July 8, 1947. M. P. CHAPLIN 2,423,756

MOLDED FIBRE ARTICLE

Filed Dec. 17, 1943 4 Sheets-Sheet 1

Fig. 1

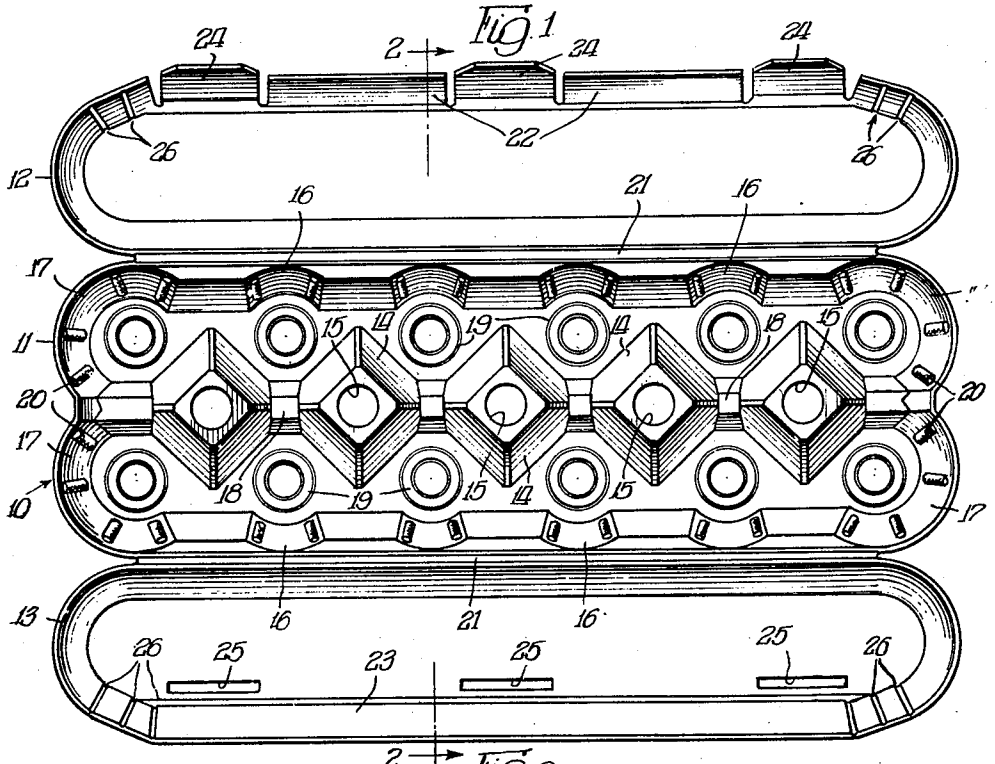


Fig. 2.

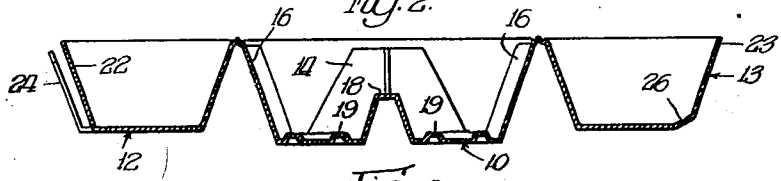
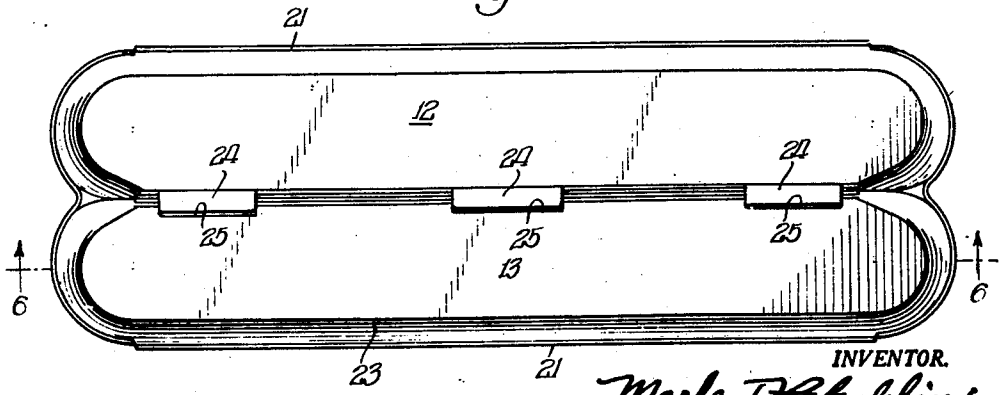


Fig. 3.



INVENTOR.

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July 8, 1947. M. P. CHAPLIN 2,423,756

MOLDED FIBRE ARTICLE

Filed Dec. 17, 1943 4 Sheets-Sheet 2

Fig. 4.

