April 12, 1966 J. F. H. PERRACHON 3,245,093

ARTIFICIAL HONEYCOMB

Filed Dec. 19, 1962

FIG. 1

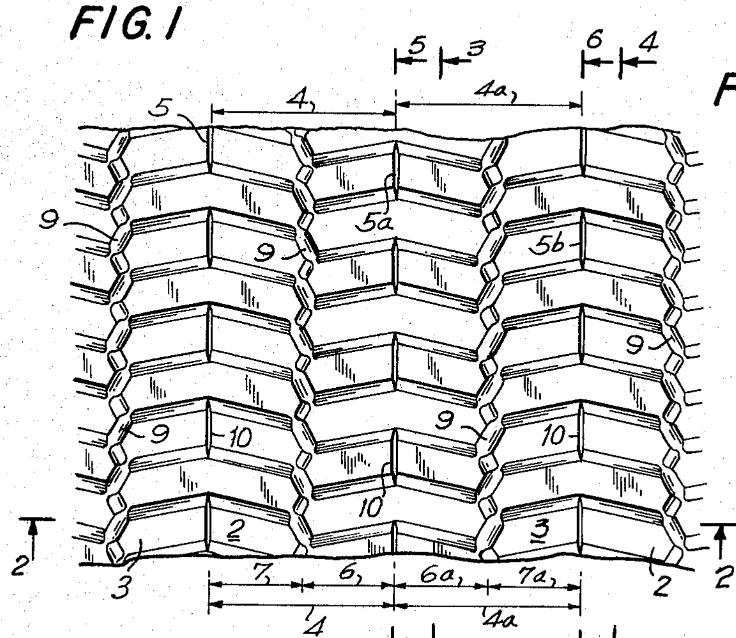


FIG. 3

FIG. 4

FIG. 2

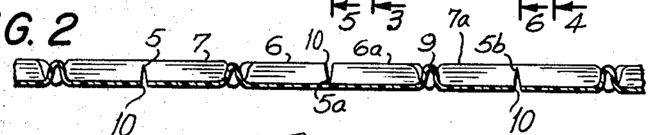


FIG. 7

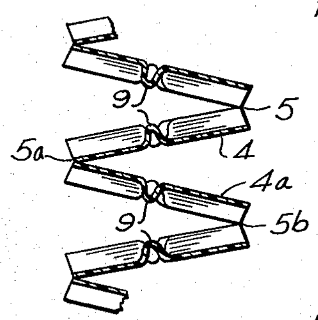


FIG. 5

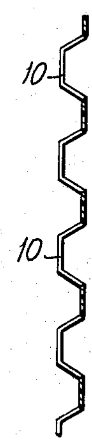


FIG. 6

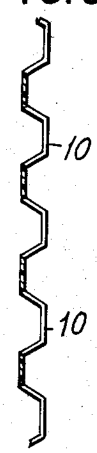


FIG. 8

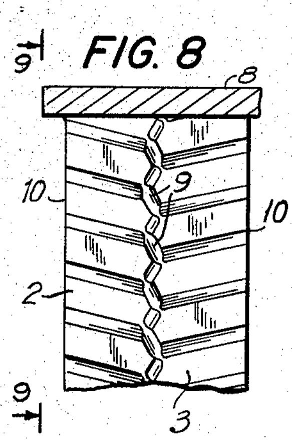
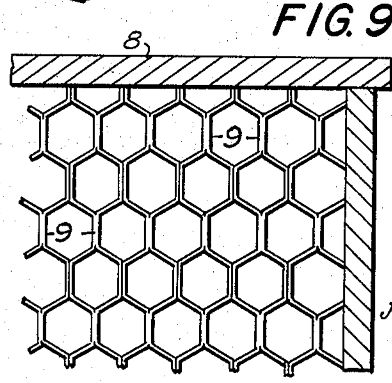


FIG. 9



INVENTOR
JEAN FERNAND HENRI PERRACHON

BY Harry Price
ATTORNEY

United States Patent Office

3,245,093

Patented Apr. 12, 1966

3,245,093

ARTIFICIAL HONEYCOMB

Jean Fernand Henri Perrachon, 24 Rue Waldeck Rousseau, Lyon, France

Filed Dec. 19, 1962, Ser. No. 245,899
3 Claims. (Cl. 6—11)

It is a known fact that at the beginning of the season, the first work of the bees in a beehive consists in forming wax cells so as to lay inside the latter their egg cells or their honey. This leads to a reduced production of honey by reason of the time lost in the execution of said cells.

