

June 12, 1945.

D. RAY ET AL
PACKAGING MACHINE
Filed May 22, 1941

2,378,324

6 Sheets-Sheet 1

Fig. 1.

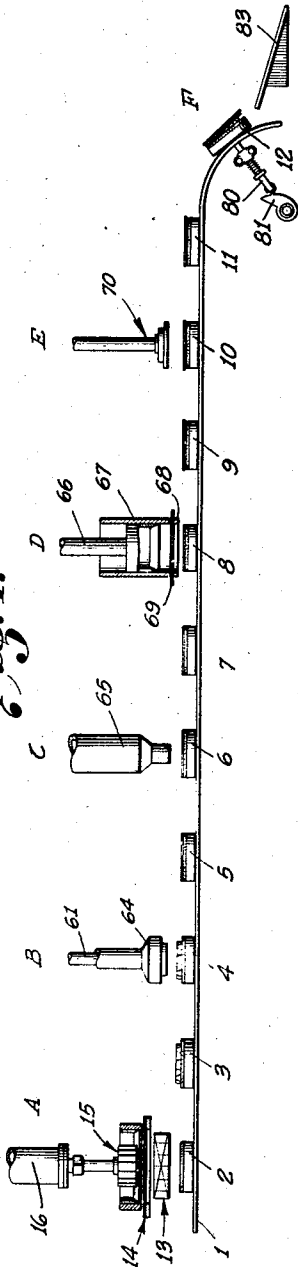


Fig. 2.

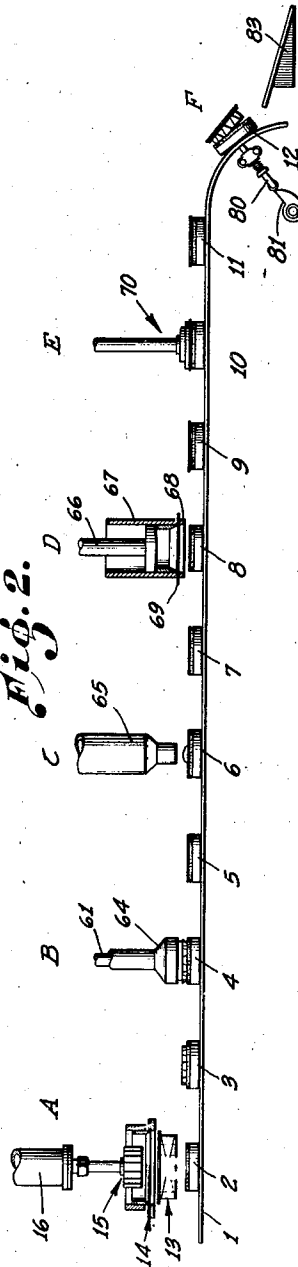
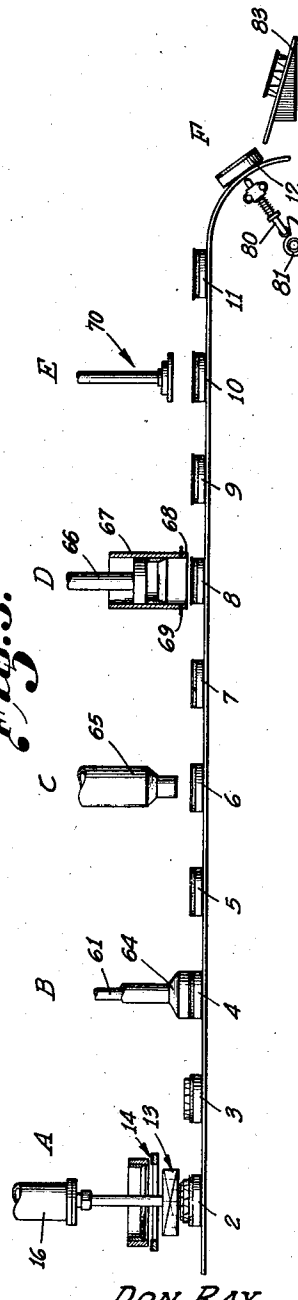


Fig. 3.



DON RAY,
CARLO RAY,
INVENTORS

BY

Edwin Kelly
ATTORNEY

June 12, 1945.