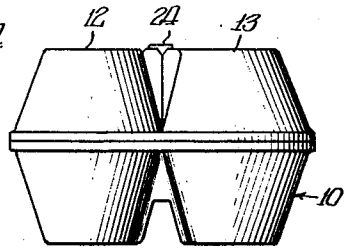


Fig. 7.

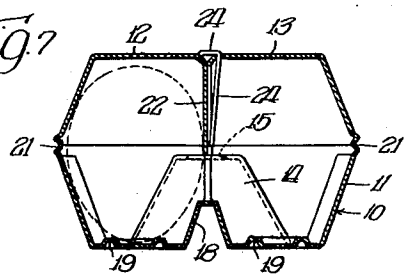


Fig. 5.

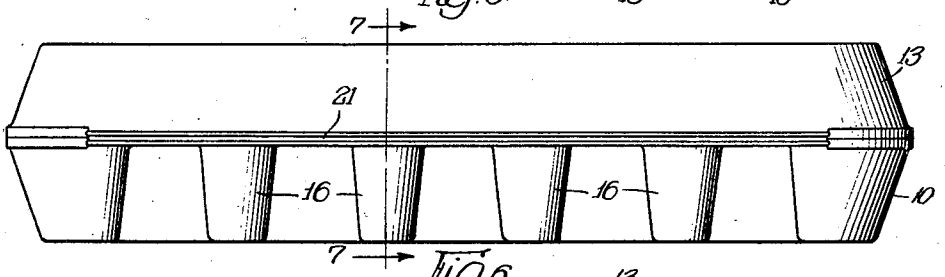


Fig. 6.

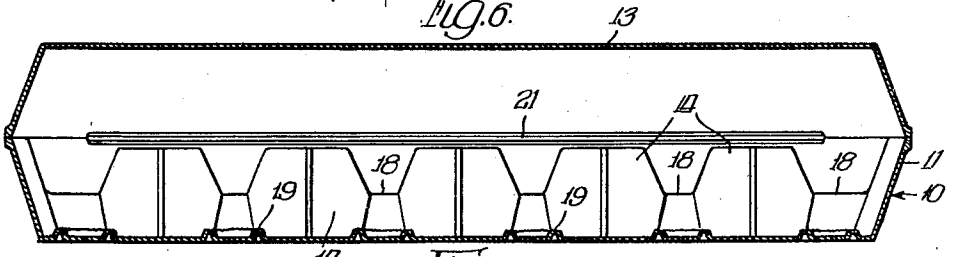


Fig. 8.

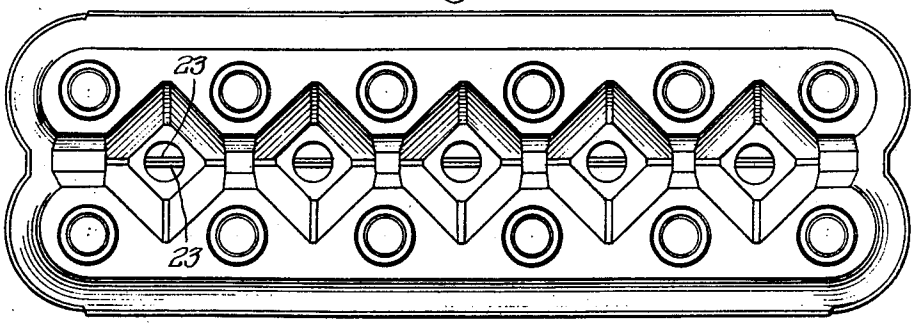


Fig. 9.

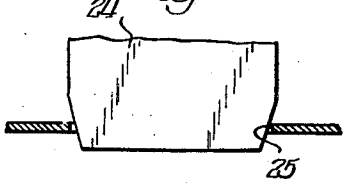
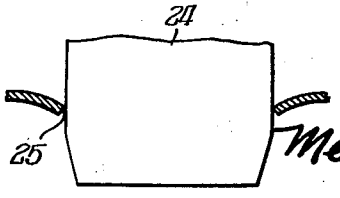


Fig. 10.



INVENTOR.

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July 8, 1947. M. P. CHAPLIN 2,423,756

MOLDED FIBRE ARTICLE

Filed Dec. 17, 1943 4 Sheets-Sheet 3

Fig. 11.

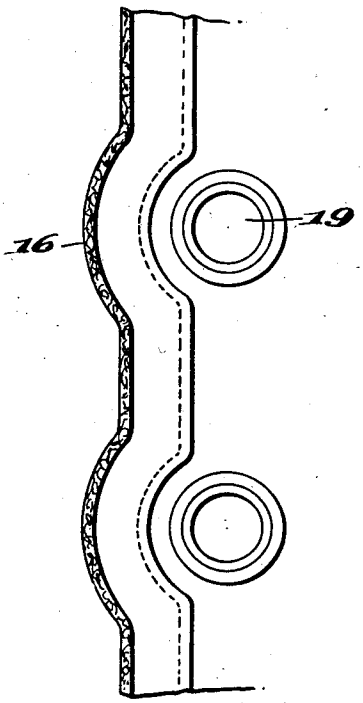


Fig. 13.

