

Dec. 28, 1965

A. L. EHE

3,225,513

AUTOMATIC PACKAGING MACHINE

Filed Nov. 1, 1961

Fig. 1

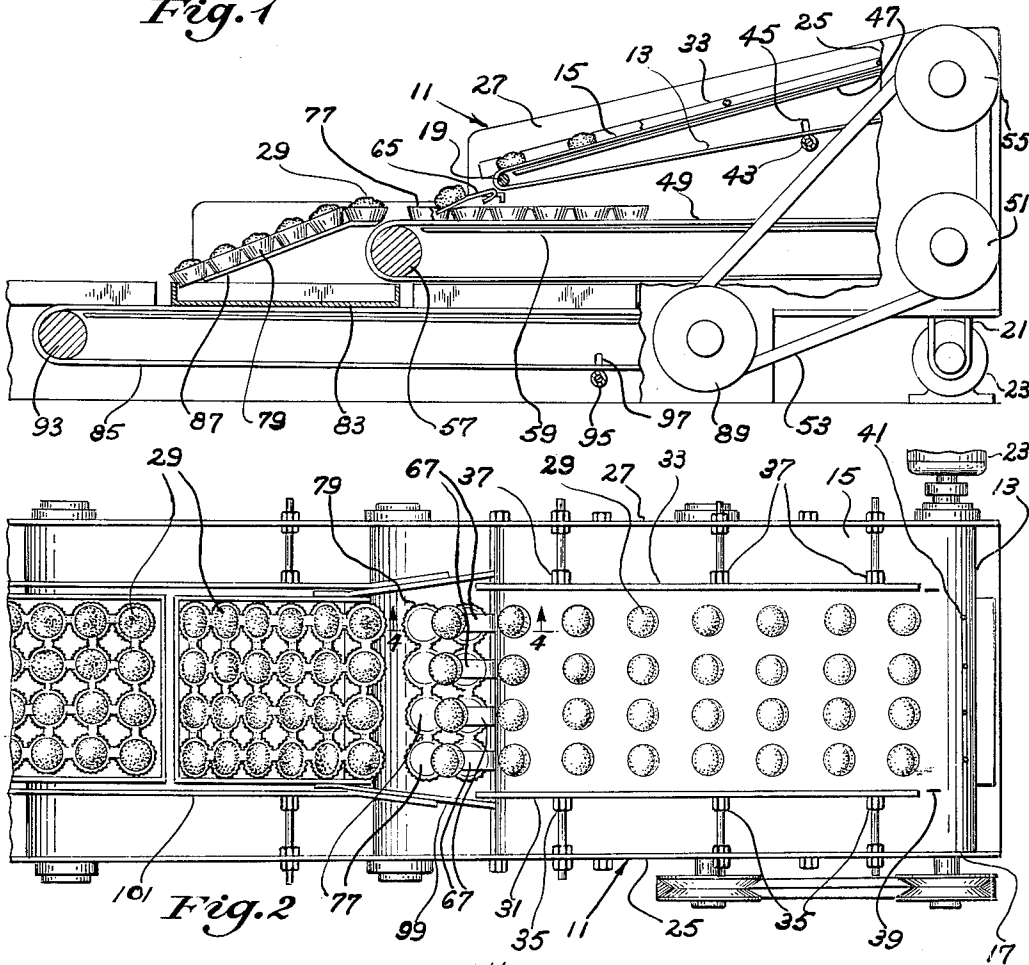


Fig. 2

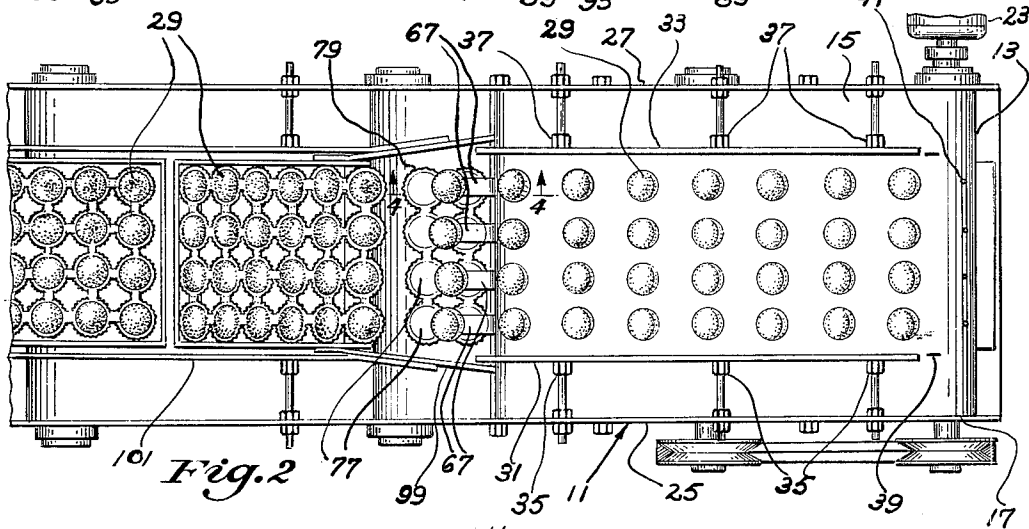


Fig. 3

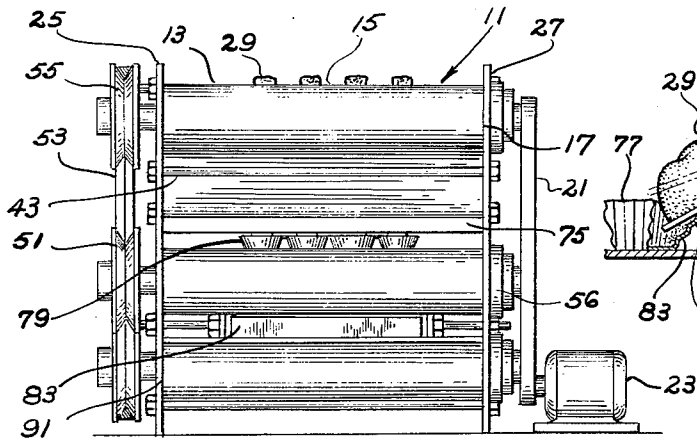
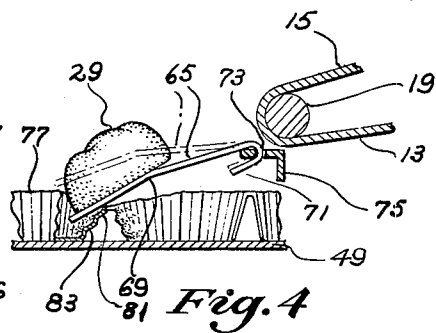


Fig. 4



INVENTOR.
ALBERT L. EHE
BY *Raymond F. Kramer*
ATTORNEY

1

3,225,513

AUTOMATIC PACKAGING MACHINE

Albert L. Ehe, Bayside, N.Y., assignor to Multicup Automation Company, Inc., Woodside, N.Y., a corporation of New York

Filed Nov. 1, 1961, Ser. No. 149,310
7 Claims. (Cl. 53—160)

This invention relates to automatic machinery for packaging articles. More particularly, it relates to the packaging of articles, such as confections, in multi-compartmented trays.

In the packaging of many products, automatic methods and machines have supplanted manual packaging. However, for many reasons, the packaging of confections, such as chocolates, in paper cups and in boxes has not hitherto been adopted commercially as an automated operation. Among these reasons are the fragility of the product, the ease with which it may be marked and made unattractive in appearance, the diversity of types of the product and the special packing patterns employed, which are subject to change frequently, plus the complexity of the equipment previously developed and the need for a substantial proportion of hand operations to supplement the machine's performance. Similar reasons account for the failure to invent automatic packing machines for other items, in addition to the chocolates mentioned above. The present machine provides a comparatively simple and trouble-free mechanism for automatic packaging of confections and articles of similar packing properties. An important aspect of the invention