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CONVEYER MECHANISM FOR PROCESSING
APPARATUS FOR PACKAGED FOOD

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2 Sheets-Sheet 1

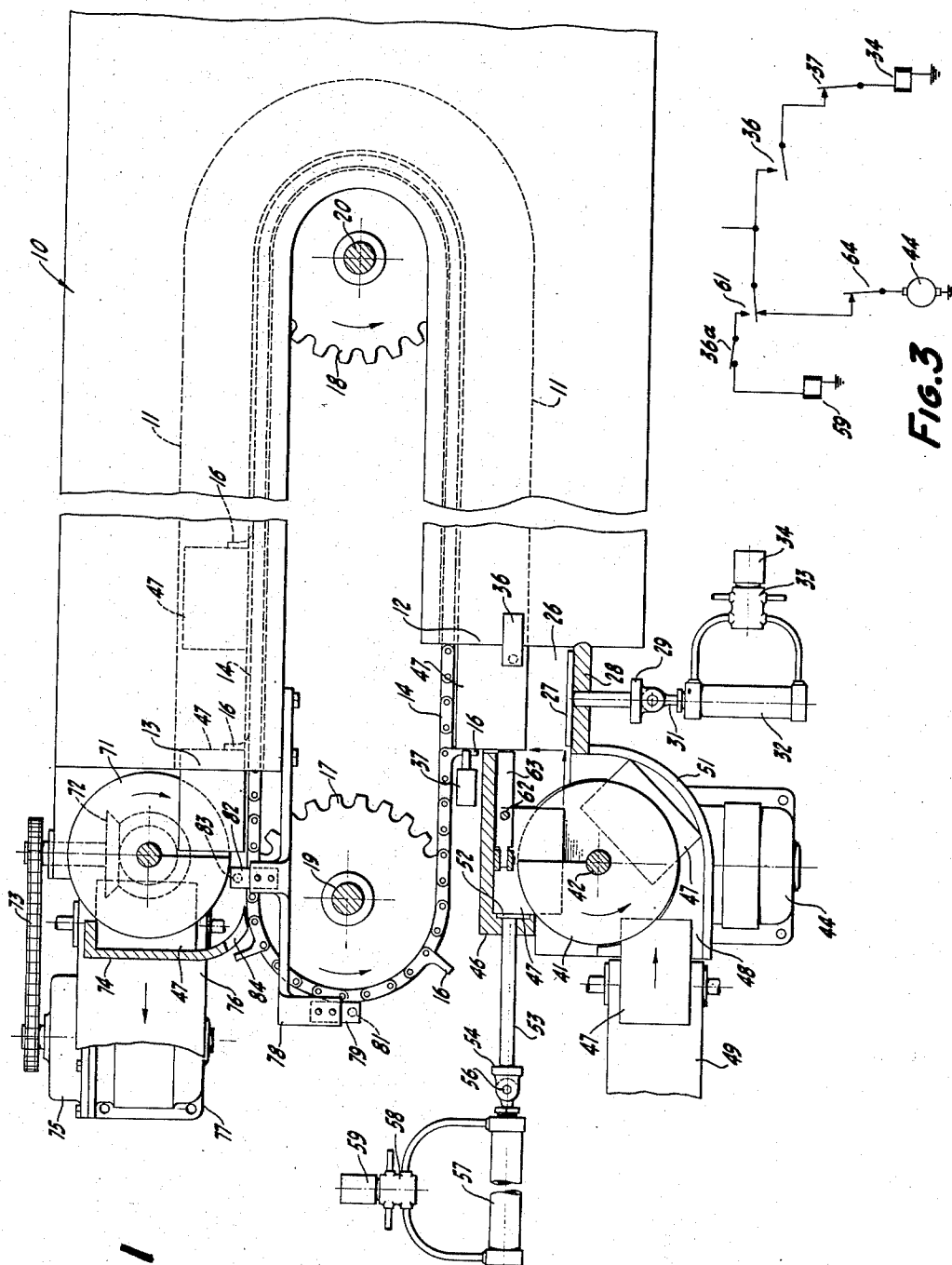


Fig. 1

Fig. 3

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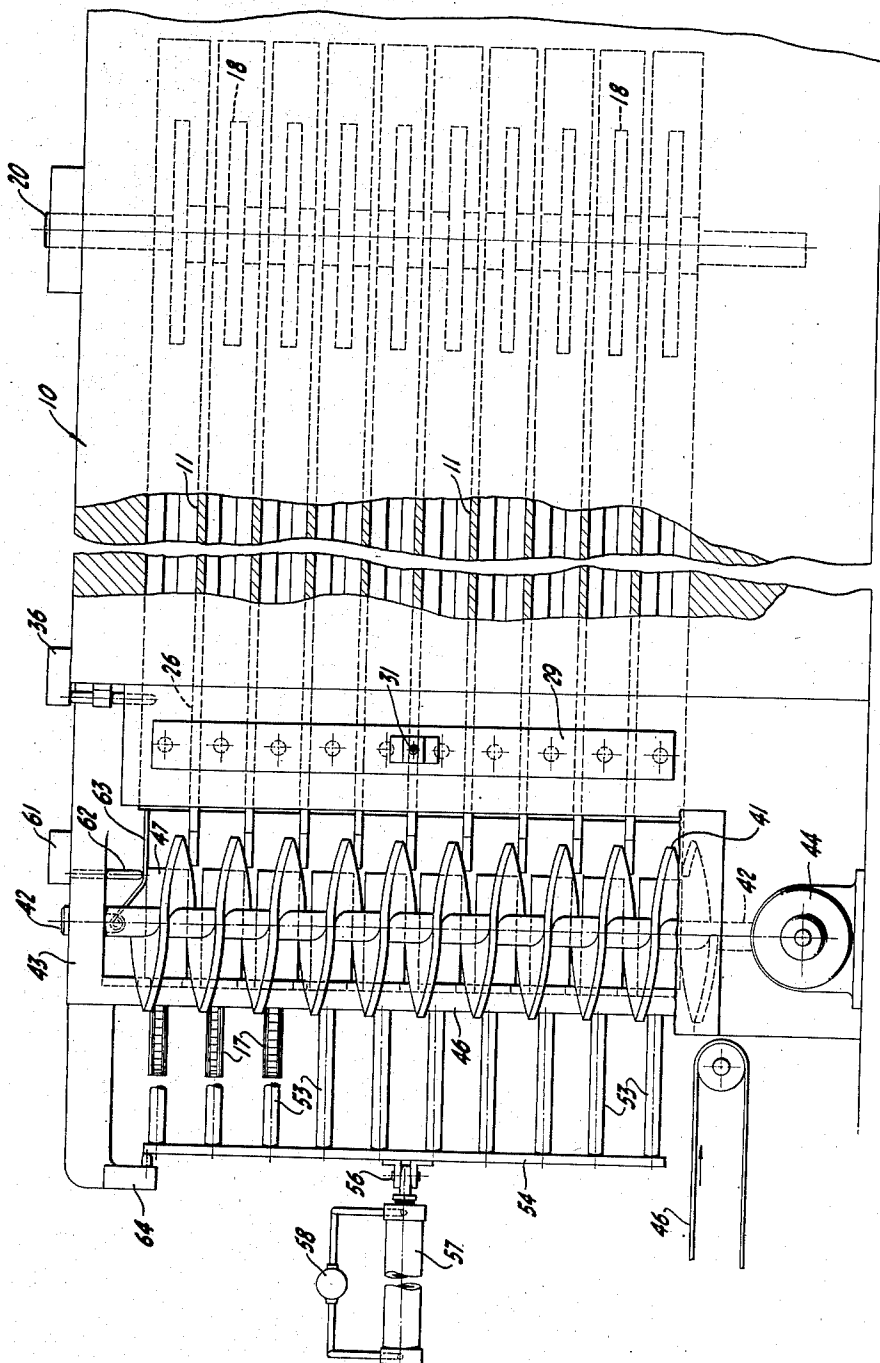


FIG. 2

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APPARATUS FOR PACKAGED FOODRoy M. Magnuson, Campbell, and Ralph K.
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10 Claims. (Cl. 198—31)

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This invention relates to processing apparatus for articles such as packaged food in which the packages of food are carried in parallel files through a parallel set of processing paths, such as chilling or freezing paths. In this type of apparatus, it is desirable to feed and discharge a plurality of articles as a stack to and from the respective processing paths, and this invention is also concerned with the provision of improved feed and discharge means adapted to re-position the articles from a file or row into a stack and vice versa for feeding or discharging of the packages from the processing paths.

