

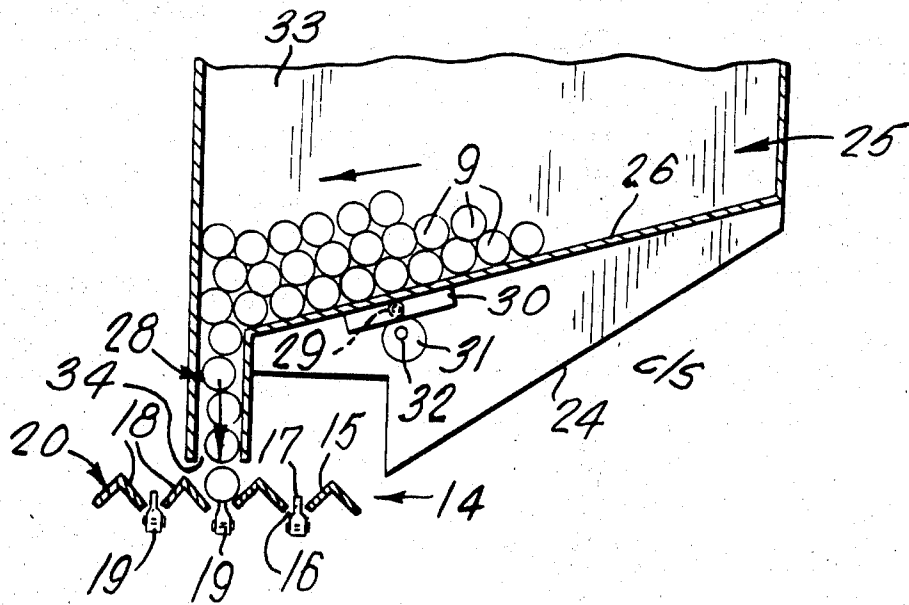
[54] AUTOMATIC COLLATOR
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[51] Int. Cl. B65g 47/18
[58] Field of Search..... 198/46, 34, 53-58,
198/190, 168, 171, 172; 53/154, 159