is in the sliding mechanisms which facilitate transfer of the articles being packed from a transporting means to the tray into which they are being packed. The invention, its objects and advantages thereof will be understood from the following description, taken in conjunction with the illustrative drawing in which:

FIG. 1 is a side elevational view of the invention, partially cut away to illustrate the packing of confections in paper trays and cardboard boxes;

FIG. 2 is a top plan view of the embodiment of the invention illustrated in FIG. 1;

FIG. 3 is an end elevation of the same machine; and

FIG. 4 is a vertical section along plane 4—4 of FIG. 2, illustrating the operation of the slide means for conveying the confections from article delivery belt to receptacle cups.

In accordance with the invention, a machine for automatically placing a plurality of articles into compartments in a multiple compartmented packing tray comprises means for simultaneously moving a plurality of articles, means for moving a multiple compartmented packing tray below the articles and means for controlling the relative movements of the moving means so that the articles are indexed to compartments therefor in the packing tray. Between the moving means are means for supporting and conducting the articles from the moving means to the compartments of the packing tray. Such supporting and conducting means, at its delivering end, is below the upper edge of the packing tray compartment into which an article is being conducted, when the article is being discharged to the compartment, and is above the upper edge of the compartment, which is also the upper edge of the adjacent compartment, when the supporting and conducting means is raised after delivery of an article.

