March 29, 1960 H. M. PETTEE ET AL 2,930,172

DEVICE FOR FEEDING ARTICLES INTO CARTONS

Filed March 17, 1955 2 Sheets-Sheet 1

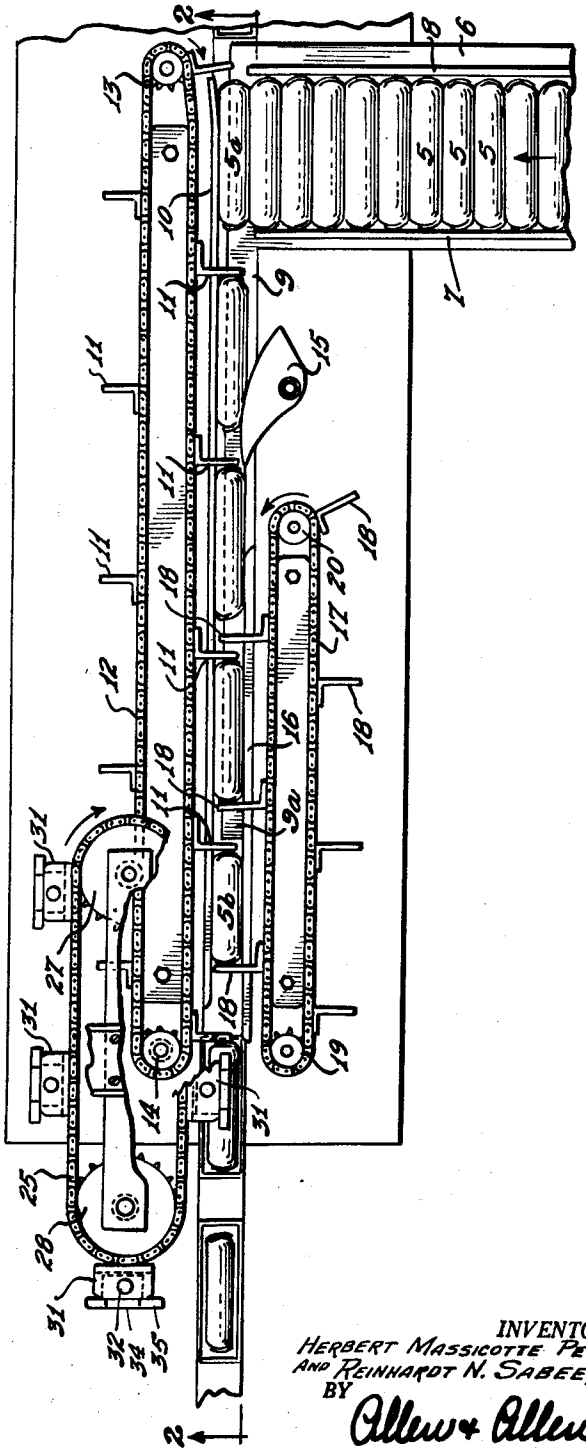


FIG. 1.

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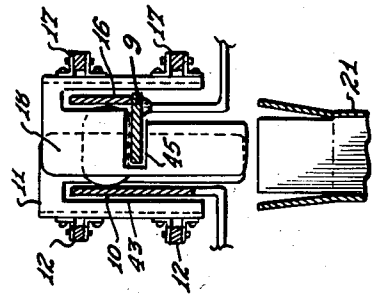


FIG. 4.

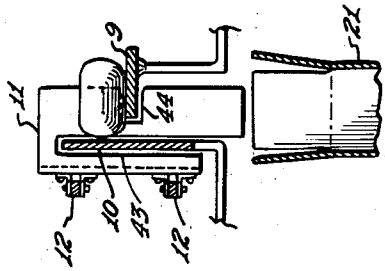


FIG. 3.

FIG. 2.