D. RAY ET AL
PACKAGING MACHINE
Filed May 22, 1941

2,378,324

6 Sheets-Sheet 2

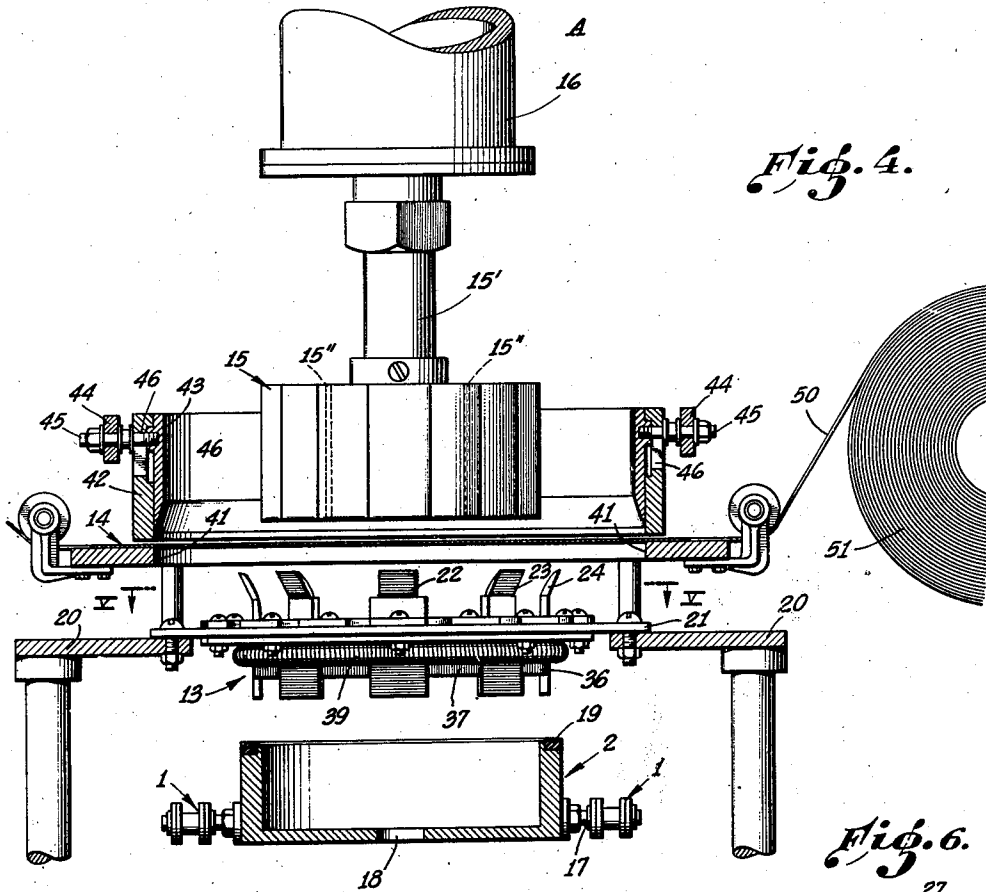


Fig. 4.

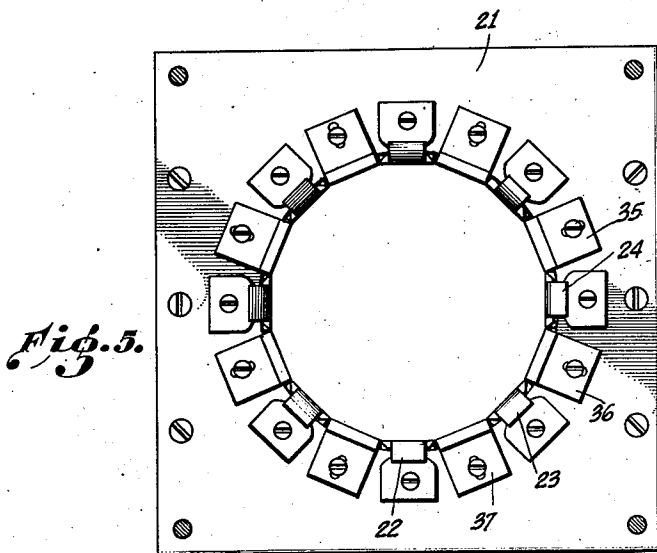
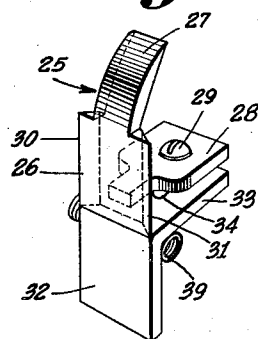


Fig. 5.



DON RAY,
CARLO RAY,
INVENTOR

BY *C. C. Kiehl*
ATTORNEY

June 12, 1945.