It is a general object of the invention to provide improved processing apparatus of the character referred to.

Another object of the invention is to provide apparatus of the character described in which a screw elevator is employed to quickly re-arrange articles from a file into a stack and vice versa.

A further object of the invention is to provide processing apparatus having progressors for carrying articles therethrough, together with a feed device operable in time with the progressors to re-arrange articles from a file into a stack for simultaneous feeding into the processing paths.

Still another object of the invention is to provide apparatus of the above character in which the transfer of a stack of articles from the screw elevator to the processing paths is effected in a desirable timed relation.

Other objects and advantages of the invention will be apparent from the following description of a preferred embodiment thereof, as illustrated in the accompanying drawings, in which:

Figure 1 is a plan view of the apparatus embodying the instant invention, a portion of the apparatus being shown schematically.

Figure 2 is a side elevational view of the apparatus as shown in Figure 1, with certain portions shown schematically or in section.

Figure 3 is a wiring diagram.

In general in the processing of food products, for example, in the quick freezing of packaged food, it is desirable to progress the packaged food through a freezing path at a controlled speed for a definite time. To obtain high volume production, it is desirable to provide a plurality of processing paths so that a large quantity of packages can be processed at the same time. In connection with such processing apparatus the packages are usually carried through the preparation and packing steps in single file so that they arrive at the processing apparatus

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as a file and must be re-arranged as a stack, either vertical or horizontal, for feeding into the plurality of processing paths.

In accordance with the instant invention, the above desired re-arrangement of the packages is effected by means of a screw elevator device which extends along the feed ends of the processing paths and operates to receive the packages as a file or row and to orient them as a stack of packages in the properly spaced relation for feeding to the processing paths.

Referring to the drawings, there is illustrated a quick freeze apparatus comprising an insulated casing or housing 10 in which there is provided a vertical array of processing paths 11 to which a suitable refrigerant is applied to perform a quick freeze operation on the packages of food introduced through the feed end 12 of the apparatus as they travel through and are discharged at the discharge end 13. To progress the packages along each freezing tunnel or path, there is provided for each path a progressor chain 14 having progressor flights 16 thereon. The chain is trained about respective sprockets 17 and 18 carried by supporting and drive shafts 19 and 20. It will be understood that there is a pair of sprockets 17 and 18 and a progressor chain 14 for each path of the vertical array of paths 11. The specific construction of the freezing tunnels or paths is not disclosed herein, and they may be of any suitable character such as, for example, the freezing tunnel or path disclosed in the copending application of Cassius L. Kirk, Serial No. 603,715, filed July 7, 1945, for Quick Freeze Tunnel and now Patent No. 2,563,936.

In accordance with the instant invention, means is provided for quickly re-arranging articles from a horizontal file to a vertical stack in aligned relation with respect to the feed ends of the vertical array of freezing paths. In the present instance, this feed means includes a feed shelf 26 disposed adjacent to each of the freezing paths 11 and lying substantially in the same plane so that packages can be transferred easily from each of the shelves 26 to the related processing path. The packages may be moved from each shelf by a pusher device or element 27 slidably carried in a vertical frame wall 28. The series of pusher elements (one at each of the shelves 26) are connected to a common operating bar 29, which is operated by the plunger mechanism 31 of a pneumatic or hydraulic cylinder mechanism 32, under control of a conventional three-way valve 33 associated therewith and suitably connected to a source of pneumatic or

hydraulic pressure. The valve 33 is under the control of a suitable solenoid 34, which has its circuit energized under the joint control of a microswitch 36 at the uppermost shelf 26 and a microswitch 37 disposed for operation by a flight 16 on the uppermost chain 14 of the progressor mechanism. In this manner the operation of the pusher members 27 will occur in timed relation to the operation of progressors 16, and can only occur when a package is on the top shelf 26 for feeding to the progressor.