The bee farmers increase the time during which bees may collect honey by inserting in the beehive frames, goffered wax plates in which the shape of the cells has been sketched out and certain farmers resort even to prefabricated artificial aluminum cells.

With a view to furthering the storing and the transportation of such artificial cells, and in order to reduce the bulk and cost price thereof, I have devised a novel type of honeycomb made of a continuous thin sheet or strip of a comparatively yielding material within the thickness of which are formed through goffering or molding in sucessive transverse rows partitions defining the cells of a honeycomb, each row including adjacent each of its transverse edges a series of uniformly spaced impressions forming each a cell, the concavities of said impressions registering two by two in the rows of the successive pairs of rows of the strip or sheet thus folded in zig-zag formation so as to produce the desired artificial honeycomb.

I have illustrated diagrammatically in the accompanying drawings, a preferred embodiment of my invention. In said drawings:

FIG. 1 is a plan view of a sheet in which the cell partitions have been stamped,

FIG. 2 is a transverse sectional view through line **2—2** of FIG. 1.

FIGS. 3 to 6 are cross-sections of FIG. 1 through lines **3—3**, **4—4**, **5—5**, **6—6** of FIG. 1 respectively.

FIG. 7 shows a sheet while it is being folded into zigzag shape so as to form the actual cells.

FIG. 8 shows the same sheet endwise after it has been completely folded.

FIG. 9 is a front sectional view through line **9—9** of FIG. 8.

FIGS. 5 and 6 indicate how the embossments are offset from each other in connection with the sections **5—5** and **6—6** of FIG. 1.

This is also indicated in FIGS. 3 and 4 which indicates the difference in the relative position of the hexagon sections taken on the lines **5—5** and **6—6** of FIG. 1.

In respect to FIGS. 7, 8 and 9, FIG. 8 is a top view of the folded and closed zig-zag shape of FIG. 7, while FIG. 9 is an side view of FIG. 7, both FIGS. 8 and 9 constituting the folded strip of FIG. 7 after it has been folded together and inserted in the frame from the outside of the honeycomb.

The sheet thickness being very reduced, in the sectional FIGS. 2 to 6 and 9 the sectionalized parts are shown in heavy lines whereas the fine lines illustrate the non-sectionalized parts lying in or behind the plane of the cross-section.

The impressions, forming each one half-cell, which are to appear in a uniformly distributed relationship to either side of the surface of each sheet of material, may be obtained by molding or else by goffering in which latter case, it is possible to provide for the continuous execution of a strip extending between two suitably engraved cylinders. Whatever may be the known or suitable means

resorted to for the obtention of a sheet provided with impressions corresponding to half-cells, I operate as follows for the formation of the cells of a beehive honeycomb.

Within the breadth of the honeycomb filling a beehive frame, I arrange in back-to-front relationship two series of blind recesses **2** and **3** (FIG. 8) in staggered formation. Before the zig-zag pleating of the sheet illustrated in FIGS. 1 and 2 there is impressed through goffering in each successive transverse row of the sheet such a series of recesses defining each one wall of a half-cell, so as to obtain a honeycomb through said pleating. The height of each elementary row **4** (FIGS. 7 and 8) between two successive folds **5** and **5a** should then correspond to the thickness required for the honeycomb and include two series **6** and **7** (FIG. 1) of half-cell impressions arranged in staggered formation so that the hollows of one half-cell of one series register transversely with the projecting section of the half-cell of the other series, each series being adapted to form part of cells opening as shown at **10** along the corresponding edge of the sheet element forming the transverse row.