D. RAY ET AL

2,378,324

PACKAGING MACHINE

Filed May 22, 1941

6 Sheets-Sheet 3

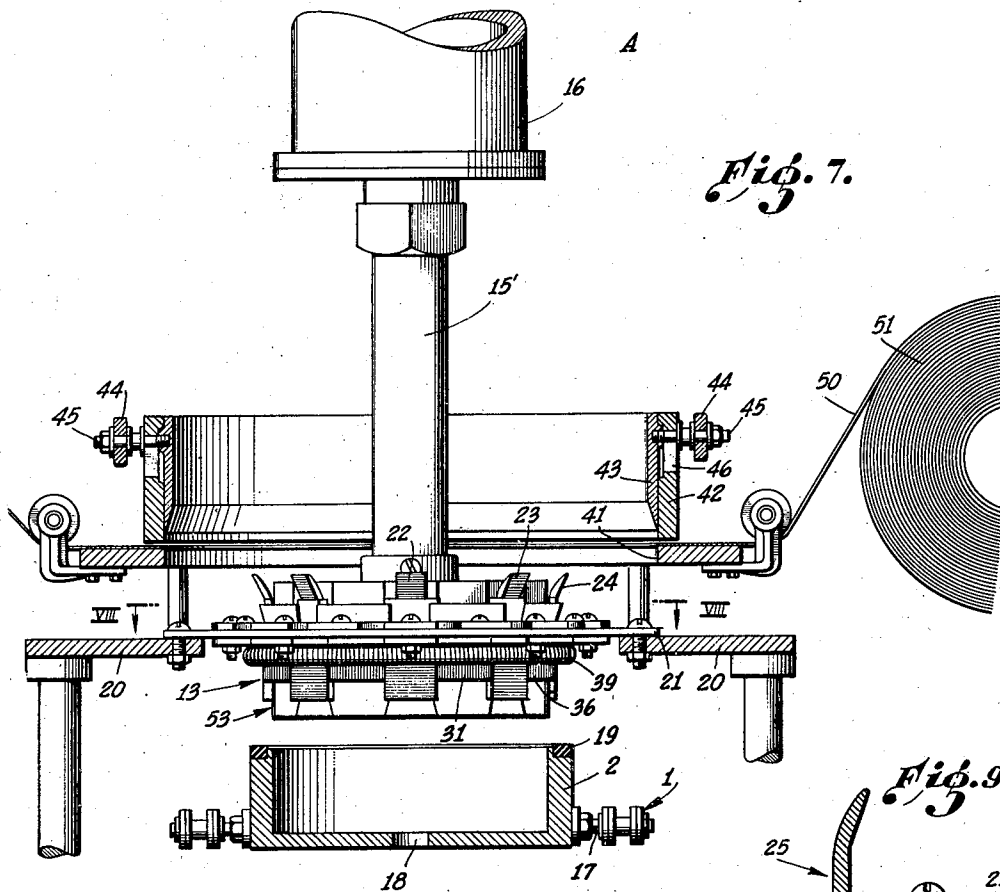


Fig. 7.

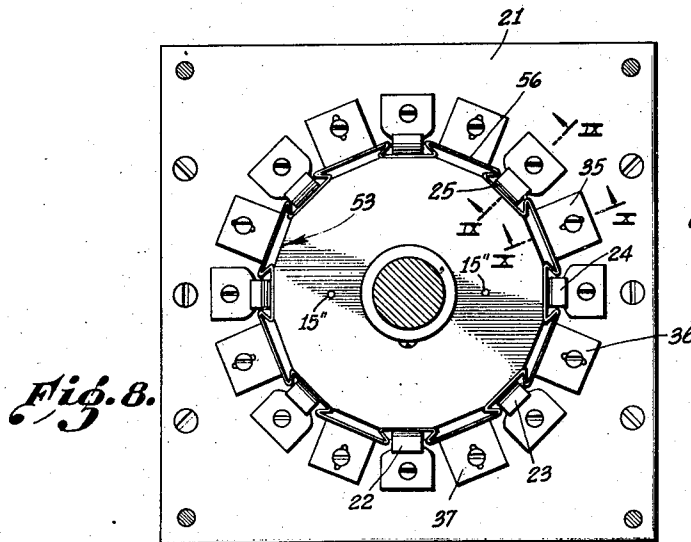


Fig. 8.

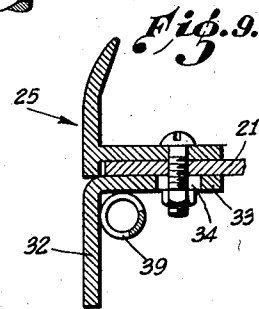


Fig. 9.

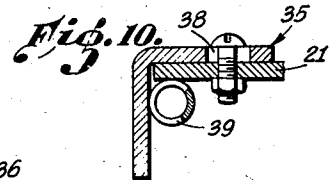


Fig. 10.

DON RAY,
CARLO RAY,
INVENTOR

BY *C. A. Mullett*
ATTORNEY

June 12, 1945.

