

United States Patent

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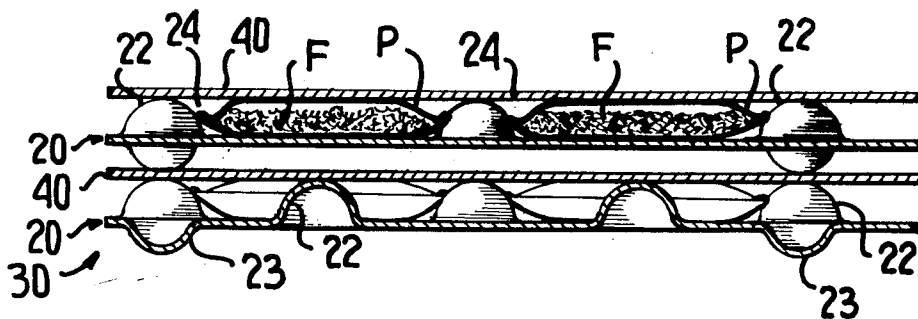
[54] **AUTOMATIC RETORT RACK SYSTEM FOR FLEXIBLE PACKAGES**
6 Claims, 7 Drawing Figs.

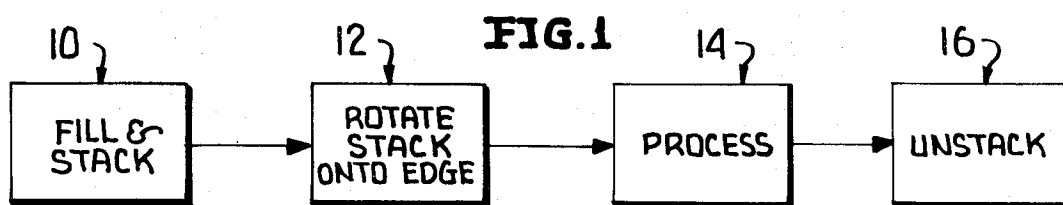
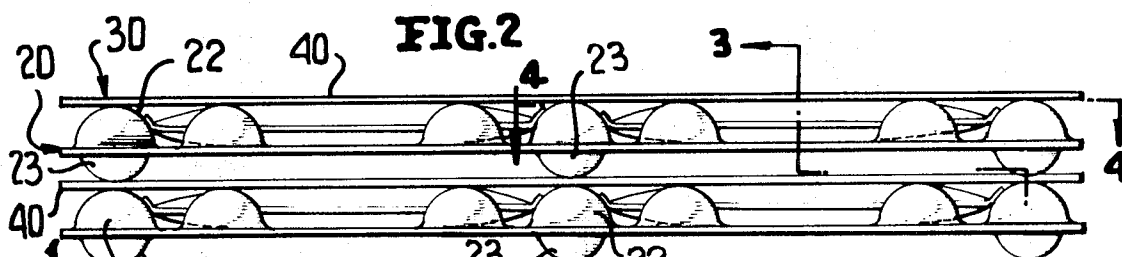
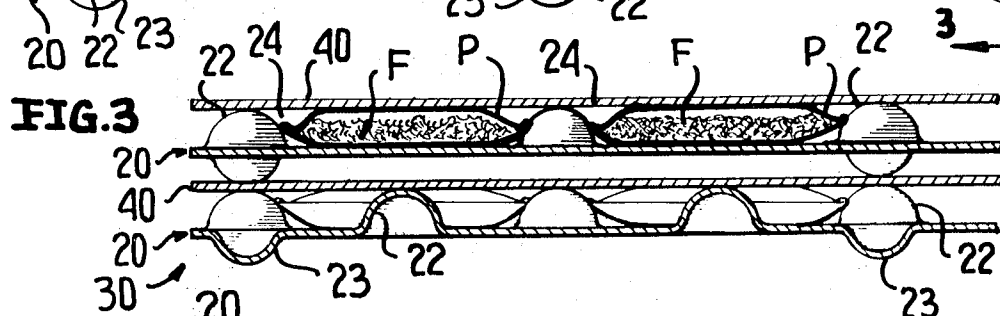
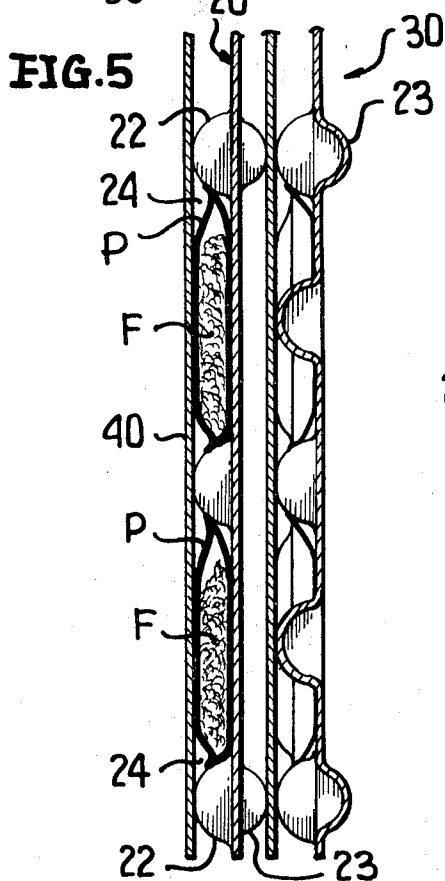
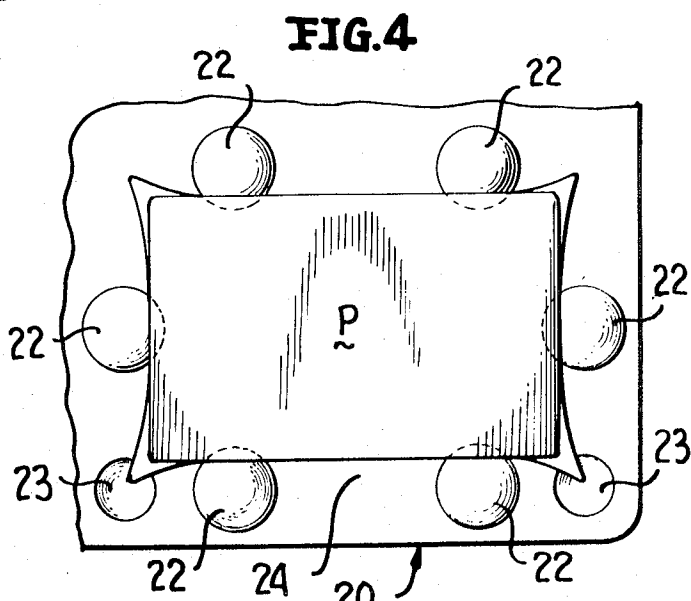
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ABSTRACT: This disclosure relates to the thermal processing of foods in flexible packages. A rack is provided for supporting a plurality of packages during the processing. The rack is comprised of a plurality of spaced parallel plates, alternate ones of which are in the form of trays having bumps stamped in one side to form compartments for positioning the packages. The rack is disposed horizontally while the packages are loaded therein and then rotated to a vertical position preliminary to processing.

