Dec. 18, 1962 F. R. LINDA 3,068,624

METHOD AND APPARATUS FOR PACKING ARTICLES IN FLEXIBLE CASES

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FIG. 2

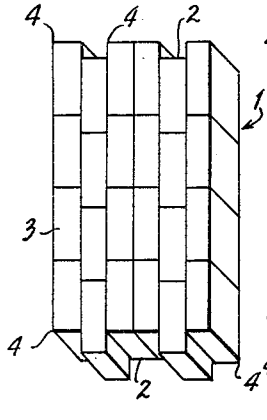


FIG. 3

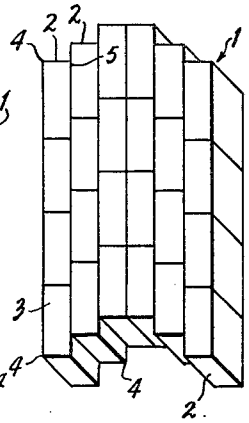
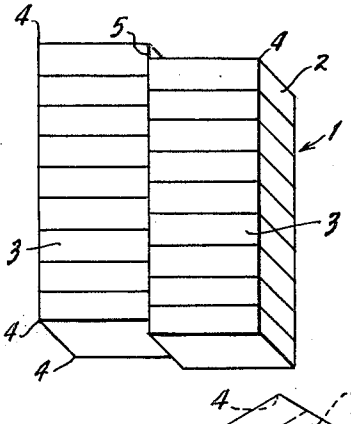