Associated with the vertical array of shelves 26 is an elevator structure including a screw elevator 41 carried by a vertical shaft 42 journaled at the top in a suitable bearing 43 and at the bottom suitably journaled and connected by gearing (not shown) to be driven by a conventional electric motor and clutch device 44. The clutch employed may be of a conventional cyclic type so that the screw elevator 41 always stops in the proper alignment with the shelves 26. Associated with the screw elevator 41 is a vertical stack guide member 46 to receive packages entering the screw elevator 41 and to direct them against the pushers 52 to restrain them against movement beyond the position shown by package 47 in Figure 1. Packages are fed to the bottom turn of the elevating screw 41 over a shelf 48 cooperating therewith from a single file belt type conveyor 49. It will be noted that the shelf 48 extends around the screw elevator 41 and has cooperating therewith an arcuate vertical guide wall 51 which extends upwardly for a portion of the length of the elevating screw 41. The wall 51 serves to guide the packages while they are being elevated and transferred around the wall 51 into engagement with the stop wall 46.

When the packages are engaged with the stop wall 46, as shown by the package 47 in Figure 1, for example, they are properly aligned for feeding onto the respective shelves 26 by means of a second pusher device including a pusher element 52 in alignment with each of the shelves 26 and connected by respective rods 53 with a vertically extending bar 54. This bar 54 is secured at 56 to the plunger of a pneumatic or hydraulic cylinder mechanism 57 under control of a three-way valve 58. The solenoid 59 for controlling the valve 58, as seen in Figure 1, is in series relation with one set of contacts of a microswitch 61 (Figures 2 and 3) having a control finger 62 extending downwardly for engagement with a spring control stop 63 operated by the top package 47 of a stack when this package is aligned with the top processing path 11. Also, a second normally closed switch device 36a is in series relation with the solenoid 59 and is operated mechanically with the switch 36 to be opened by the top package on the shelf 26 so that the pushers 52 cannot be operated until the packages on the shelves 26 are fed into the machine. Also, the other normally closed contacts of the microswitch 61 are preferably placed in controlling relation to the motor 44 so that when the microswitch 61 is operated by the package 47, as seen in Figure 1, the circuit for the motor 44 is interrupted and the drive of the screw 41 is thereby stopped with the packages properly positioned for feeding onto the shelves 26. If desired, the pushers 52 may be dimensioned to clear the screw 41, so that there will be no possibility of interference between the pushers and this screw device when its operation resumes after the packages are fed from beneath the microswitch 61. At the beginning of the stroke of

the pushers 52, a normally closed switch 64 in the motor circuit is opened so that the motor cannot drive the screw 41 until the pushers 52 have returned upon de-energizing of the solenoid 59 so that the valve 58 is adjusted to restore the pushers 52.

At the discharge end of the processing paths 11, a discharge device is provided for receiving a stacked array of packages from the processing paths and for discharging the packages as a file. For this purpose, a descending elevator screw device 71 is provided which is operated through a suitable gearing arrangement 72 and a sprocket and chain drive 73 from a clutch and electric motor mechanism 75-77. The clutch 75 is of a conventional cyclic type so that the discharge screw 71 is always rotated an exact number of revolutions similar to the feed screw 41. The motor 77 is controlled to drive the screw 71 through the clutch 75 for the desired number of revolutions through a start microswitch 82 and a stop switch 79 both carried by a bracket 78. The switch 82 has a control finger or plunger 83 disposed for engagement by the topmost package 47 immediately after a stack of packages are free of the discharge end 13 of the freezing paths. The stop microswitch 79 has a control finger or plunger 84 for engagement by the flight 16 of the conveyor immediately ahead of the flight engaged with the package being discharged to interrupt the motor circuit. Associated with the descending screw device 71 is an L-shaped stop wall 74 above a discharge conveyor 76, and the wall 74 is cut off at the bottom to allow discharge of the packages one by one as they are brought down by the screw device 71. The curved end of the wall 74 projects into the path of packages being discharged from the freezing paths so as to guide them as they are being turned and lowered by the screw 71. The wall 74 is provided with a series of vertically spaced slots 84 through which the flights 16 of the vertical series of conveyors can pass. The slots 84 and the flights 16 are narrower than the corresponding dimension of the packages 47. The screw device 71 is operated at a speed and for the number of revolutions required to receive packages from the progressors or flights 16 of the respective processing paths and to quickly lower the packages onto the discharge conveyor 76. The timing of the operation is such that a complete stack of packages will be lowered and discharged by the screw device 71 and the discharge conveyor 76 before a second series of progressors or flights 16 bring their packages into cooperation with the screw device 71.

