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C. J. MALHIOT

2,680,545

CARTON FILLING MECHANISM

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FIG. 1

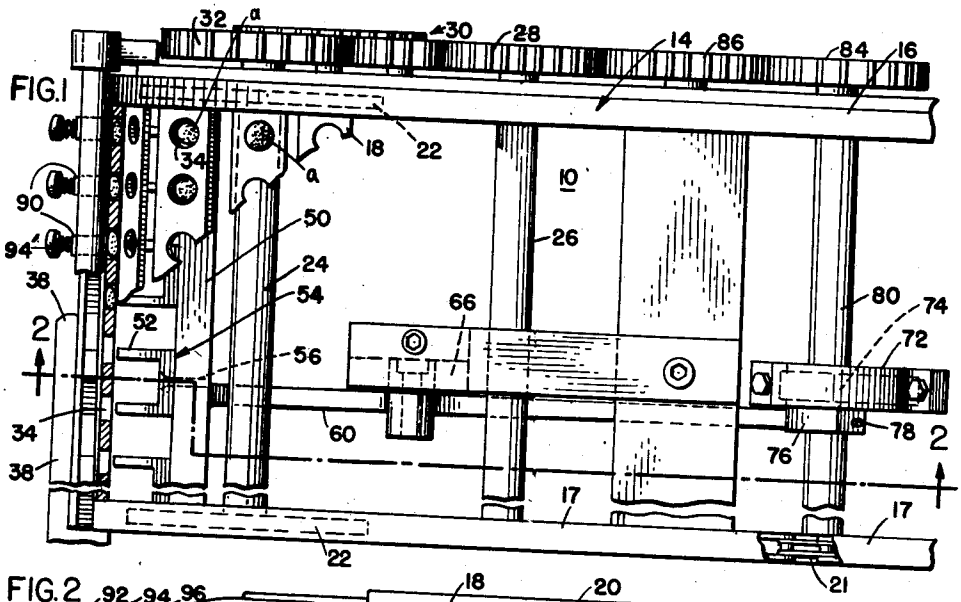



FIG. 2

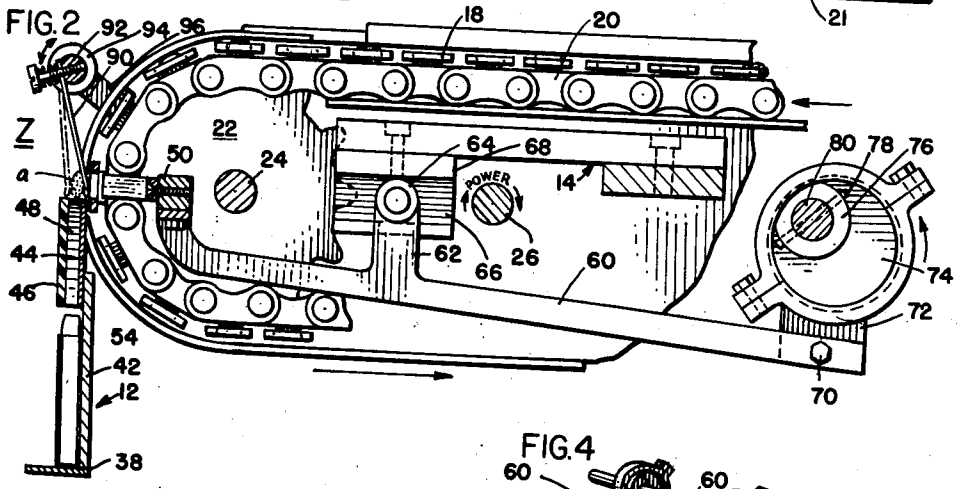



FIG. 3

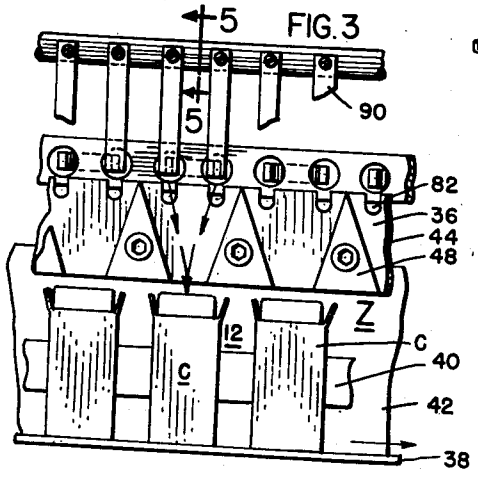



FIG. 4

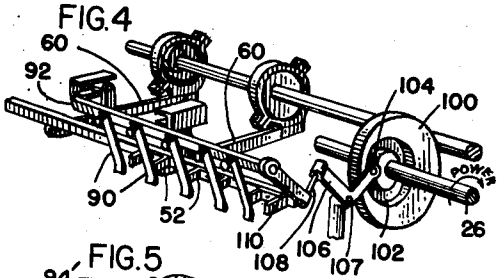
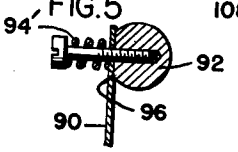



FIG. 5




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# UNITED STATES PATENT OFFICE

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## CARTON FILLING MECHANISM

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7 Claims. (Cl. 226—2)

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The present invention relates to carton filling mechanism and more particularly to improvements in feeding mechanism for segregating a predetermined number of articles, particularly articles of tablet form, such as cough drops, or the like, and for bringing them to a predetermined position relative to a series of receptacles or cartons in which the articles are to be packaged and for then discharging them into the respective cartons in such a manner that the cartons are progressively filled with a predetermined number of the articles. The invention is designed as an improvement over the apparatus shown and described in my prior Patent No. 2,307,415, dated January 5, 1943, for Feed Mechanism.

Briefly, the apparatus illustrated in the above mentioned application comprises a carton conveyor by means of which open ended cartons are passed in rapid succession through a carton filling zone and wherein the articles are adapted to be successively deposited in pairs or groups into the cartons so that the cartons will emerge from the filling zone in filled condition.

A filling and counting mechanism serves to segregate the articles from a batch and bring them to a predetermined position in close proximity to the cartons prior to depositing them in pairs into the cartons. This mechanism includes a plurality of perforated strips or bars which are carried on an article conveyor and which are provided with receiving openings therein into which the articles are caused to be positioned. The bars are moved beneath the batch of articles and emerge therefrom with a single article positioned in each opening. An ejector mechanism operating in timed relationship with the movement of the perforated bars and with the movement of the cartons through the filling zone is provided so that when the loaded conveyor bars reach a predetermined position within the filling zone a series of fingers forming a part of the ejector