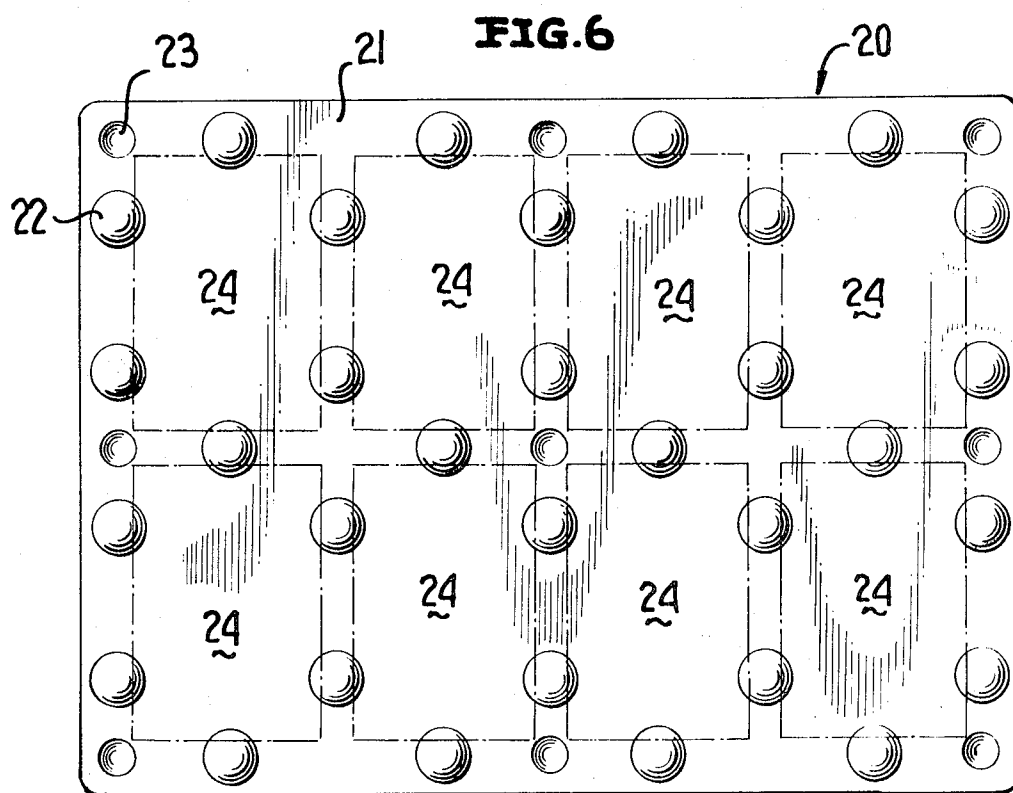
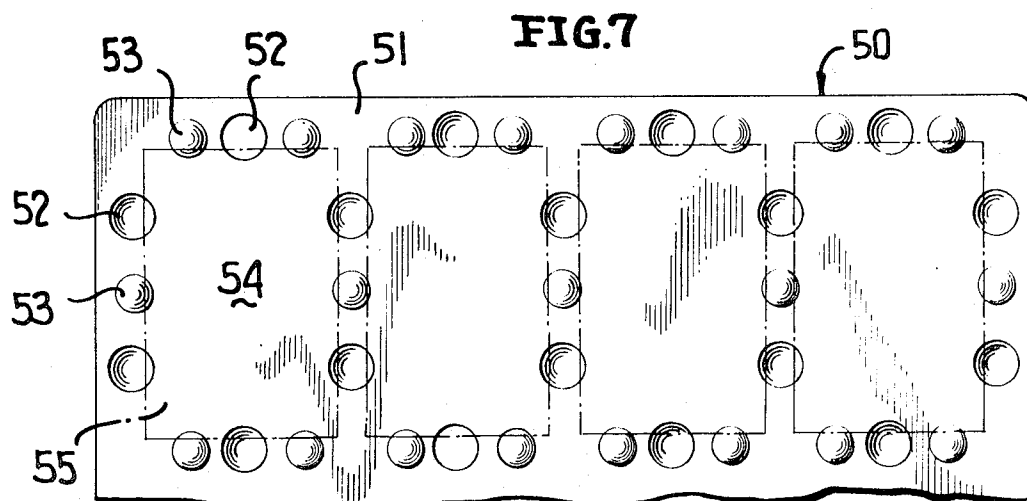