D. RAY ET AL

2,378,324

PACKAGING MACHINE

Filed May 22, 1941

6 Sheets-Sheet 4

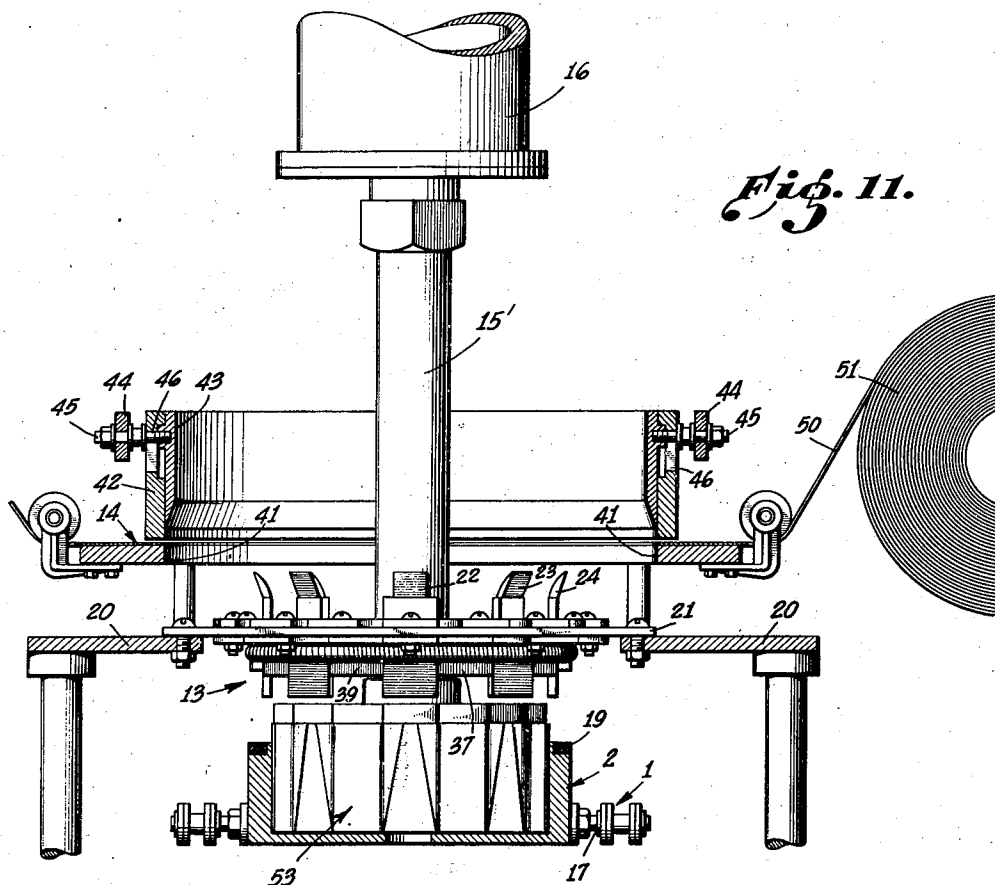


Fig. 11.

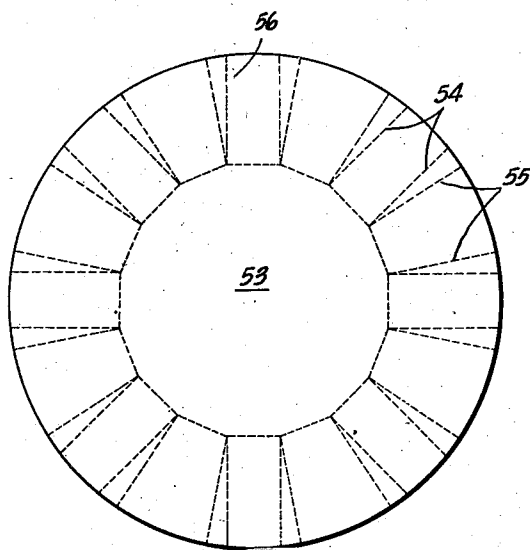


Fig. 12.

DON RAY,
CARLO RAY,
INVENTORS

BY

C. P. W. [Signature]

ATTORNEY

June 12, 1945.

D. RAY ET AL
PACKAGING MACHINE
Filed May 22, 1941

2,378,324

6 Sheets-Sheet 5

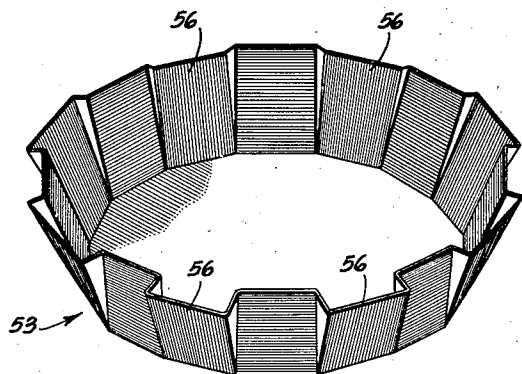


Fig. 13.

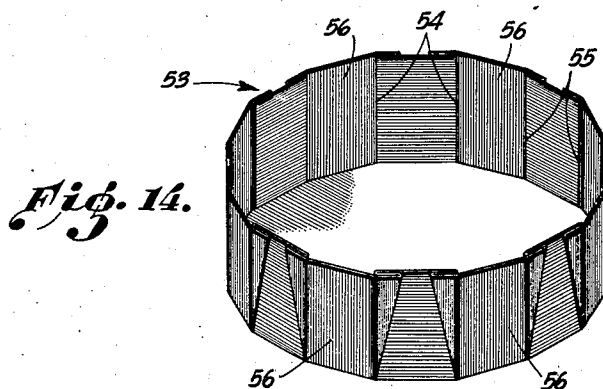


Fig. 14.

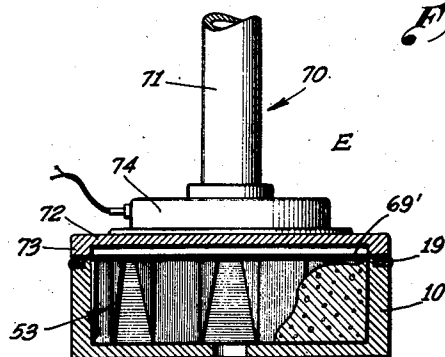


Fig. 17.

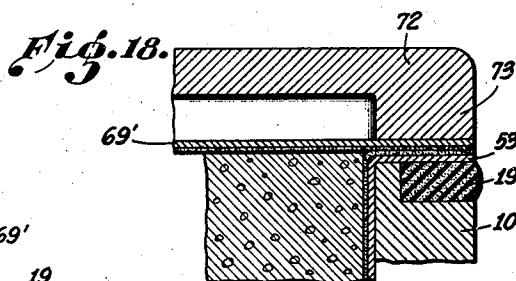


Fig. 18.

