Feb. 7, 1961 D. H. BAUGHAN 2,970,736

CONTAINER SYSTEM

Filed Oct. 24, 1957 3 Sheets-Sheet 1

Fig. 1.

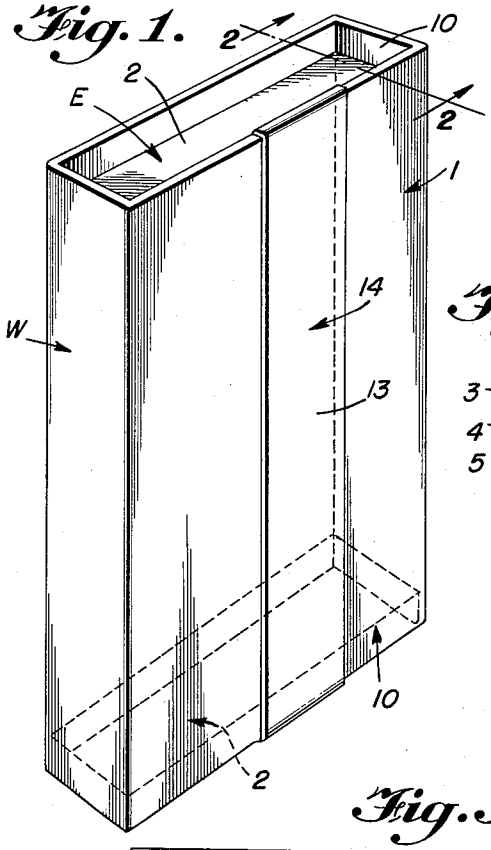


Fig. 2.

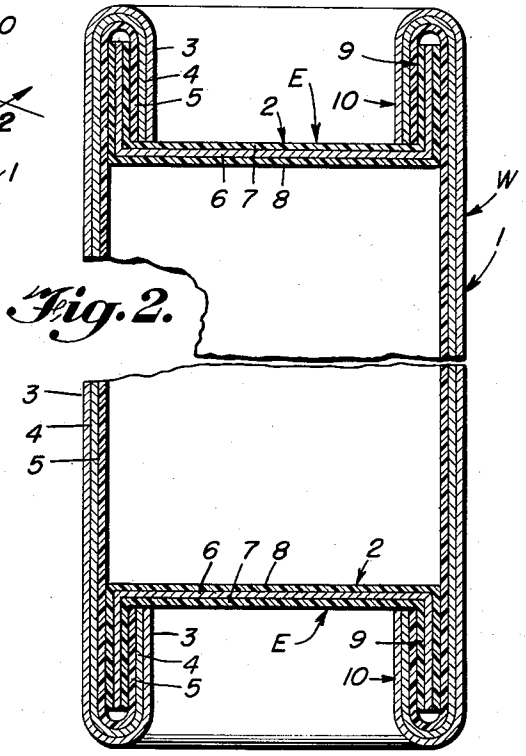
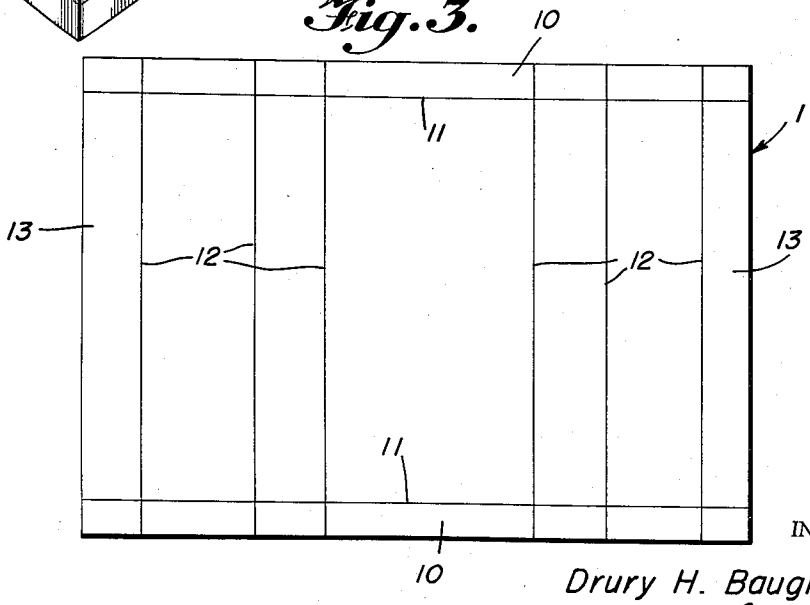


Fig. 3.



