Dec. 11, 1956 T. E. PIAZZE ET AL 2,773,285

METHOD OF MAKING STERILE CONTAINERS

Filed Nov. 6, 1947

Fig. 3

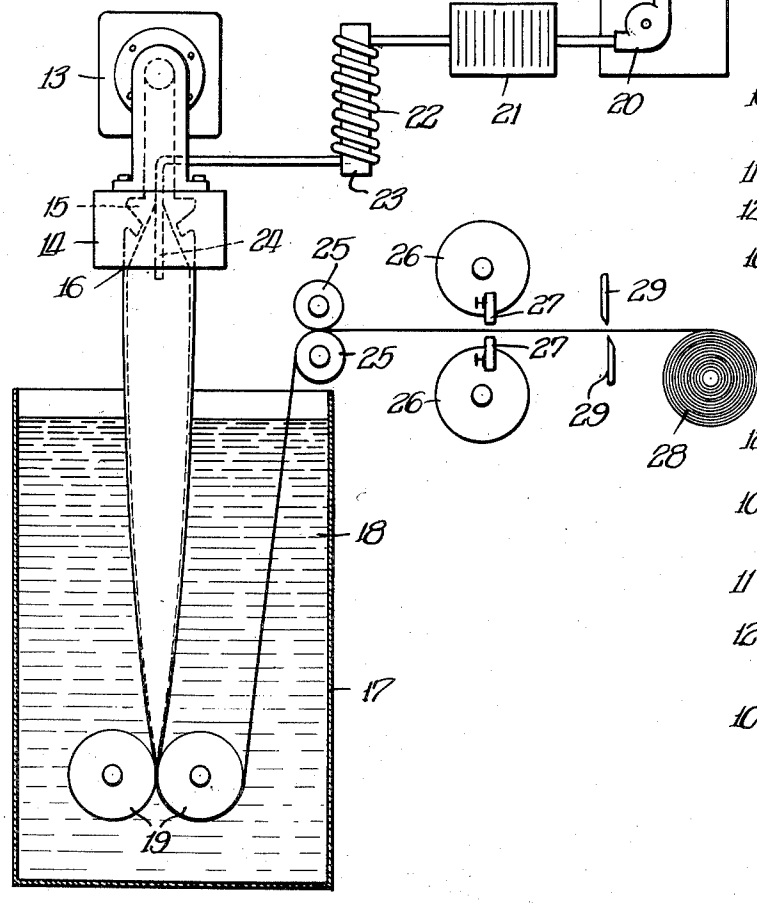


Fig. 1

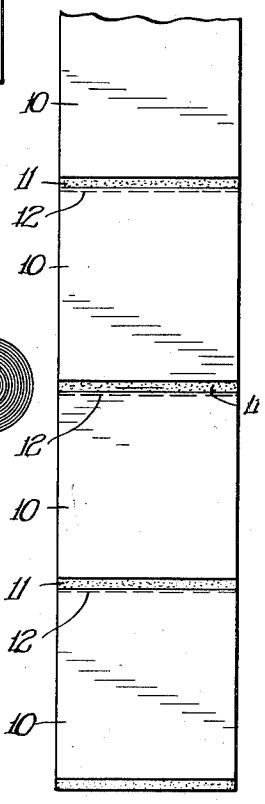
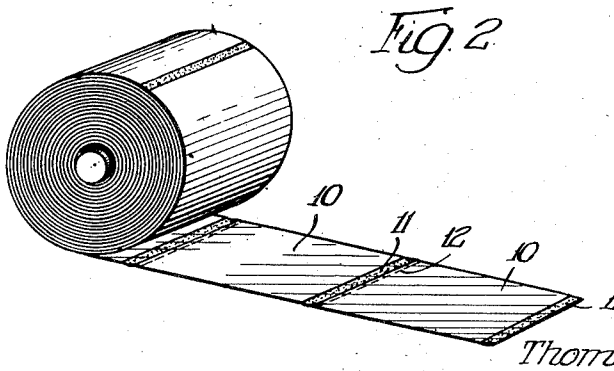


Fig. 2



INVENTOR.
Thomas E. Piazze,
BY Thomas R. Baxter,
Cromwell, Greist & Warden
Attys.

