

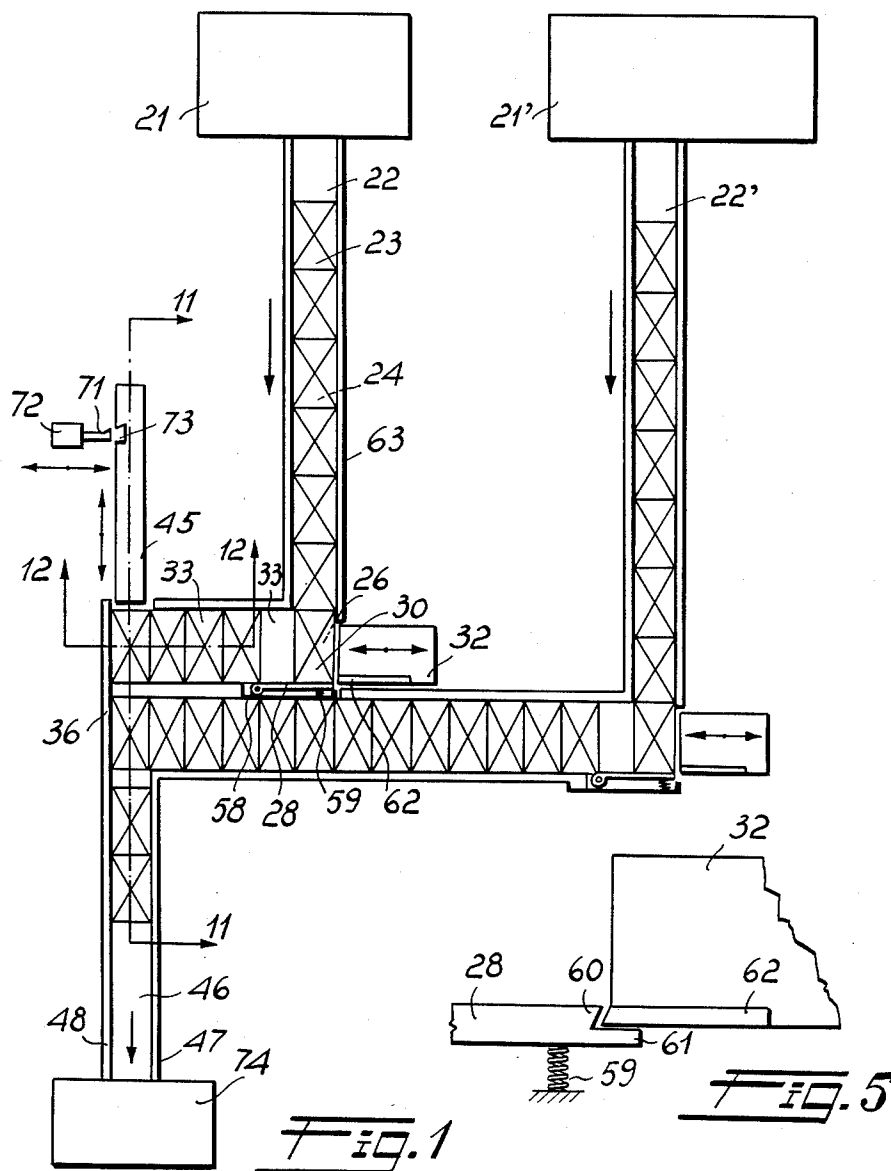
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CANALIZING CONVEYOR SYSTEM, PARTICULARLY
FOR PACKING MACHINES