DON RAY,
CARLO RAY,
INVENTORS

BY

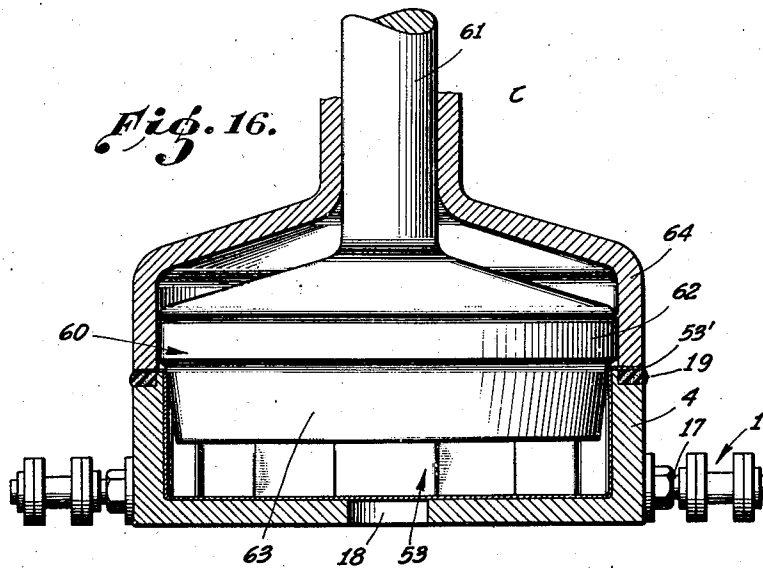
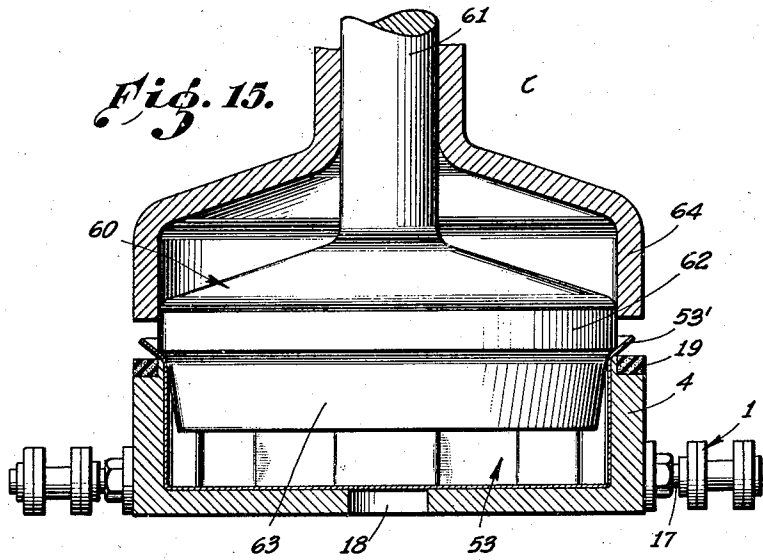
C. H. Wick
ATTORNEY

June 12, 1945.

D. RAY ET AL
PACKAGING MACHINE
Filed May 22, 1941

2,378,324

6 Sheets-Sheet 6



DON RAY,
CARLO RAY,
INVENTORS

BY

C. H. H. H.
ATTORNEY

UNITED STATES PATENT OFFICE

2,378,324

PACKAGING MACHINE

Don Ray and Carlo Ray, Beverly Hills, Calif., assignors to Kraft Cheese Company, a corporation of Delaware

Application May 22, 1941, Serial No. 394,682

6 Claims. (Cl. 93—60)

The present invention pertains to methods and devices for packaging various materials, particularly food stuffs. More specifically, the invention is directed to a method and apparatus whereby containers may be formed, filled and sealed rapidly and economically with minimum amounts of container material within a compact space, the resulting packages being hermetically sealed so that the contents are maintained sterile for a substantially indefinite period of time.

Many food stuffs, such as for example cheese, are being packaged in containers made from glass, metal, metal foil, or in preformed containers which need be provided with a liner or require that the cheese be first wrapped and then placed in a container. In many instances the container is dipped in wax or other material in an attempt to render the container air-tight. The various operations involved in making the containers, filling the containers, and then in wrapping, folding or dipping the containers are usually accomplished upon different machines and often at different plants. The present invention eliminates the use of expensive materials and the use of liners and permits the manufacture of the container to be accomplished upon the filling machine. Moreover, the resulting containers are air-tight and hermetically sealed without the necessity of dipping the same in wax or the like.

Generally stated, the method of the present invention comprises intermittently advancing a series of retainers past forming, preparing, filling, cover placing, sealing and ejecting zones, intermittently feeding bendable strip material provided with a thermoplastic coating into the forming zone, cutting the material to form a container blank, forming the blank into a container having an inner thermoplastic coating, placing the same into a retainer, moving the container into a preparing zone, outwardly flaring the upper edge portion of the container in the preparing zone, then moving the prepared container into a filling zone, filling the container therein, then moving the retainer with its filled container into a cover placing zone, feeding bendable strip material provided with a thermoplastic coating into such zone, cutting a container cover therefrom and depositing said cover upon the filled container with the thermoplastic coating in contact with the contents. The retainer with its filled and covered container is then moved into the sealing zone wherein the cover is sealed to the outwardly flaring edge portion of the container by the localized application of heat and

pressure. The retainer is then moved into an ejecting zone in which the now completely formed, filled and sealed container is ejected from the retainer.

5 All of the above operations may be carried out in an efficient and economical manner upon a single machine so that a high output of filled containers may be readily attained with limited amount of space.

10 The invention also contemplates in its preferred form, a particular form of container and a preferred form of machine.

