

Nov. 27, 1956

L. PLUSQUELLIC
METHOD AND APPARATUS FOR OPENING AND
EMPTYING PAPER CONTAINERS

2,772,009

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3 Sheets-Sheet 1

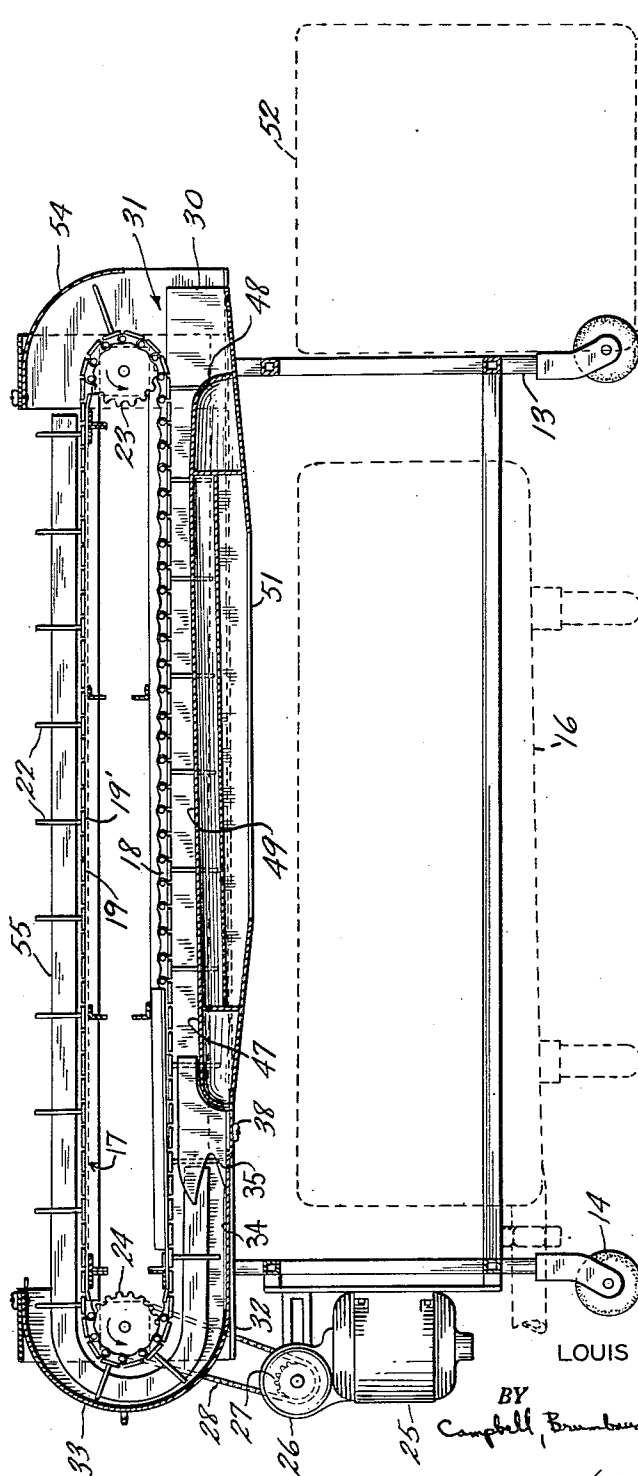


FIG. 1.

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FIG. 3.