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AUTOMATIC RETORT RACK SYSTEM FOR FLEXIBLE PACKAGES

This invention relates to the processing of food, and more particularly to the thermal processing of foods contained in flexible packages.

Flexible packages, such as those used to pack beef, ham, vegetables, fruit and similar edible, as well as inedible products, etc., are frequently processed through a heating retort before being sent out to the market. The heating process is intended to assure commercial sterility of the package contents.

It has been found by experimental evaluation that it is highly desired to process the packages in a vertical manner, rather than a horizontal manner, in retorts in order to establish reliable heat penetration and minimum damage to the packages. In the past, quantities of retort packages have been made using prefabricated packages, loading these packages by hand, manually inserting the packages in a vertical slot rack and then processing them at elevated temperatures for a predetermined period of time. There is a need to make such flexible retort packages more economical so as to be competitive with current thermally processed rigid food packages. In order to accomplish this and increase the order of microbiological reliability of the unit, there is provided in accordance with the invention, an automated system which will make the package, load the package with the product, and then rack these packages to confine their configuration so that satisfactory heat penetration can be established and maintained through commercial operations. It is, therefore, an object of this invention to provide apparatus which will facilitate an automated system of thermal processing of foods in flexible packages.

More particularly, it is an object of this invention to provide a rack which is adapted to receive a plurality of flexible packages from a form and fill machine and then be rotated 90° in order to place the packages in the vertical position for processing in a retort.

Another object of this invention is to provide a rack comprising a plurality of spaced parallel plates, these spaced parallel plates defining alternate layers having means for positioning a plurality of food packages therein, whereby processing fluid may be passed between the alternate layers to thereby effect a processing of food contained in the packages.

Another object of the invention is to provide a simplified rack, consisting of a die stamped plate, which die stamped plate would permit the stamping to provide the control thickness of a package on the placement side of the plate and the stamping on the opposite side of the plate to provide passage means for water flow in order to obtain good circulation of water through the retort to provide for good heat penetration during the processing cycle.

Still another object of this invention is to provide an automated method of racking flexible packages for insertion into a retort, the method including the steps of providing a stamped tray, automatically loading filled flexible packages into the tray, disposing a flat plate over the tray to thereby complete the formation of a plurality of filled compartments, disposing loaded trays and flat plates alternately thereon to form a plurality of package-receiving layers as desired, and then rotating the stacked rack to a vertical position whereby food contained within the flexible packages will drop down to the bottoms of the packages and thereby press against the vertical sidewalls of their respective compartments so as to control the thickness of the packages in order to assure adequate thermoprocessing control and to further facilitate communication with processing fluid which will be passed between the stacked layers during the processing cycle.

A further object of this invention is to provide a rack for receiving flexible packages, the rack comprising a plurality of die stamped trays, each tray having stampings on one side thereof for positioning a plurality of flexible packages and stampings in the other side to provide spacing means between adjacent plates to thereby permit water flow between the plates, the stampings on either side of the trays being of dif-

ferent depth, and wherein the trays are reversible whereby the stampings which provide spacing means may be used to define the compartments for receiving flexible packages, the choice of tray side being determined by the thickness of the packages being handled.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claimed subject matter and the several views illustrated in the accompanying drawings:

In the drawings;

FIG. 1 is a block diagram showing the four major steps in the automated system provided for the thermal processing of foods in flexible packages using the novel rack of this invention.

FIG. 2 is a side elevational view of a novel rack formed in accordance with this invention and illustrates two flexible package receiving layers and two processing fluid layers defined by alternate flat plates and stamped trays.

FIG. 3 is a fragmentary sectional view taken along line 3—3 of FIG. 2 and illustrates flexible food-containing packages positioned between bumps in stacked trays and shows the food in the packages supported by the upper tray being spaced from the top plate.

FIG. 4 is a fragmentary plan view taken along line 4—4 of FIG. 2 and illustrates flexible food-containing package positioned between bumps formed in a tray, the bumps forming a compartment and being so disposed as to center the position of the package therein.

FIG. 5 is another fragmentary sectional view of the stacked rack illustrated in FIG. 3 rotated through 90° to a vertical position and shows that the food contained in the flexible packages has dropped down to the bottoms of the packages and thereby presses against the vertical sidewalls of their respective compartments.

FIG. 6 is a plan view of a single tray formed in accordance with this invention which is used in the formation of the racks illustrated in FIGS. 2, 3 and 5 and shows a plurality of large bumps formed in its upper surface defining compartments for positioning flexible food packages therein, and smaller bumps formed in its underside which provide spacing means between adjacent plates in the rack.

FIG. 7 is a fragmentary plan view of a modified form of the tray illustrated in FIG. 6 and shows a reversible tray wherein the smaller bumps formed in the underside of the tray are so positioned and disposed as to also provide compartments therein for positioning and supporting flexible packages, the bumps in the underside of the tray being of a lesser depth than the bumps in the upper side of the tray facilitating the positioning therein of thinner packages.