INVENTOR

Drury H. Baughan

BY Glenn & Jackson

ATTORNEYS

Feb. 7, 1961 D. H. BAUGHAN 2,970,736

CONTAINER SYSTEM

Filed Oct. 24, 1957 3 Sheets-Sheet 2

Fig. 4.

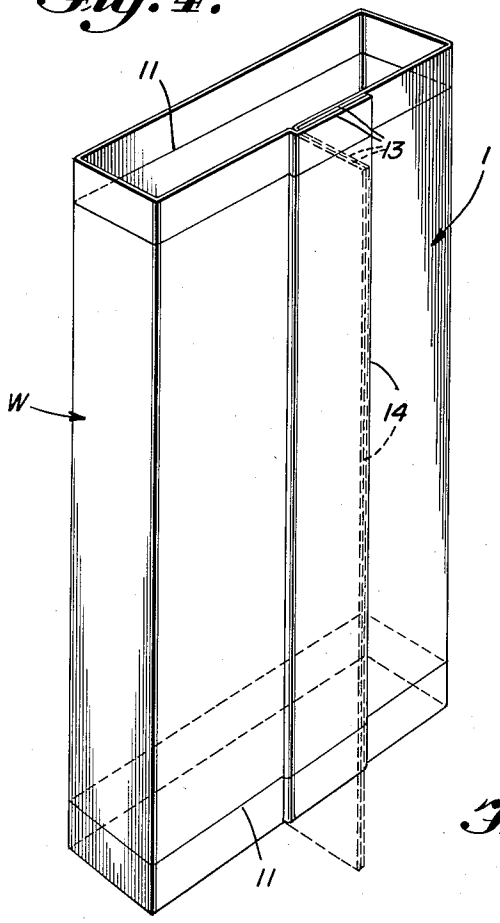


Fig. 5.

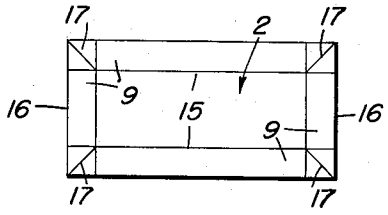


Fig. 6.

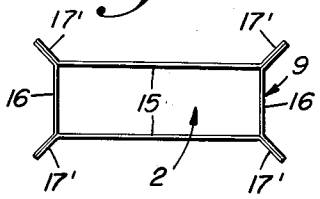


Fig. 7.

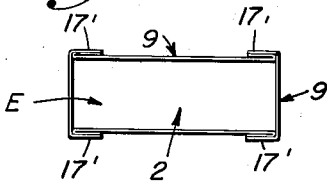
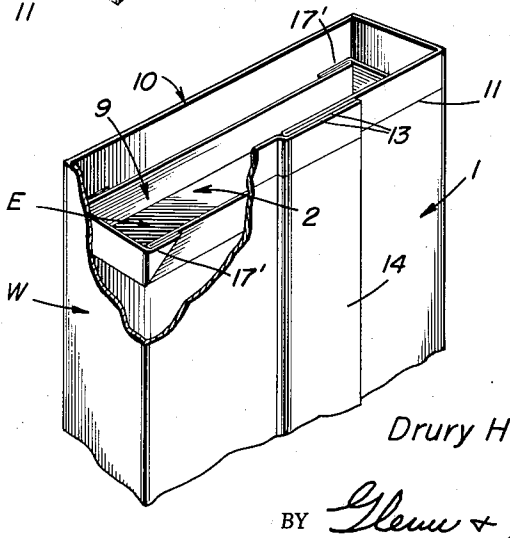


Fig. 8.