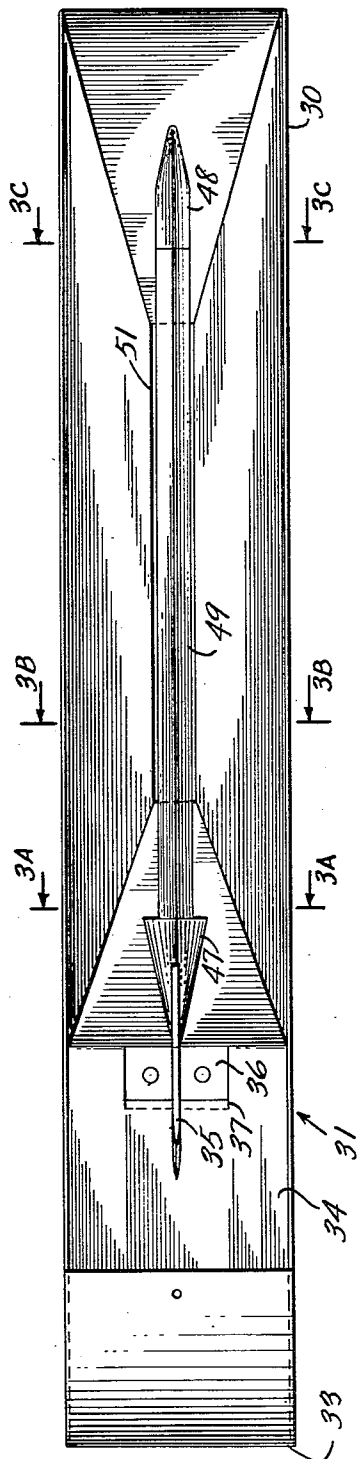
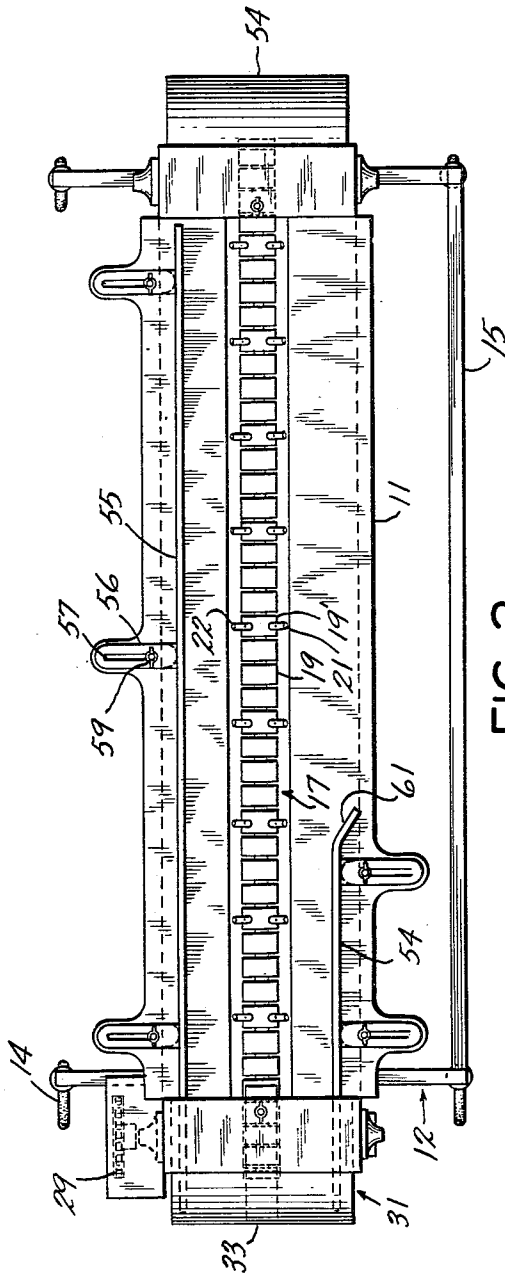


FIG. 2.



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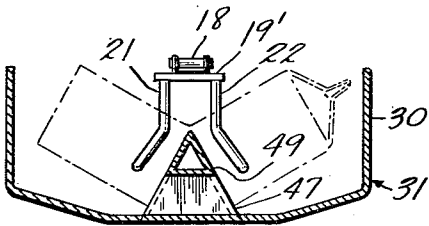


FIG. 3A.

FIG. 3B.

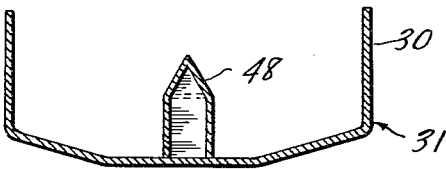
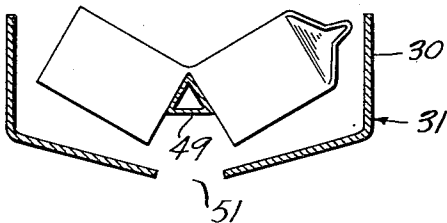


FIG. 3C.

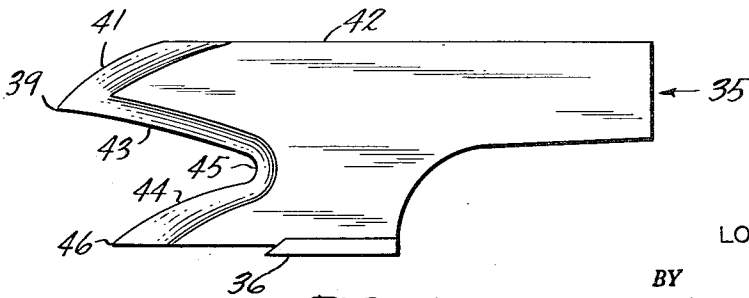


FIG. 4.