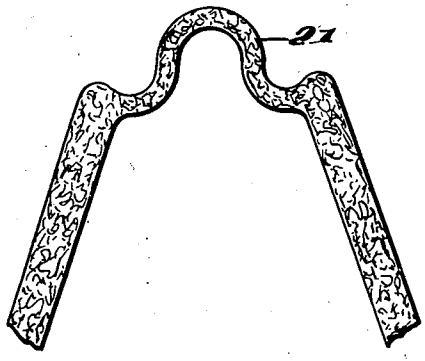
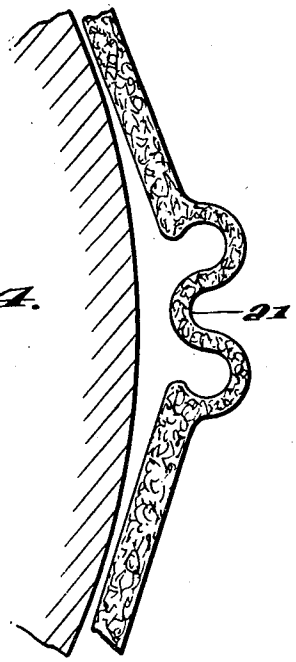


Fig. 14.



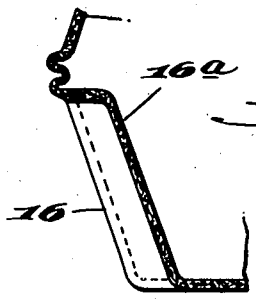


Fig. 12.

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July 8, 1947. M. P. CHAPLIN 2,423,756

MOLDED FIBRE ARTICLE

Filed Dec. 17, 1943 4 Sheets-Sheet 4

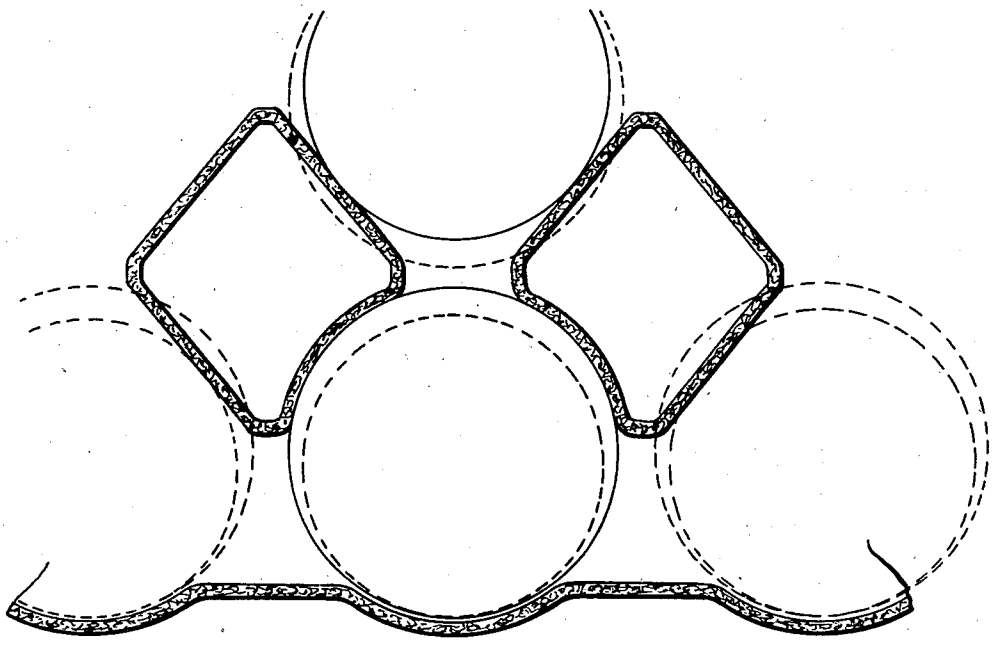


Fig. 15.

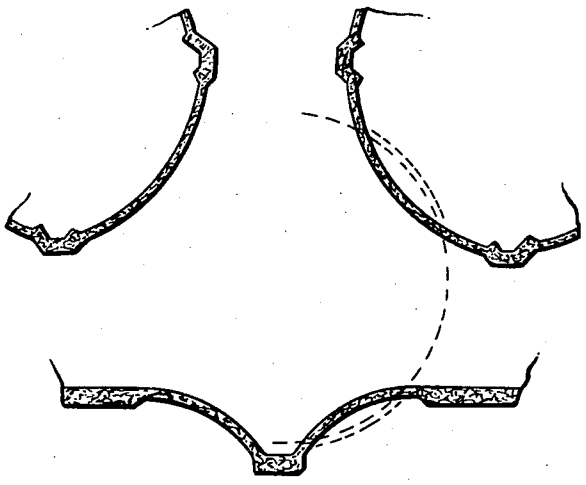


Fig. 16.

