movement of the paper article 11, the sides 23 of the buckets function to hold the article 11 substantially perpendicular to the direction of movement of the buckets, and at its position HHH, the paper article is more than slightly half out of its bucket 10. During this movement of the pusher rod 46 to its position H, and during the corresponding movement of the paper article 11 to its position HHH, the corresponding rod 53 of the small guide wheel 15 moves successively to its positions BB to HH, and it will be observed that in all of these positions, the rod 53 is out of contact with the article 11.

It is desired that the paper articles 11 remain approximately perpendicular to the path of movement of the buckets 10 as the articles 11 are moved onto the table 13, so that the articles 11 may enter the path X formed by the guides 40 and 41 without substantial impediment and approximately parallel with the end of the guide 40 adjacent the buckets 10. The rods 53 on the small guide wheel 15 function to assure that the paper articles 11 move in this manner as they move out of the buckets onto the table 13.

When the rod 46 moves to its position I, the paper article 11 has thereby been moved farther out of its bucket 10 so that the bucket sides 23 exert a less force on the article 11 tending to hold the article 11 perpendicular to the path of movement of the buckets, and the rod 53 on the small wheel 15 at this time makes contact with a side of the paper article, taking the position II. The rod 46 continues its movement about the center of the large wheel 14 taking the positions J to P, and the rod 46 moves the paper articles farther onto the table 13 and into the path X defined by the guides 40 and 43, the paper article taking the respective positions JJJ to PPP. The rod 53 on the small propelling wheel 15 during these movements of the rod 46 and the paper article maintains contact with the paper article 11

and moves the forepart of the article **11** on the table **13** in the direction of travel of the buckets **10**, the rod **53** respectively having the positions JJ to PP corresponding to the positions J to P of the rod **46** and the positions JJJ to PPP of the article **11** . In all of these positions of the article **11**, the rod **53** is in contact with the article **11** and exerts thrust on its forepart in the direction of bucket movement and holds the article approximately perpendicular to the path of movement of the buckets **10**, even though, during this movement, the sides **23** of the buckets are not effective in themselves to maintain the article **11** parallel with the sides of the buckets and perpendicular to the path of movement of the buckets.

The paper article **11** in passing from its positions JJJ to KKK moves completely out of its bucket **10** onto the table **13**, and the rod **46** cooperating with the rod **53** moves the article **11** from its positions KKK to PPP without any help from the bucket sides **23**. The paper article **11** at its position PPP is within the path X defined by the guides **40** and **43**; and the guide **40**, in particular, functions to hold the paper article **11** within the path X and causes it to turn from a direction perpendicular to the direction of travel of the buckets **10** to a direction parallel with the direction of travel of the belt **12**. The curved portion of the path X, as will be observed, has its center along the line of travel of the rod **46**, so that the rod **46** is effective to propel the articles **11** along the path X. The rod **46** continues propelling the article **11** until it has moved off the table **13** onto the belt **12**, with the rod **46** passing off the belt between the guides **41** and **42**. The guide **53** after its position PP is not effective on the article **11** and passes out of the path X between the guides **41** and **43**, as the small guide wheel **15** continues its rotation.

The transfer mechanism above described advantageously controls both ends of each article **11** as it is moved out of a bucket **10** onto the table **13** preliminary to movement of the article over the table **13** between the fixed guides **40** and **41**.

I wish it to be understood that the invention is not to be limited to the specific constructions and arrangements shown and described, except only insofar as the claims may be so limited, as it will be aparent to those skilled in the art that changes may be made without departing from the principles of the invention.

What is claimed is:

1. In material handling mechanism, the combination of a conveyor for carrying a series of articles disposed side to side in predetermined spaced relation along a predetermined path, a member rotatable about a predetermined axis carrying a plurality of pusher elements spaced on radii of predetermined length from said axis and spaced predetermined distances arcuately of the member, said axis of rotation being located closer to said conveyor than the lengths of said radii and in such position that said pusher elements sweep across said path from the side of said axis to the opposite side and recross said path to the side of said axis as said member rotates, and means for driving said member and said conveyor in a predetermined speed relationship so that said pusher elements move between articles on said conveyor as the elements pass from said axis side to said opposite side of the conveyor and engage the articles on their ends and push them off the conveyor in a direction transverse of said path as the elements move from said opposite side back to said axis side.

2. In material handling mechanism, the combination of a conveyor for carrying a series of articles in equally spaced relation along a predetermined path, said conveyor comprising a plurality of article receiving buckets carried by an endless flexible belt, a member rotatable about a predetermined axis carrying a plurality of pusher elements spaced equal distances from said axis on equally spaced radii, said axis of rotation being located adjacent and on one side of said conveyor in such position that said pusher elements sweep across said path from the side of said axis to the opposite side and back again as said member rotates, and means for driving said member and said conveyor in a predetermined speed relationship so that said pusher elements move between said buckets as the elements pass from said axis side to said opposite side of the conveyor and engage the articles in each of said buckets and move them out of the buckets as the pusher elements move from said opposite side back to said axis side.