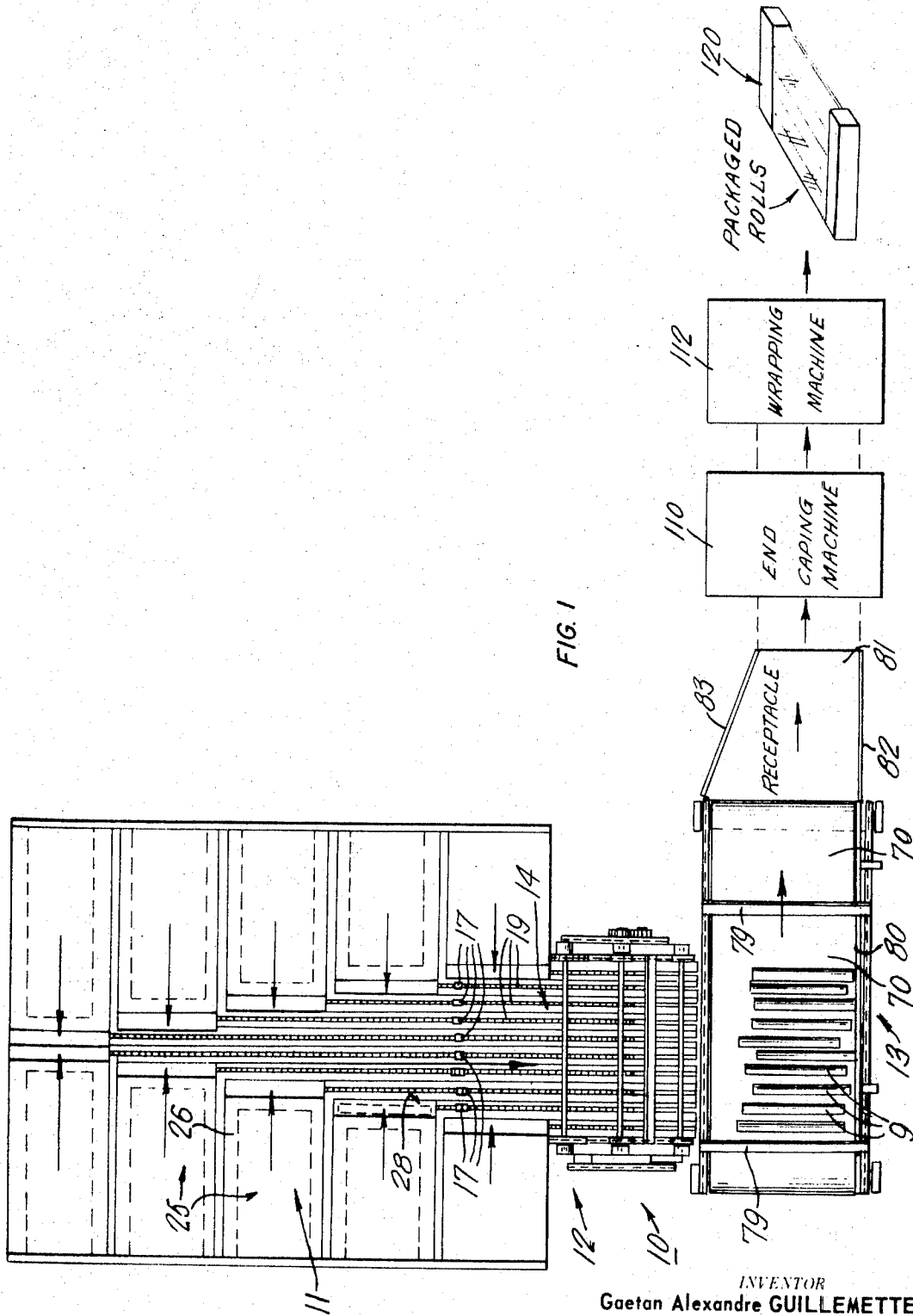
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[57] ABSTRACT
An automatic collator for handling elongated rod like articles and which comprises a plurality of storage means having elongated rod like articles therein and adapted to feed the articles in sequence on an associated guide channel of a conveyor platform. Means are further provided for engaging and conveying the articles along a portion of the guide channels. Discharge means discharge the articles longitudinally in a predetermined side-by-side relationship from the conveyor platform.

10 Claims, 7 Drawing Figures





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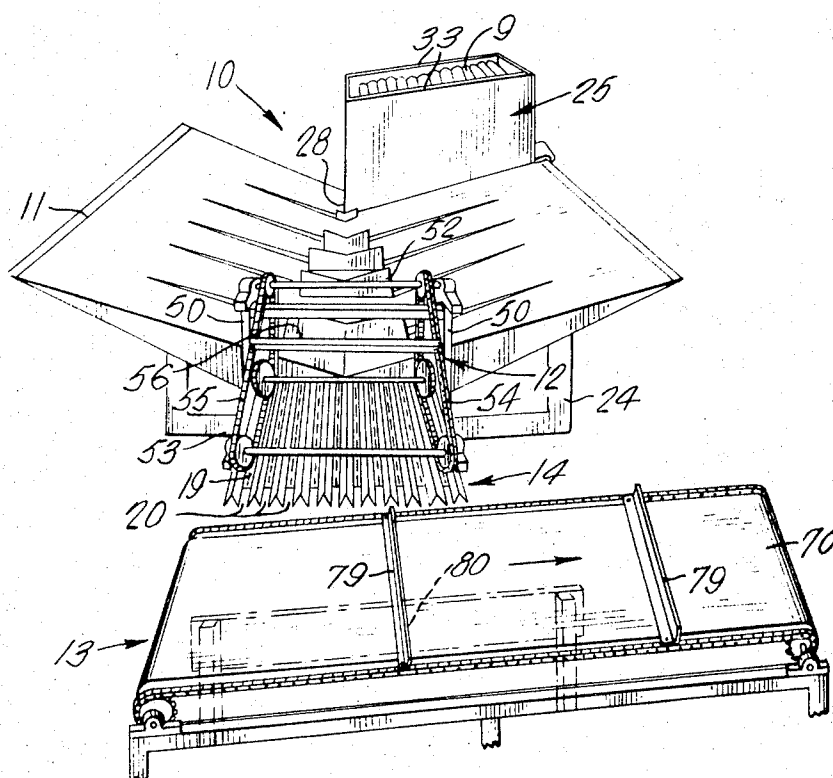