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2,772,009

METHOD AND APPARATUS FOR OPENING AND EMPTYING PAPER CONTAINERS

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Application December 21, 1951, Serial No. 262,830

10 Claims. (Cl. 214—305)

The present invention relates to a method and apparatus for opening and emptying paper or cardboard containers and, more particularly, to a method and apparatus for salvaging the contents of milk containers.

Prior to the present invention, milk distributors have employed time consuming and inefficient methods of handling returned milk in paper containers. One of the usual methods of salvaging the milk is to employ an operator for prying open the lid or jabbing a hole in each container and draining the contents. Likewise methods of breaking the container open on the edge of a milk can or forcing it against a cutting edge not only are slow but also result in considerable loss of product through failure to drain the contents of the containers completely.

It is an object of the present invention to provide a method and apparatus for emptying liquid from a paper container speedily, completely, and hygienically.

Another object of the invention is to provide apparatus for cutting open containers successively and yet simultaneously draining a plurality of containers.

A further object is to provide a knife having a blade suitably shaped for partially severing containers in an incisive manner with minimum resistance.

Yet another object is to provide an arrangement for sliding emptying containers along a draining trough without exposing the draining surface to contact with the exterior of the containers.

According to one aspect of the invention there is provided an endless conveyor which is adapted to receive containers on their sides. The conveyor pushes each container laterally against a knife which cuts through the lower side and the two vertical sides, leaving the upper side undamaged. The container is then carried past a spreader which forces apart the severed edges causing the ends of the container to pivot upwardly about the upper side at its intersection with the plane of the cut. The container is then supported on the severed edges in an open position with the ends raised above the middle portion and slid along a separator until the contents are drained into a receiving vat. Finally, the empty containers are dropped off the conveyor into a waste bin.

In order that the invention may be more fully understood it will be described in detail with reference to the accompanying drawings, wherein:

Figure 1 is a side elevation view, partly in section, of a container cutting and dumping apparatus showing a conveyor for feeding containers to a draining trough;

Figure 2 is a plan view of the apparatus showing the top of the conveyor and front and rear guide fences;

Figure 3 is a plan view of the draining trough showing the container-cutting knife, edge spreader and halves separator;

Figures 3A, 3B and 3C are views of transverse sections of the draining trough taken along the dashed lines 3A, 3B and 3C, respectively, of Figure 3 in the direction indicated by arrows; and

Figure 4 is a side elevation view on a larger scale of the knife showing a preferred configuration of the blade.

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Referring now to the drawings, a horizontal receiving table 11 is mounted on a metal frame 12 of generally rectangular outline. The frame 12 is provided with four legs 13 which preferably terminate in swivel casters 14. Horizontal braces 15 are provided along the front and the two ends of the frame to stiffen the legs 13. The rear, however, is left clear in order to permit the frame 12 and the table 11 to be rolled over a receiving vat 16.

Positioned longitudinally through the center of the receiving table 11 is an endless conveyor 17. The conveyor comprises a roller chain 18 on the links of which flat plates 19 are welded. At equal recurrent distances, for example, on every fourth plate 19, upright spacer studs 21 and 22 are affixed. The spacer studs 21 and 22 are spaced equally on either side of the center line of the conveyor 17 and the tips of the studs diverge in the transverse plane. The roller chain 18, which supports the plates 19 and the recurrent studs 21 and 22, is carried at either end of the frame 12 on toothed sprockets 23 and 24. The conveyor 17 is driven by a motor 25 through reduction gearing 26, a sprocket 27, and a roller chain 28 which engages a sprocket 29 keyed to the same shaft that mounts the conveyor sprocket 24.

Partially surrounding the sprocket 24 and extending the entire length of the frame 12 beneath the conveyor 17 is a draining trough 31 having substantially vertical sides 30. The trough 31 is supported by the frame 12 on longitudinal angle irons 32 for ready removal for cleaning. The draining trough 31 is formed with a semi-cylindrical portion 33 which serves to guard the sprocket 27 and to guide the containers fed to the conveyor 17. Next in the direction of travel of the conveyor 17 is a generally flat cutting portion 34 containing a knife 35. The knife 35 is secured in a vertical position to a horizontal mounting plate 36 which is received into a well 37 in the draining trough 31. The mounting plate 36 is secured by wing nuts 38 beneath the trough 31 in order to permit easy removal of the knife 35 for sharpening or replacement.