The invented automatic packing machine includes article delivering means 11 which comprises an article delivery belt 13 of the continuous endless belt type, stretched tightly or otherwise held so that the upper supporting surface thereof, 15, is held straight, free of any objectionable sag. Upper belt surface 15 is downwardly inclined, from driving cylinder 17 to idling bar 19, of thin cylindrical

2

stock. Drive cylinder 17 is powered by a belt 21 driven by motor 23. In the embodiment of the invention shown, both the drive and idling cylinders are held in movable relationship with each other by mounting on the thin side walls 25 and 27 of a suitable frame for the machine. The frame is suitably rigidified by conventional means. The rigidity of the frame is increased by the presence of the driving and idling cylinders of the article delivery belt, already described, and also by the presence of similar cylinders on tray and box delivery means, to be described later. As is apparent from the drawing, bearing surfaces must be provided for the belt drive parts but these may be conventional designs and are not specially indicated in this description.

The article delivery belt 13 has a plurality of articles to be packed distributed over its upper surface 15 in an ordered arrangement so that they may be packed into the compartmented packing tray. Articles 29 are confections, such as the well-known chocolates or bon-bons. They are prevented from being badly misaligned by the presence of side rails 31 and 33 which are adjustable by movement of adjusting nuts 35, for rail 31 and by movement of nuts 37 for rail 33. The rails are regulated in position according to the size of the candies and the number of compartments per tray. To facilitate placement of the rails in correct positions for each size combination, the screws on which nuts 35 and 37 are threaded may be marked along their lengths. Better still, the belt surface 15 may be marked, as at 39. Marking of the belt, as at 41, also allows correct placement of each of the pieces of candy, so that they may be fed into the compartments of the packing trays with the least difficulty. The candies may be placed on the article delivery belt automatically, as by another machine which is not a part of the present invention or such placement may be effected by hand.

In the foregoing description, the supporting surface of the article delivery belt was said to be held taut but means for so holding it were not specifically described. Idling roller 43 may be moved in slots 45 to exert the proper tension on the belt. Also, a piece of form-retaining sheet material, such as metal, acts as a support 47 below the upper surface 15 of the article belt, to prevent sagging.

Underneath the article delivery belt 11 is a horizontal tray delivery belt 49. This belt is powered through a pulley 51 belt-driven by belt 53, which also rides in the sheave or pulley 55, attached to driving cylinder or roller 17. The pulleys employed are of variable groove width and the belt 53 is of the V-type, making the pulley and roller speeds adjustable so that the non-slipping belts which hug the pulleys positively hold them so article and tray moving means may be correctly indexed together. Pulley 51 is fastened to roller 56 which drives the tray delivery belt 49, roller 57 being the other end of the belt holding means. Table means 59 helps keep the belt 49 straight and flat, while an idler can be firmly positioned with respect to slots to maintain the proper tension on the belt 49. Although not illustrated, side rails much like those of the article delivery belt may also be used to wall the tray delivery belt top surface. Also, the belt may be marked for placement of the trays.

Between the article and tray delivery belts, there is provided a slide means or supporting and conducting means 65 for transferring the bon-bons from article belt to tray compartment. In the drawing this is shown to be a set of four spring metal, preferably spring steel fingers 67 bent downwardly near the mid-length of the spring material at 69 and bent into a U-shape 71 at the end to hook through opening 73 in angle iron bar 75. As is seen, the angle 75 is fastened in place under the take-off end of the article delivery belt by affixation to frame sides 25 and 27. Fingers 67 are shown mounted independently,

one finger for each file of tray compartments 77. Files of compartments parallel the belts, while ranks are transverse to them. Instead of individually mounted fingers, those mounted together or made from one piece of material may be used provided that they can perform the same function efficiently. The function of the fingers is to allow the candy to slide down the finger, maintained in upright position, without tipping or inversion, and be deposited in the correct compartment of the packing tray 79. It will be noted that fingers 67 are depressed or lowered when a piece of candy is advanced by belt 13 onto the finger in the same file as the candy. The degree of lowering is dependent upon the shape of the U-bend of the finger and the passageway through which it is inserted. As illustrated, the finger is in a downmost position and the piece of candy resting on it is about to slide into the compartment of the packing tray. Of course, the timing of the belt movements will be such as to cause the candy to be perfectly positioned in the compartment. The insertion of the article in the tray compartment is facilitated by the action of the slide finger in spreading open the compartment, as is shown at 81, where the wall 83 is temporarily distorted. After insertion of the article in the proper place, the finger 65 is raised by the next advancing cup to the position indicated by the broken lines in FIG. 4, allowing the next cup to move into filling position without having the forward cup wall pressed downwardly to a position where it would interfere with the subsequent filling of the cup. From the above description, it is clear that flat-bottomed articles, such as chocolates, may be packed easily into packing trays by means of this invention, and such articles will slide down the fingers 65 without turning or tipping. However, the invention may be used for packing articles other than those with flat bottom surfaces, although in some such cases the fingers will best be re-designed to prevent the articles from slipping sidewardly. Such a design may be a channel or groove in the finger extending longitudinally.