FIG. 2

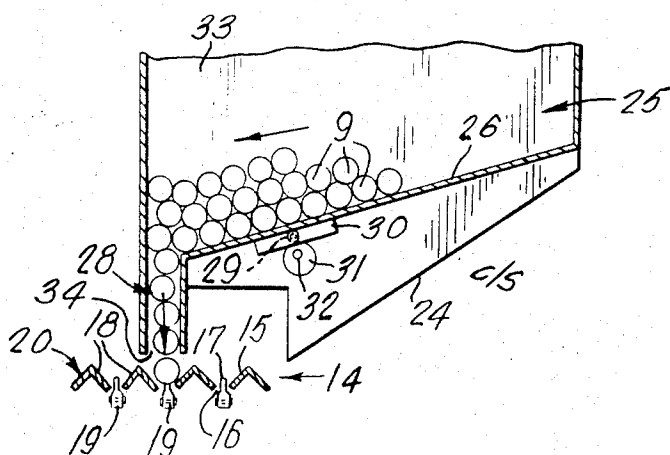


FIG. 3

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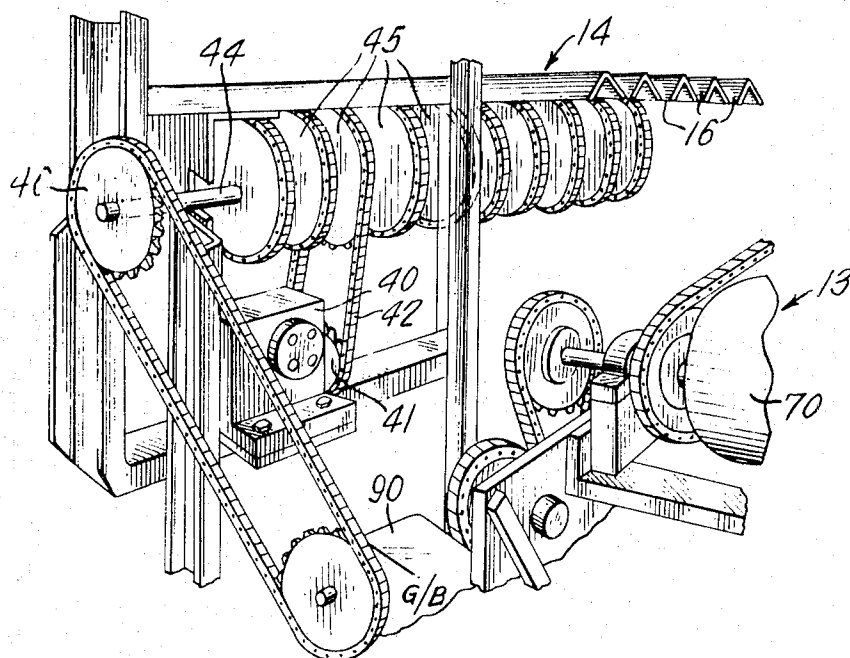