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United States Patent Office 2,930,172
Patented Mar. 29, 1960

2,930,172

DEVICE FOR FEEDING ARTICLES INTO CARTONS

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Application March 17, 1955, Serial No. 495,013

13 Claims. (Cl. 53—124)

This invention is directed primarily to the introduction into cartons of articles which may be of non-uniform size or are soft and compressible, tending in their uncompressed state to be larger in one direction at least than the corresponding cross-sectional dimension of the cartons. The cartons may be designed to accept these articles for shipment as such, or the articles may be of the nature of packaged premiums for insertion into empty cartons which are then to be filled with flakes or granules of soap, cereal, or the like. Although the invention is not so limited, it will be described in connection with the insertion of premiums into soap granule cartons.

In prior machines for this purpose, the premiums are brought to a pick-off point with their longitudinal axes parallel to the travel of a flexible member, such as a chain, equipped with blocks or abutments to carry the premiums along a path parallel to the path of the empty cartons. The premiums are pushed along a slide above the cartons, and at the point where insertion is desired, the slide terminates and a premium drops into each carton. Such an arrangement is generally satisfactory for premiums or other articles which are of uniform size or are encased in a package of uniform size. But the arrangement is not satisfactory for handling objects which cannot be depended upon to fall into a proper position in the carton without guides, nor is it satisfactory for objects of a flexible and compressible nature which must be compressed in order to be caused to enter the cartons. An example of such flexible and compressible premiums embraces wash cloths encased in a bag.

It is a primary object of the invention to provide mechanism suitable for the handling of flexible and compressible articles and the insertion thereof in cartons even when the articles are of very light weight.

It is an object of the invention to provide a mechanism serving to feed into cartons compressible articles which must be introduced in the compressed condition.

It is an object of the invention to provide a feeder which will accurately deposit flexible and compressible articles in cartons with assurance that these articles will attain a final desired position therein.

It is an object of the invention to provide a mechanism for the attainment of the foregoing objects, which mechanism is simple to construct, economical, and positive in operation.

These and other objects of the invention, which will be set forth hereinafter, or will be apparent to one skilled in the art upon reading these specifications, are accomplished by that construction and arrangement of parts, of which an exemplary embodiment will now be described. Reference is made to the accompanying drawings wherein:

Fig. 1 is a plan view of the essential parts of the apparatus.

Fig. 2 is a vertical longitudinal sectional view taken along the section lines 2—2 of Fig. 1.

Fig. 3 is a partial transverse vertical section taken along the line 3—3 of Fig. 2.

Fig. 4 is a partial transverse vertical section taken along the line 4—4 of Fig. 2.

The drawings have been simplified for the purpose of clarity. These do not show the details of the machine frame nor do they indicate the drives, it being within the skill of the worker in the art to provide drives with suitable timing in the light of the teachings herein. The machine elements disclosed and hereinafter described may be considered as part of a carton setting up, filling, and closing machine (not shown).

Referring to Fig. 1, the articles or premiums 5 are shown approaching the mechanism in an assembly on a lateral table 6 between the side guides 7 and 8. The assembly of the articles 5 is urged in the direction of the arrow by any suitable means (not shown), i.e. by a resilient pusher or by conveyor belts moving around the guides 7 and 8 and engaging the ends of the packages. The foremost one 5*a* is thus brought onto a longitudinal table 9 against a side guide 10. On the longitudinal table, the article is engaged and caused to move forwardly by a vane 11 on a longitudinal chain conveyor 12. The chain or chains of this conveyor return at each end over sprockets indicated at 13 and 14. These sprockets are on vertical shafts at least one of which is driven, as hereinafter explained.

To the left of the table 6 on the side opposite the guide 10 there is an adjustable guiding and compressing means 15 designed to bring the articles as they move along the longitudinal table 9 behind a side guide 16 so that the articles will be confined on both sides prior to their introduction into the cartons.