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Filed Dec. 18, 1962

2 Sheets-Sheet 1



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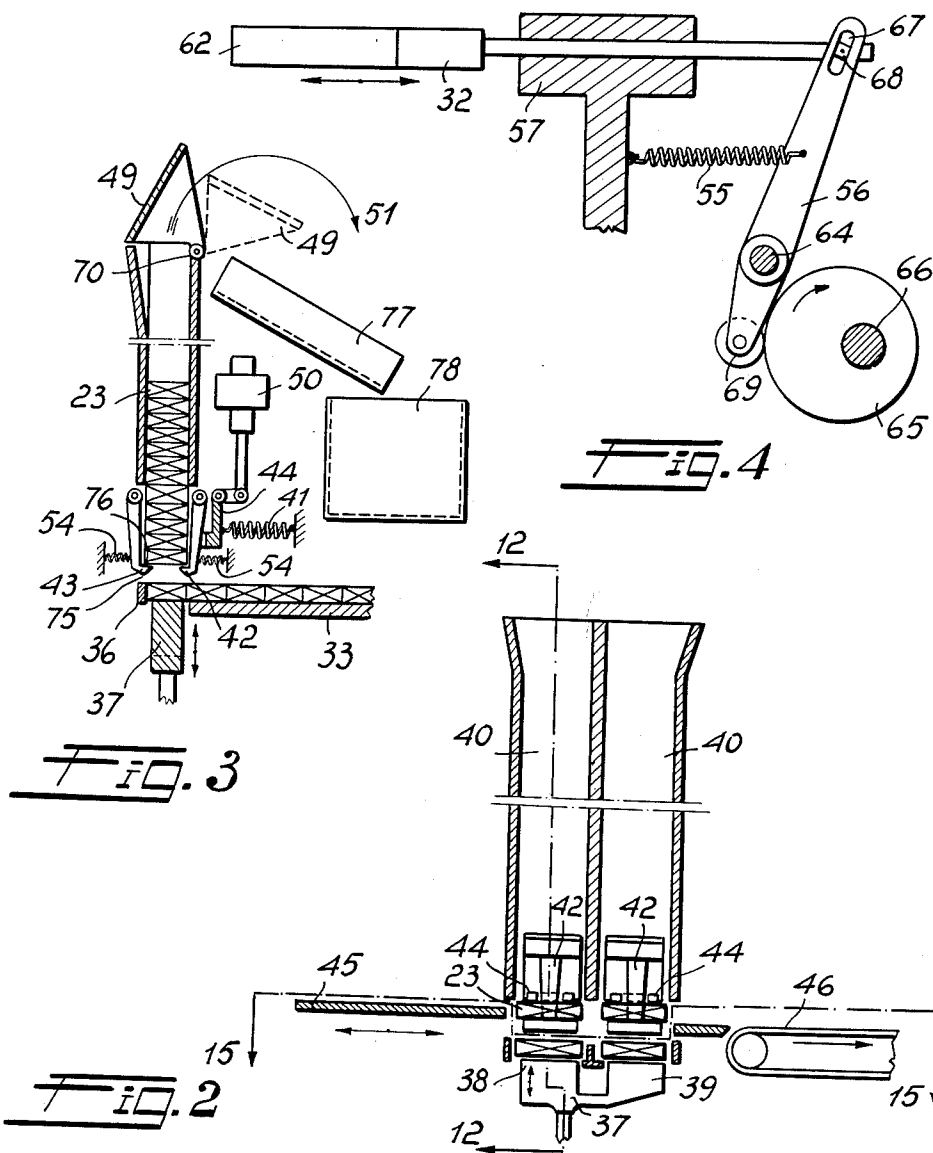
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CANALIZING CONVEYOR SYSTEM, PARTICULARLY FOR PACKING MACHINES

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6 Claims. (Cl. 198—32)

This invention relates to a conveyor system by which articles are conveyed from the outlets of one or more first machines to the inlet of a subsequent machine, particularly for packing machines and the like.

In the packing or wrapping machine art, it is frequently necessary to convey products, packets or the like, from the outlets of one or more first machines, by which they are manufactured or treated in any manner, or by which e.g. a first covering is applied thereto, to the inlet of a subsequent machine, by which a further treatment or operation is carried out e.g. a second covering—e.g. of cellophane—is placed upon the first one.

Of particular interest is the case wherein the articles come from at least two outlets of the same first machine, or of different first machines, and are to be conveyed to the single inlet of a subsequent machine.

The articles coming from the different outlets of the first machine or machines, must be then fed in sequence to the single inlet, by mutually intercalating the arriving articles.

Typical of the foregoing situation is the making of cigarettes, wherein there are packaging machines, by which the cigarettes are packaged in a box or packet, upon which is then placed a second cellophane covering by means of subsequent wrapping machines.

The cigarette packaging machines are equipped with relatively slowly operated packaging heads, each of which is capable of producing at a rate much slower than that at which the pickets can be covered with cellophane by a packing or wrapping machine. Each packaging head feeds an outlet; and a single machine may be fitted with a plurality of packaging heads, with as many outlets. This is one of the cases wherein the conveyor system according to this invention can be conveniently utilized, to feed to a single cellophane wrapping machine (or subsequent machine) from a plurality of outlets of the packing machine (or first machine).