FIG. 4

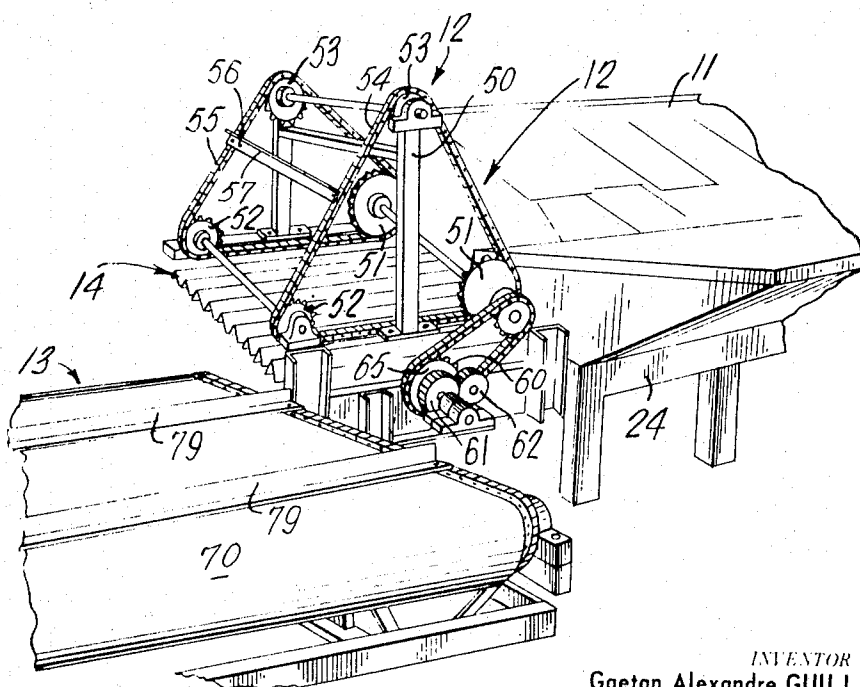


FIG. 5

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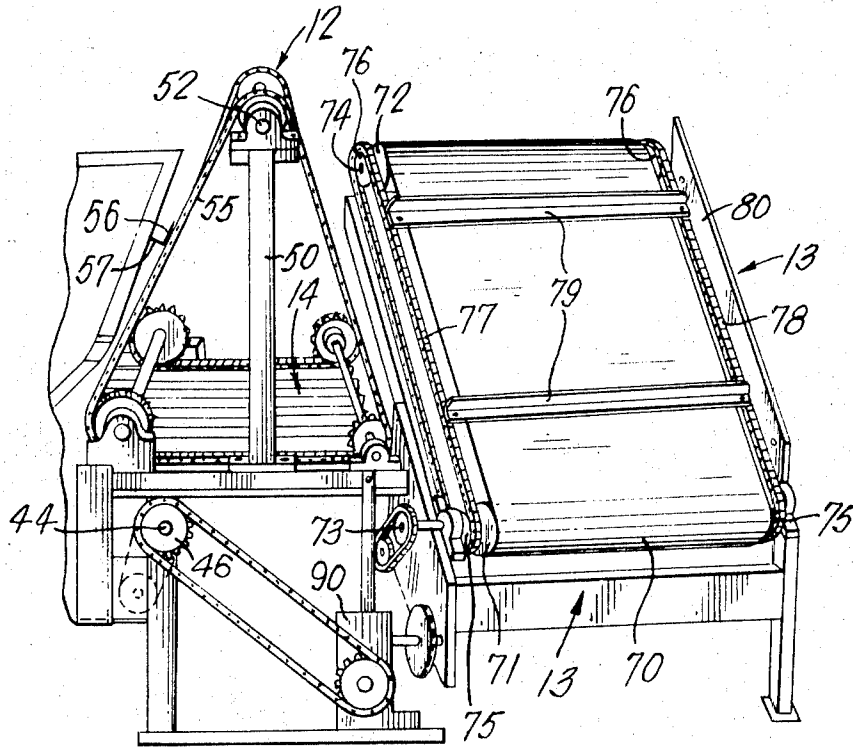


FIG. 6

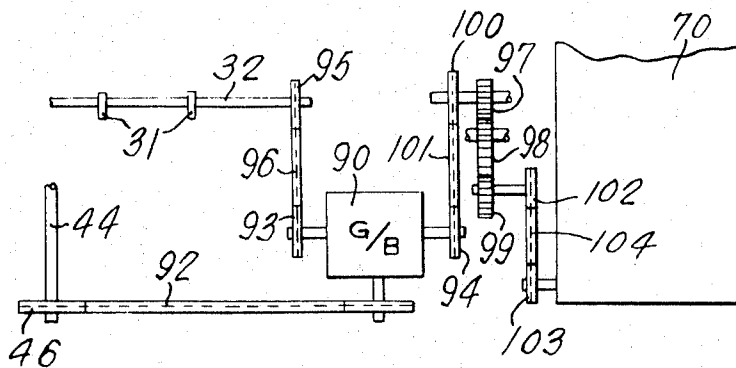


FIG. 7

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AUTOMATIC COLLATOR

BACKGROUND OF THE INVENTION

a. Field of the Invention

This invention relates to an automatic collator and, more particularly, to a machine for handling and feeding elongated rod like articles in a predetermined arrangement.