FIG. 4



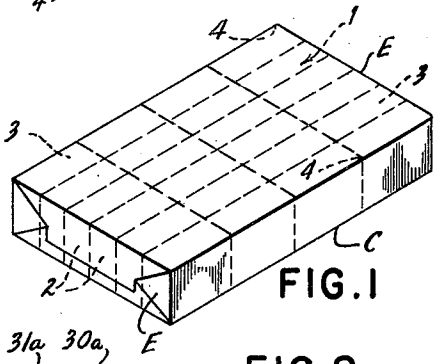


FIG. 1

FIG. 6

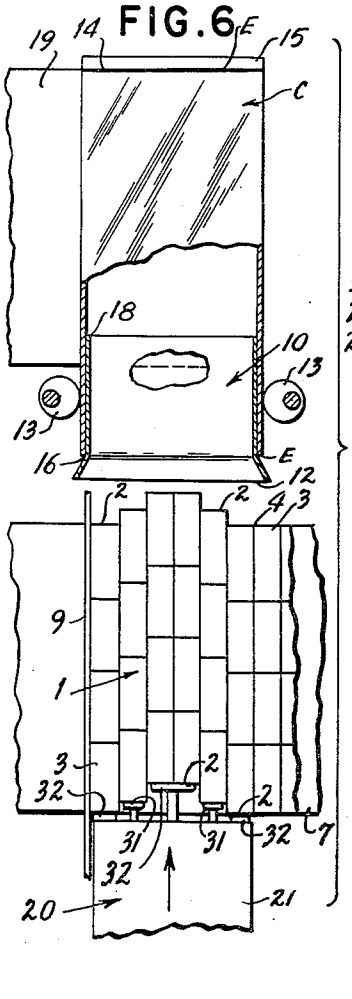


FIG. 9

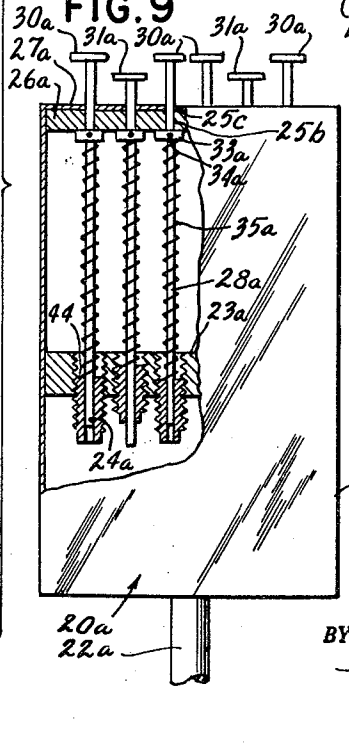
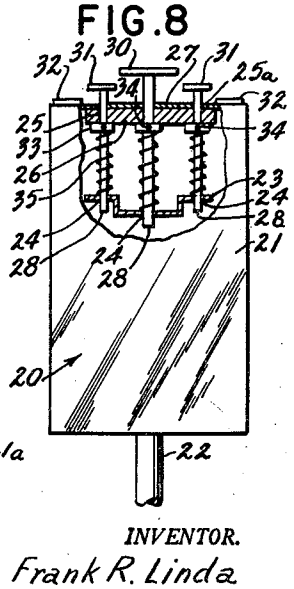


FIG. 8



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METHOD AND APPARATUS FOR PACKING ARTICLES IN FLEXIBLE CASES

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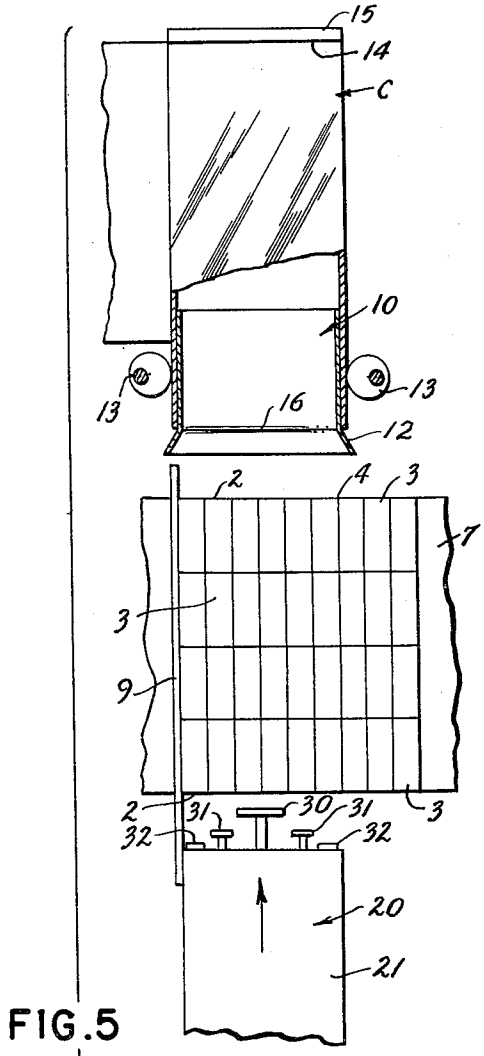


