May 26, 1942. E. C. EBERTS 2,284,269

APPARATUS FOR PROCESSING THE CONTENTS OF SEALED CANS

Filed March 11, 1938 2 Sheets-Sheet 1

Fig. 1.

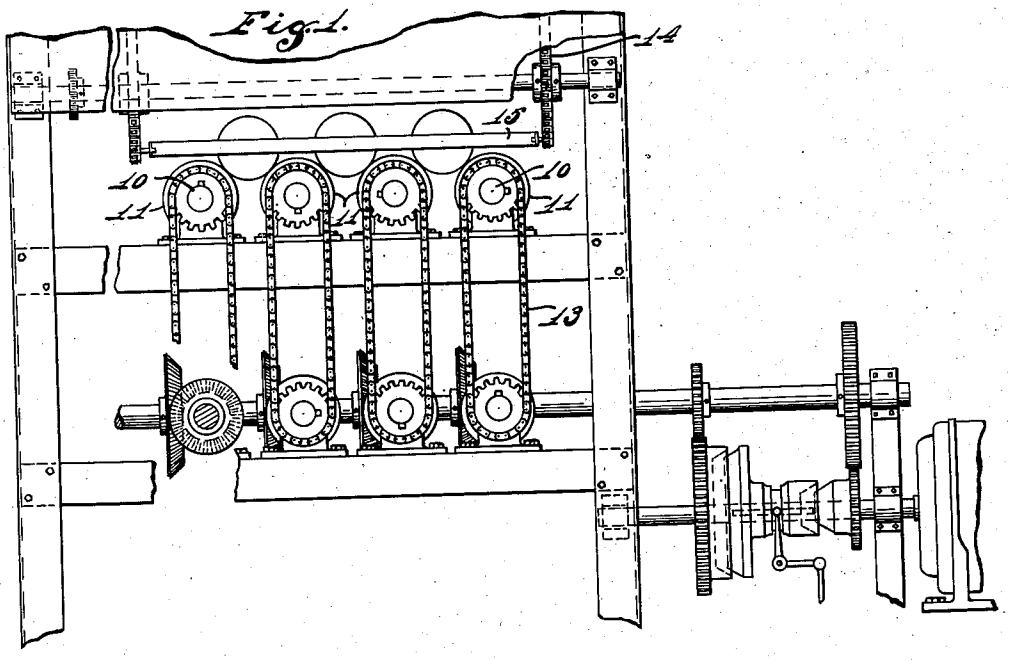


Fig. 4.

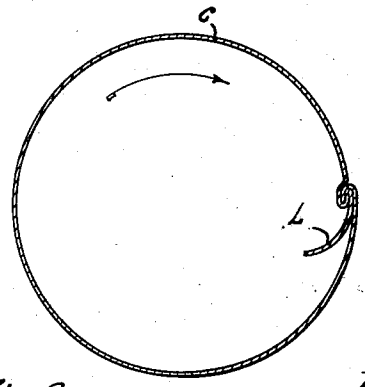


Fig. 5.

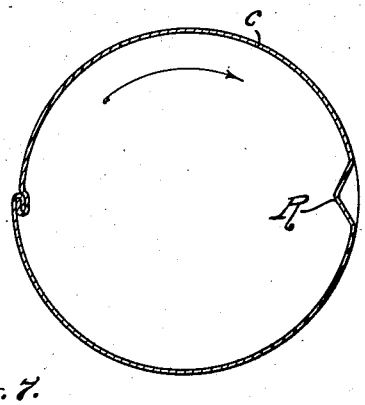


Fig. 6.

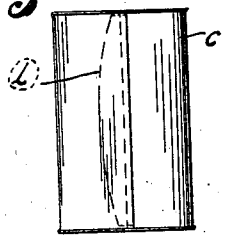
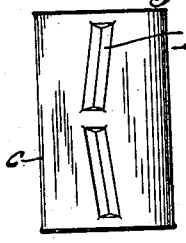


Fig. 7.



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Filed March 11, 1938 2 Sheets-Sheet 2