b. Description of Prior Art

In the packaging of rolls of gift wrapping paper, it is required, for particular packages, that a plurality of rolls be oriented in a side-by-side relationship and wrapped into packages. The majority of these packages contain rolls having paper of different colors or designs and oriented side-by-side in a predetermined sequence to impart an esthetic appearance to the package. One manner of forming these packages is to place the rolls side-by-side and maintain them in fixed position by means of cardboard end caps and a transparent wrapping paper surrounds the package to secure it.

Heretofore, this type of packaging has been done manually in order to orient the differing colors or designs of the paper rolls in a predetermined sequence. Particular rolls are arranged in sequence and end caps are then positioned about the ends thereof. A transparent paper is then applied by a machine to secure the package. This manner of packaging has numerous disadvantages, namely that the operation is very time consuming and requires substantial floor space; it requires personnel for every function of the operation, and the collating of the articles is subject to human error and very slow.

SUMMARY OF INVENTION

It is a feature of the present invention to provide an automatic collator which requires very little supporting labor, is rapid, efficient and economical.

Accordingly, from a broad aspect, the present invention provides an automatic collator for handling elongated rod like articles and comprises a plurality of storage means having elongated rod like articles therein and adapted to feed the articles in sequence on an associated guide channel of a conveyor platform. Means are further provided for engaging and conveying the articles along a portion of the guide channels. Discharge means discharge the articles longitudinally in a predetermined side-by-side relationship from the conveyor platform.

BRIEF DESCRIPTION OF DRAWINGS

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings in which:

FIG. 1 is a plan view illustrating the collating machine and associated apparatus;

FIG. 2 is a perspective view of the conveyor platform and the transfer conveyor;

FIG. 3 is a fragmented section view of a storage container showing the disposition of the articles therein;

FIG. 4 is a perspective view of the collating conveyor drive;

FIG. 5 is a perspective view illustrating the discharge mechanism;

FIG. 6 is a perspective view of the transfer conveyor and the discharge section; and

FIG. 7 is a plan illustration of the drive transfer from the collating conveyor to the transfer conveyor.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to the drawings and more particularly to FIGS. 1, 2 and 3, there is shown the collating machine 10 and associated apparatus. The collating machine 10 comprises essentially two conveying sections, an article pick-up section 11 and an article discharge section 12 and a transfer conveyor 13. A channel conveyor platform 14 extends across both sections 11 and 12 and guides the rolls 9 of wrapping paper thereon. The conveyor platform 14 is formed by a plurality of elongated guide members 15 of inverted V-shape cross-section, as shown in FIG. 3. The guide members 15 are held in fixed parallel relationship and equidistantly spaced apart to form an opening 16 therebetween. The size of the opening 16 is sufficiently wide to permit a driven roll engaging lug 17 to protrude therein, above the opening 16. The lugs 17 are secured to endless chains 19 held below the opening 16. The spacing between adjacent guide members 15 is selected so that a roll 9 of paper can be supported between adjacent inclined side surfaces 18 forming a conveying guide channel 20, above the opening 16 whereby the roll engaging lugs 17 will abut against an end of a roll 9 resting in its associated channel 20. The engaging lugs 17 are removably secured to their respective driven endless chains 19 and aligned laterally and equidistantly spaced longitudinally a distance longer than the length of the rolls 9 being conveyed. The number of channels 20 provided is dependent on the desired number of rolls required for packaging.