In order to convey the articles coming from the outlets of first machines to an inlet of a subsequent machine, such articles were heretofore usually collected in containers, which were then brought to the inlet of the subsequent machine.

It was also proposed to take the articles directly from the outlets of first machines, and to convey them to the subsequent machine by means of automatic conveyors.

Difficulties are encountered with the above method due to the fact that the rates of operation or outputs of the first machines and of the subsequent machines are usually independent or unrelated from one another. Further difficulties arise from possible stoppages or failures of the first machines, or of the subsequent machine.

An object of the present invention is to provide a conveyor system adapted to automatically distribute articles coming from a greater number of conveyor lines to a reduced number of conveyor lines.

Another object of the invention is to provide a conveyor system as described with reference to the preceding object which will be sensitive to the flow rate of the articles in the conveyor lines and adapted to automatically divert the articles from over-charged or obstructed conveyor lines to free conveyor lines.

A further object of the invention is to provide a con-

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veyor system as described in the preceding object, which will be capable of automatically diverting the articles from over-charged or obstructed conveyor lines to accumulating magazines from which the accumulated articles are again conveyed to the previously obstructed conveyor lines when these lines return to their normal operative conditions.

A further object is to provide a conveyor system as described in the preceding object in which all the operative members are mutually coordinated and sensitive to the operative conditions of the system and adapted to automatically adapt the operative condition of one part of the system to a change in operative conditions in another part of the system.

Still another object of the invention is to provide a conveyor system as described in the preceding objects, which will be reliable, durable, simple in operation and of low cost.

These and other objects are attained according to the invention by a conveyor system for conveying articles from at least two outlets of first machines to a subsequent machine, comprising conveyor channels by which the articles that come out of the first machines are brought in front of transverse pushers reciprocating in a direction transverse to the conveying direction of the articles, in combination with:

Feelers designed to cooperate with each one of said transverse pushers and allowing the latter to be moved forward only when an article is properly located in front of them;

A transverse channel positioned in front of each pusher.

A reciprocating lifting device arranged at the end of each transverse channel, and whereon the articles moved by the related transverse pusher are deposited at the end of each forward stroke thereof,

Magazines with hooking teeth and pressure teeth disposed above said lifting device, one magazine being provided for each transverse channel,

A second pusher reciprocating across the transverse channels under the magazines,

Drive means for the above operative members, timed in such a manner that the transverse pushers are moved forward when the lifting device is in its lowest position, and that

When the lifting device is being raised, the second pusher is out of the zone above said lifting device, and

That when the articles have been raised by the lifting device up to the hooking teeth, the second pusher is moved forward, thereby advancing the articles that are in front of it onto and along a feed channel extending to the subsequent machine.

As mentioned, this invention relates to a conveyor system, by which articles are conveyed from at least two outlets of first machines, to the inlet of a subsequent machine.

In such a case, it is required, according to the invention, that the articles coming from the outlets of first machines be successively conveyed to a subsequent machine, along a single feeding line for the subsequent machine.

Although the system according to the invention may be adapted for a number of outlets of first machines greater than two and a number of subsequent machines greater than one, but preferably less than the number of the outlets of the first machines, the case of conveying of articles from at least two outlets of first machines, to the inlet of a subsequent machine having a capacity slightly greater than the total capacity of both first machines, will be hereinafter described.

The above, and other objects, features and advantages of the invention, will be apparent in the following description of an embodiment thereof, related to conveying of articles from two outlets of first machines, to the inlet of

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a subsequent machine, and which is shown in the accompanying drawings.

In the drawings:

FIG. 1 is a diagrammatic top view of the conveyor system, as viewed along the line 15—15 of FIG. 2.

FIG. 2 is a vertical section of the conveyor system, taken on the line 11—11 of FIG. 1.

FIG. 3 is a vertical section of the conveyor system, taken on the line 12—12 of FIGURES 1 and 2.

FIGS. 4 and 5 are views of some details of the conveyor system.

In all the above figures, the same component parts are identified by the same reference numerals.

In FIG. 1, the first machines 21, 21' are provided with outlets 22, 22' at which articles 23 are discharged, and such articles are to be conveyed to the inlet of a subsequent machine 74.