The knife, as clearly shown in Figure 4, is formed with a point 39 adapted to puncture the vertical side of a container intermediate the upper and lower sides thereof. An upper cutting edge 41 curves upwardly from the point 39 and joins a horizontal top edge 42. An intermediate cutting edge 43 sweeps backwardly and joins a lower cutting edge 44 in an open gullet 45. The lower cutting edge 44 rises from a point 46 that lies somewhat to the rear of the point 39.

Immediately behind the knife 35 is a spreader member 47 having a substantially triangular shape both in plan and in cross section. The horizontal edge 42 overlaps a portion of the spreader member 47. Supported between the spreader member 47 and an end member 48 is an elongated separator 49 having a triangular cross section. The separator 49 is spaced above a draining slot 51, which is normally over the vat 16. The draining trough 30 from the knife 35 to the end member 48 has its bottom sloping inwardly and downwardly towards the draining slot 51.

A waste bin 52 placed at the open end 53 of the trough 31 to catch the empty containers as they are pushed off by the spacer studs 21 and 22 is provided. A guard 54 covers the discharge end of the conveyor 17 to protect the operator.

In order to adapt the apparatus for handling quart, pint or half-pint containers, adjustable front and rear guide fences 54 and 55 are provided on the receiving table 11 parallel to the conveyor 17. The guide fences 54 and 55 have horizontal mounting lugs 56 attached to the lower portions thereof. The lugs 56 are formed with slots 57 therein extending transversely of the conveyor 17. Studs 58, which are fixed to the table 11, project through the

slots 57 and carry wing nuts 59 threaded thereon, which latter when tight bear against the lugs 56 and secure the fences 54 and 55 in position. The fences 54 and 55 may be adjusted toward or away from each other to accommodate the particular size of container being handled. The rear fence 55 extends the full length of the table 11, curves around the end of the conveyor 17 inside the semi-circular portion 33 of the trough 31 and terminates opposite the knife 35. The front fence 54 commences slightly in advance of the entrance to the trough 31 with a converging portion 61 and then parallels the rear fence 55 to the knife 35. The front of the table 11 has no lip in order to facilitate loading containers on the conveyor 17.

In operation containers are placed on top of the table 11 with one end against the rear fence 55. The middle portion of each container is supported by the plates 19 of the conveyor and separated from the adjacent container by the spacer studs 21 and 22. As the top of the conveyor 17 travels toward the entrance of the draining trough 31, the containers are carried past the converging portion 61 of the front guide fence 54 which adjusts for any transverse misalignment in the placing of the containers. The containers are then taken one by one around the semi-cylindrical portion 33 of the draining trough 31 at which time they gently fall off the conveyor plates 19 and slide along the surface of the trough 31. The containers upon reaching the flat portion 34 of the trough are propelled by the succeeding spacer studs 21 and 22 against the knife 35.

The knife 35 initially penetrates the middle part of the side of the container substantially halfway between the two ends thereof. The puncture in the side of the container is extended upwardly and downwardly as a result of the shape of the blade. As the studs 21 and 22 force the container past the knife, the lower corner of the container is cut while the slit is travelling to the top edge of the container. Finally, when the side of the container reaches depth of the gullet 45 the entire leading side of the container is divided. The height of the knife 35 is sufficiently less than the height of the cross section of the container to ensure that the upper side of the container is not cut through and may serve as a hinge on which the container may be hung.

The spreader member 47 acts to displace progressively the severed edges of the container so that the sealed ends thereof are gradually raised above the severed middle portion, and all portions of the container are tilted inwardly and downwardly. In this position the containers are slid for a substantial distance along the separator 49 giving time for the contents to drain completely through the open space beneath the separator 49 and out of the drain slot 51 into the receiving vat 16. When the emptied containers reach the end of the draining trough 31 they fall into the waste bin 52.

It is to be understood that the knife 35 may be replaced by a generally similar knife of suitable height when containers having a different cross sectional dimension are to be cut open.

It is apparent that the apparatus may be easily adjusted to handle different sizes, but it should be noted that tubular and conical containers as well as containers of rectangular cross section may be dumped. In all cases the draining container is hung on the clean interior surface of its top side or upper portion as it passes over the draining slot 51. This minimizes the danger of contaminating the salvaged liquid.

While the receiving table 11 and the conveyor 17 are kept reasonably clean, only the draining trough 31 and the knife 35 need be sterile since the contents of the containers only come in contact with these latter members.

Although the invention has been illustrated by a commercial milk container cutting and dumping machine which processes 58 containers each minute, the underlying inventive concepts may be embodied in widely varying apparatus according to the particular application; conse-

quently the invention is limited only by the scope of the appended claims.