INVENTOR

Drury H. Baughan

BY Glenn & Jackson

ATTORNEYS

Feb. 7, 1961 D. H. BAUGHAN 2,970,736

CONTAINER SYSTEM

Filed Oct. 24, 1957 3 Sheets-Sheet 3

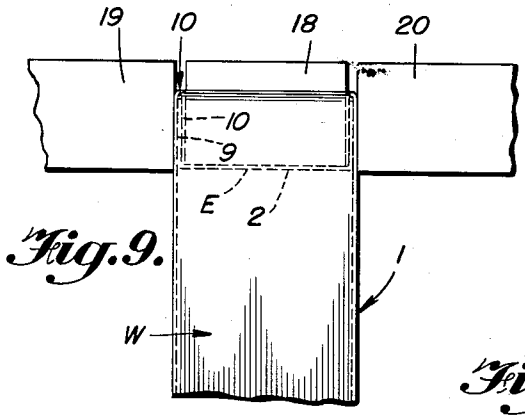


Fig. 9.

Fig. 11.

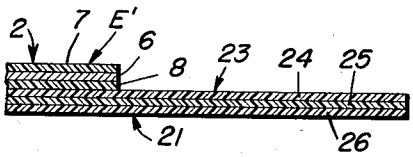


Fig. 10.

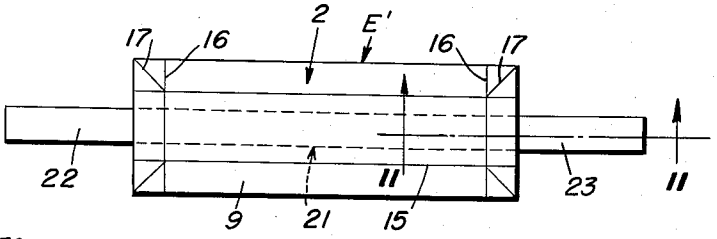


Fig. 12.

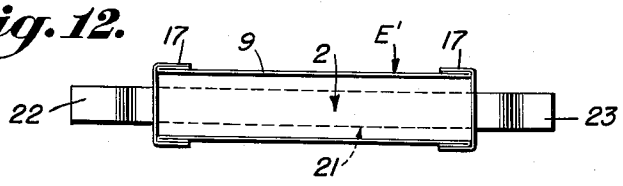


Fig. 13.

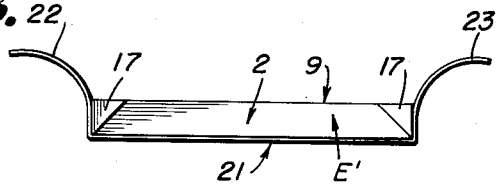


Fig. 15.

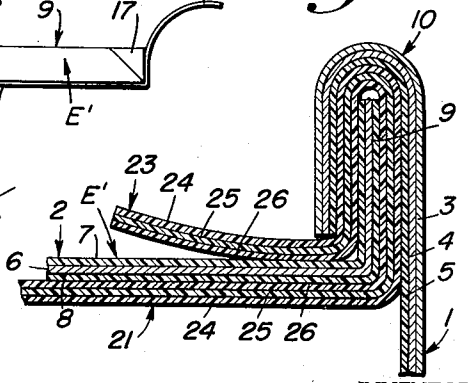
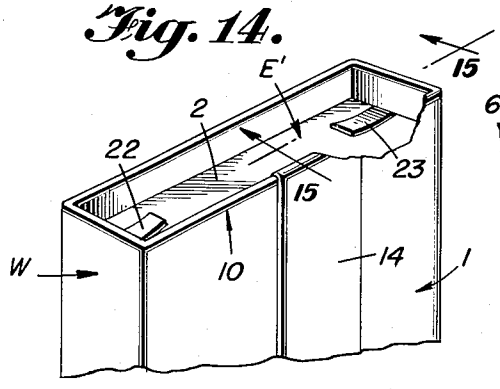


Fig. 14.



INVENTOR

Drury. H. Baughan

BY Glenn & Jackson

ATTORNEY

United States Patent Office 2,970,736 Patented Feb. 7, 1961

2,970,736

CONTAINER SYSTEM

Drury H. Baughan, Richmond, Va., assignor to Reynolds Metals Company, Richmond, Va., a corporation of Delaware

Filed Oct. 24, 1957, Ser. No. 692,092

3 Claims. (Cl. 229—3.5)

This invention relates to a moistureproof container for use in the freezing, storing and heating of food products.