FIG. 5

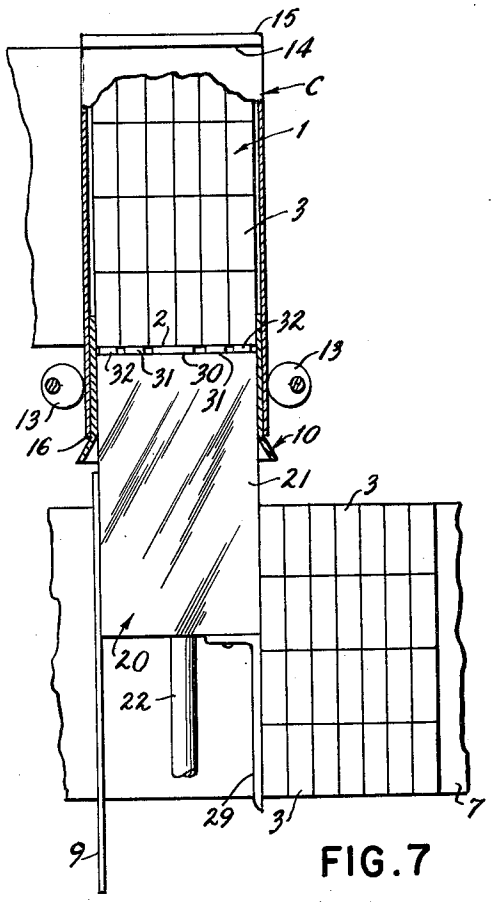


FIG. 7

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METHOD AND APPARATUS FOR PACKING ARTICLES IN FLEXIBLE CASES

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FIG.10

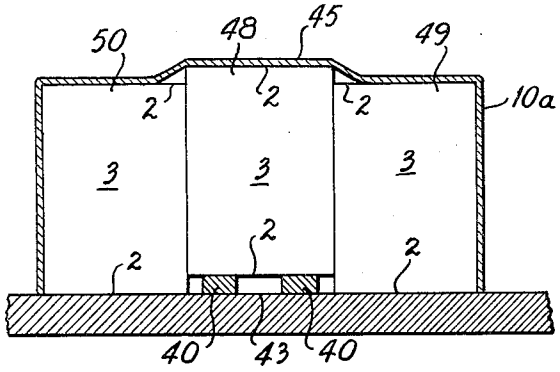
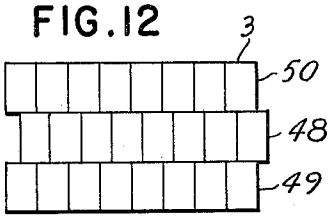


FIG.12



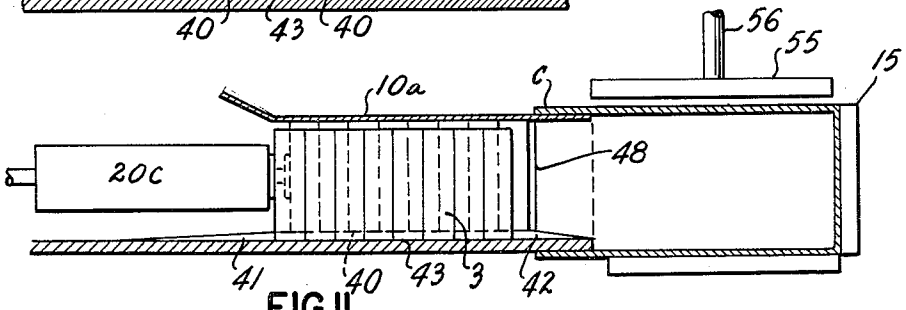


FIG.11

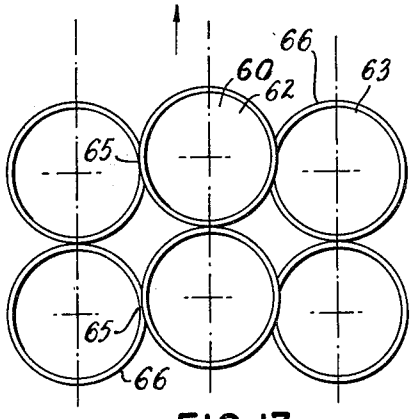
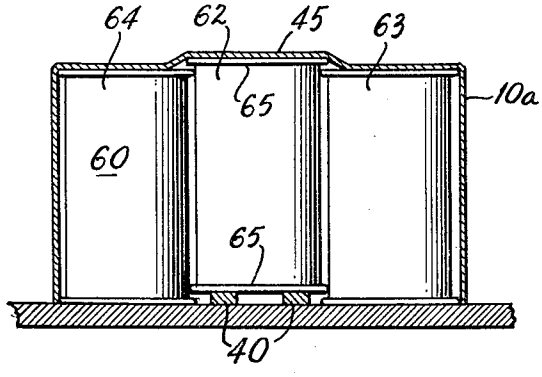


FIG.13

FIG.14



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METHOD AND APPARATUS FOR PACKING ARTICLES IN FLEXIBLE CASES

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Filed Feb. 2, 1960, Ser. No. 6,155
6 Claims. (Cl. 53—124)

This invention relates to method and apparatus for packing articles in flexible cases and is particularly concerned with tightly packing several articles such as individual cartons of cereal or soap and cans of food and beverages through one end of a flexible pre-formed heavy paper container and into a tightly arranged symmetrical pattern.