A second longitudinal conveyor 17 with spaced vanes 18 is set up to parallel a portion of the length of the conveyor 12. The chains of this second conveyor return over sprockets 19 and 20, and drive is accomplished as hereinafter set forth.

The vanes 11 on the first conveyor are shown as spaced apart a distance greater than the uncompressed length of the packages 5*a*. The conveyor 12, can, of course, be driven, nevertheless, at such a speed as to deliver a package to a loading point in timed relationship with a carton reaching the same point. Conveyor 17 operates in such fashion that its vanes turn in behind the vanes 11 of the conveyor 12. Now, if conveyor 17 be driven somewhat more slowly than conveyor 12, it will be clear, as shown in Fig. 1, that the vanes 11 will tend to catch up on the vanes 18, the net result being an endwise compression of the articles 5*a* by the time they reach an unloading point. In Fig. 1 the longiudtinal table 9 is shown terminating at the point 9*a*. A premium or article 5*b* is shown as carried beyond the end of the table to an unloading position. It is carried beyond the end of the table by the combined action of one of the vanes 11 of conveyor 12 and one of the vanes 18 of conveyor 17. The article is compressed and therefore held at the unloading point between these two vanes, and thus maintains its position even though the table 9 has ceased to support it. When the article is in the position 5*b* in Fig. 1, it is positively inserted into a carton, without relief of the compression, by means hereinafter described.

There are various ways in which the conveyors 12 and 17 may be timed. Either the conveyor 12 or the conveyor 17 can be so timed that its vanes move at the speed of movement of the cartons into which the premiums will be loaded. If the conveyor 12 moves synchronously at carton speed, the conveyor 17 will be driven more slowly so as to exert the required compressive action. If, on the other hand, conveyor 17 is synchronized with carton travel, conveyor 12 must move at a slightly faster speed in order to compress. Alternatively, one of the conveyors may be driven slightly faster and the other slightly slower than the rate of travel of the cartons. The net

result, however, will be the delivery of an article or premium to the unloading point indicated at 5*b* for each carton synchronously with the arrival of the carton at the same point, the article being in the aforesaid compressed condition. The coaction of the two conveyors 12 and 17 is made to be a continuous operation by an appropriate spacing of the vanes on the two conveyors. For any given operation, the speed ratio will be fixed. Therefore, the vanes 18 may be so spaced on the conveyor 17 with reference to the spacing of the vanes 11 on the conveyor 12 that each of the vanes 18 will turn in behind a vane 11 as indicated. The length of the conveyors 12 and 17 will be apportioned to the spacings of the vanes, as will be readily understood. For example, the spacing of seven of the vanes 18 on the conveyor 17 may occupy the same linear distance as the spacing of eight vanes on the conveyor 12. Other ratios may, of course, be chosen, and the conveyor speeds adjusted accordingly.

It is most clearly shown in Fig. 2 that the cartons 21 are moved through the machine on a conveyor 22. The cartons are in erected or squared-up form with their lower ends closed and their upper ends open, as shown. They are spaced on the conveyor 22 by blocks 23 forming part thereof, and are confined between side guides, one of which is shown at 24. The relative timing of the conveyor 22 is such that a carton 21*b* will arrive coincidentally with the packaged premium 5*b* at the unloading point.

It has already been explained that at this point the compressed premium will be retained between a vane 11 and a vane 18 frictionally; and the vanes are of such size that they extend downwardly to approach the topmost portions of the carton. At this point the article is ejected downwardly from between the vanes and introduced into the carton by a mechanical pushing device traveling at the same speed as the carton and the article. A pair of chains 25 and 26 is journaled on sprockets 27 and 28 on vertical shafts 29 and 30 above the level of the conveyors 12 and 17. At suitable intervals bracket members 31 are fastened to the chains in vertical position. These bracket members carry vertical rods 32, or other suitable forms of slides on which sliding members 33 are engaged. Vertically movable pushing devices 34 having feet 35 are fastened to the sliding members 33. Each sliding member 33 has a finger 36 extending rearwardly through a vertical slot 37 in the bracket 31. The finger bears a cam roller 38; and a cam track 39 of suitable shape is fastened to the framework of the machine. This cam track is shown as terminating at a high level substantially at the unloading point, as at 40. At this point the cam releases the sliding member 33, and this member and the attached pushing device 34 are free to fall rapidly by gravity, causing the foot 35 to push the article 5*b* into the carton 21*b*. It is also within the purview of the invention to make the cam track continuous, and control the speed of descent of the pushing device by the slope of the cam track at the unloading point.