The various objects of the present invention will become apparent to those skilled in the art from the following description of the method and exemplary forms of a machine in which the method may be readily carried out. The illustrative form of machine hereinafter described in detail is shown in the appended drawings, in which:

20 Figs. 1, 2 and 3 constitute diagrammatic representations of the process as it may be carried out automatically.

Fig. 4 is a side elevation, partly in section, through the forming zone of the machine.

25 Fig. 5 is a horizontal section taken along the plane V—V of Fig. 4.

Fig. 6 is an enlarged perspective view of a forming element.

30 Fig. 7 is a vertical section through the forming zone with the forming plunger at an intermediate stage in its travel.

Fig. 8 is a horizontal section taken along the plane VIII—VIII of Fig. 7, showing the container in process of formation.

35 Figs. 9 and 10 are vertical sections taken along the planes IX—IX and X—X respectively of Fig. 8.

Fig. 11 is a vertical section taken through the forming head showing the forming plunger at the bottom of its travel.

Fig. 12 is a plan view of a container blank with fold lines indicated thereon.

45 Figs. 13 and 14 are perspective views of the container at intermediate steps in the process.

Figs. 15 and 16 are vertical sections through the container preparing zone of the machine and illustrate elements used in forming an outwardly extending flange on the container.

50 Fig. 17 is a vertical section through the cover sealing apparatus.

Fig. 18 is an enlarged section of a portion only of Fig. 17.

In the diagrammatic representations, Figs. 1 to 3, a work table of a machine is indicated with

a continuous conveyor 1 extending thereover, this conveyor being provided with a plurality of retainers 2 to 12 inclusive. The conveyor 1 is intermittently driven by means, not shown, the driving means being geared to other operating elements of the machine so that the operations can take place in precise timed relation. A container forming zone is indicated at A, a container preparing zone is indicated at B, the filling zone is indicated at C, the cover preparing and placing zone is indicated at D, the heat sealing zone at E and an ejection zone at F. These various operating stations are immediately above or contiguous to the even-numbered retainers 2 to 12. Intermediate positions of the conveyor are indicated by the odd-numbered retainers 3 to 11. Although a straight line operation is shown, it is to be understood that instead of a belt type continuous conveyor, the conveyor 1 may be in the form of a rotating turret above which the various zones A to F may be positioned.

In the forming zone A a forming head is generally indicated at 13, a die table at 14 and a forming plunger at 15, this plunger being actuated by a pneumatic or hydraulic cylinder and piston 16. It will be evident that other means of actuating the forming plunger may be used.

By referring to Figs. 4 to 10 inclusive, the construction of the forming head will be made evident. As indicated in Fig. 4, the conveyor chain 1 carries a retainer 2 which should be of a size adapted to receive the container. It will be noted that the retainer 2 is pivotally connected to the conveyor 1 as at 17 and the bottom is provided with an opening 18. The outer edge of the retainer 2 may be stepped to receive a yielding ring 19 whose upper surface is at a slightly higher elevation than the inner edge of the retainer 2.

Stationarily mounted above the conveyor 1 is the forming head 13 which may comprise suitable supports 20 carrying a plate-like member 21 having a circular opening therein. Circularly arranged about the opening are folding elements 22, 23, 24 and the like, these elements being circumferentially spaced one from the other. As more specifically shown in Fig. 6, each of the folding elements includes a face portion 26 which is substantially vertical, and an upwardly and rearwardly extending curved portion 27. The folding element 25 illustrated in Fig. 6 is shown provided with a rearwardly extending lug 28 which rests upon the plate 21 and is attached thereto by means of the screw 29. The face portion 26 of the folding element is wider than the upwardly and rearwardly curved portion 27. Moreover, the face portion 26 is provided with laterally extending side wings 30 and 31 which are tapered in horizontal section to a slightly rounded but relatively sharp side edge. The wings 30 and 31 add width to the face 26. Sharp corners should not be present on any of the edges of the folding elements.

Positioned beneath each stationary folding element is a readily movable presser plate which may be in the form of an angle element having a vertical leg 32 and a horizontal leg 33. The horizontal leg 33 may be provided with a slot 34 so as to facilitate movement of the element toward and away from the center of the aperture in the forming head plate 21 (see Figs. 6 and 9). Additional presser elements may be positioned between the stationary folding elements, such as, for example, the elements 35, 36, 37 and the like. These presser elements may also include an upper horizontal leg and an inwardly directed vertical

face and be provided with slots such as 38 (Fig. 10) and means for holding the elements in movable relation on the forming head plate 21. All of the various presser plates may be yieldably urged toward the center by spring means as, for example, a continuous encircling spring 39. The presser elements, such as 32, and/or the auxiliary presser elements 35, 36, 37, may be heated or provided with heating means if desired.

Positioned immediately above the forming head 13 is the die table 14. This die table is provided with an opening indicated at 41 of the proper size and contour to delineate a container blank. Above the die table is a frame 42 in which a cutting die 43 is slidably mounted. The cutting die may be operated in any suitable manner, as, for example, by means of a yoke or arms 44 engaging stud bolts 45 extending through slots 46 in the frame 42 and connected to the cutting die 43. Strip material 50 may be fed from a supply reel 51 over the die table 14. Means for intermittently advancing strip material 50 over the die table are provided, such advancing means being operated in timed relation with the means for actuating the cutting die 43, the conveyor 1 and other elements of the machine.