Referring now to the drawings in detail, there is seen in FIG. 1 an automated system provided for the thermal processing of foods in flexible packages. The apparatus for carrying out the steps of this system are all well known and in and of themselves form no part of this invention. The apparatus generally indicated by the numeral 10 is a well known form and fill machine which will make the package from polyester, polyethylene, or like webs of similar material, load the package with the food product, seal and then deliver the filled package to a first conveyor. Simultaneously, a tray as illustrated in FIG. 6 and generally indicated by the numeral 20 is provided on a conveyor which is disposed beneath and is moving in timed relation to the first conveyor. The packages being carried by the first conveyor are then dropped into the tray 20 and then a flat plate 40 (FIG. 2) may be positioned over the tray 20 in order to restrict the packages therein. A second tray 20 may then be automatically positioned on the flat plate 40 and thereafter loaded with packages in the same manner as the first tray 20. Another flat plate 40 may then be automatically positioned over the second tray 20 as heretofore disclosed. This alternate stacking of flat plates and trays and the loading of each tray with flexible packages continues until a stack containing the desired number of package containing

layers is achieved. A stack, generally indicated by the numeral 30, is illustrated in FIGS. 2, 3 and 5. The stack 30 includes two such package containing layers.

The stack 30 is then delivered to an apparatus generally referred to by the numeral 12 where it is automatically loaded in a retort car or cart whereupon the cart is then rotated 90° so as to position the stack 30 in a vertical manner as illustrated in FIG. 5 so that the flexible food-containing packages are in the desired vertical position for processing.

The loaded cart is then delivered to the apparatus generally referred to by the numeral 14 where it is inserted into a retort, the food processed at the given time and temperature relationship, then the packages are cooled and the cart removed from the retort.

The cart is then delivered to the apparatus generally referred to by the numeral 16 where it is again rotated 90° in order to place the trays in a horizontal position so that they can be easily unloaded and passed through inspection and drying to prepare the package for final overpacking and cartoning.

In accordance with the foregoing automated system for the thermal processing of foods in flexible packages, there has been provided the novel tray 20 illustrated in FIG. 6. The tray 20 is formed from a generally rectangular metallic plate 21 having a plurality of hemispherical bumps 22 stamped in one side thereof and a plurality of smaller hemispherical bumps 23 stamped in the other side. The bumps 22 are disposed in five spaced transverse rows of four bumps each extending from one longitudinal edge of the plate 21 to the other edge and in three spaced longitudinal rows of four bumps each. Two of the longitudinal rows extend along the longitudinal edges of the plate 21 and the third longitudinal row extends along the longitudinal center line of the plate 21. The bumps 22 in the longitudinal rows are spaced equidistantly between the transverse rows of bumps. The above-described disposition of bumps 22 defines a plurality of package receiving zones or compartments 24. Each of the compartments 24 is defined on two of its sides by two bumps 22 and on its other two sides by a single bump 22. The generally rectangular shape of each compartment 24 facilitates receipt of a rectangular or pillow-shaped package P. The manner in which a pillow-shaped package P is received in a compartment 24 defined by six hemispherical bumps 22 is clearly illustrated in FIG. 4. The rounded shape of the bumps 22 serves to center the package P in the compartment 24.

As clearly illustrated in FIGS. 2, 3 and 5 the stack 30 is formed by stacking alternate layers of flat plates 40 and trays 20. Each tray 20 is supported on a flat plate 40 by means of the smaller bumps 23 formed in its underside. The larger bumps 22 function to support each plate 40 which overlies a corresponding tray 20. Each plate 40 which overlies the bumps 22 in a tray 20 serves to complete the formation of the compartments 24 by providing top walls thereof. The depth of each compartment 24 is, of course, determined by the depth or height of the bumps 22. In a preferred form, the trays 20 are designed such that their bumps 22 are of a predetermined depth substantially equal to the thickness of the packages P intended to be processed. As a result of such construction the packages P will be held securely in the compartments 24 with their configurations confined to the general shape of the compartments 24. The amount of food F loaded into each package P is such that when the packages P are lying flat as seen in FIG. 3 the level of food F contained therein will come up to just below the plates 40 which define the tops of the compartments 24. This is clearly illustrated in FIG. 3. When the stack 30 is rotated 90° by apparatus 12 to the position illustrated in FIG. 5, the food F in the package P will drop down to the bottoms of the packages P and thereby press against the now vertically extending portions of the plates 40 and trays 20 which form the upstanding sidewalls of the compartments 24. This assures intimate contact of the food F with the heat conductive sides of the compartments 24 so that reliable heat penetration of the food F is established in the retort by water

flowing through the spaces in the rack 30 between the trays 20 and the plates 40 defined by the spacing bumps 23 as well as by water flowing between the trays 20 and plates 40 which define the actual compartments 24.