mechanism will project into the openings provided in the bars and eject the articles into a series of chutes, each of which extends to the open end of a respective carton passing through the filling zone and into which carton the articles are deposited. After the articles have been ejected from the respective openings in which they are contained and allowed to fall by gravity into the respective cartons, the fingers are withdrawn from the openings and the unloaded ejector bars pass along the lower straightaway portion or run of the conveyor and are returned to the batch for subsequent filling operations. The process is a continuous one.

The present invention is designed as an improvement over the apparatus briefly described above in that means are provided for accurately aligning the articles with the open ends of the cartons passing through the filling zone prior to their release so that the articles will fall directly into the cartons and not obstruct the entrance to

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the same. The present invention is particularly useful in the packaging of articles in tablet form as, for example, cough drops, which are either of lozenge shape design or which are of disc-like design having a diameter which is somewhat in excess of the thickness thereof. Where attempts are made to package tablets of this nature in a package whose internal thickness is less than the diameter, length, or width of the article, there is a tendency for articles which are fed by gravity into the packages to fall across the openings leading into the package and obstruct the passage of subsequently fed articles into the carton. The present invention is designed to remedy the above mentioned limitation that is attendant upon feeding of articles by gravity into cartons and toward this end it contemplates the provision of a gripping means whereby each article as it emerges from the opening in the perforate filler strips under the influence of the ejecting fingers is engaged by a flexible retaining finger so that the article is momentarily poised above the filling opening of the carton and so oriented that its relatively flat side surfaces are contained wholly within a vertical projection of the carton sides. The articles, thus held between the gripping fingers and the ejecting means, are then released and allowed to fall by gravity directly into the carton, the distance above the open end of the carton at which the articles are momentarily poised being sufficiently small that there is no possibility of the article becoming tilted before it is received within the confines of the carton.