3. In material handling mechanism, the combination of a first conveyor for carrying a series of articles in predetermined spaced relation along a predetermined path, a member rotatable about a predetermined axis carrying a plurality of pusher elements spaced equal distances from said axis and disposed on equally spaced radii, a second conveyor spaced from said first conveyor, a table disposed between said conveyors, said axis of rotation being located between said conveyors and closer to said first conveyor than said equal distances and in such position that said pusher elements sweep across said path from the side of said axis to the opposite side and recross said path to the side of said axis as said member rotates, and means for driving said member and said first conveyor in a predetermined speed relationship so that said pusher elements move between articles on said first conveyor as the elements pass from said axis side to said opposite side of said first conveyor and engage the articles on sides of the articles remote from said axis and push them off said first conveyor in a direction transverse of said path and onto said table as said pusher elements move from said opposite side back to said axis side and said pusher elements thereafter push the articles across said table and onto said second conveyor.

4. In material handling mechanism, the combination of a first conveyor for carrying a series of articles in equally spaced relation along a predetermined path, said conveyor comprising a plurality of article receiving buckets carried by an endless belt, a second conveyor spaced from said first conveyor, a table disposed between said two conveyors, a member rotatable about a predetermined axis carrying a plurality of downwardly depending pusher elements spaced equal distances from said axis on equally spaced radii, said axis of rotation being located adjacent said first conveyor and between said two conveyors in such position that said pusher elements sweep across said path from the side of said axis to the opposite side and back again as said member rotates, means for driving said member and said first conveyor in a predetermined speed relationship so that said pusher elements move between said buckets as said pusher elements pass from said axis side to said opposite side of said first conveyor and engage the articles in said buckets and move them out of the buckets onto said table as the pusher elements move from said opposite side back to said axis side, and a circular guide on said table for subsequently guiding the articles across said table and onto said second conveyor as said pusher elements push the articles across the table.

5. In material handling mechanism, the combination of a conveyor for carrying a series of articles in predetermined spaced relation along a predetermined path, said conveyor comprising an endless belt carrying a plurality of buckets having bottoms and opposite article engaging sides and opposite open ends, a member rotatable about a predetermined axis carrying a plurality of downwardly depending pusher elements spaced equal distances from said axis on equally spaced radii, said axis of rotation being located adjacent and on one side of said conveyor in such position that said pusher elements sweep across said path from the side of said axis to the opposite side and back again as said member rotates, a table located substantially on the same level as and having an edge adjacent the bottoms of said buckets as they travel in said path, means for driving said member and said conveyor in a predetermined speed relationship so that said pusher elements move between said buckets as the pusher elements

pass from said axis side to said opposite side of the conveyor and engage the articles in said buckets and move them out of said buckets as the pusher elements move from said opposite side back to said axis side with said bucket sides engaging said articles and holding them substantially perpendicular to said path as the articles begin to move out of the buckets, a second rotatable member having a plurality of article engaging elements with the axis of said second rotatable member being so located that said article engaging elements engage sides of the articles adjacent the leading ends of the articles as they move out of said buckets for maintaining the articles substantially perpendicular to said path, and means for driving said second rotatable member in predetermined speed relationship with said first rotatable member and said conveyor so that said article engaging elements when engaging the articles have approximately the same speed as the articles.

6. In material handling mechanism, the combination of a conveyor for carrying a series of articles in predetermined spaced relation along a predetermined path, said conveyor comprising an endless belt carrying a plurality of buckets having bottoms and opposite article engaging sides and opposite open ends, a member rotatable about a predetermined axis carrying a plurality of downwardly depending pusher elements spaced equal distances from said axis on equally spaced radii, said axis of rotation being located ajacent and on one side of said conveyor in such position that said pusher elements sweep across said path from the side of said axis to the opposite side and back again as said member rotates, a table located substantially on the same level as and having an edge adjacent the bottoms of said buckets as they travel in said path,

means for driving said member and said conveyor in a predetermined speed relationship so that said pusher elements move between said buckets as the pusher elements pass from said axis side to said opposite side of the conveyor and engage the articles in said buckets and move them out of said buckets as the pusher elements move from said opposite side back to said axis side with said bucket sides engaging said articles and holding them substantially perpendicular to said path as the articles begin to move out of said buckets, a second rotatable member having a plurality of article engaging elements with the axis of said second rotatable member being so located that said article engaging elements engage sides of the articles adjacent the leading ends of the articles as they move out of said buckets for maintaining the articles substantially perpendicular to said path, means for driving said second rotatable member in predetermined speed relationship with said first rotatable member and said conveyor so that said article engaging elements have approximately the same speed as the articles, a second conveyor spaced from said first conveyor and connected with said first conveyor by means of said table, and a circular guide on said table for guiding said articles across the table as propelled by said pusher elements of said first rotatable member so that the pusher elements are effective to move the articles onto said second conveyor.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,164,240 January 5, 1965

Charles T. Banks

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 8, for "bucket" read -- buckets --; line 65, for "37", second occurrence, read -- 27 --.

Signed and sealed this 24th day of August 1965.

EAL)
test:

RNEST W. SWIDER
testing Officer

EDWARD J. BRENNER
Commissioner of Patents