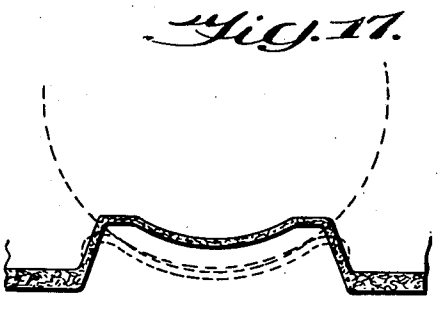


Fig. 17.

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Patented July 8, 1947 2,423,756

UNITED STATES PATENT OFFICE

2,423,756

MOLDED FIBRE ARTICLE

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Application December 17, 1943, Serial No. 514,684

9 Claims. (Cl. 229—28)

1

This invention relates to molded fibre cartons, and particularly to a carton suitable for packing fragile objects such as eggs. The drawings herein referred to illustrate a carton suitable for packing eggs in two rows of six eggs per row, or a total of one dozen eggs. This is known to the trade as the 2 x 6 carton. It is, however, understood that the invention is not limited to a carton if this size or shape, nor is it limited exclusively to the packing of eggs.

By molded fibre carton is meant an article formed from a mixture of fibres and liquid on a contoured die, shaped to the approximate size and kind of object to be made. This is in contradistinction to an article for a similar purpose, but fabricated from flat sheet material.

Molding from liquid fibre mixtures enables shapes and forms to be produced not possible or practicable where flat sheet materials are employed. Preferably the article of this invention, after forming on suitably shaped dies, is dried between other heated dies to preserve the exact shape and form of the article, and to impart to its surface distinctive finishes.

There are many specific and novel features herein disclosed which can be best understood by reference to the following description and drawings, in which:

Figure 1 is a top plan view of the carton shown with its two part cover open.

Figure 2 is a transverse sectional view along the line 2—2 of Fig. 1 looking in the direction of the arrows.

Figure 3 is a top plan view of the carton with the covers closed.

Figure 4 is an end elevation of the carton with the covers closed.

Figure 5 is a side view of the carton shown with the covers closed.

Figure 6 is a lengthwise sectional view along the lines 6—6 of Fig. 3 and looking in the direction of the arrows.

Figure 7 is a cross-sectional view taken on line 7—7 of Fig. 5 and looking in the direction of the arrows.

Figure 8 is a bottom view of the carton similar to that shown in Fig. 1 but with planular side walls in the bottom section.

Figure 9 is a somewhat enlarged fragmentary view, partly in section, illustrating a locking tab of one cover member entering the locking slot of the other cover member.

Figure 10 is a view similar to Fig. 9 but showing the tab of one cover member locked in the slot of the other cover member.

2

Figure 11 is a fragmentary plan view of the pocket section of Fig. 1, slightly enlarged to show the side wall construction.

Figure 12 is a fragmentary end elevation partly in section of the side wall structure of Fig. 11.

Figure 13 shows the hinge construction between the pocket and cover sections when the covers are open.

Figure 14 shows the position taken by the hinge section when the covers are closed.

Figure 15 is a section through one of the article receiving areas considerably enlarged to show the flexure of the walls of the central supporting members for the article.

Figure 16 shows a modified structure of the article receiving area where flexible sections are molded integrally with the rest of the structure to provide greater flexibility for the supporting areas of the article receiving cavity.

Figure 17 shows the structure of the bottom support for the article where the article is supported on a special cushion member, forming a part of the rest of the molded fibre structure.

Containers or cartons for eggs, or other similar fragile objects, are customarily made by two generally different methods. One is a fabricated carton made from flat sheet board, and the other is a carton molded or formed to its desired shape by some pulp forming process or method.

The carton made or fabricated from board is limited in its design and construction, as board can be bent or formed in one direction only. It is not possible to secure shaped, curved, or other irregular surfaces from a sheet of board without destroying its strength.

In order to provide sufficient flexibility for the packaging of articles such as eggs, it is frequently necessary, in cartons made from board, to strip, cut, or otherwise weaken certain egg supporting areas in order to provide sufficient flexibility for the proper cushioning of the eggs.

In making cartons by a pulp molding or fibre molding process, many of the limitations of shape and contour necessary in a board carton are eliminated, as, within reasonable limits, it is possible to shape a molded article to fit or meet any desired contour or irregular shape.

Heretofore, in making cartons for the packing of eggs and similar objects by a pulp molding process, it has been thought necessary to make the walls of the carton rather thick, heavy, and soft, in order to provide an adequate cushioning for the egg surfaces.