It has been found of advantage to equip the foot 35 with a pair of spaced needle-like points 41. These needle-like points are polished, and perforate the bag of the article and penetrate the premium within, making for a more positive engagement and tending to prevent the immediate re-expansion of the compressed article.

By increasing the spacing of the chains 25 and 26 and elongating the brackets 31 and pusher members 34, the apparatus can be arranged, if desired, to deliver the article to the very bottom of each carton. After the delivering operation, the sliding member 33 is picked up by the opposite lower end 42 of the cam track 39, and the pusher is raised. The rate of rise can be varied by the slope of the cam track. The pusher foot 35 disengages the delivered article and leaves it in the bottom of the carton.

Figs. 3 and 4 are illustrative of the nature of the vanes 11 and 18. As shown in Fig. 3, the vane 11 is slotted vertically, as at 43, to accept the side guide 10. It is also slotted laterally, as at 44, to accept the longitudinal table 9. As shown in Fig. 4, the vane 18 on the conveyor 17 is slotted vertically, as at 44, to accept the side guide 16 and laterally, as at 45, to accept the table 9.

Modifications may be made in the invention without departing from the spirit of it. The invention having been described in an exemplary embodiment, what is claimed as new and desired to be secured by Letters Patent is:

1. In a device for feeding compressible articles into cartons, a table, means for causing said articles to move along said table in timed sequence, said means comprising a conveyor with vanes overlying the table, a second conveyor with vanes interdigitating with the vanes of the first mentioned conveyor, said vanes traveling at a different effective speed so that each article moved along said table is engaged and compressed between vanes of the two conveyors so as to be moved off an end of said table to a discharge position at which said article is held in compressed condition between said two vanes, means for bringing an open carton to said discharge position, and means at said position to push said article from between said vanes into said carton.

2. The structure claimed in claim 1, wherein the means for bringing the carton to the discharge position comprises a conveyor below said table substantially parallel to said first mentioned conveyors, the several conveyors acting to bring cartons and compressed packages to the said discharge position serially in timed relationship, and in which the means for pushing said articles from between said vanes is a pushing means traveling in the direction of the cartons and articles at the discharge position in the same direction.

3. The structure claimed in claim 2, wherein the pushing means comprises a series of brackets mounted on a conveyor having a flight paralleling the direction of movement of the articles and cartons at the discharge position, said brackets providing ways, and cam controlled slides mounted on said ways, said pushing means being mounted on said cam controlled slides.

4. The structure claimed in claim 3, wherein each pushing means carries a pair of spaced needle-like elements extending beyond the pushing surface thereof and adapted to penetrate the compressed article at the discharge position so as to maintain engagement therewith and to prevent undue loss of compression as the article is displaced from between said vanes.

5. In apparatus of the character described, a lateral table on which compressible articles move in side-by-side relationship, a longitudinal table at the end of said lateral table on which said articles are caused to move in endwise spaced relationship, a conveyor having vanes overlying said longitudinal table for moving said articles therealong, a second conveyor having vanes positioned to turn in behind the vanes of the first conveyor, said second conveyor being driven at a slower speed whereby as said articles are moved along said table by the vanes of the first conveyor, they are brought against and ultimately compressed against the vanes of the second conveyor, until said articles in compressed condition are carried off the end of said longitudinal conveyor and held in compressed condition between the coacting vanes of the said conveyor, and means for discharging said compressed articles thereat by pushing them from between said vanes.