Heretofore, containers have been used which employ a very thin metal foil, such as tin or aluminum foil, as a moisture impervious barrier on the inner or outer surface of a fibrous container wall. While such foil is generally impervious to moisture, it is normally rolled so thin as to contain many pinholes which render such containers ineffective to prevent food deterioration by reason of infiltration of moisture bearing air. Other disadvantages of conventional containers of this type are the difficulties involved in obtaining leakproof joints or seals between the carton walls and closures, and the use of wax bearing sealing materials which render the container useless for heating of the food stored therein.

It is a principal object of this invention to provide a foil container so constructed as to obviate the difficulties mentioned and which is useful for freezing, storing and heating food products, such as fruits, berries, fruit juice concentrates, soups, beverages, vegetables and the like.

It is a further object of the invention to provide a single foil layer container which is rendered impervious to hot or cold liquids by application of a layer of thermoplastic material, bonded thereto or to a fibrous liner, which remains set and hard under normal temperatures of usage but softens under application of heat and pressure, during fabrication of the container, to seal the wall edges to the closures.

It is another object of the invention to provide an improved container construction which utilizes a minimum of material yet is rigid and durable.

Yet another object of the invention lies in the provision of an opener strip of strong and durable material, preferably heat bonded to the container closure, which enables the container to be readily and quickly opened for removal of its contents, such strip serving to break the closure seal and pull the entire closure from the container.

The novel features that are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of specific embodiments when read in connection with the accompanying drawings, wherein like reference characters indicate like parts throughout the several figures and in which:

Figure 1 is a perspective view of a container constructed in accordance with the invention;

Figure 2 is an enlarged vertical longitudinal sectional view taken on line 2—2 of Fig. 1 showing the wall and closure sections in exaggerated detail;

Figure 3 is a top plan view of the container side wall precut to size and ready for forming;

Figure 4 is a perspective view of the container wall formed to shape prior to insertion of the end closures;

Figure 5 is a top plan view of a container closure precut to size and ready for forming;

Figure 6 is a top plan view of the closure partially formed;

Figure 7 is a view similar to Fig. 6 showing the closure after the corners are completely folded;

Figure 8 is a perspective view of the inverted lower end of the container with the bottom closure inserted prior to sealing of the container wall to the closure;

Figure 9 is a partial side elevation of one end of the container showing the positioning of forming blocks to apply heat and pressure for sealing a closure thereto;

Figure 10 is a top plan view, before forming, of a modified closure embodying a removal strip;

Figure 11 is an enlarged detail section taken on line 11—11 of Fig. 10;

Figure 12 is a top plan view of the modified closure formed and ready for insertion into the container;

Figure 13 is a side elevation of the closure shown in Fig. 11;

Figure 14 is a perspective view of the upper end of the container with the modified closure of Fig. 12 inserted and sealed in place, and

Figure 15 is an enlarged detail section taken on line 15—15 of Fig. 14.

Referring now to the drawing, specifically to Fig. 1, the container illustrated is a preferred embodiment of the invention and comprises a tubular side wall W of rectangular section closed at both ends by identical closure members E. The wall W is formed of a single sheet 1 (Fig. 3) of laminated construction (Fig. 2) and comprises an outer layer 3 of metal foil, such as aluminum or tin, preferably coated on a thin layer 4 of fibrous material such as paperboard, and further sealed with an inner coating 5 of a thermoplastic material, such as polythene or polyethylene.

All three layers of the side wall sheet 1 are very thin, their thickness being greatly exaggerated in Fig. 2 for clarity of illustration. The foil outer layer and the plastic inner layer are both impervious to liquids, the inner layer serving to seal any pinholes which may exist in the foil. In certain instances, as where rigidity is unessential, it may be desirable to omit the intermediate layer and use only foil coated with the thermoplastic as the container wall.

Each end closure E is also preferably formed of a single laminated sheet 2 (Fig. 5), which, as best shown in Fig. 2, comprises a layer of metal foil 6 coated on both sides by layers 7 and 8 of thermoplastic material such as polyethylene. Each closure is formed with a peripheral out-turned flange 9 over which the respective end portions 10 of the side wall is folded 180°. Heat and pressure is then applied to seal the peripheral joints resulting in the bonding of the inner wall layer 5 to both thermoplastic layers 7 and 8 of the closures 2. It will be noted that this structure provides contacting thermoplastic layers at all edge seals, the surface layers 7 and 8 of the end closure engaging the inner layer 5 of the wall so that when heated, these layers become integral and form a strong, fluid tight seal that has great strength.