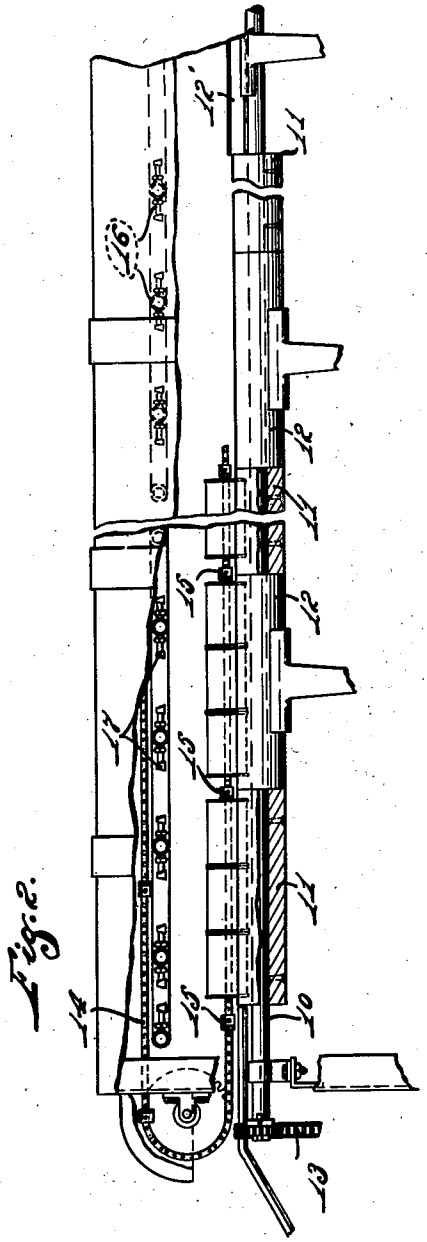


Fig. 2.

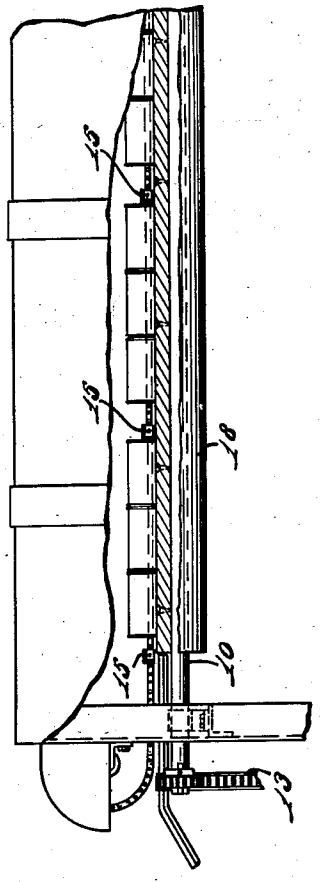


Fig. 3.

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APPARATUS FOR PROCESSING THE CONTENTS OF SEALED CANS

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Application March 11, 1938, Serial No. 195,247

2 Claims. (Cl. 126—272)

The object of my invention is to provide an improved method of and apparatus for heat transfer to or from the contents of a sealed package whereby the time required for the essential heat transfer may be materially shortened. My improved process and apparatus is primarily designed for dealing with comestibles having a substantial water content but is not necessarily limited to comestibles.

It has long been generally recognized, in the canning art, that it is highly desirable to heat penetrate the entire contents of a can as rapidly as possible and to that end many devices have been heretofore provided with the idea that they would operate to agitate the contents of the can, during the application of the necessary heat, in such manner as to reduce the time required to bring the central portions of the can contents up to the desired sterilization temperature before the outer portions of the contents of the can become overheated or have been subjected to heat for an undesirable length of time.

The accompanying drawings illustrate my invention:

Fig. 1 is an end elevation of an embodiment of my apparatus;

Fig. 2 is a vertical section axially of one of the can rotators;

Fig. 3 is an elevation of another form of can rotator;

Fig. 4 is a transverse section of one form of improved can;

Fig. 5 is a transverse section of another form of improved can; and

Figs. 6 and 7 are side elevations on a smaller scale, of the structures shown in Figs. 4 and 5.

It has heretofore been thought that, if a filled can be rolled on its side during the period of heat transfer, the contents of the can, being an agglomeration of small particles, or liquids, or semi-liquid, will be agitated and mixed in such manner as to hasten the transfer of heat through the body of the can to the contents.

If the can be rotated about its axis and the contents be in a fluid or semi-fluid condition, short of a very sluggish mush, the can slips around the content, at least in the early stages of rotation, and, therefore, there is but little agitation of the contents during much of the rolling transportation of the can.

I have discovered, however, that, if a can of proper form be rotated about its own axis fairly rapidly for a short time, and then be suddenly stopped or materially reduced in rotative speed, the content of the can will immediately become turbulent, the amount of turbulence being dependent upon the character of the internal surface of the can and the variations in speed of rotation.

My improved method, therefore, consists fundamentally of alternate rapid rotations and sudden stoppages, or substantial reductions, of rotations of the can, preferably about the axis of a cylindrical can and without lateral displacement of the can axis, during the necessary period of heat transfer. In the case of heat sterilization, this will involve the alternate rotation variations of the can during the heating period and, desirably, a similar treatment of the can during the cooling period, whereas, in the case of freezing, the method would involve only the alternate rotation variations during that period of heat extraction which will bring the contents just to the freezing point, just before mobility of the contents ceases.