Corrugated paperboard containers have been customarily used for shipping case loads of packaged goods such as individual cartons of foodstuff, soap powder and the like which are usually shipped to the retailer in cases of twenty-four individual cartons. Corrugated shipping cases present no packing problems because they are strong enough so that the individual articles such as boxes of cereal are protected in shipment even though relatively loosely packed. This means that the cases can be loaded by inserting the articles all at once in a predetermined symmetrical pattern without damaging either the shipping cases or the articles being packed.

From an economic point of view corrugated cartons are satisfactory in larger sizes and values of cases. But with smaller sized articles and smaller case sizes the cost of heavy corrugated cases or shipping containers can be excessive and so it becomes desirable to package case lots of articles in lighter more inexpensive cases or containers which are preferably made of single ply paper or paperboard such as heavy kraft paper.

These flexible paper containers are entirely satisfactory provided they can be packed so that the individual articles fit tightly in them with no play. Once the articles are tightly packed there is no problem of damage in shipment because of the inherent strength of the combined case and its tightly packed load. The problem is in getting the articles into the paper casings without tearing the casings and damaging the articles being packed, and it is this problem to which the present invention is primarily directed.

An example of a suitable prefabricated single ply heavy kraft paper casing or container is shown and described in my co-pending application, Serial No. 819,259, filed June 10, 1959. What happens is that if we try to shove a symmetrical pattern of twenty-four cereal boxes tightly into one end of the tubular paper casing all at once, the leading corners of the cartons tear and mar the casing and in turn the cartons are jammed and disfigured. This is because the leading and trailing faces of the cartons being inserted are in alignment so that the cartons cannot be readily compacted temporarily to clear or at least relieve the pressure of their contact with the casing while being inserted. When cans are inserted fully aligned, the chimes or rims around the ends of the cans tend to cut the paper of the container.

Accordingly, it is an object of this invention to provide an apparatus and method for loading single ply cases in such a manner as to preclude tearing of the walls and side edges of such cases.

A further object is to provide means and method to push articles into a case all at the same time but in such a manner that the load is temporarily compacted sufficiently to avoid tearing and so that the articles, when fully packed, fit tightly in the case.

Another object is to provide a system for rapid, efficient and economic assembly-line packing of flexible single ply cases.

I have discovered that the basic solution to the problems and the accomplishment of the objectives lies in the provision of method and means for initially inserting, all at once, a body or case-load of articles in staggered relation and then finally bringing them at least partly into line as further described and shown.

In the drawings:

FIG. 1 is a perspective view of a case fully loaded;

FIGS. 2–4 are perspective views of various patterns of cartons being initially loaded according to the invention;

FIGS. 5–7 are top plan views showing the pattern of cartons of FIG. 3 being loaded into a case;

FIG. 8 is a detail view of the loading plunger of FIGS. 5–7;

FIG. 9 is a view of a modified version of the loading plunger which loads the pattern of cartons shown in FIG. 2;

FIG. 10 is an end elevation, partly in section, showing a modified method and means for inserting articles;

FIG. 11 is a side elevation, partly in section, showing the method and means of FIG. 10;

FIG. 12 is a top plan view showing the pattern of articles which are also shown in FIGS. 10 and 11;

FIG. 13 is a top plan view of a pattern of beer cans being inserted in a container; and

FIG. 14 is an end view of the pattern of beer cans shown in FIG. 13.

In FIG. 1 a pattern or case loading **1** of twenty-four articles **3** in the form of individual packages or cartons of material are shown tightly packed and sealed into a flexible single ply tubular container C of the type under consideration, one form of which is shown in my said copending application, Serial No. 819,259 filed June 10, 1959. Such a container is prefabricated into a rectangular tubular form with a glued manufacturer's joint running lengthwise of it. Prior to loading of its contents and final closing, it is open at one or both ends and is loaded according to this invention through one of its ends E which is left open and which after loading is folded over and glued to form a closure as seen in FIG. 1.