In operation of the apparatus with the progressors 16 in the various processing paths 11 moving at a slow constant rate of speed, packages are fed single file by the feed conveyor 49 into the elevating screw device 41 and they will be picked up one by one, with the lowermost spiral of the screw device 41 serving as a stop for the remaining packages on the conveyor 41 when it is not properly positioned to receive a package. As a result, the screw device 41 will receive one package for each revolution. The packages 47 are quickly elevated by the screw device and carried around the wall 51 into engagement with the guide wall 46 and the associated pushers 52.

When a complete stack of packages is fed into the device, or when a leading package reaches the topmost processing path, the drive for the screw device 41 is interrupted, and the solenoid

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59 operates to adjust the valve 58 of the cylinder mechanism 57 so that its plunger is extended. In this way the pushers 52 are operated to move the complete stack of packages onto the aligned shelves 26. At the end of the stroke of the pushers 52, the valve 58 is adjusted back to normal position to cause return of the pushers. The topmost package of the stack will close the micro-switch 36 upon movement of the packages onto the shelves 26. However, the pushers 27 will not be operated by their cylinder mechanism 32 until a flight 16 of the topmost series closes the micro-switch 37, and, at this time, the valve 33 is adjusted to cause movement of the plunger 31 outwardly so that the pushers 27 deliver the stack of packages into engagement with the processing paths 11 and the respective operative flights 16 of the progressor mechanisms. The packages are then carried through the processing paths as a separate stack and delivered as a stack to the discharge screw device 71. The discharge screw device turns the superposed packages away from the flights 16 and directs them into engagement with the stop and guide wall 74. As previously explained, this discharge device 71 is operable at a speed to quickly lower a stack of packages down the guide wall 74 onto the conveyor 76. The number of revolutions of the discharge screw 71 is determined by the number of processing paths, and the desired number of revolutions is attained by the length of time the motor 77 operates between closing of its circuit by the switch 82 and opening of its circuit by the switch 79. The clutch 75 being cyclic always stops the screw 71 in the correct position to receive packages from the processing paths 11. The length of time of travel through the processing paths is, of course, controlled in accordance with the processing time desired for the particular product being packed.

While we have shown and described certain preferred embodiments of the invention, it will be seen that the invention is capable of variation and modification from the form shown so that its scope should be limited only by the scope of the claims appended hereto.

We claim:

1. In processing apparatus for articles, the combination of a housing enclosing a plurality of spaced parallel processing paths each open at an end thereof, each of said paths having conveyor means associated therewith for advancing the articles therealong, a single file conveyor means communicating with the open end of one of said processing paths, transfer mechanism including a screw conveyor and stop means cooperating therewith disposed adjacent said single file conveyor and extending along and communicating with the open ends of said processing paths and also communicating with said single file conveyor, said screw conveyor being disposed to transfer articles from one of said conveyor means to the other, and means for synchronizing the operation of said screw conveyor with said processing path conveyor means.

2. In processing apparatus for articles, the combination of a processing structure including a plurality of parallel processing paths having a conveyor mechanism associated therewith for advancing the articles therethrough, a single file conveyor mechanism, means including an article progressing screw and an arcuate guide wall and stop means disposed between said conveyor mechanisms for effecting transfer of articles from one of said conveyor mechanisms to the other, and means for coordinating the operation

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of said screw and said first named conveyor mechanism to facilitate the aforesaid transfer of said articles.