While my above-described improved method may be used, with some degree of advantage, in connection with smooth interior cans of the present type, to quite materially reduce the necessary heat-transfer period, I have found that very striking reductions in time of the necessary heat-transfer period will be obtained by providing a modification of the interior of the can. Two such modifications are illustrated in Figs. 4 to 7 hereof. In Fig. 4, I show, in cross section, a cylindrical can C, the main cylindrical wall of which is provided at one end with an internally-projecting lip L which projects spirally toward the axis of the can for a short distance. The amount of this projection is not great and I have found that about half an inch is very effective.

When a filled can is rotated about its cylindrical axis for a short time in the direction indicated by the arrow, and then suddenly stopped, or reduced to relatively slow rotation, the fluid or semi-fluid contents of the can immediately become turbulent, the outer portions of the contents striking the lip and being deflected thereby toward the axis of the can. This turbulence lasts only for a moment or two, whereupon rerotation of the can about its axis should be resumed; again stopped or reduced, etc., until the necessary time has elapsed to accomplish a uniform temperature change in the contents.

In Fig. 5 I have shown, in cross section, a can in which the main body, at one point, has been inwardly indented to form a rib R which, when utilized in the performance of my method, causes similar turbulence of the contents.

The internal projections in the can may be set at an angle to the can axis, preferably in opposite directions from the middle of the length of the can, as indicated in Figs. 6 and 7, so that they serve to direct the turbulent contents toward the can ends and thus cause the contents to sweep across the can ends.

I have found that, by the practice of my above-described method, I have been able, in the heat-processing of canned fruit juices, peas, and corn, to reduce the heat-processing time to a very considerable extent.

It will, of course, be understood that various types of apparatus may be provided to facilitate the practice of my above-described method, one type of said apparatus being shown in the present drawings, wherein some advantages are attained by reason of the fact that the cans may be caused to traverse the apparatus axially and without lateral displacement of the can axis. In this apparatus, I provide a plurality of parallel shafts 10, each provided with a plurality of axially spaced cylindrical portions 11 which rotate with the shaft, and a plurality of intermediate cylindrical portions 12 within which the shaft rotates, thereby providing a plurality of longitudinal can-supporting crotches or cradles. The shafts are rotated in the same direction by suitable driving means 13 so that the cans in any one crotch will be rotated about their longitudinal axes. Instead of the non-rotative portions 12, fixed opposed guides 12' may be arranged to bridge the gaps between adjacent ends of shaft portions 11.

An endless conveyor 14 arranged above and parallel with each can-supporting crotch is provided with fingers 15 arranged to engage the cans, either individually or in longitudinal groups, so as to transport said cans axially along the crotches formed by the shafts.

For heat-processing, I provide, over an initial portion of the shafts for an appropriate length, can-heating means 16 which may be either in the form of a steam chamber or a hot spray chamber; and over a portion of the shafts following the heating zone, I provide a cooling zone 17 which may be either in the form of a refrigerating chamber or a cooling spray.

In operation, the filled and sealed cans are placed in the crotch runways formed by alternate pairs of shafts, and parts carried thereby, and are transported longitudinally of those crotches. When the cans are in contact with the rotating portions 11 of the shafts, they are rotated about their longitudinal axes, and when the cans lie upon the non-rotating portions 12, they are suddenly stopped, as to rotation about their axes, although their longitudinal progress may be uninterrupted, and the contents of the cans are turbulated, thereby assisting in transferring the outer portions of the contents toward the center of the can.

In Fig. 3 the can-supporting and rotating shafts are continuous and variations of speed of can rotation may be obtained by means of a driving gear such as is shown in Fig. 1, wherein the clutch mechanism X may be utilized to obtain alternate high speed rotation and either lower speed rotation or stoppages.

The enforced turbulation of the contents of the can insures rapid heat-transfer to or from said contents. In heat preservation, the consequent reduction of time required for sterilization results in a much higher grade of product with much less deterioration of color and flavor. Fruit juices may be preserved by this method, either by heat sterilization or by quick freezing, in much less time than heretofore, with a consequent improvement in color and flavor.

The term "cans" is used herein as synonymous with packages.

I claim as my invention:

1. Apparatus for handling substantially cylindrical charged cans, comprising a recumbent can guide along which the cans may be transported axially, said guide comprising a series of means spaced longitudinally of the guide by which said cans may be intermittently rotated about their axes while moving axially along said guide, and means for propelling said cans axially along the guide, the spacing of said spaced means being such that the cans will not be rotated as they pass from one to another.

2. Apparatus for handling substantially cylindrical charged cans, comprising aligned pairs of recumbent rotatable rollers forming a can-receiving crotch, non-rotative can-supporting means bridging the gaps between said pairs of rollers, and means for propelling cans axially of the cans, and means by which said rollers may be rotated to cause can rotation about the can axis.

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