The cutting die 43 is preferably hollow and the forming plunger 15 is vertically movable through the cutting die and through the aperture 41 in the die table into the forming head. The forming plunger 15 is preferably of polygonal cross section, the number of faces being preferably twice the number of forming elements in the forming head. The forming plunger is mounted upon the shaft 15' and is actuated by the fluid pressure cylinder 16 or in any other suitable manner in precise timed relation to the other operations of the machine.

After the strip material 50 has been advanced over the die table 14, the cutting die 43 is actuated so as to cut-out the container blank. The cut-out portion drops onto the upwardly and rearwardly curved upper portions of the forming elements. The forming plunger 15 then moves downwardly through the die opening 41 carrying the cut-out container blank into the forming head. Fig. 7 shows the forming plunger after it has moved the paper partly through the forming head. The partly formed container is indicated at 53 and the folding action is illustrated in Fig. 8. The operation of the folding elements and the conversion of a substantially circular disc into a cylindrical container will perhaps be best understood by a contemplation of Figs. 8, 12, 13 and 14, Fig. 13 showing the blank in a partly formed and partly expanded position whereas Fig. 14 shows the completely folded container.

By referring to Fig. 12, it will be observed that areas delineated by parallel lines, such as the lines 54 and 55, correspond to those areas which come into direct contact with the folding elements 22, 23, 24 and the like, the intervening portions extending beneath the laterally extending wings of the forming elements as indicated at 56 (Figs. 8, 12 and 14) to form a plurality of folds on the exterior cylindrical surface of the container. In the event the presser elements are heated, it will be found that the folds of the resulting container are positively bonded together by the thermoplastic coating.

The forming plunger moves the precut disc of material through the forming head directly into the retainer 2 and deposits the container therein. The forming plunger 15 may be provided with a plurality of air-release bores 15''.

After the retainer 2 has had a container deposited therein in the manner stated, the chain advances by two movements into zone B wherein the container is prepared for filling. By referring to Figs. 15 and 16 it will be seen that the retainer, having a container 53 therein, comes to rest beneath a flaring head 60 carried by the lower end of a vertically reciprocable shaft 61. The flaring head 60 is provided with a cylindrical portion 62 of slightly larger diameter than the internal diameter of the retainer 4 and with a conical portion 63 extending therebelow, the conical portion 63 blending into the cylindrical portion in a concave curve. The head 60 moves downwardly into the container 53 and bends the upper edge portions of the container outwardly into the position indicated in Fig. 15. This downward movement of the flaring head 60 is immediately followed by a downward movement of the presser element 64 which is movable with respect to the flaring head 60.

The presser element 64 presses down against the outwardly flaring edge portions 53' of the container and forms a shoulder extending outwardly from the upper portion of the container 53. The limit of downward movement of the presser 64 is indicated in Fig. 16. It will be noted that the presser compresses the edge portion 53' of the container 53 against the yielding ring 19 carried by the retainer 3.

The conveyor chain 1 then moves the retainer together with its formed and flared container into position beneath a filling spout, generally indicated at 65 in Figs. 1, 2 and 3. The product to be packed is deposited within the container and the chain 1 again advances the retainers, the next operation being that of preparing and placing a cover sheet onto the filled container.

By referring to Figs. 1, 2 and 3, with particular attention to zones D thereof, it will be seen that a cutting head 66 operating within a cylinder 67 and against a die plate 68 cuts a strip of intermittently advanced fibrous material 69 and places the cut disc directly upon the filled container in the retainer 3. It is to be understood that the cutting head 66 is operated in timed relation with the other movements hereinbefore and hereafter described.

The filled container then moves into the sealing zone E, wherein the sealing element is generally indicated at 70. By referring to Figs. 17 and 18, it will be seen that the sealing element comprises an actuating shaft 71 carrying a plate 72 provided with a downwardly extending peripheral lip 73. A heating element, generally indicated at 74, is carried by the plate 72 and is suitably insulated from the actuating shaft 71.

The cover disc 69' is of larger diameter than the body of the container 53 so that it overlies the outwardly flaring lip 53' of the container. The lower surface of the cover disc 69' carries a film of thermoplastic material and the inner surface of the container 53 also carries a film of thermoplastic material so that the two thermoplastic surfaces of the cover and container are in contact at the outwardly flaring edge portion 53 of the container. When the sealing element presses the cover and flared edge of the container together and heat is applied to such edge through the downwardly extending peripheral lip 73, the cover 69' is firmly bonded to the container.

The now filled and sealed container within its retainer is moved to the ejection zone F where-

in a push rod 80 actuated by a cam 81 pushes the sealed container out of the retainer, the push rod 80 extending through the opening 18 in the bottom of the retainer.

By comparing zones A of Figs. 1, 2 and 3, it will be seen that paper is being advanced into position over the die table in Fig. 1, the paper is being cut in Fig. 2, and in Fig. 3 the forming operation is being completed. Similarly, comparison of zones B indicates the flare forming devices at rest in Fig. 1, the original flare head in position in Fig. 2 and the presser in position in Fig. 3. Comparison of zones D shows the strip material 69 being advanced in Fig. 1 and a cover disc being cut out in Fig. 2, this cover disc being shown in position in Fig. 3. A comparison of zones E shows the sealing element rising and falling while accomplishing the sealing operation. A comparison of zones F shows the progressive discharge of the filled and sealed container from its retainer onto a slide or conveyor 83.