Figs. 3–9 illustrate a preferred method of fabricating the container. The described laminated sheet 1 of wall material is cut to a predetermined size, as shown in Fig. 3. Fold lines 11 are scored at fixed distances from the top and bottom edges and parallel thereto and to each other to form the end fold portions 10. Fold lines 12 are formed at fixed distances from the side edges to form flaps 13 and also define the wall panels if the container is non-circular. The side edge flaps 13 are brought together with the thermoplastic inner layer 5 engaging itself and heat sealed, forming a fin seal 14, as shown in broken lines in Fig. 4. The wall body is then formed

around a mandrel to any desired shape, round, square, hexagonal or the like, the rectangular shape being illustrated in Fig. 4. The fin 14 is then folded to lie flush against the wall body.

Each closure E is also precut to size, see Fig. 5, from the laminated sheet material 2, previously described. A pair of parallel fold lines 15 are scored on the sheet at equal distances from the upper and lower edges, respectively, and a second pair of parallel fold lines 16 are marked at the same distance from the side edges to define the portions forming the flange 9. Diagonal fold lines 17 are marked from the intersections of the two sets of parallel lines 15 and 16 to the corners of the sheet. The peripheral flange 9 turned 90° to the sheet is then formed by folding along the lines 15 and 16, the excess material at the corners of the rectangle being folded along lines 17 to provide projecting tabs 17', see Fig. 6. The tabs 17' are then folded by pressure to lie along two or more sides of the peripheral flange 9, as shown in Fig. 7.

A formed bottom closure E is then inserted into container wall W until the outer edge of flange 9 is approximately even with fold line 11, see Fig. 8. It is tacked here by a quick application of heat which bonds thermoplastic layers 5 and 8 at a number of spaced points. The end fold 10 of the side wall is then folded 180° over the closure flange 9 along fold line 11, this fold 10 binding the fin 14 flat against the wall. A predetermined amount of heat and pressure is then applied simultaneously to the inside and outside of fold 10 by means of suitable heated pressure forms, one of which enters the container to the level of the closure E inside fold 10.

Figure 9 illustrates such a heated forming block 18 seated within fold 10 at the end of the container. Two lateral forming blocks 19 and 20 exert pressure and heat on two side walls of the container opposite the fold 10 to seal the walls and fold to both sides of the closure flange 9. The container may be removed, turned 90°, and reinserted between the forming blocks to seal the remaining two sides of fold 10, or additional forming blocks may be used to simultaneously seal all sides. After the container is filled with the liquid or solid food to be packaged, the upper end is closed and sealed by an upper closure E, formed, applied and sealed in the same manner. A similar method of fabrication, with some differences in detail, may be used to form round, square, hexagonal, conical or other shaped containers.

A modified and readily removable closure E' is illustrated in Figs. 10–15. The closure E' may be formed of a precut sheet 2 exactly as described and shown in Figure 5. Before forming, however, a removal strip or tape 21 of thin material having high strength is placed under the closure sheet 2. This strip 21 is provided with surface layers of a heat sealing medium compatible with the heat sealing surface 5 of the container wall and preferably, but not necessarily, is heat bonded to the closure sheet 2. The strip 21 extends beyond the ends of the closure proper to form pull tabs 22 and 23. The removal strip is of laminated structure whose layers may vary in material so long as a very strong, durable member is provided.

Very good results have been obtained by forming one of the layers of the strip 21 of the polyethylene terephthalate resin sold under the trade name "Mylar" which is outstandingly strong and chemically formed with oriented molecules of high tensile strength similar to "Dacron." Preferably, as shown in Fig. 11, the strip comprises an intermediate layer 25 of metal foil coated on opposite sides with thermoplastic layers 24 and 26, one of which may be "Mylar" and the other a thermoplastic such as polyethylene. In a preferred embodiment, the layer 24 may be "Mylar" and the layer 26 may be "Saran" which is a generic class of thermoplastic resins formed by polymerization of vinyl chloride or polyvinylidene chloride.