Two conveyor lines, which are essentially the same, start from outlets 22, 22'. For the sake of clarity, the component parts of the line beginning at outlet 22' have not had reference numerals applied thereto in the drawing as they are the same as those of the line beginning at outlet 22.

Thus, only one of the conveyor lines is described in detail, namely that which starts from the outlet 22.

Said outlet 22 leads onto a conveyor belt (not shown) 24, pertaining to the conveyor system, and which is moved in the direction of the arrow. Such belt, together with stationary sides 63, forms a conveyor channel. At the end of such channel, a supporting landing 26 and a feeler member 28 are provided.

Such feeler 28 consists of a swinging blade pivoted, as at 58, on a base, and movable against the action of a return spring 59. A tooth 60 and a shoulder 61 are formed on the right end of said blade, as shown in the FIG. 5.

The operating speed of belt 24 is adjusted so as to be greater than the average speed with which the articles are delivered from the outlet 22 into the conveyor channel.

A pusher 32 provided on the right of the landing 26 (FIG. 1) is reciprocated in the direction of the arrow. Such pusher is formed with an inclined side catch 62 (FIG. 5) that is designed to cooperate with the feeler 28 in the hereinafter described manner.

Extending leftward from the landing 26 is a transverse channel 33 which ends on a lifting device 37 and against a stop wall 36.

The upper section of lifting device 37, which can be vertically reciprocated (as indicated by the arrows), is forked, and thus has two spaced end portions 38 and 39 (one for each of said conveyor lines) as shown on FIG. 2. When said lifting device is in its lowest position (i.e. that shown in FIG. 3), the upper edges of end portions 38 and 39 are flush with the bottom of channel 33.

A magazine 40, in the form of a vertical channel arranged above lifting device 37, is provided for each conveyor line.

Teeth 42, 43 are pivotally mounted in the lower section of each of magazines 40, and are acted upon by springs 54, so as to tend to protrude below the magazine lower edge. The lower end of each of the teeth is triangularly shaped, and has an inclined bottom edge 75 below, and a supporting shoulder 76 above.

Such teeth 42 and 43 (FIG. 3) are located so as to allow the articles conveyed by the transverse channel 33, to pass therebelow onto the upper end of the lifting device 37. When the lifting device 37 moves upwardly, the article thereon rides against the inclined edges 75 of teeth 42 and 43, thereby spreading apart the latter and permitting the article to pass therebetween. The supporting shoulders 76 of the teeth are flush with the forked ends 38 and 39 of device 37, when the lifting device is in its highest position.

Pressure teeth 44 project into each magazine through

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the sides of the latter at locations above the hooking teeth 42 and 43. Such pressure teeth are linked in groups, i.e. one group for each group of magazines associated with the outlets of a first machine, and each group of pressure teeth 44 is subjected to the action of corresponding electromagnets 50.

Such teeth 44 are urged by springs 41 against the second article (counting from below) contained within the corresponding magazine (see FIG. 3), and when the electromagnet 50 is energized, the teeth 44 are drawn outwardly, thus releasing the corresponding article.

The faces of teeth 44 that act against the article 23, are slightly chamfered or bevelled downward, thus allowing the articles that are pushed upwardly, to pass between said teeth and the opposite magazine wall, even when the teeth are pressed against the articles.

A tilting deflector member 49 (shown on FIG. 3 only) is pivoted, as at 70, in the upper section of each magazine 40, and can be moved by hand into two positions, which are respectively shown in solid and broken lines. A chute 77 (see FIG. 3) is arranged at one side of the magazines, and is designed to collect and to bring into a removable container 78 all articles which might fall from the top of magazines 40.

The above described conveyor lines end at the lifting device 37. From that point onward, the subsequent machine 74 is fed by a single feed conveyor whereon the articles coming from the preceding conveyor lines are canalized, mutually intercalated and aligned one behind the other.

A second pusher 45 is disposed in back of the rearmost magazine 40 (see FIG. 1) and is reciprocated in the direction of the arrows with a stroke sufficient to cover the whole area above the lifting device 37. The upper edge of pusher 45 is flush with the lower edge of the article 23 that rests on the supporting shoulders 76 of teeth 42 and 43 (see FIG. 3).