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METHOD OF MAKING STERILE CONTAINERS

Thomas E. Piazze and Thomas R. Baxter, Mount Vernon, Ohio, assignors, by mesne assignments, to Continental Can Company, Inc., New York, N. Y., a corporation of New York

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2 Claims. (Cl. 18—47.5)

This invention is concerned with improvements in containers and methods of making the same, and relates more particularly to a series of integrally connected flexible containers which are initially provided in hermetically sealed, sterile condition and which are adapted to remain in such condition until they are severed to provide individual containers for use.

In the copending applications of Thomas E. Piazze, Serial No. 668,267, Nursing Bottle Top, filed May 8, 1946, now abandoned, and Serial No. 743,112, Closure Device for Containers, filed April 22, 1947, now Patent No. 2,520,335, containers are shown which are made of transparent flexible material and which are used as disposable nursing bottles. In supplying containers for this purpose it is very desirable to provide containers which may be furnished to the ultimate user in closed and sterile condition and which may be easily maintained in such condition until it is desired to attach the individual containers to the tops or holders for use.

It is an object of this invention to provide a plurality of containers in the form of a continuous tube having the inner walls sterilized and having spaced transverse sealing areas whereby individual containers may be severed from the tube as they are desired for use and the remaining containers will be maintained in sealed and sterilized condition.

It is a further object of the invention to form sterilized containers by providing a tube of transparent material and transversely sealing the tube at spaced intervals, while maintaining the inner walls thereof in a sterilized condition, to provide a series of integrally connected hermetically sealed sterile container forming sections which may be cut off one at a time as desired for use.

It is a more specific object of the invention to form containers by providing a continuous tube of heat-sealable material. subjecting the inner walls thereof to a sterilizing medium and heat sealing the tube transversely at predetermined spaced intervals to form a plurality of integrally connected hermetically closed and sterile containers or bags which may be severed, one at a time, to provide individual open-ended bags when desired.

It is a still more specific object of the invention to form a continuous, transparent, flexible, heat-sealable tube of material while simultaneously subjecting the inner walls thereof to a sterilizing treatment and thereafter to transversely seal the tube at predetermined spaced intervals while maintaining the inner walls thereof in sterile condition whereby a plurality of integrally connected hermetically sealed and sterile containers are provided which can be severed between the individual seals to obtain containers for use as nursing bottles or for enclosing commodities which are intended to be kept substantially free of bacterial, fungicidal and other contamination.

These and other objects of the invention will be apparent from a description of the preferred form of the container and the method of making the same which are illustrated by way of example in the accompanying drawing, wherein:

Fig. 1 is a plan view of a plurality of integrally connected containers which embody the principles of the invention;

Fig. 2 is a perspective view of a roll of the connected containers; and

Fig. 3 is a schematic view illustrating a method of continuously forming the integrally connected hermetically sealed and sterile containers.

This application is a continuation-in-part of our application Serial No. 715,940, Sterilized Tubular Container Construction, filed December 13, 1946, now abandoned.

Referring to Fig. 1 of the drawing, there is illustrated the end portion of a continuous tube of material which has been flattened and divided into a plurality of containers **10** by spaced transverse sealing areas or lines **11**. The containers **10** are adapted to be detached, one by one, by cutting along the dotted lines **12** when they are desired for use.

The inner walls of the containers **10** are initially sterilized and maintained in sterilized condition while the transverse seals are made so that the inside walls of the containers **10** are in sterilized condition when furnished to the user and are never exposed to outside air until the individual containers are detached for use.

The containers are preferably formed of a flexible transparent material such as polyethylene, rubber hydrochloride, heat-sealable cellophane or equivalent materials. The containers may be made any desired size such as 4, 6, or 8 ounces as required for nursing bottle use and they may be conveniently supplied in roll form as illustrated in Fig. 2.