In order to impart to the article sufficient soft-

ness or cushioning qualities, it has been necessary to materially detract from its strength, rigidity, and sturdiness. Also the thickness and bulk of such a type of molded carton is high, and considerable packing space is required both to pack and ship cartons for use, and also considerable extra space is taken up by the pulp detracting from the useful egg packing space.

By methods and processes, not a part of this application, ways and means have been found to mold fibre objects to any desired shape and contour and still have them strong and rigid, and their surfaces comparable in smoothness and texture with the smoothest of board or similar materials, which have been well calendered or finished in sheet form. This at once removes two of the objections of soft bulky molded articles, in that strength is restored and its surface is smooth, attractive, and can be printed in colors or decorated in any desired manner.

With the restoration of strength and surface finish to the article it is still necessary that adequate cushioning means be provided which will yield to cushion the eggs against shock, and will also yield to permit the packing of larger eggs, while still holding the smaller eggs against shaking around or vibration within the carton itself. These should be accomplished without slitting or otherwise weakening the strong smooth structure and, therefore, must be accomplished by features of design and construction of the carton itself.

Means must also be provided so that when the carton is closed for shipment, after being filled with eggs, that the cover or covers are securely locked in place, so that the carton cannot by any possibility come open accidentally, and allow the eggs to be exposed or spilled out. This locking means must hold the covers securely in place, be easy to accomplish, and not require the use of any added material such as a clip, string, or tape for securing the covers in closed position. Nevertheless, when it is desired to open the carton, to take out the eggs, it must be opened without material difficulty, although it may necessitate the rupture of some part of the locking device, which, of course, serves as an indication that the carton has been opened and would be useful in preventing tampering with eggs while in storage.

One additional feature regarding this particular carton as shown is that its outside size must be such that will permit it to be packed in a standard thirty dozen egg case or crate with 15 cartons in each end or section of this crate. This is the standard egg crate used for packing eggs in bulk, where thirty dozen eggs are packed, fifteen dozen in each end or section of the crate, in five layers with three dozen eggs on each layer. In such a standard bulk packing, adjacent eggs are separated only by a relatively thin cardboard separator or filler, and it consequently follows that, when eggs are packed in dozen cartons, there must be a minimum of space between cartons, or eggs in adjacent cartons in order that the cartons themselves can be packed in the standard case without wasting space.

This feature and limitation as to carton size, makes it absolutely necessary to reduce the thickness or bulk of the carton as much as possible, and to utilize all of the available space inside the carton for the eggs themselves, while still maintaining the eggs out of contact with each other, and also protect them from all reasonable shocks from the outside of the carton itself.

Referring to the several figures before enumerated, Figure 1 shows the carton viewed from the

top with its two cover members open and the carton in position to receive a dozen eggs.

The carton itself consists of a bottom or egg containing section, shown generally at **10** and **11**, with cover sections **12** and **13**. These two cover sections are connected by means of specially molded integral hinges to the opposite sides of the egg receiving portions **10** and **11**, these hinges being shown generally at **21**. The side walls of the carton can be made generally straight or planular as indicated in Fig. 8, but preferably I make them in a pilastrade, or a series of pilasters, in order to give the side walls stiffness, rigidity, and strength, and also to provide, in part, the egg or article receiving cavity. These pilastrated side wall structures are joined at their ends by two curved sections, **17**, which form the end of the carton, and also form, in part, egg receiving cavities. The side walls consist generally of the pilaster portions **16** (see Figs. 1, 11, and 12) and the intermediate portions **16***a*. Each curved end section **17**, of the carton forms, in effect, an end pilaster, and at the same time, a connecting member to the center of the carton where it joins a second member **17**, which ties in with the opposite carton wall.

Referring particularly to Figures 11 and 12, it will be observed that the wall section on each long side of the carton is greatly increased in strength over and above what would be obtained if a single flat straight wall was employed as shown in Figure 8. The bending moment of the wall is, in effect, the distance between the outermost portions of the wall **16** and **16***a*, as shown in Fig. 12, in contradistinction to the mere thickness of the stock of the side wall, were a planular single straight wall employed as is shown in Fig. 8. To space the eggs from each other both lengthwise and crosswise in the carton, there is arranged through the center of the carton a plurality of flat sided pyramids **14**. Five such pyramids are shown and they are positioned with the axial planes of their converging edges arranged longitudinally and transversely of the carton. One side of each pyramid forms one of the cavity defining walls for the egg or other article.

These pyramids **14** are made with long flat sides molded and finished to have strength and rigidity in a vertical direction for supporting purposes, but flexible between their converging edges to permit yielding when eggs of different sizes are inserted in the carton. Referring more particularly to Fig. 15, which is a sectional view looking down on the carton and through the approximate center of the area which supports the egg, it will be observed that the egg on one side is supported within the curved area of one of the side wall pilasters **16**, while the other is supported on a wide flat surface on two adjacent center members **14**.