3. In processing apparatus for food comprising a plurality of parallel processing paths, a feed device for receiving articles as a single file and delivering a row of articles to said paths, said device including a screw element having its axis at right angles to said paths and extending along the similar ends thereof, the pitch of said screw corresponding to the spacing of said paths, means for operating said screw to convey a series of articles into aligned feeding relation as a row with respect to said paths, and means for stopping operation of said screw upon positioning of said series of articles in said aligned feeding relation.

4. In processing apparatus for food comprising a plurality of parallel spaced apart processing paths each including an article progressor, a feed device for receiving a single file of articles and for re-arranging the articles as a row, said means including a screw element having its axis at right angles to said paths and extending along the similar ends thereof, means for operating said screw to convey a series of articles as a row into aligned feeding relation with respect to said paths, and means operable in time with said progressors for transferring a row or articles from said screw element into said paths.

5. In processing apparatus for packaged food comprising a plurality of parallel processing paths having progressor elements extending therethrough, a feed structure for receiving articles as a single file and for re-arranging the articles as a stack for delivery to said paths, said means including a screw device disposed at right angles to said paths and extending along a similar end thereof, stop means cooperating with said screw device to cooperate therewith in effecting a stacked alignment of articles engaged with the screw device, said stop means being disposed to restrain rotative movement of the article with the screw device, means for controlling transfer of an aligned stack of articles from said screw device to said paths in synchronism with the operation of said progressor elements.

6. In processing apparatus comprising a plurality of vertically stacked parallel paths, an article progressing conveyor including a series of flights mounted to travel through each one of said paths, the flights of said conveyors being disposed in vertical alignment, and feed means for said paths and said article progressing means therein including a screw elevator extending along said paths for carrying articles in an ascending column adjacent said paths to dispose said articles in aligned relation with the feed ends thereof, and also including transfer means for effecting transfer of the articles from the screw elevator into engagement with the respective aligned flights of the conveyors in said paths.

7. An apparatus for processing food packages, comprising a plurality of parallel package processing paths disposed in aligned parallel relation and having conveyor means associated therewith for advancing said packages therethrough, a screw conveyor and cooperating stop means extending along and communicating with the discharge ends of each of said processing paths, and means for operating said screw conveyor in time with the movement of said conveyor means, whereby said screw conveyor receives a plurality of aligned processed packages simultaneously delivered from said paths and thereafter succes-

sively discharges said packages in a single file at one end of said screw conveyor.

8. An apparatus for processing food packages, comprising a plurality of parallel processing paths disposed in vertically aligned relation and having conveyor means associated therewith for advancing the packages therethrough, a rotatable screw conveyor extending vertically along and communicating with the discharge ends of said processing paths, stop means comprising a baffle member extending along said screw conveyor for engaging and controlling vertical descent of a plurality of packages discharged from said processing paths into vertically spaced engagement with said screw conveyor, and a single file conveyor disposed adjacent the lower end of said screw conveyor for successively receiving and discharging processed packages advanced by said screw conveyor beyond the lower end of said baffle.

9. A discharge mechanism for an article processing apparatus having a plurality of vertically aligned package discharge openings, comprising a screw conveyor extending vertically along each of said discharge openings and having a pitch equal to the vertical spacing of said openings, means for operating said screw conveyor, and stop means comprising a baffle wall extending along said screw conveyor for controlling vertical alignment and descent of processed packages discharged from said openings into engagement with said screw conveyor.

10. Processing apparatus for food comprising a plurality of vertically stacked, horizontally disposed, parallel processing paths, said processing paths each including a conveyor, a single file feed conveyor for food articles, a screw device interposed between said single file conveyor and each of said processing paths, means for operating said screw device to convey a series of articles from said single file conveyor into aligned feeding relation as a row with respect to said paths, means for stopping operation of said screw device upon positioning of said series of articles in said aligned feeding relation, and means operable in time with said conveyor mechanisms for transferring a row of articles from said screw device into said paths.

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