Where the cartons are moved through the filling zone continuously the articles which are released in the manner outlined above may be allowed to fall into a chute leading to the open-ended carton and the width of the chute may be substantially equal to or only slightly greater than the width of the carton with which it communicates and only slightly greater than the minor dimension of the articles undergoing packaging. In such an instance the article will be poised above the upper entrance to the chute in close proximity thereto before being released into the chute for transfer into the carton.

The provision of a feeding mechanism of the character outlined above being the principal object of the invention, another object thereof is to provide an improved ejecting means whereby the articles are progressively ejected from the openings in the filler bars by a series of ejecting fingers which are caused to extend into the openings to discharge the articles therefrom and which at the same time have imparted thereto components of motion which cause them to follow the travel of the filler bars and maintain registry with the openings therein during the passage of the filler bars through the filling zone.

Another object of the invention is to provide a feeding mechanism of this type wherein the

gripping fingers are individually flexibly mounted on a common actuating bar so that the flexing pressure applied to each finger will be effectively isolated and not transferred to the other gripping fingers carried by the same actuating bar.

The provision of a feeding mechanism including orienting means for the individual articles as briefly outlined above which is extremely simple in its construction, one which is comprised of a minimum number of moving parts and which therefore is unlikely to get out of order, one which is rugged and durable and therefore dependable in its operation, and one which may be manufactured at a comparatively low cost are further desiderata which are to be borne in mind in the production and development of the present invention.

In the accompanying single sheet of drawings forming a part of this specification,

Fig. 1 is a fragmentary top plan view of a carton filling mechanism constructed in accordance with the principles of the present invention. In this view certain parts have been broken away to more clearly reveal the invention;

Fig. 2 is a sectional view taken substantially along the line 2—2 of Fig. 1;

Fig. 3 is a front elevational view of the structure shown in Fig. 1;

Fig. 4 is a perspective view somewhat schematic in its representation showing a certain driving mechanism for the operative machine parts employed in connection with the present invention; and

Fig. 5 is an enlarged detail sectional view taken substantially along the line 5—5 of Fig. 3.

In all of the above described views similar characters of reference are employed to designate similar parts throughout.

The carton filling mechanism comprising the present invention involves in its general organization an article conveyor designated in its entirety at 10, and a carton conveyor designated in its entirety at 12. The article conveyor 10 may be generally of the type shown and described in the above mentioned patent. The article conveyor 10 has associated therewith a suitable feed hopper and other operative instrumentalities (not shown herein) by means of which a series of articles *a* are deposited and distributed on and over the surface of the upper run of the conveyor, all in a manner clearly set forth in the above mentioned patent.

The article conveyor 10 includes a framework 14 having a pair of side members 16 and 17. The conveyor 10 further includes a plurality of transverse strips which are operatively positioned between the side members 16 and 17 and are connected to a pair of conveyor chains 20 and 21. The chains 20 and 21 pass over respective pairs of sprockets, only one sprocket 22 of each pair being shown in the drawings. The sprockets 22 are suitably mounted on a shaft 24 which extends transversely across the conveyor and which serves to synchronize the movements of the two chains 20 and 21 so that the latter travel in unison.

The shaft 24 shown in Fig. 1 constitutes the driving shaft for the conveyor 10 and is operatively connected to a suitable source of power represented by a power shaft 26 which has been labelled "Power" in Figs. 2 and 4. The power shaft 26 is suitably journalled in the machine framework 14 and carries a gear 28, which is connected by a train of reduction gearing 30 to a driving gear 32 mounted on the conveyor driving shaft 24.



The transverse strips 18 assume positions of parallelism along the upper run or straightaway portion of the conveyor and occupy positions slightly spaced from each other, thus forming in the upper straightaway portion of the conveyor a table portion onto which the articles are adapted to be fed from the feed hopper, not shown. Each of the strips 18 is provided with a series of openings 34 which are preferably in the form of small holes of a diameter slightly in excess of the diameter of the articles *a*. The articles are distributed on and about the upper straightaway portion of the conveyor, by mechanism which forms no part of the present invention but which has been illustrated in the above mentioned patent, in such a manner that during passage of each strip 18 along the upper straightaway portion of the conveyor each of the openings or holes 34 receives therein one of the articles *a*, which in the present instance may be in the form of a cough drop, or similar tablet. The articles *a*, which find respective positions within the various openings 34 provided in the transverse strips 18, are carried forward along the upper straightaway portion of the conveyor and as the strips 18 successively move downwardly at the forward end of the conveyor, shown at the left-hand side of Fig. 2, the articles are likewise carried downwardly and pass through a filling zone Z wherein the articles are positively forced from the holes or openings 34 and are deposited by gravity into a series of chutes 36, which communicate with the open upper ends of a series of cartons *c* carried on the conveyor 12 and into which cartons the articles are packaged.