As indicated, the ends **2** of the cartons **3** are in alignment and the cartons **3** are tightly packed together in the casing so that the latter fits snugly around them without any slackness or wrinkles, thus forming a strong compact structure, part of whose strength depends on the compressive resistance of the contained articles **3** and part of whose strength depends upon the laminations of the structural closed ends E.

It is apparent that it would be uneconomical to load the articles **3** one by one into the casing C and that it is desirable to load all twenty-four all at once in one single operation, but it will also now be apparent that to prearrange the cartons **3** as in their final position shown in FIG. 1 in the container would cause their end edges **2** and corners **4** to tear and damage the casing during insertion because with the ends **2** all lined up the load has insufficient compressive give and remains expanded to its fullest dimensions during loading.

Referring now to FIGS. 2–4, it is seen that with the longitudinal rows of cartons **3** arranged before loading in any of the staggered relations shown, the ends **2** of any one row are not in line with the ends **2** of at least one adjacent row but are abreast a part **5** of an adjacent carton which is between its ends **2**, so that this part of the carton more readily gives to a compressive force. Since the give in each carton **3** will be cumulative, the entire case-load of cartons **3** can be compressed suffi-

ciently to get it substantially entirely into the casing C without tearing the casing C.

In FIG. 5, the cartons 3, to be packaged, are moved in rows from right to left from a source of supply, not shown, into the case loading position by a conveyor belt 7 which provides a support means, and the first row (on the left) of a case-load on the belt comes up against a stop plate 9. This plate 9 restricts further movement of the cartons so that, if desired, the belt 7 can be operated continuously to supply cartons in close order formation to the case loading position, the belt sliding under the cartons after their movement has stopped.

The case C, into which a group comprising the first six rows (four deep) of the cartons 3 is to be loaded, is moved into the carton receiving position by an appropriate means, not shown, or by hand. In this position, the closed end 14 of the case C abuts a stop member 15 and its open end 16 receives or is drawn over a funnel in the form of a rectangular loading horn 10 which has a funnel-shaped entrance 12. The case C is secured on the horn 10 by a pair of eccentrically mounted clamps 13, which are moved to clamp the walls of the casing C against the walls of the loading horn 10.

When the conveyor belt 7 has moved at least six rows of cartons 3 into their case loading position against the stop plate 9 and the case C is secured, a loading plunger 20 is moved inwardly in the direction of the arrows in FIGS. 5 and 6, thereby pushing a group of articles comprising the case load 1 through the loading horn 10 and into the case.

The loading plunger 20 of FIG. 5 is shown in greater detail in FIG. 8. It consists of a casing 21 having an integral piston. Affixed to the inner wall of the casing 21 is a guide member 23 having a plurality of guide apertures 24 which are in line with corresponding guide apertures 25 and 25*a* in a guide bar 26 integral with an end plate 27.

The apertures 24, 25 and 25*a* slidably receive a plurality of shafts 28, two of which have pusher plates 31 affixed at their outer ends while the third or center shaft 28 has a pusher plate 30 affixed to its outer end. The pusher plates 30 and 31 constitute yieldable elements, while two additional pusher plates 32 are fixed to the end plate 27.

An adjustable collar 33 is adjustably positioned on each of the shafts 28 by means of a set screw 34. A tension spring 35 surrounds each of the shafts 28 between their respective collars 33 and the guide member 23. These springs 35 act to bias the pusher plates 30, 31 and 31 outwardly to the limit allowed by the collars 33 when they are in contact with the guide bar 26. Therefore, it is seen that the adjusted positions of the collars 33 on the shafts 28 determine the distance the pusher plates 30, 31 and 31 are biased outwardly from the top plate 27.