I claim:

1. In a paper container opening and emptying apparatus, means for moving containers in a given path, a knife in the path of travel of the containers for slitting an intermediate portion of each container, a member behind said knife in the path of travel of the container for spreading apart the severed edges of each container and for supporting each moving container on certain of the severed edges while the contents of the container drain.

2. In a paper container opening and emptying apparatus, means for moving containers in a given path, a knife in the path of travel of the containers for cutting through an intermediate portion of each container with the exception of an upper surface portion, a wedge-shaped member behind the knife in the path of travel of the containers for spreading apart the cut edges of each container, and a supporting member behind said wedge-shaped member for receiving each moving container from said wedge-shaped member and holding said container in open position while the contents thereof drain.

3. In a paper container opening and emptying apparatus, means for moving containers in a generally horizontal plane, a knife in the path of travel of the containers for cutting each container almost into two parts, leaving only an upper surface portion intact, a wedge-shaped member behind said knife for spreading apart the cut edges of each container, and a separator to the rear of said wedge-shaped member for supporting each moving container on the cut edges while the contents of the container drain.

4. In a paper container opening and emptying apparatus, means for moving sideways in a generally horizontal direction containers that are lying on their sides, a knife having a substantially vertical blade extending upwardly into the path of travel of the containers for cutting through the lower portion of each container leaving an upper portion intact, a wedge-shaped member behind said knife for splitting each container at the cut lower portion and bending the container upwardly about the intact upper portion, and a separator having an erect generally triangular cross sectional outline extending from the rear of said wedge-shaped member for supporting each moving container while the contents thereof drain.

5. In a paper container opening and emptying apparatus, a draining trough, means for pushing containers sideways along said draining trough, a knife in said trough for almost severing each container substantially at the middle portion thereof, wedge-shaped means for spreading apart the cut edges of each container to open the same, and a separator for slidably supporting each opened container on the unsevered part of the middle portion thereof until the contents are emptied into said trough.

6. A paper container opening and emptying apparatus comprising an endless conveyor having transversely bifurcated spacers for restraining backward slippage of a container laid thereon, a draining trough beneath said conveyor and partially surrounding one end thereof, a knife in said trough for severing all but the upper side of a container forced against it by the spacers, a spreader behind said knife for opening a container by forcing apart the severed edges of the same, and a separator for slidably supporting an opened container above said draining trough on the inner surface of the upper side of said container.

7. A knife for a paper container opening and emptying apparatus comprising a pointed portion for piercing the side of a container, an upper cutting edge sloping upwardly from said pointed portion to a horizontal straight edge, an intermediate cutting edge sloping downwardly from said pointed portion, and a lower cutting edge rising from a position rearward of said pointed portion and joining said intermediate cutting edge in a rounded gullet.

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8. A method of opening and emptying paper containers comprising puncturing a generally vertical surface portion of a container between its upper and lower surface portions at a point intermediate the horizontal extremities of the container, extending the puncture upwardly and downwardly, cutting through the lower surface portion of the container to form a second cut, extending the second cut upwardly toward the downwardly extending puncture, terminating the upward extent of the puncture short of the upper surface portion of the container, joining the downwardly extending puncture and the upwardly extending second cut to sever the container substantially in two parts with the exception of the upper surface portion, bending at least one of the two parts of the container upwardly to separate the severed edges of the container, and supporting the container on at least one of the severed edges while the contents drain.

9. In a method of opening and emptying paper containers the steps comprising puncturing a generally vertical surface portion of a container between its upper and lower surface portions at a point intermediate the horizontal extremities of the container, extending the puncture upwardly and downwardly, cutting through the lower surface portion of the container to form a second cut, extending the second cut upwardly toward the downwardly extending puncture, terminating the upward extent of the puncture short of the upper surface portion of the container, and joining the downwardly extending

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puncture and the upwardly extending second cut to sever the container substantially in two parts with the exception of the upper surface portion.

10. A method of opening and emptying rectangular paper containers comprising laying each container on its side, puncturing a generally vertical surface of the container between its upper and lower corners at a point intermediate the ends of the container, extending the puncture upwardly and downwardly, cutting through the bottom corner of the container to form a second cut, extending the second cut upwardly toward the downwardly extending puncture, terminating the upward extent of the puncture short of the top surface of the container, joining the downwardly extending puncture and the upwardly extending second cut to sever the container substantially in two parts with the exception of the top surface, bending at least one of the two parts of the container upwardly to separate the severed edges of the container, and supporting the container on at least one of the severed edges while the contents drain.

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