The cartons *c* are carried on a conveyor belt 38, which constitutes a part of the carton conveyor 12, and the articles move in the direction indicated by the arrow in Fig. 3. A series of spacer elements or retaining members 40 also constitute a moving part of the conveyor 12 and serve to maintain the cartons *c* properly oriented with respect to the various chutes 36 during passage of the cartons through the filling zone Z. A backing plate 42 extends across the filling zone Z and cooperates with the members 40 in maintaining the cartons *c* in filling position.

The chutes 36 into which the articles are discharged are provided in a composite chute assembly which includes a rear wall 44, which also constitutes a stripper plate for the articles, as will be described presently, and a front wall 46, the two walls being maintained spaced apart by generally triangular-shaped pieces 48 which extend between the two plates and which, in combination with the inner surfaces of the two plates, provide a series of hopper-like or V-shaped passages representing the chutes 36. The lower ends of the chutes 36 are open to permit discharge of the articles from the chutes into the various open ended cartons *c* which pass beneath the chutes and which are maintained in registry with the lower open ends of the chutes at the time that the articles are discharged from the chutes.

The ejecting means for positively forcing the articles *a* out of the openings 34 and depositing them in the chutes 36 comprise an elongated transversely extending bar 50 arranged beneath the upper straightaway portion of the conveyor 10 in the vicinity of the filling zone and extending a distance substantially equal to the width of the conveyor and consequently to the length of the strips 18. The bar 50 is provided with a series of forwardly extending ejecting fingers 52, the number of fingers being the same as the number

of openings 34 provided in the various strips 18. The fingers 52 are adapted to be projected through the openings 34 so as to engage the articles at a precise moment in the machine cycle and eject the same simultaneously from the various openings 34 to cause the same to fall by gravity into the chutes 36 underlying a particular bar at the filling zone at the time of ejection. The fingers 52 may conveniently be formed in pairs by the provision of generally U-shaped members 54 which are suitably secured to the bar 50 by anchoring studs 56 at spaced points along the bar 50.

The bar 50 is carried at the forward ends of a pair of movable rocker arms 60, each having an upstanding medially disposed suspension arm 62 formed thereon and carrying at its upper end a roller 64. The rollers 64 are slidably disposed in respective guideways 66 formed in a pair of channel members 68 which are suspended from a stationary portion of the framework 14 of the conveyor 10.

The rear ends of the rocker arms 60 are each attached as at 70 to an eccentric sleeve 72 mounted on an eccentric disc or member 74, the latter having a hub portion 76 secured as at 78 to a shaft 80 rotatably journalled in the side members 16 and 17 of the conveyor 10.

The two eccentric discs 74 are similarly eccentrically disposed on the shaft 80 so that as they rotate in unison the rocker arms 60 move in unison with both tilting and sliding components of motion so as to impart a closed orbital path of movement to the ejector bar 50 which is carried at the forward end of the rocker arms. The path of movement of the ejector bar 50 is such that an ejecting operation will take place each time one of the transverse strips 18 arrives in ejecting position at the filling zone Z. Toward this end the extreme ends of the various fingers 52 will enter their respective openings 34 in the strips 18 and travel with the strips downwardly while at the same time projecting through the openings 34 so as to eject the articles *a* into the chutes 36. During the inward or retracting stroke of the bar 50 the fingers 52 will move into register with a series of slots 82 (Fig. 3) provided in the upper edge of the stripper plate 44 to positively dislodge the articles *a* from the tips of the fingers 52 in the event that there is any tendency for the articles to adhere to the fingers.