A latch 71 is controlled by an electromagnet 72 fitted with a return spring, whereby it can be brought into two different positions, i.e. that shown in FIG. 1, and a second position shifted toward the right, wherein latch 71 comes into engagement with a recess 73 formed in the second pusher 45 thus preventing the forward stroke thereof.

Such hindrance to the forward stroke continues even if, by the electromagnet 72, an attempt is made to draw the latch 71 outwardly, while the pusher is pulled forward by its resilient driving mechanism which is hereinafter described, because the end of latch 71 and recess 73 have inclined engaging surfaces shaped to then keep the latch engaged in the recess, thus overcoming the pull exerted by the electromagnet 72 (see FIG. 1).

A conveyor belt 46 extends from the side of magazine opposite to pusher 45, and is continuously driven in the direction of the arrow. Such belt is designed to cooperate with stationary sides 47, 48, thereby forming a conveyor or feed channel by which the articles are brought to the subsequent machine 74 (which is diagrammatically shown).

All the above described stationary components are carried by a base on which the specified movable components are also guided.

The transverse pushers 32 are slidably fitted in stationary guides 57 (FIG. 4) and are actuated by levers 56 rockable on stationary pivots 64. The levers 56 are each driven by a cam 65 rotatable on a shaft 66 effecting a complete revolution in the direction of arrow, during each cycle of operation. One end of each lever 56 is formed with a slot 67 receiving a slide 68 which is connected with the pusher 32, while the opposite end of said lever is formed with a roller 69 that is held against the contour of cam 65 by the action of a spring 55.

It will be understood that the active pushing stroke of the pusher is effected by the action of spring 55, while the return stroke is effected by the cam 65.

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The forward motion of each of the transverse pushers 32 is possible only when permitted by the respective feeler 28; in other words, only when an article has attained the position 30, exactly in front of the corresponding transverse pusher, thereby forcing the related feeler 28 outwardly so that the corresponding transverse pusher is allowed to move forward.

In the case in question, the stroke covered by each of the pushers 32 is such that the article is pushed from the position 30, into the transverse channel 33; whereby the articles already present therein are shifted forward, until the first article of the row contained in said channel, is brought to rest against the limit wall 36.

Conversely, when the feelers 28 have not been forced outwardly, they do not permit forward stroking of the pushers 32. In fact, when the pushers 32 are urged forward by the springs 55, the side teeth 62 of the pushers come into engagement with the teeth 60 of feelers (FIG. 5), and further motion of the pushers can take place only in the subsequent cycle, since even if in the meantime the feeler has been engaged by an article, it cannot be moved, because the motion thereof is prevented by the thrust exerted by the inclined end 62 of pusher 32, against the nose 61 of feeler 28.

The second pusher 45 is driven by a mechanism similar to the abovedescribed one for the transverse pushers 32. Therefore such mechanism is not shown in the drawings.

The drive for second pusher 45 is derived from a cam that rotates at the same velocity as cam 65, since it is connected therewith by gear or chain drives.

The lifting device 37 is rhythmically reciprocated up and down, for example, by the action of a cam and a rod or lever transmission, which may be considered obvious, and therefore have not been shown. Said cam is also rotated at the same speed as cam 65, to which it is, in turn connected by gear and chain transmissions.

Thus, the motions of transverse pushers 32, of pusher 45 and of the lifting device 37, are maintained in a positive relationship and coordinated with one another, thereby to cyclically operate, and all components perform a complete cycle of operation during each period, and return to their starting position at the end of each period.

The profiles or the shape of the periphery and timing or mutual angular setting of the several cams are designed in such a manner as to attain the hereinafter described coordination:

The lifting device 37 performs a reciprocating vertical motion, with dwell in the lowest position.

The operation of the mechanism for effecting the yieldable drive of second pusher 45, is such that pusher 45 is moved forward (when not prevented by the latch 71) only after the end of an upward stroke of lifting device 37, at which time the articles are held up by the shoulders 76 of teeth 42, 43, whereafter said pusher is returned to the position shown in FIG. 2 before the articles 23 are again lifted by the lifting device 37.

The operation of the mechanisms for driving the pushers 32 is coordinated with the motion of lifting device 37 that the pushers 32 are moved to the left, as viewed on FIG. 1, to bring the articles onto the lifting device 37 while the latter is in its lowest position.