A modified tray 50 is illustrated in FIG. 7. The tray 50 is formed from a generally rectangular plate 51 and has bumps 52 stamped in one side thereof and disposed in the same alignment as the bumps 22 in the tray 20. The tray 50 also includes smaller bumps 53 stamped in its underside similar to the bumps 23 in the tray 20. The bumps 52 define compartments 54 similar to the compartments 24 in the tray 20.

The disposition of the bumps 53, however, differs from the disposition of the bumps 23 inasmuch as they are disposed in opposed relation to the bumps 52. A bump 53 is stamped in the underside of the plate 51 between the pairs of bumps 52 which define the sides of the compartments 54 and two bumps 53 are stamped in the underside of the plate 51 on either side of the bumps 52 which define the other two sides of the compartments 54. Each arrangement of six such bumps 53 defines a compartment 55 in the underside of the tray 50 in opposed relation to each of the compartments 54. The compartments 55 are of the same configurations as the compartments 54 except that they are of a lesser depth.

From the foregoing it should be thus apparent that the tray 50 may be reversed and that packages P may be disposed in the compartments 55 defined by the bumps 53 instead of in the compartments 54. This provides for the processing of two different thicknesses of packages merely by using the side of the tray 50 having bumps corresponding to the package thickness desired.

It should also be readily apparent that the trays 20, 50 could be made so that they are one package or a number of packages wide, and could be designed to handle any length of packages also so that the length of the tray could be the length of the retort cart or car. The plates 40 could also be part of the retort car or rack, rather than be supplied as a separate plate, as the tray could be the only external unit from the car merely sliding into the slots between the plates on the retort car or rack. A roll could be imposed on the feedline over the top of the trays as they are feeding to the cars to insure that the packages are properly seated in the containing section prior to inserting into the cart. The purpose of this would be merely to locate or flatten the packages so they may be inserted into the cart easily if the plates were already incorporated or built into the retort car or rack.

From the foregoing it should be readily apparent that there has been provided a novel rack comprised of stacked plates and trays which is adapted to a simplified method of loading and will thus facilitate an automated system for the thermal processing of foods in flexible packages.

Although only preferred embodiments of the invention have been specifically illustrated and described herein, it is to be understood that minor variations may be made without departing from the spirit of the invention.

I claim:

1. A method of processing food products in flexible packages comprising the steps of providing a plurality of horizontally disposed compartments, loading filled flexible packages in the compartments, and rotating the compartments to a vertical position whereby food contained within the flexible packages will drop down to the bottoms of the packages and thereby press against the vertical sidewalls of the compartments so as to control the thickness of the packages in order to assure adequate thermoprocessing control and to further facilitate communication with processing fluid passing outwardly of the sidewalls.

2. In the method of claim 1 wherein said horizontally disposed compartments are provided by stacking a plurality of plates in spaced parallel relation, alternate ones of said plates being trays formed with compartment forming means in at least one side thereof, said compartment forming means being of a depth substantially equal to the desired thickness of the filled flexible packages being processed.

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3. In the method of claim 2 including the step of passing processing fluid between plates defining adjacent compartments.

4. In the method of claim 1 wherein there is a heat transfer between the processing fluid and the food in said packages.

5. Apparatus for processing food products comprising a pair of generally parallel horizontally disposed plates defined by an upper plate and a lower plate, a plurality of spaced means projecting upwardly and outwardly of the plane of said lower plate for defining therebetween a food product chamber in

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conjunction with the upper plate, another plurality of spaced means projecting downwardly and outwardly of the plane of said lower plate for spacing the latter plate from a next adjacent underlying plate, both of said plurality of projecting means are a plurality of bumps, and the bumps on one side of said lower plate are deeper than the bumps formed on the other side of said lower plate.

6. The apparatus as defined in claim 5 wherein said bumps are hemispherical in outline.

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