In this figure, the circles *e* and *e'* indicate eggs of small and large size. The full lines show the support of a small egg *e*, in that the egg is contacted on a plurality of sides, so that it is held from shaking around or moving within the carton, which is objectionable.

The full line circle in this same Fig. 15 shows what happens when a large egg *e'* is inserted in the carton, and shows how the long flat walls of the interior members **14** can flex to provide space for the larger egg while still insuring that the eggs opposite each other do not touch.

In other words, the eggs are always held to-

ward the outside of the carton so that there is a maximum of space between adjacent eggs at all times. However, when large eggs are packed which is a very necessary feature of all cartons in order that they may take and hold the largest eggs, they must necessarily come nearer to each other, and the center support structure permits this, while definitely assuring that they do not touch each other.

It has already been pointed out that the outside size of the carton is limited by the fact that it must be packed with other cartons in a certain definite space. In order to insure that there be the maximum space between the eggs in any carton, I pack the eggs against the pilastrated outside walls, or the cushions in these outside walls, and hold the eggs or other articles in their proper places between the pilastrated sections by means of the flexible walls of the inner pyramidal structures. The outside walls are prevented from moving outwardly under the added pressure of eggs from the inside, both by reason of their structural design, and also because they are tied together at the top by means of the interlocked cover sections. As larger eggs are packed in the carton, the long flat walls of the pyramid sections will be flexed inwardly as shown in Fig. 15, until the maximum size of egg has been reached, and all of the space inside the carton utilized. Under this condition the eggs are individually held firmly between the two flexed walls of two adjacent pyramid sections, and the recess between the pilasters in the outer walls, thereby firmly retaining the egg in position, and preventing it from vibrating or shaking against or coming in contact with adjacent eggs.

In order that the eggs may be adequately protected from the outside, two methods may be used either in conjunction with each other, or one may be used alone. Referring particularly to Fig. 14, this shows, considerably enlarged, the outside of the carton at the hinge line, or at the line of greatest egg diameter. It will be observed that the hinge structure here employed, adequately protects the egg against shock from the outside, or from an egg in an adjacent carton, by providing a series of convolutions, yielding in their nature and located directly opposite the egg at its largest diameter. Another method which I may employ in order to further cushion eggs, particularly where it is desired to pack eggs having extra thin shells or where it is desired to handle them very carefully for incubating or other purposes is shown in Fig. 16.

For this extra cushioning I may, in the side walls of the interior supporting members 14, or in the walls of the pilasters 16 provide cushion members, which will serve as flexible cushions over the area which the eggs will contact, without detracting from the strength and supporting characteristics of the remainder of the carton.

Some similar, but not as effective means, may be had by providing thickened or soft sections at these points as is generally shown at 20, Fig. 1. While these relatively soft sections provide a certain amount of cushioning, they do, however, have the objection of taking added space, particularly when the cartons are nested for shipment and at the best, they do not provide as good a support, particularly so far as resiliency and flexibility is concerned, as do the structures shown in Fig 16.

For supporting the egg at the bottom, I may employ a soft pulp area in each of the egg receiving areas, such as is generally shown at 19 in

Figs. 6, 7, and 8, but preferably I employ an integral structure shown considerably enlarged, in Fig. 17.

This structure is made a part of the carton in its integral molded fibre formation, by methods not a part of this application. However, this structure provides a supporting area over a substantial part of the bottom of the eggs which accommodates itself to the shape of the egg, and can be pressed downward whenever long eggs are packed in the container, which, when the cover is closed, requires the extra space and necessitates that the bottom of the egg come nearer to the bottom of the carton, as is shown by the dotted line in Fig. 17.

For further stiffening of the carton lengthwise in addition to the pilaster structure of the side walls, I preferably connect the interior supporting members 14 by a series of hollow rib members 18, as shown in Fig. 1 and 8. These connecting hollow rib members are shown in section in Fig. 3.

Besides providing longitudinal strength, the rib sections 18, connecting the members 14, provide an air space beneath the carton, which can communicate with the interior of the carton by providing holes or openings 15 in the top of each one of the center members 14. This will provide ventilation within the carton insuring better refrigeration of eggs in storage.

The cover members 12 and 13 are connected to the upper portion of the pilastered side walls 16 and 16a by means of hinges 21, as already mentioned. The shape of the two cover portions are such that they will nest when open as in Fig. 2, but when closed they will match evenly around the ends of the bottom section, and close together in the position as shown in Figs. 4 and 7.

The outer portions of the walls of the covers 12 and 13 are flared outwardly as indicated at 22 of cover section 12, and 23 of cover section 13. In order that they may swing inwardly from the flared or tapered position shown in Fig. 2, to the locking position shown in Fig. 7, a hinge is provided on cover portion 13 at 26 and on cover portion 12 at 27 and 28.