The operation of electromagnets 72 and 50 is as follows:

The energizing circuit of magnet 72 is controlled by a control switch associated with the subsequent machine 74, whereby, when the latter machine is running, the circuit of electromagnet 72 is closed. The latch 71 is then kept withdrawn to the left, and the second pusher 45 is free to operate cyclically.

Conversely, when the subsequent machine 74 is inoperative, the circuit of electromagnet 72 is open and the electromagnet is deenergized to permit the latch 71 to be pushed outwardly by a spring (not shown), and thereby

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engaged with the recess 73 for preventing the forward motion of second pusher 45.

Thus, pusher 45 can be operated only when the subsequent machine 74 is running and adapted to receive the articles that are conveyed by the second pusher 45 onto the feed channel 46.

The electromagnets 50, by which the pressure teeth 44 are controlled, are controlled by switches associated with the related first machines 21, 21' in such a manner that, when first machines 21 and 21' are running, said electromagnets are de-energized, and the corresponding teeth 44 are engaged with the articles 23, as stated before, thereby preventing the engaged articles—together with all other articles piled thereon—from falling down.

If any one of the first machines 21, 21' is inoperative, then the corresponding electromagnets 50 are energized, thus withdrawing the teeth 44 out of contact with the related articles 23, whereby such articles, together with all other articles piled thereon, can come down step by step, and are pushed forward, one after the other, by the pusher 45 toward the machine 74.

It is to be noted that the operational cycle of the described transfer and conveyor system need not be synchronized with the operational cycle of the first machines 21, 21'.

The operation of the system is as follows:

The articles that come out of the first machines 21, 21' at the outlets 22, 22' and are conveyed by the belts 24 to the positions 30 on the supporting landings 26, where they cause the feelers 28 to be swung outwardly, and thereby permit the forward motion of pushers 32.

The operating cycle of the conveyor mechanism will be described starting from the stage wherein the cam 65, continuing in its rotation from the position shown on FIG. 4, causes the pusher 32 to be moved to the left, owing to the pull of the spring 55 acting on the lever 56. Each of the pushers 32, in being moved to the left, will push to the left the article in the position 30, whereby all other articles present in the transverse channels 33 are also pushed forward, until the first article of the row comes into contact with the limit wall 36 below the magazines 40.

If, on the other hand, no articles are present in the position 30, in front of pushers 32 at the moment when the drive mechanism would tend to move the pushers to the left, such movement is prevented by the feelers 28, and the corresponding transverse pushers 32 will stay in the position shown in the drawing, and may perform again a stroke to the left only in the subsequent operational cycle, provided that an article 23 is then properly conveyed to the position 30.

After the pushers 32 have been moved toward the left, the lifting device 37 is lifted, thus bringing the pile of articles, held by the teeth 42 and 43, to a position wherein the lowermost article in each pile is aligned with the second pusher 45.

During the above stage, as previously stated, the second pusher 45 is located outwardly of, or withdrawn from the space through which the articles are lifted, whereby it does not interfere therewith.

The hooking teeth 42, 43 are again closed below the lifted articles, whereby the lowermost articles are held in front of second pusher 45.

After the lifting device 37 has accomplished its upward stroke, the second pusher 45 can be moved forward. Such pusher, by travelling below the magazines 40, will push the articles 23, previously lifted by the lifting device 37, onto the conveyor belt 46.

Should a failure or inoperativeness of subsequent machine 74 occur, this would result in stopping of second pusher 45 in the previously described manner, while all other components proceed with their operation, so that the articles that are lifted by the lifting device 37 during each cycle thereof, are raised above the teeth 42, 43, and corresponding lift the pile of articles already present in the magazine 40 for storage in the latter.

When the magazines are full, and further articles are

introduced at the bottom, the articles at the tops of the piles are diverted by the tilting deflector member 49, which causes them to fall onto the chute 77 and down into the underlying removable container 78.

In case of a failure or stopping of any one of the first machines 21, 21', the pressure exerted by the teeth 44 against the article 23 within the magazine, is relaxed, and all articles come down to rest on the lowest one. The articles that are still on the corresponding conveyor lines continue to come into the magazines for a certain time. During such time, the articles stored in the magazines will be subjected to a rhythmic up and down reciprocating motion. If such motion is to be prevented, a lag or time delay might be inserted in the circuit of electromagnets 50, in order that the teeth 44 will continue to act against the article 23 in the magazines for some more time after the failure or stopping of the corresponding first machine. Such arrangement is not shown in the drawings, since it may be considered as obvious.