The rolls 9 of wrapping paper are stored in storage containers 25 angularly supported above the conveyor platform 14 on the frame 24. For each channel 20 there is provided an associated container 25. The container 25 is essentially a box having an inclined flat bottom surface 26 in which a central portion is slit to provide a vibratory plate 27 to impart a vibration to the rolls 9 in the container whereby the rolls 9 are properly oriented and fed to a discharge throat 28 provided in the front portion of the container in front of the bottom surface 26. The vibratory plate 27 is caused to oscillate by means of a cam coupling located thereunder. The underside of the plate 27 is provided with a cam follower bearing 29 secured to an angle iron 30. The bearing 29 is in frictional contact with the periphery of a cam 31 supported on a driven cam shaft 32 (see also FIG. 7) extending longitudinally under the containers 25 on each side of the platform 14. Each container 25 is provided with an adjustable side wall 33 which is adjusted to suit the length of the rolls 9 stored in its container 25. The discharge throat 28 defines an opening 34 in the lower end thereof and disposed a predetermined distance above a respective channel 20 so that it will clear and not interfere with the larger diameter rolls 9 resting on the channel 20 and will always retain the roll 9 resting on top of the roll to be conveyed and positioned in the channel 20.

As can be seen from FIG. 1, the storage containers 25 are positioned on each side of the conveyor platform 14 in opposing pairs. Looking at the platform 14 from the far end to the discharge section 12, the first pair of containers will discharge its rollers 9 in the two channels 20 at the center of the conveyor platform 14. The next pair of containers 25 will discharge rolls in its respective channel 20 to each side of the two center channels 20. This sequence continues for the remaining

channels and containers. Thus, it can be seen that as a row of roll engaging lugs 17 approach the far end of the conveyor platform 14, the rolls 9 resting on the center two channels 20 are engaged and pushed along its respective channel. When the lugs 17 approach the next pair of containers 25 it then picks-up the rolls 9 in the adjacent two channels 20, and so on down the platform. Should rolls 9 from a particular container 25 not be required for packaging all the lugs 17, on the endless chain 19 associated with that particular channel 20, are removed.

Referring now additionally to FIGS. 4 and 5, there is shown the arrangement of the drives of the collating machine 10. A drive motor 40 is supported on the frame of the machine under the conveyor platform 14. The motor drive sprocket 41 transmits the drive to a driven shaft 44 via drive chain 42 and driven sprocket 43 secured to shaft 44. Endless chain drive sprockets 45 are secured to the driven shaft 44 and are positioned directly under a respective channel opening 16. At one end of the driven shaft 44 there is secured a drive transfer sprocket 46 to transfer the drive to the transfer conveyor 13, as will be described later.

Referring more particularly to FIG. 5, there is shown the article discharge section 12. A suitable framework 50 secures three pairs of driven chain sprockets 51, 52 and 53 in parallel relationship with each other and disposed transverse to the longitudinal axis of the conveyor platform 14. Two spaced apart pairs of sprockets 51 and 53 are positioned a fixed distance above the conveyor platform 14 and the other pair 52 is positioned between and above the two pairs 51 and 53. Endless chains 54 and 55 are disposed about a respective one of said sprocket pairs 51, 52 and 53 to each side of the platform 14. The chains 54 and 55 are held parallel to each other and are twice as long as the spacing between each lateral row of roll engaging lugs 17. The chains 54 and 55 define a discharge path of travel a fixed distance above the platform 14 to the end thereof.

A discharge conveyor bar 56 is secured transversely across the endless chains 54 and 55 and provided with a roll engaging surface 57 protruding above the chains 54 and 55. The chains 54 and 55 travel at twice the speed of the endless conveying chains 19 and the bar 56 is positioned relative to a row of roll engaging lugs 17 so that as the bar 56 comes around the first pair of sprockets 51, its engaging surface 57 will be approximately a few inches behind a row of lugs 17 and consequently behind the ends of the rolls 9 conveyed by the lugs 17. As the lugs 17 of the conveying chains 19 pass about their associated drive sprockets 45, the lugs 17 disappear below the opening 16 in their respective channel 20. The rolls 9 become engaged by the bar 56 slightly before the lugs 17 disappear and continues conveying the rolls at approximately twice the initial speed, to eject them in parallel relationship onto the transfer conveyor 13.