6. The structure claimed in claim 5, wherein said conveyors are endless conveyors adapted to operate continuously in spite of the said difference in speed by proportioning the distance between the vanes on the several conveyors in accordance with their linear speeds.

7. A machine for feeding compressible articles into cartons, comprising a conveyor for continuously moving said cartons, a slide having guides, means for picking off articles in succession and moving them along said slide, means for slowly compressing said compressible articles while moving on said slide, and means for pushing said compressible articles from between the said compression means, said pushing means having a foot from the

pushing surface of which sharpened pins project and penetrate said compressible articles whereby said articles are guided into said cartons, said pins being of such size and polish that they will withdraw from the compressed article in the carton as the pushing means are withdrawn.

8. A machine for feeding compressible articles into cartons, comprising a conveyor for continuously moving said articles, a slide substantially paralleling said conveyor, means for depositing articles in succession on said slide, continuous motion moving means engaging rear portions of said articles for moving them along said slide in timed relation to said cartons, additional continuous motion moving means engaging forward portions of said articles for progressively compressing them in the direction parallel to their movement and against said first mentioned moving means, and means for pushing said compressed articles from between said moving means into said cartons.

9. In a machine for the purpose described, a conveyor for continuously moving a succession of open cartons, a slide located above said conveyor and terminating intermediate the ends thereof, a chain having vanes moving over said slide, means for delivering compressible articles in succession to said slide so as to be engaged by said vanes and moved therealong, a second chain having vanes interdigitating with the vanes of said first mentioned chain, means for driving said chains so that each article becomes engaged between a vane of each chain and progressively compressed during its movement along said slide, being retained between said vanes off the end of said slide, the movement of such article being timed in relation to the movement of a carton to receive it, and pushing means for introducing the compressed article into the carton and comprising chains moving with said first mentioned chains and carrying brackets, plungers mounted on said brackets for movement transverse the movement of said chains, and means for actuating said plungers to push said articles from between said vanes.

10. A machine for feeding compressible articles into cartons, comprising a conveyor for continuously moving said cartons, a slide having side guides for preventing lateral deflection of said articles, said slide located above and substantially paralleling said conveyor and terminating intermediate the ends thereof, means for depositing said articles in succession on said slide, moving means comprising vanes on a moving member engaging rear portions of said articles for moving them along said slide in timed relation to said cartons, additional moving means comprising vanes on a moving member engaging

forward portions of said articles for progressively compressing them in the direction of their movement against said first mentioned moving means, said moving members being detimed with respect to one another whereby to exert compressive action on said articles while moving them to an unloading point in timed relation to said cartons, said articles being retained between said moving means beyond the end of said slide by friction due to said compression, and means for pushing said compressed articles downwardly from between said moving means into said cartons, said means for pushing comprising plungers traveling with said compressed articles, said plungers also having movement transverse the direction of motion of said compressed articles.

11. A machine for feeding compressible articles into cartons, comprising a conveyor for continuously moving said cartons, a slide substantially paralleling said conveyor, means for depositing articles in succession on said slide, moving means comprising vanes on a moving member engaging rear portions of said articles for moving them along said slide in timed relation to said cartons, additional moving means comprising vanes on a moving member engaging forward portions of said articles for progressively compressing them in the direction parallel to their movement and against said first mentioned moving means, said moving members being detimed with respect to each other whereby to exert said compressive action while moving said articles to an unloading point in timed relation to said cartons, and means for pushing said compressed articles from between said moving means and into said cartons.

12. The structure claimed in claim 11 in which said slide has side guides for preventing lateral deflection of said articles.

13. The structure claimed in claim 12, in which said means for pushing comprises plungers traveling with said compressed articles and also having movement transverse the direction of motion of said compressed articles.

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