It is to be understood that after the container has been made, prepared, filled and sealed in the manner described, it may be subsequently packaged but packaging devices are well known in the trade and need not be described here.

The method and apparatus hereinabove described are particularly adapted for use in packaging processed cheese since processed cheese is available in substantially liquid condition for filling the containers, the cheese cooling and hardening readily. The use of bendable materials coated with thermoplastic films gives rise to added advantages in the handling of cheese since the containers are air and moisture-tight and cheese may be kept indefinitely therein.

We claim:

1. A packaging machine comprising: a vertically reciprocable forming plunger; a forming head including a plurality of forming elements arranged in a circle through which said forming plunger may move, each forming element including a substantially vertical lower face portion, a narrow upwardly and rearwardly curved upper portion, the lower face portion having laterally extending wings provided with relatively thin edge portions and inwardly and rearwardly inclined rear surfaces; a narrow supporting member for each forming element adapted to provide unrestricted passageways for blanks in the rear of said laterally extending wings and between opposing wings of spaced forming elements, a plurality of presser elements arranged in a circle beneath said forming elements, means for moving said plunger through said forming head, and means for yieldably urging said presser elements toward said plunger when moving through said forming head.

2. In a packaging machine: a vertically reciprocable forming plunger; a forming head including a plurality of forming elements arranged in a circle through which said forming plunger may move, each forming element including a substantially vertical lower face portion, a narrow upwardly and rearwardly curved upper portion, the lower face portion having laterally extending wings provided with relatively thin edge portions and inwardly and rearwardly inclined rear surfaces; a narrow supporting member for each forming element adapted to provide unrestricted passageways for blanks in the rear of said laterally extending wings and between opposing wings of spaced forming elements, and a plurality of presser elements ar-

ranged in a circle beneath said forming elements and means for yieldably urging a pair at least of said presser elements toward the center of said circle.

3. In a packaging machine, the combination of: a vertically reciprocable forming plunger; a forming head including a plurality of forming elements arranged in a circle through which said forming plunger may move, each forming element including a substantially vertical lower face portion, a narrow upwardly and rearwardly curved upper portion, the lower face portion having laterally extending wings provided with relatively thin edge portions and inwardly and rearwardly inclined rear surfaces; a narrow supporting member for each forming element adapted to provide unrestricted passageways for blanks in the rear of said laterally extending wings and between opposing wings of spaced forming elements; and a plurality of presser elements arranged in a circle beneath said forming elements, and means for yieldably urging a part at least of said presser elements toward the center of said circle.

4. In apparatus for forming an open-ended container having a laterally outwardly extending rim flange embodying a plurality of rebent portions presenting multi-ply flange portions on opposite sides of single-ply flange portions, the combination of means for folding a sheet material blank into a container having bottom and side walls integrally connected with said bottom wall and with each other, the side walls being provided with rebent portions incident to the formation thereof, a holder for receiving said container from said folding means, said holder embodying a wall portion surrounding the side wall of the container, and said surrounding wall having its upper end recessed, a resilient material element seated in said recess and extending above said upper end of the surrounding wall, a plunger embodying inner and outer parts, the inner part being movable into the open end portion of the container to flare an upper marginal portion of the container outwardly, and said outer part being movable towards said resilient material element to cooperate therewith to bend said outwardly flared marginal portion into predetermined laterally extending position, and to yieldingly press together the multi-ply portions of said flange.

5. In apparatus for forming an open-ended container having a laterally outwardly extending rim flange embodying a plurality of rebent portions presenting multi-ply flange portions on

opposite sides of single-ply flange portions, the combination of means for folding a sheet material blank into a container having bottom and side walls integrally connected with each other and wherein the side walls have downwardly tapered rebent portions, a holder for receiving said container from said folding means, said holder embodying a wall portion covered on its upper end with a resilient material cushion, a plunger embodying inner and outer parts, the inner part being movable into the open end portion of the container and so formed as to flare an upper marginal portion of the container wall outwardly over said cushion-covered end of said holder side wall, and said outer part being movable toward said resilient material end cushion to bend said outwardly flared marginal portion into predetermined laterally extending position, said outer part co-operating with said resilient material element to press together the multi-ply portions of said rim flange.

6. In apparatus for forming an open-ended container having a laterally outwardly extending rim flange embodying a plurality of rebent portions presenting multi-ply flange portions on opposite sides of single-ply flange portions, the combination of means for folding a sheet material blank into a container having bottom and side walls integrally connected with each other and wherein the side walls have downwardly tapering rebent portions, a holder for receiving said container from said folding means, said holder embodying a wall portion having its outer upper end portion recessed so as to provide a thin, upwardly extending flange contiguous with the inside of the holder wall, a resilient material element seated in said recess outwardly of said thin upstanding flange, a plunger embodying inner and outer parts, the inner part being movable into the open end portion of the container and so formed as to flare an upper marginal portion of the container side wall outwardly, and said outer part being movable towards said resilient material element to cooperate therewith to fold said outwardly flared container wall portion to predetermined laterally extending container-flange position, and to press together the multi-ply portions thereof, said container-flange being thereby bent over said thin, upwardly extending holder wall flange, whereby said container flange is sharply folded to said predetermined position.

CARLO RAY.
DON RAY.