When no more articles come in from the corresponding conveyor lines, and the teeth 44 have been withdrawn from the articles 23, the articles present in the magazines come down to rest on the teeth 42, 43 each time that a backward stroke is accomplished by the pusher 45, and in the subsequent step, they are brought forward onto the conveyor belt 46 of the feed channel.

In such a manner, a compensating action is exerted by the magazines which serve as a storage chamber, wherein the excess of articles coming from the first machines is stored, and respectively given back to subsequent machines when such condition is reversed.

Such magazines 40 may then be refilled manually with articles taken, e.g., from the underlying container 78 wherein the articles diverted by the deflector member 49 are collected, when they become empty owing to a protracted stoppage of the first machines.

To allow a convenient refilling, said deflector member 49 can be swung outwardly to the position as shown with broken lines in FIG. 3.

After having thus described a preferred embodiment of the invention, it will be understood that many modifications and variations might be made thereto, as may be readily appreciated by any person skilled in the art, without departing from the spirit and scope of the invention, as defined by the claims.

In particular, it is apparent:

That the first machines might have any number of outlets, with as many lines for the conveyance of articles from the outlets 22, to the station of lifting device 37 which is provided with as many end portions as there are conveyor lines.

That a magazine for each line be provided above the lifting device.

That the pusher 45 shall have a stroke sufficient to cover the whole area above the lifting device 37.

I claim:

1. A conveyor system comprising in combination at least two first conveyor lines and at least one second conveyor line, said first conveyor lines having ends opening into said second conveyor line, a magazine member having an inlet above said ends of said first conveyor lines where said first conveyor lines open into said second conveyor line, first pushing means to push the articles conveyed in said first conveyor lines towards said opening ends, second pushing means to push against gravity the articles arriving at said opening ends towards the inlet of said magazine member, third pushing means to push the articles arriving at said inlet of the magazine member into said second conveyor line, first stopping means for stopping said third pushing means while allowing said

second pushing means to push the articles in said magazine member, second stopping means for stopping said first pushing means when there is a deficiency of articles in said first conveyor lines while allowing said second and said third pushing means to continue their operations and to push the articles descending from said magazine member at the inlet of said magazine member into said second conveyor line.

2. A conveyor system by which articles are fed from at least two outlets of first machines, to a subsequent machine, including conveyor channels for transporting the articles that come out of first machines, and transverse pushers arranged adjacent said channels and to which a reciprocating motion, normal to the direction of article travel in said channels, is imparted, in combination with: a feeler, designed to cooperate with each one of said transverse pushers, and that allows the related transverse pusher to be moved forward only when an article is properly located in front of it,

transverse channels positioned in front of said transverse pushers,

a vertically reciprocating lifting device, arranged at the end of said transverse channels, and whereon the articles, moved by said transverse pushers, are brought at the end of each forward stroke thereof, magazines with hooking teeth and pressure teeth disposed above said lifting device, one magazine being provided for each transverse channel,

a second pusher mounted for reciprocation across said transverse channels under said magazines,

a feed channel extending from in front of said second pusher to the subsequent machine, and

drive means for the transverse pushers, lifting device and second pusher timed in such a manner that the transverse pushers are moved forward when the lifting device is in its lowest position,

the second pusher is out of the zone above said lifting device when the latter is being raised, and

when the articles have been raised by the lifting device up to the hooking teeth, the second pusher is moved forward, thereby advancing the articles that are in front of it along said feed channel.

3. A conveyor system according to claim 2, further comprising means permitting said second pusher to operate only when the subsequent machine is running.

4. A conveyor system according to claim 2, further comprising means permitting the pressure teeth to act against articles present in the magazines only as long as the first machines are running, and, when the first machines are stopped, being operative to withdraw the pressure teeth, thus allowing the articles contained in the magazines to descend in the latter and be advanced onto said feed channel by said second pusher.

5. A conveyor system according to claim 2, wherein the upper ends of the magazines are open, to allow the discharge of articles in excess of the storage capacity of the magazines.

6. A conveyor system according to claim 5, further comprising a tilting deflector member arranged on the upper end of each magazine, to divert into a container the articles discharged from the overfilled magazines, said deflector members being tiltingly secured on the magazines to allow free access to the upper ends of the magazines.

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