In addition to the hinge portion extending along the entire length of cover portion 13 at 26, there is provided on each end, and adjacent to the hinge portion and the curved end portions, a plurality of connected hinged sections 29, to permit the flared portion of the cover 13 to swing inwardly about its hinge 26 from the flared position of Fig. 2 to the vertical position of Fig. 7. When the flared portion 23 of the cover 13 swings inwardly, the hinges at 29 flex, and the several sections between them move to a nearer vertical position, permitting the portion 23 to assume a full vertical position and adjacent to the companion part on cover 12.

Similarly, on cover 12, there are hinges provided between the portions 22, the locking portions 24, and the main cover part 12, these hinges being indicated at 27 and 28. Similarly, there are a plurality of hinges 29a in the tapered wall to permit the end sections on the side of the cover to bend inwardly from the flared position shown in Fig. 2 to the vertical position shown in Fig. 7.

For securing the two cover sections 12 and 13 in closed position, there is provided a plurality of locking tabs 24 in cover portion 12 and a similar number of locking slots 25 on cover portion 13. In closing the carton the central portions 22 of cover 12 contacts the tapered portion 23 of cover 13,

and both are pressed against each other, swinging each portion into a vertical plane as indicated in Fig. 7.

At the same time that the covers are closed together, locking tabs **24** are inserted in slots **25**, and after the covers are completely closed they assume the position where they are locked together by the tabs as shown in Fig. 7. It has already been pointed out that the several hinge areas **29** and **29a** permit the flared portions, longitudinal or lengthwise of the cover portions, to bend inwardly into locking position. When the covers are in locked position, the portion **23** of cover **13**, or the edge of this portion rests directly on the tops of the central members **14**, thereby providing a vertical support for the cover when other cartons of eggs are packed on top. Portions **22** of cover **12** similarly rest their edges on the tops of portions **14**, forming an additional support for the cover sections **13** in addition to that afforded by the tabs which lock cover **13** to cover **12**.

It will be noted that the hinge areas **21**, between the base sections **10** and **11**, and the cover portions **12** and **13**, are located somewhat above the center of the carton depth. This provides the widest area opposite the portion of the egg of greatest diameter which is somewhat above its center when the egg is packed small end downward as is customary. Fig. 14 illustrates the position of the largest portion of the egg diameter relative to the hinge **21**, and shows the protection afforded the bulge of the egg by the hinge structure itself. This is not only shown in Fig. 14 considerably enlarged, but also in Fig. 7, on a somewhat reduced scale from actual carton size.

It will also be noted that the tops of portions **14** are located somewhat below the hinge line of the carton, so that when portions **23** and **22** contact each other and are pushed all the way down to the top of parts **14**, they will be somewhat below their hinge center, and therefore, have a tendency to go farther due to the natural springiness of the hinge portion between parts of the two covers.

For locking the tabs **24** in slots **25**, the width of the slot is made somewhat less than the width of the tabs as is indicated in Fig. 9. When the tab is pushed all the way into the slot the edges of the slot **25** bend downwardly as indicated in Fig. 10 and thereby lock the tabs in position at both edges. This prevents the carton from opening accidentally and securely locks the cover portions of the carton together until it is desired to open them to remove the eggs.

It will thus be seen that I have provided a simple molded fibre structure, which has incorporated in itself, a considerable number of novel features necessary to the proper packing of articles such as eggs. As already stated, I preferably finish my molded fibre article between heated dies both to retain the article in exact size and shape and also to provide its surfaces with a smooth, attractive finish not possible where the ordinary pulp sucking methods of molding are employed and the carton oven dried or by similar drying methods.

I also provide an outer wall structure, pilastrated in form, and made firm and rigid, eliminating all flexibility or yielding which might result in the eggs being broken or injured by contact from the outside. Where it seems necessary, I may provide over certain areas of these outside rigid walls, cushioning members. Preferably, however I provide the cushioning means in the

center areas of the cartons, as has already been described, in order that my outside walls may be left firm and rigid to properly protect the eggs against damage by contact either with other cartons, or with the walls of the packing case.

Generally speaking, the eggs are held in position against the outer or pilastrated walls, or against cushions in these walls, the pyramid sections through the center of the carton yielding as much as is necessary in order to provide for the different sizes of eggs. The ultimate yielding, of course, provides space to fill the entire central area of the carton with eggs, so that eggs crosswise the carton and adjacent to each other, may be fairly close together, but definitely separated by the springy action of the long flat walls in the pyramid sections themselves.

By providing hinge sections as here shown, I protect the egg or row of eggs at the point of the greatest diameter by a corrugated member running the entire length of the carton and opposite all of the eggs in the outside rows, this assuring that the eggs, at their largest and most exposed area, are further protected in addition to any cushion member which may be located in the carton wall itself.