Figures 12 and 13 are top and elevational views, respectively, of the closure E' completely formed with the removal strip 21 attached and its pull tabs 22 and 23 extending from the ends of the closure. The closure E' is inserted into the tubular container wall W and heat sealed thereto in the same manner as previously described, except that portions of the tabs 22 and 23 are folded over closure flange 9 and under wall fold 10, see Figure 15, and are heat sealed to both of these upon application of the heat and pressure means. The ends of tabs 22 and 23 lie unsealed, however, adjacent the outside layer 7 of closure E'. This may be accomplished in any suitable manner, as for example, by varying the shape of the inserted heat and pressure form 18 to insure that heat is not applied to the ends of tabs 22 and 23.

Opening of the container illustrated in Figure 14 is effected by pulling either tab 22 or 23 toward the other. Removal strip 21 is sufficiently strong to break the seal between flange 9 of the closure and fold 10 of the container wall and has the unique advantage of lifting the entire end closure from the container even when the package is frozen. This is particularly advantageous when the thermoplastic sealing layers have been somewhat softened by heating or cooking the food content in the carton. The complete removal of the end closure enables rapid access to contents of the container without requiring use of tools.

The advantages of the invention are quite apparent from the foregoing description. The primary advantage resides in the fact that a flexible, light weight carton is provided of thin laminated sheet material which is as effective in protecting its contents from air and moisture as is a heavy sealed, more expensive metal can. The container is of simple construction capable of fabrication on conventional machines. Although the material is thin and flexible, the sealed folds in the wall and closure members provide an adequate amount of rigidity so that a liquid filled container can be dropped without material damage to the carton or loss of contents. The foil layer on the outside of the carton provides eye appeal and the provision of a removal strip permits ready access to the food content without the need for puncturing the carton with a can opener or sharp tool. Finally, and outstandingly, the double thermoplastic layers of the end closure engaging the inner thermoplastic layers of the wall, enables the integral joining of these layers to form a completely fluid-tight seal.

Although certain specific embodiments of the invention have been shown and described, it is obvious that many modifications thereof are possible. The invention, therefore, is not to be restricted except insofar as is necessitated by the prior art and by the spirit of the appended claims.

What is claimed and desired to be secured by Letters Patent is:

1. A liquid impervious container for freezing, storing, and heating of foods comprising: a laminated tubular side wall having an outer layer of metal foil bonded to an inner layer of thermoplastic material; a laminated end closure telescoped into said tubular side wall and comprising a layer of foil and a layer of thermoplastic material bonded to each side thereof, said closure having a central flat portion and an outwardly turned peripheral flange, said side wall having a fold over said flange, and both layers of thermoplastic material of the closure being heat bonded to the thermoplastic layer of the container side wall at the said fold; and a closure removal strip adjacent the inner side of said end closure and extending outwardly thereof, said removal strip comprising laminations of thermoplastic materials bonded on each side of a foil layer, one of said laminations comprising a strong durable material whereby the exertion of pulling force on an end of said strip will serve to break the seal between the closure and side wall to open the container.

2. A container as set forth in claim 1 wherein said removal strip is heat bonded to the inner side of the end closure and comprises a layer of Mylar, a layer of foil, and a layer of Saran bonded together.

3. A liquid impervious container for freezing, storing, and heating of foods comprising: a laminated tubular side wall having an outer layer of metal foil bonded to an inner layer of thermoplastic material; a laminated end closure telescoped into said tubular side wall and comprising a layer of foil and a layer of thermoplastic material bonded to each side thereof, said closure having a central flat portion and an outwardly turned peripheral flange, said side wall having a fold over said flange, and both layers of thermoplastic material of the closure being heat bonded to the thermoplastic layer of the container side wall at the said fold; and a closure removal strip adjacent the inner side of said end closure and extending outwardly thereof, whereby the exertion of pulling force on the ends of said strip will serve to break the seal between the closure and side wall and accomplish intact removal of the end closure.

References Cited in the file of this patent

UNITED STATES PATENTS

1,462,443	Brooks	July 17, 1923
2,100,739	Gilfillan	Nov. 30, 1937
2,150,058	Frazier	May 7, 1939
2,152,322	Moore	Mar. 28, 1939
2,152,323	Moore	Mar. 28, 1939
2,437,114	Moore	Mar. 2, 1948
2,603,401	Strauss	July 15, 1952
2,665,616	Jungmayr	Jan. 12, 1954
2,808,192	Raisin	Oct. 1, 1957
2,829,701	Keely	Apr. 8, 1958

FOREIGN PATENTS

7570A	Great Britain	of 1903