It is also necessary for the sheet to be first subjected to a preliminary cutting or slotting along the lines of fold **10** to open the cells formed by the cooperation of the half-cells formed to either side of each line of fold.

Said cutting along a same direction extends for instance in registry with the fold **5** across the sections of the goffering which project outwardly of a given surface of the sheet while the cut registering with the fold **5a** passes through the depressed sections of the sheet of material. These cuts are thus in staggered relationship on any two successive folds since any two successive rows carrying two series of half-cells are mirror images of each other. The cuts may be executed after the goffering by means of a blade moving perpendicularly to the direction of progression of the sheet in its plane or else through perforation, the sheet being caused to pass between two perforating cylinders specially designed for this purpose.

In order to form the cells of a honeycomb which is to fill a frame, a fashioned sheet is folded in zig-zag shape, as illustrated in FIG. 7, and each row such as **4** of said sheet extending between two folds **5** and **5a** includes the two series **6** and **7** of half-cell impressions which are identical in the odd rows and in the even rows respectively. As a matter of fact, starting from each fold **5** and **5a** (FIG. 1) separating two strips **4** and **4a** (FIGS. 1 and 7), the two half-cell impressions of the series **6** nearest the fold **5a** for one of the rows considered, are superposed over those of the adjacent series **6a** of the next row **4a** whereas the impressions in the other series **7** of the first row considered are superposed over the impressions in the series **7a** which is further removed in said following row **4a**.

When superposing the rows **4** and **4a** which are separated by the fold **5a**, the arrangement in staggered formation of the series of half-cell impressions in a same row furthers the formation of the wall **9** substantially closing the inner ends of the cells of both series formed between the superposed rows, said wall subdividing thus transversely the honeycomb into equal parts.

The honeycomb is finished when the successive rows such as **4** and **4a** have been stacked through folding or pleating of the sheet to an extent sufficient for them to fill completely the frame **8** they are intended for.

The material extending between the fold lines **10** will consist of two half hexagonal cell structures which are oppositely inclined on each side of the fold line **10** and which terminate midway between the fold lines **10** and a reversely folded oppositely oblique half hexagonal cell structure.

The bottoms of the cells will be formed by the abutment between two flat bottom sides of the cell structure as is taking place in FIG. 7. In other words, each cell structure will take the shape as indicated in FIGS. 1, 3, 4, 5 and 6 and the bottoms will be formed by the flat bottom sides of each half hexagonal cell which will abut each other in the alternate rows when the zig-zag folded structure is achieved as in FIG. 7.

When the structure is closed together with a full abutment as in FIG. 7 it is inserted in the frame 8 and FIG. 8 gives a top plan view and FIG. 9 gives a side sectional view upon the line 9—9 of FIG. 8.

Obviously, my invention is not limited to the sole execution of cells starting from shaped and pleated sheets of plastic material, paper, cardboard, a coated fabric, or any other material obtained in a suitable manner. Similarly, it is possible to give any desired size and shape to the cells of the honeycomb.

What I claim is:

1. An artificial honeycomb formed by a flexible lightweight plastic sheet of yielding material folded upon itself to form a plurality of individual cells, each sheet having adjacent transverse rows of deformations, each

row including a series of uniformly-spaced impressions extending generally longitudinally of the sheet and forming successive concave half-cells separated by convex half-cells and having an abutment at the bottom of said half-cells, alternate half-cells of each row being scored so that when adjacent rows are folded upon each other, the slit portion forms the cell openings.

2. The honeycomb of claim 1 in which the half cells in cross-section take the form of one half of a hexagon and in which the adjacent rows have the cells extending obliquely to each other in each successive group of half cells.

3. The honeycomb of claim 1 in which the plastic sheet is formed of a continuous thin strip of sheet plastic material.

References Cited by the Examiner

UNITED STATES PATENTS

1,389,294	8/1921	Dean	6—11
1,561,623	11/1925	Watson	6—11
2,933,122	4/1960	Christman	6—11 X

SAMUEL KOREN, *Primary Examiner.*

LUCIE H. LAUDENSLAGER, *Examiner.*