The shaft 80 is adapted to be driven in timed relation to the movements of the conveyors 10 and 12 and, accordingly, a gear 84 carried by the shaft 80 is connected by an idler gear 86 to the gear 28 on the power shaft 26.

In order to insure proper orientation of the various articles *a* as they are ejected from the openings 34 of the strips 18 so that the minor dimension thereof is parallel to the minor dimension of the cartons *c* on the conveyor 12 and to thus prevent the articles from falling across the upper openings of the chutes and obstructing access to the interior of the carton, a series of gripping fingers 90 are carried in spaced relationship on an oscillatable rod or rock shaft 92 suitably journalled in bearings 94 carried by a pair of brackets 96 secured to the framework 14 at opposite sides of the conveyor 10.

The gripping fingers 90 extend generally downwardly in parallel comb-like fashion from the rock shaft 92 and the oscillatory movements of the latter are timed relative to the movements of the transverse strips 18 and ejecting fingers 52 so that immediately prior to and during ejection of the articles *a* from the openings 34 in the strips 18 by the fingers 52, the extreme lower ends of the gripping fingers 90 will lightly engage the exposed surface of the article *a* and, in conjunction with the fingers, hold the article poised, so to speak, directly above the entrance to the chutes 36.

The individual fingers 90 are yieldingly carried on the bar 92 by means of retaining stud and spring assemblies 94' (Fig. 5) which serve to hold the upper sides of the fingers 90 against a flattened portion or face 96 formed on the rock shaft 92. The fingers 90 are thus capable of individual and slight rocking movement on the rock shaft 92 and each finger is capable of yielding slightly so as not to place a strain on the bar tending to affect the gripping action of adjacent fingers in the event that a particular article is not of standard dimensions.

The mechanism for oscillating the rock shaft 92 in timed relationship to the movements of the conveyors 10 and 12 is illustrated in Fig. 4 and includes a disc 100 which may be mounted on the power shaft 26 and which is provided with a cam slot 102 therein in which there is disposed a follower roller 104 mounted on a bell crank lever 106 pivoted as at 107 to a stationary part of the machine framework 14 and connected by a link 108 to an arm 110 secured to an end of the bar 92. It will be seen that upon rotation of the power shaft 102 the eccentric movements of the cam roller 104 in the groove 102 will impart an oscillatory movement to the bar 92 through the linkage system including the bell crank lever 106, link 108 and rocker arm 110. Obviously any other suitable linkage system or driving connection may be employed for imparting oscillatory movements to the bar 92 to attain the desired result.

The extent of the oscillatory movement applied to the rock shaft 92 and the timing of the movements thereof are such that the articles *a* are engaged by the lower ends of the fingers 90 as they emerge from the openings 34, are gripped between the fingers 90 and 52, are brought to a position directly above the chutes 36 and then released as the fingers and rock shaft 92 reach the limit of their clockwise oscillatory movement as viewed in Fig. 2. The articles are thus held properly oriented relative to the chutes so they will enter the chutes and pass therethrough and into the cartons *c* with their minor dimensions parallel to the minor dimensions of the chutes and of the cartons *c*.

The moving parts of the apparatus are so correlated and synchronized so that they all work harmoniously together and assure for positive operation.

Changes may be made in the form, construction and arrangement of parts from those disclosed herein without in any way departing from the spirit of the invention or sacrificing any of the attendant advantages thereof, provided, however, that such changes fall within the scope of the claims appended hereto.

The invention is hereby claimed as follows:

1. In an apparatus for depositing articles in the open upper end of a container, means establishing a filling zone, means for supporting the container beneath said zone, continuously moving means for successively bringing articles to said filling zone, means at said zone for engaging simultaneously the opposite sides of said articles brought to said zone while said articles are continuously moving and for moving the articles bodily to a position of vertical alignment with

the open end of the container beneath said zone and for thereafter releasing the articles to cause the same to fall by gravity into said container through the upper open end thereof.

2. In an apparatus for depositing articles in the open upper end of a container, means establishing a filling zone, means for supporting the container beneath said zone, continuously moving means for successively bringing articles to said filling zone, means at said zone for yieldingly engaging simultaneously the opposite sides of said articles brought to said zone while said articles are continuously moving and for moving the articles bodily to a position of vertical alignment with the open end of the container beneath said zone and for thereafter releasing the articles to cause the same to fall by gravity into said container through the upper open end thereof.