After the articles have been properly placed into the corresponding cups, the trays continue to advance, moving down an inclined slide into the bottom of a box into which they are packed. Trays 79 are flexible and conform to the slide surface, as illustrated. Yet, the tray is a unit and therefore is more easily packed into box 83. The box bottoms are advanced into filling position by belt 85 under slide 87. Proper timing is maintained by adjustment of the effective diameter of pulley 89 which runs off belt 53. Pulley 89 is positively attached to drive roller 91 and belt 85 turns about that roller and roller 93. Idling roller 95 is adjustable in slot 97 to maintain the correct tension on the belt. Adjustable guides 99 and 101 help to position the trays and boxes and avoid mismatching and disalignment.

Use of the present invention is simple and operational techniques are quickly learned, even by personnel who are not mechanically trained or inclined. If the belts are pre-marked with spots where the chocolates or other articles are to be placed, and contain other indicia for the trays and boxes, it is only required of the operator that he make sure that the belts are kept loaded, as indicated, with articles, trays and boxes, and that he remove the packed boxes. He need not and should not make any belt speed adjustments after the delivery means have been coordinated. Keeping the belts full is not any problem for a single operator because in commercial machines the belts will all be of greater lengths than those illustrated and therefore re-loading will not have to be done as frequently. In the machine illustrated, the belt lengths are shortened to improve the illustration and to clarify the operations described.

If the belts have not been marked or if it is desired to pack articles of different sizes or to pack in different trays and boxes, it still is not a difficult operation to coordinate the belts and then re-mark or mark them for the first time with indicia for placement of the various

items moved by them. To accomplish this, first the speed of motor 23 or equivalent prime mover is set and articles 29 are arranged on belt 13 in spaced ranks and files. Trays 79 are placed on the tray delivery belt 49 and pulley 51 is adjusted until the speed of the tray delivery belt is such that the rows of chocolates are deposited in the tray compartments for which they are intended. Next, a similar operation is repeated to index the tray with the box. When the correct speeds and spacings are established, which should take no longer than a few minutes of experimentation, the belts are marked for placement of articles, trays and boxes. Markings of the type described are useful when the belts of the machine are being loaded by hand. When machine loading is employed and the filled boxes are automatically withdrawn, marking of the belts may not be necessary or even especially advantageous.

The structure and use of the invented machine for packing articles in multi-compartmented trays has been described with reference to the foregoing description and the drawing in which a preferred embodiment of the invention has been illustrated. It is not meant that the invention should be restricted to the device described. Rather, the invention includes the subject of the claims and all equivalents to the device therein described. Thus, instead of filling a single multicompartmented tray, a pair of such trays, comprising one or more files each, may be filled at a time and both trays may be placed automatically into the same box. In another version, two or more such trays may be filled at a time and then automatically filled into a plurality of boxes. The invented machine may also find use in packing single-compartment cups which are fed below the article delivery belt in a file or a plurality of files. While the invention has been described in reference to filling candy cups and trays with chocolates, it is clear that it may also be employed for packing fruits, baked goods, delicate electrical parts and other items as well.

What is claimed is:

1. A machine for automatically placing a plurality of articles individually into individual compartments of a multiple and flexible compartmented packing tray which comprises a continuous article delivery belt for simultaneously supporting and moving in ordered relationship a plurality of articles to be packed, a continuous tray delivery belt for simultaneously supporting and moving a series of multiple compartmented trays into position below the articles, the trays each containing identically located compartments extending in ranks across the tray delivery belt and in files paralleling it and the articles being positioned correspondingly on the article delivery belt, variable drive means for controlling the relative movement of the belts so that the articles are indexable to the compartments therefor in the packing trays and slide means between article and delivery belts slidably to support and conduct the articles from the article delivery belt to the individual compartments of the compartmented packing trays, the slide means having a plurality of slide fingers extending from position adjacent to the article delivery belt in the direction of belt movement to free ends, the means for holding the slide fingers in lateral spatial relationship corresponding to the files of compartments in the packing trays and means for holding the slide fingers pivotably at the upper ends thereof so that the free end of the slide will descend into the compartments of the tray to be filled, will open the compartment for insertion of article delivered by the slide, as the tray passes beneath the slide end, and will be moved upwardly over the compartment side as the tray advances and after it has had an article placed in the compartment, to the next compartment, which it will open in like manner.