As shown in FIG. 8 the collars 33 are so positioned on the shafts 28 that the pusher plates 30, 31 and 32 present a stepped configuration and it is this configuration that enables the case load 1 to be pushed into the case C in the staggered pattern of FIG. 3.

The operation of the loading plunger 20 can best be seen by referring to FIGS. 5–7. In FIG. 5 the case C is secured on the horn 10 in carton receiving position and the group comprising the first six rows of cartons 3 comprising the case load 1 are ready to be inserted by the plunger 20 which is retracted.

As the plunger 20 is moved toward the case C, the pusher plate 30 pushes against the two center rows of cartons causing them to be advanced first in staggered relation with respect to the adjacent rows toward the mouth 12 of the loading horn 10. As movement continues, the pusher plates 31 push against the two next adjacent rows of cartons 3, causing them to move. Finally, the fixed pusher plates 32, 32 push the outer rows of cartons toward the loading horn 10. Now the entire group or case load of six rows is being pushed in a staggered adjacent relation into the casing C as shown in FIG. 6.

Since the inside of the loading horn 10 is narrower than the inside of the case C and also, therefore, narrower than the normal width of the case load 1, as the latter is pushed through the loading horn the staggered cartons 3 are compressed to a narrower width so that they can slide in readily without tearing the case 3. This narrowed or compressed condition continues until the load is pushed well into the far end of the case, and, of course, the length of the loading horn 10 can be varied to suit particular conditions.

When the two center rows of cartons 3 being pushed by the plate 30 reach the closed far end 14 of the case C, the inward movement of the plate 30 ceases and retracts relative to the plunger 20, and as the loading plunger 20 continues moving, it starts to overtake the plate 30. Likewise, the rows of cartons 3 being pushed into the case by the pusher plates 31 reach the closed far end 14 of the case, the plates 31 stop moving relative to the case C and they are also overtaken by the plunger 20.

When all of the rows of cartons 3 have been pushed flush with each other and completely into the case C, the case load 1 expands laterally because the ends of the individual cartons have been brought abreast of each other, and they now press tightly against the walls of the case C.

An extension 29 may be affixed to the plunger casing 21 to prevent succeeding cartons 3 from moving toward the stop plate 9 while the plunger 20 is operating.

A modified version 20*a* of the loading plunger is shown in FIG. 9. It is similar in construction and operation to the plunger 20 except that all of its pusher plates 30*a*, 31*a* are spring loaded (none are fixed with respect to the casing 21*a*) and there are six instead of five; also, the rear guide bar 23*a* has adjustable guide screws 44 for varying the tension on the springs 35*a*. Otherwise the parts and features 23*a*, 24*a*, 25*b*, 25*c*, 26*a*, 27*a*, 28*a*, 30*a*, 31*a*, 33*a*, 34*a* and 35*a* correspond in function and operation to the parts and features 23, 24, 25, 25*a*, 26, 27, 28, 30, 31, 33, 34 and 35.

By adjusting the position of the collars 33*a* on the shafts 28*a* and, as necessary, the tension screws 44, any number of stepped pusher plate configurations are possible. As shown, the pusher 20*a* is arranged to insert the pattern of FIG. 2.

After it is loaded, the case C is moved to various sealing and finishing stations as by a conveyor belt 19.

Thus far the description has covered staggering one or more rows of articles with respect to an adjacent row in the direction in which the articles are moved into the container, i.e. horizontally.

A modification of the invention which for suitable purposes may be either combined with or used separately from horizontal staggering encompasses staggering at least one row of articles in a direction normal to the direction in which they are moved into the container, i.e. vertically with respect to an adjacent row. This modification is particularly useful where it is desirable to load cartons or articles standing on end or vertically with respect to the large horizontal surfaces of the case which is being loaded. It is also particularly useful in the loading of conventional cans of food and beverages which have chimes or rims around their end edges which protrude beyond their cylindrical surfaces.