In Fig. 3 of the drawing there is diagrammatically illustrated a preferred method of forming a plurality of connected containers which are sterile on the inside walls and which may be maintained in a sterile condition until individual containers are detached for use. In carrying out the method a plastic material, preferably polyethylene, is supplied to an extrusion head **13** which terminates in a tube forming die **14** having internal passageways **15** leading to a forming slot **16** in the lower face of the die. The plastic material is in the proper condition for extruding from the forming slot **16** in the form of a tube. The extruded plastic passes into a cooling vessel or container **17**, which contains water or other suitable cooling liquid **18**, and is drawn away from the forming die **14** by a pair of rollers **19**. The rollers **19** rotate at a greater rate of speed than the travel of the material from the extrusion die and stretch the material before it sets to reduce the thickness of the walls of the tube to the desired dimension.

In order to prevent the plastic tube from collapsing and the inner walls of the same from coming together and adhering before the plastic sets, air or other gas is supplied to the inside of the tube as it is being formed. The air, which may be supplied by means of a pump **20**, is preferably passed through a filter **21** to remove any dirt or solid impurities. The air is then passed through a coil **22** which is heated by an electric heating element **23** or other heat source and the temperature is raised to approximately 350° to 400° F. which is above the sterilization point. The heated air is then passed through the forming die **14** by means of the tube **24**, which may have its end projecting slightly beyond the lower face of the die, and into the plastic tube as the latter is being formed. The heated air prevents the walls of the tube from collapsing and also sterilizes the inner walls as they are being formed.

The formed and sterilized tube is set when it reaches rolls **19** which flatten the tube and prevent the passage of the internal air used in the forming and sterilizing operation. The tube passes upwardly out of the cooling vessel **17** to a pair of rolls **25** which further flatten and

crease the tube. The flattened tube then passes between a pair of rollers **26** which are provided with sealing elements **27** which heat-seal the tube transversely at spaced intervals. The spacing of the transverse seals may, of course, be varied to provide containers of any desired capacity. The tube which is now completely formed into a series of integrally connected container forming sections may then pass to a wind-up roll **28**. Cut-off knives **29** may be provided adjacent the transverse seal-forming rolls **26** to permit severance of the tube when the roll **28** contains the desired number of container forming sections.

The containers and the method of forming the same which have been specifically described herewith are merely illustrative of the invention. The containers may also be formed from one or more webs of suitable sheet material by longitudinally sealing the webs into tube form and providing for sterilization of the inner surfaces of the tube prior to the forming of the transverse seals.

The sealed and sterile containers which are contemplated by this invention are useful not only as disposable nursing bottles but also for the packaging of commodities which are intended to be kept substantially free of bacterial, fungicidal and other contamination and for many other purposes, where it is desired to supply the user with a sterile container which may be easily maintained in sterile condition until immediately prior to its actual use.

While specific materials and details of construction have been referred to in describing the preferred form of the container and the method of making the same, it will be understood that other materials and details of construction may be resorted to within the spirit of the invention.

We claim:

1. A continuous process of forming sterile containers comprising extruding a thermoplastic material in the form of a hollow tubular body, supplying a fluid medium within the tubular body which is heated to a temperature sufficient for sterilization, maintaining the interior of the tubular body in sterile condition, flattening the tubular body and thereby removing the fluid medium from the tubular body, and transversely sealing the tubular body at spaced intervals while maintaining the interior thereof

in sterile condition to provide a plurality of integrally connected containers which are adapted to remain free from internal contamination until they are individually severed.

2. The process of forming a plurality of integrally connected sterile containers comprising extruding a thermoplastic material in the form of a tube, supplying the interior of the tube with a fluid medium under sufficient pressure to prevent collapse of the walls of the tube as it is formed, said fluid medium being passed through a filter to remove impurities and being preheated to a temperature sufficient for sterilization, collapsing the walls of the tube to free the same of the fluid medium and transversely sealing the tube at longitudinally spaced intervals while maintaining the inner walls thereof in sterilized condition thereby providing an integrally connected series of hermetically sealed containers which may be maintained in sterile condition until they are individually severed from each other for use.

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