For these and other novel features shown on the drawings and herein described I make the following claims:

1. A molded fibre egg carton comprising: a carton body having relatively rigid outer side walls provided at spaced apart distances longitudinally thereof with internally concave egg engaging portions and said body having a bottom provided, between said side walls, with integral projections extending into the confines of the body in staggered relation to the concave egg engaging portions of the side walls and presenting to eggs, positioned between said concave egg engaging portions and said projections, relatively yieldable surfaces adapted to bend to compensate for eggs of different diameters, said body being provided with relatively rigid multiple bowed end walls connecting the opposite ends of the side walls to provide within said end walls additional internally concave egg engaging portions facing yieldable surfaces of the end projections interiorly of the body, and covers integrally hinged to the opposite side walls of the carton body, said covers having bowed ends of greater radius than the adjacent bow in the end walls of the carton body when the covers are open and provided with integral bendable sections to cause the bowed ends of the covers to conform with the multiple-bowed end walls of the body when the covers are closed.

2. A self-locking molded fibre egg carton comprising: a carton body having a bottom provided, between outer side walls, with a row of upstanding compartment forming knobs, the upper ends of which constitute cover supporting abutments positioned below the upper edges of the side walls, and integral covers hinged to the upper edges of the opposite side walls of the body and having flanges at their free edges adapted to facially engage one another with their free edges resting upon said abutments when said covers are closed.

3. A self-locking molded fibre egg carton comprising: a carton body having a bottom provided, between outer side walls, with a row of upstanding compartment forming knobs, the upper ends of which constitute cover supporting abutments positioned below the upper edges of the side walls, integral covers hinged to the upper edges of the opposite side walls of the body and having flanges at their free edges adapted to facially engage

one another with their free edges resting upon said abutments when said covers are closed, and means integral with said covers to interfit and lock said covers in closed position.

4. A self-locking molded fibre egg carton comprising: a carton body having a bottom provided, between outer side walls, with a row of upstanding compartment forming knobs, the upper ends of which constitute cover supporting abutments positioned below the upper edges of the side walls, and integral covers hinged to the upper edges of the opposite side walls of th body and having flanges at their free edges adapted to facially engage one another with their free edges resting upon said abutments when said covers are closed, one cover being slotted and the other cover having at least one tapered cooperating tab of greater width than the length of the cooperating slot to fit into such slot under stress and lock the covers closed.

5. A molded fibre egg carton comprising: a compartment body having side walls, chambered covers pivoted to the upper edges of the opposite side walls of the body by interposed integral corrugated hinge sections, said body being of so much less depth than said covers that when eggs are set upright within the body compartments, with their small ends down, the hinge sections will be juxtaposed with the points of greatest diameter of such eggs to cushion such eggs against external shock.

6. A molded fibre egg carton comprising: a compartment body having side walls, chambered covers pivoted to the upper edges of the opposite side walls of the body by interposed integral corrugated hinge sections, said body and covers being of such unequal depth that eggs may be positioned in upright manner in the compartments of the body with the hinge sections juxtaposed with the points of greatest diameter of such eggs to cushion such eggs against external shock.

7. A molded fibre egg carton comprising: a carton body having relatively rigid outer side walls provided at spaced apart distances longitudinally thereof with internally concave egg engaging portions having downwardly inclined horizontally curved egg engaging surfaces and said body having a bottom provided, between said side walls, with integral upwardly projecting posts extending into the confines of the body in staggered relation to the concave egg engaging portions of the side walls and presenting to eggs, positioned between said concave egg engaging portions and said projecting posts, relatively yieldable substantially flat surfaces adapted to bend to compensate for eggs of different diameters, said body being provided with relatively rigid multiple bowed end walls connecting the opposite ends of the side walls to provide within said end walls additional internally concave egg engaging portions facing yieldable surfaces of the end projections interiorly of the body.

8. A molded fibre egg carton comprising: a body having side walls and end walls, the former provided at spaced distances longitudinally thereof with relatively rigid egg seats interiorly concave in the direction of the length of the walls and with substantially straight surfaces in the direction of the depth of the body, a bottom wall and a cover integral with and respectively tying together the side walls at the bottom and top of the body whereby the overall width of the body is maintained substantially constant irrespective of the sizes of the eggs in the body, and tapering hollow compartment-forming knobs integral with said bottom wall and extending into the confines of the body in staggered relation to the concave egg seats of the side walls to form between each two adjacent knobs and the interposed rigid egg seat of the adjacent side wall a compartment adapted to receive an egg, adjacent knobs being provided with broad substantially plane peripheral walls arranged in converging relation to the adjacent side wall and adapted to yieldably engage an egg which is in non-yielding engagement with such interposed rigid concave seat.

9. A molded fibre egg carton comprising: a carton body having a bottom provided, between outer side walls, with a row of upstanding compartment forming knobs, the upper ends of which constitute cover supporting abutments, and integral covers hinged to the upper edges of the opposite side walls of the body and having flanges at their free edges adapted to facially engage one another with their free edges resting upon said abutments when said covers are closed.

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