In FIGS. 10 and 11, three rows of cartons 3 on end with their end faces 2 up and down are being pushed by a plunger 20*c* through a modified form of loading horn 10*a* into a flexible case C. A pair of rails 40 having inclined ends 41 and 42 are positioned longitudinally along the center of the bottom surface 43 of the loading horn 10*a* and the central longitudinal top portion 45 of the loading horn 10*a* is raised so that when the group of cartons 3 is pushed through the loading horn 10*a*, the center

row 48 is raised into staggered relation in a direction normal to the direction in which the articles are being moved and with respect to the adjacent outer rows 49 and 50 and also advanced horizontally into staggered relation. Thus at least one row of articles has been staggered in two directions with respect to an adjacent row. This allows the top and bottom ends 2 of the articles 3 to be brought out of alignment with those of the adjacent rows and also front and back surfaces of articles in one row to be brought out of alignment with those in adjacent rows, thereby to facilitate lateral compression of the group of articles by the loading horn 10*a*.

When the center row 48 has reached its final position to the right in case C as seen in FIG. 11, the plunger 20*c*, which has yieldable elements as previously described, continues to push the outer rows 49 and 50 to their final position flush with the center row 48 with respect to the direction of movement of the group of articles.

Means are provided to push the center row 48 down flush and into alignment with the outer rows 49 and 50. Such means include a plate 55 having an integral operating piston or shaft 56 by which it is moved downwardly against the case C.

In loading cans 60 the center row 62 may be advanced with respect to the outer rows 63 and 64 in the direction of movement of the group as indicated by the arrow as seen in FIG. 13 and into the case, and the center row 62 may also be raised with respect to the adjacent outer rows 63 and 64 as by rails 40 in the loading horn 10*a* as seen in FIG. 14.

The horizontal staggering shown in FIG. 13 allows movement of the outer rows 63 and 64 laterally inwardly because it places the centers of adjacent cans laterally out of line with each other. Raising the center row 62 allows the upper and lower chimes 65 of the cans of the center row 62 to overlap the chimes 66 of the outer rows 63 and 64, thus allowing further lateral compression of the group. The cans 60 are otherwise loaded similarly to the articles 3 as in FIGS. 10 and 11 except that in loading cans it may be preferable to leave the center row 62 in the upward position seen in FIG. 14 permanently in the container C in which case the plate 55 is not operated to push it down flush with the other rows.

The mechanisms described and shown may be operated in automatic timed sequential relation by mechanisms which do not form part of this invention or they may be operated sequentially by hand.

The mechanisms may be varied to accommodate a casing, one end of which has been previously closed as shown and described, or a casing in which both ends are open and then closed and sealed after loading.

I claim:

1. Mechanism for tightly packing articles into a preformed case comprising means to support said articles in rows, a loading plunger to push at least one of said rows into advanced staggered relation with respect to an adjacent row and to push said articles into said case while said rows are in staggered relation, said loading plunger including a casing having end plate means, a plurality of apertures in said end plate means, a plurality of yieldable elements each slidably received within said apertures and being operable to push all said rows flush with each other when the advanced row reaches its destination within the case, means for adjusting the position of each of said yieldable elements with respect to said end plate means, a shaft affixed to each of said yieldable elements, a collar adjustably positioned on each of said shafts, a guide bar affixed to the inner wall of said casing, each of said shafts having a tension spring positioned therearound between their respective collars and said guide bar, said guide bar having a plurality of guide screws for varying the tension on each of said springs.

2. In the mechanism as set forth in claim 1, means to laterally compress said articles being pushed into said case.

3. In the mechanism as set forth in claim 1, integral means to stagger at least one of said rows with respect to an adjacent row in a direction normal to the direction in which they are being moved.

4. In the mechanism as set forth in claim 3, means to push the said rows staggered in the direction normal to the direction in which they are being moved into alignment with the other said rows.

5. In the mechanism set forth in claim 2, said compressing means comprising a funnel positioned to receive said particles at the entrance of a said case.

6. In the mechanism set forth in claim 3, said last named staggering means comprising at least one rail positioned at the entrance of a said case.

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