2. A machine for automatically placing a plurality of articles individually into individual compartments of a multiple compartmented flexible packing tray which com-

5

prises a downwardly inclined continuous article delivery belt, a substantially horizontal continuous tray delivery belt below the article delivery belt, variable drive means for driving the belts and controlling relative movement thereof and slide means between article and tray delivery belts for sliding support and transportation of articles between the belts, the slide means having a stationary transverse member below the article delivery belt and above the tray delivery belt, which transverse member has a plurality of holes therein, and slide fingers pivoted, for movement upwardly and downwardly, about a portion of the transverse member and passing through the holes therein, so that articles from the article delivery belt may be slid downwardly into compartments of trays on the tray delivery belt when the slide fingers are in lower position and so that the fingers may be raised by contact with a wall of a filled compartment, pass over that wall and descend into a subsequent compartment.

3. A machine for automatically placing a plurality of articles individually into individual compartments of a multiple compartmented flexible packing tray in accordance with claim 2 in which the stationary transverse slide member has a plurality of substantially rectangular holes therein near the edge thereof nearer to the tray delivery belt and the slide fingers are of flat stock bent about the edge of the transverse member and passing through the holes therein, the bends being such as to limit the upward and downward movements of the fingers.

4. A machine according to claim 3 in which the fingers are of spring metal and are bent downwardly between pivot and delivery ends to facilitate delivery of articles to tray compartments without tipping of the articles.

5. A machine for automatically placing a plurality of flat-bottomed candies individually into individual compartments of a multiple compartmented flexible packing tray which comprises a downwardly inclined continuous article delivery belt, an idler shaft about which the belt reverses direction at the lower end thereof, the shaft extending transversely with respect to the direction of belt movement and being of small diameter, a substantially horizontal continuous tray delivery belt below the article delivery belt, variable drive means for driving the belts and controlling relative movement thereof and slide means between article and tray delivery belts for sliding support and transportation of candies from the article delivery belt into compartments of the flexible tray on the tray delivery belt, said slide means having a stationary transverse bar with a substantially horizontal upper section in which is a plurality of rectangular holes, and

6

mounted on the bar, a plurality of flat spring steel slides, narrower than the compartments to be filled, each slide being bent sharply back on itself and inserted through the hole corresponding thereto on the bar, so that the slide is held in pivoting relationship with the bar, with the free end of the slide capable of limited vertical movement into and above the wall of a compartment to be filled with candy, the slide being bent in the middle portion thereof to facilitate entry into a compartment without flattening the adjoining compartment wall and the inclination of the slide at downmost position being great enough to allow the candy to slide downward, of its own weight, into the compartment of the tray.

6. A machine according to claim 5 in which the belts are of non-slip construction so as to be positively indexed and are marked with indicia for location of candies, on the article delivery belt, and trays, on the tray delivery belt, so that the candies will be delivered to the tray compartments, as desired.

7. A machine for automatically packing articles in ordered arrangement in boxes which comprises means for simultaneously moving a plurality of articles in ordered arrangement, means for moving multiple compartmented flexible packing trays below the articles, means for moving boxes, means for controlling the relative movements of the moving means so that the articles are indexed to compartments in the trays and the trays are indexed to boxes into which they are to be inserted, supporting and conducting means between the moving means for supporting the articles in ordered arrangement and conducting them from the article moving means to the tray moving means, and supporting and conducting means between the moving means for supporting the filled trays and conducting them from the tray moving means to the box moving means, and supporting and conducting means in both instances are downwardly inclined slides.

References Cited by the Examiner

UNITED STATES PATENTS

2,544,125	3/1951	Bain et al. -----	53—159 XR
2,728,508	12/1955	Marasso -----	53—244
2,844,926	7/1958	Mattos -----	53—160
2,873,771	2/1959	Gerrans -----	53—250 XR
3,000,154	9/1961	Stickler -----	53—74

FRANK. E. BAILEY, *Primary Examiner.*

ROBERT A. LEIGHEY, *Examiner.*