The drive for the discharge section 12 is provided via a drive gear 60 secured to the driven shaft 44 at the opposite end from the transfer sprocket 46. The drive gear 60 is in tooth engagement with a driven idler gear 61 secured on an idler shaft 62. Idler gear 61 reverses the drive from gear 61 and transmits it to a sprocket 63 having twice the number of teeth as the endless chain sprockets 45 and the driven sprocket 64 of the first pair of sprockets 51 driving the discharge conveyor bar 56.

The drive from sprocket 63 is transmitted to sprocket 64 via endless chain 65. The drive sprocket 64 has the same number of teeth as the sprocket 63 which is twice that of the sprockets of the other two pairs 52 and 53 of chain sprockets which are supported in an idle condition.

Referring to FIGS. 6 and 7, there is shown the transfer conveyor as comprising a driven endless belt 70 held about two cylinder rollers 71 and 72 secured to a respective shaft 73 and 74. A pair of sprockets 75 and 76 is provided each on a respective shaft 73 and 74. An endless chain 77 and 78 is engaged around sprockets 75 and 76 on each side of endless belt 70. A plurality of transfer lugs 79 are secured between the chains 77 and 78 and extend transversely across the belt 70. The transfer lugs 79 are equidistantly spaced and synchronized to receive the ejected rolls 9 from the discharge section 12 at the end of the conveyor platform 14. An end plate 80 is secured adjacent the outer edge of the conveyor belt 70 to prevent the ejected rolls 9 from being projected beyond the discharge conveyor 13. The end of discharge conveyor 13, remote from the article receiving end, is adjustable to permit the discharge of the collated groups of rolls 9 at various levels.

As can be seen from FIG. 1, an adjustable discharge receptacle 81 having a fixed side wall 82 and an adjustable angulated side wall 83 may be provided to align and transfer the rolls 9 from the transfer conveyor 13 to associated equipment. The angulated side wall 83 provides end-to-end alignment of the rolls 9 being discharged.

As mentioned earlier, the drive for the transfer conveyor 13 is taken from sprocket 46 and is coupled to an input sprocket 91 of gear box 90 via a chain 92. The gear box 90 is provided with two output sprockets 93 and 94 having a 1:1 drive ratio from the input sprocket. Output sprocket 93 drives cam shaft 32 (described earlier) via sprocket 95 and chain 96. Output sprocket 94 couples the drive to a first cam gear 97 via a chain 101 and sprocket 100 secured to the same shaft as the first cam gear 97. The cam gear 97 is in toothed engagement with a second cam gear 98 which in turn is in toothed engagement with a third cam gear 99. The second cam gear 98 reverses the drive so that cam gear 97 and 99 are rotating in the same direction. The shaft of the third cam gear 99 is coupled to a sprocket 102 which is coupled to driven sprocket 103 via chain 104. Driven sprocket 103 is secured to shaft 73 which drives sprockets 75 and cylinder roller 71 about which is provided the endless belt 70.

It can be seen that with this drive coupling the transfer conveyor is driven at a varying speed. Cam gears 97, 98 and 99 are eccentrically secured to a respective shaft to provide a drive to sprocket 102 which will vary from slow to fast and then back to slow. The cycle of this drive is synchronized to the discharge conveyor bar 56 so that a transfer lug 79 will be positioned to receive the ejected rolls 9 from the discharge section 12 of the machine when the drive of the transfer conveyor is at its lowest speed.

In operation, a predetermined number of containers 25 are each filled with rolls of wrapping paper of a predetermined color or pattern depending on the sequence required for packaging. The side wall 33 of each container 25 is adjusted to suit the length of the rolls 9. If rolls associated with a container 25 are not to be picked up, the lugs 17 are removed from the endless

chain 19 associated with its channel 20. Also, it is within the ambit of the invention to provide a stop (not shown) to obstruct the opening 34 of the discharge throat 28 thus eliminating the need for removing the lugs 17 travelling in a channel 20 not being utilized.