3. In an apparatus for depositing articles in the open upper ends of a series of containers, means establishing a filling zone, means for supporting the containers beneath said zone, continuously moving means for successively bringing articles to said filling zone at predetermined positions, means for engaging one side of successive articles in said predetermined positions while said articles are moving and forcing the same bodily into vertical alignment with the open upper end of the cartons disposed beneath said zone, and means for engaging simultaneously the opposite side of said articles while said articles are moving and during bodily movement thereof to clamp the articles to said first engaging means and for thereafter disengaging said latter side of the articles to release the articles for movement by gravity into said containers through the open ends thereof.

4. In an apparatus for depositing articles in the open upper ends of a series of containers, means establishing a filling zone, means for supporting the containers beneath said zone, a continuously moving conveyor for successively bringing articles to said filling zone and positioning them in predetermined locations, a plurality of ejecting fingers movable repeatedly from retracted positions to advanced positions wherein they engage the articles on said conveyor in said predetermined positions at the filling zone while said articles are moving and move the same from the conveyor bodily into register with the open end of the cartons below said filling zone, a series of gripping fingers likewise movable from retracted positions to advanced positions wherein they engage the articles while said articles are moving and maintain the same in engagement with said ejecting fingers during bodily movement of the articles, and means for moving said ejecting fingers and gripping fingers in timed relationship.

5. In an apparatus for depositing articles in the open upper ends of a series of containers, means establishing a filling zone, means for supporting the containers beneath said zone, a conveyor for successively bringing articles to said filling zone and positioning them in predetermined locations, a plurality of ejecting fingers movable repeatedly from retracted positions to advanced positions wherein they engage the articles on said conveyor in said predetermined positions at the filling zone and move the same from the conveyor bodily into register with the open end of the cartons below said filling zone, a rock shaft mounted for oscillation about an axis, a series of gripping fingers mounted on the rock shaft and movable in unison therewith from retracted positions to advanced positions wherein the free ends thereof engage the articles and maintain the same in engagement with said ejecting fingers during movement of said latter fingers from their retracted to their advanced positions, means for moving said ejecting fingers and means for oscillating said rock shaft in timed relationship to the movement of said ejecting fingers.

6. In an apparatus for depositing articles in the open upper ends of a series of containers, means establishing a filling zone, means for supporting the containers beneath said zone, a conveyor for successively bringing articles to said filling zone and positioning them in predetermined locations, a plurality of ejecting fingers movable repeatedly from retracted positions to advanced positions wherein they engage the articles on said conveyor in said predetermined positions at the filling zone and move the same from the conveyor bodily into register with the open end of the cartons below said filling zone, a rock shaft mounted for oscillation about an axis above the level of said articles at said predetermined positions, a series of gripping fingers mounted on said rock shaft and depending therefrom, said rock shaft being capable of limited oscillating movement wherein the free ends of the fingers carried thereby are movable from retracted positions to advanced positions wherein the free ends thereof engage the articles at said predetermined positions and maintain the same in engagement with said ejecting fingers during movement of the latter fingers from their retracted positions to their advanced positions, means for moving said ejecting fingers, and means for oscillating said rockshaft in timed relationship to the movement of said ejecting fingers.

7. In an apparatus for depositing articles in the open upper ends of a series of containers, means establishing a filling zone, means for supporting the containers beneath said zone, a conveyor for successively bringing articles to said filling zone and positioning them in predetermined locations, a plurality of ejecting fingers movable repeatedly from retracted positions to advanced positions wherein they engage the articles on said conveyor in said predetermined positions at the filling zone and move the same from the conveyor bodily into register with the open end of the cartons below said filling zone, a rock shaft mounted for oscillation about an axis above the level of said articles at said predetermined positions, a series of gripping fingers mounted on said rock shaft and depending therefrom, said rock shaft being capable of limited oscillating movement wherein the free ends of the fingers carried thereby are movable from retracted positions to advanced positions wherein the free ends thereof engage the articles at said predetermined positions and maintain the same in engagement with said ejecting fingers during movement of the latter fingers from their retracted positions to their advanced positions, cam means for moving said ejecting means, cam means for oscillating said rock shaft, and means correlating the movements of said cam means.

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