An advancing lateral row of lugs 17 pick-up associated rolls 9 on its travel down the conveyor platform 14 until they arrive at the discharge section 12 of the machine. All the lugs 17 then start disappearing below the channels 20 as the discharge conveyor bar 56 comes in contact with the rear end of the rolls 9. The bar 56 then continues conveying the rolls 9 at twice its initial conveying speed to eject them from the end of the conveyor platform.

As can be seen more clearly from FIG. 1, the ejected rolls 9 are received on a belt surface 70 of transfer conveyor 13 and conveyed by transfer lugs 79 which are driven, along with belt 70, at a variable speed. The lugs 79 are synchronized to be at their lowest speed when at their article receiving position, as shown in FIG. 1. After the discharged articles are received, the transfer conveyor speeds up to its maximum speed to unload in a discharge receptacle where the rolls 9 are aligned laterally and transferred to an end capping machine 110 (not described herein). Here the rolls 9 which are aligned and arranged in a specific sequence are directed into cardboard end caps 111 which are fastened about the ends of the rolls 9. The package is then fed to an automatic wrapping machine 112 where a transparent wrapping paper is affixed to the package to secure the end caps 111 and the rolls 9 to form the complete package 120.

I claim:

1. An automatic collator for handling elongated cylindrical articles comprising a platform having a plurality of stationary guide channels each having a longitudinal opening therealong, a plurality of containers having a plurality of said articles therein and positioned along said platform, each said containers having a discharge throat section through which said articles are discharged one by one on an associated one of said guide channels, one or more driven lugs protruding above said opening to abut against an end of said article discharged on said guide channel to convey said article along a portion of said guide channel, said lugs being transversely aligned with the lugs in adjacent channels so that said articles in each said channel are conveyed by said lugs to a discharge section on said platform in side-by-side substantially parallel relationship and in longitudinally spaced apart groups, a discharge conveyor member synchronized with said driven lugs and adapted to engage said ends of said articles engaged by said lugs at a speed faster than the speed of said lugs whereby said articles are no longer in abutting relation-

ship with said lugs and said articles are discharged in said groups and in side-by-side relationship onto a transfer means where said articles are conveyed in abutting side-by-side relationship.

2. An automatic collator as claimed in claim 1 wherein said storage container has an inclined bottom surface extending downwardly to said discharge throat section and a vibratory plate provided in said inclined bottom surface to impart oscillations to said articles in said container thereby causing them to orient themselves and to prevent blockage of said discharge throat.

3. An automatic collator as claimed in claim 2 wherein a side wall of said storage container is adjustable to accommodate elongated articles of different lengths.

4. An automatic collator as claimed in claim 2 wherein said vibratory plate is provided with a cam follower bearing secured thereunder, said bearing being in frictional contact with the periphery of a driven cam.

5. An automatic collator as claimed in claim 1 wherein said lugs are secured to a driven endless chain located under a respective longitudinal opening and extending to said discharge means, said lugs secured to each said driven endless chains being spaced apart a distance exceeding the length of said elongated articles being conveyed and being aligned transversely with the lugs of said other driven endless chains.

6. An automatic collator as claimed in claim 1 wherein said discharge conveyor member is a conveyor bar disposed transverse to the longitudinal axis of said conveyor platform and travels along said discharge platform section at approximately twice the speed as said lugs.

7. An automatic collator as claimed in claim 1 wherein said transfer means is an adjustable conveyor having a driven conveyor belt and driven transfer lugs equidistantly spaced apart and positioned above and transverse to said driven conveyor belt.

8. An automatic collator as claimed in claim 7 wherein said conveyor belt and transfer lugs are provided with a variable drive cycle so that said transfer lugs are at their lowest speed when articles are ejected onto said conveyor belt between a pair of transfer lugs.

9. An automatic collator as claimed in claim 8 wherein said drive cycle is synchronized to the rate of discharge of said articles from said conveying platform.

10. An automatic collator as claimed in claim 7 wherein said adjustable conveyor has an adjustable discharge end provided with a discharge receptacle having an adjustable angulated side wall to permit end-to-end alignment of said articles being discharged by said adjustable conveyor.

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