Oct. 15, 1963 A. F. UHLIG 3,106,780

GLASS CONTAINER INSPECTING APPARATUS

Filed Feb. 8, 1961

FIG. 1.

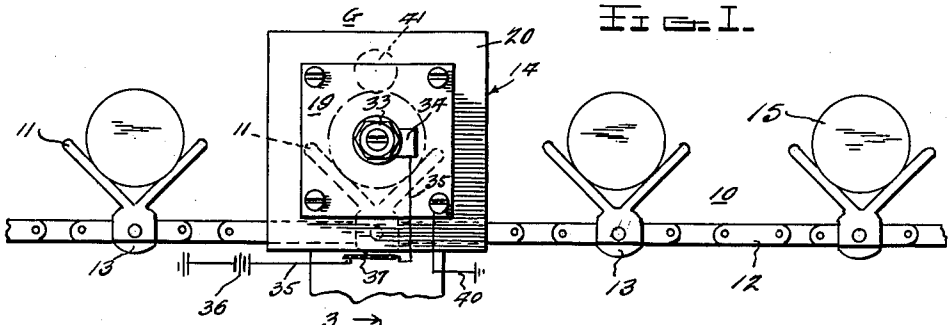


FIG. 2.

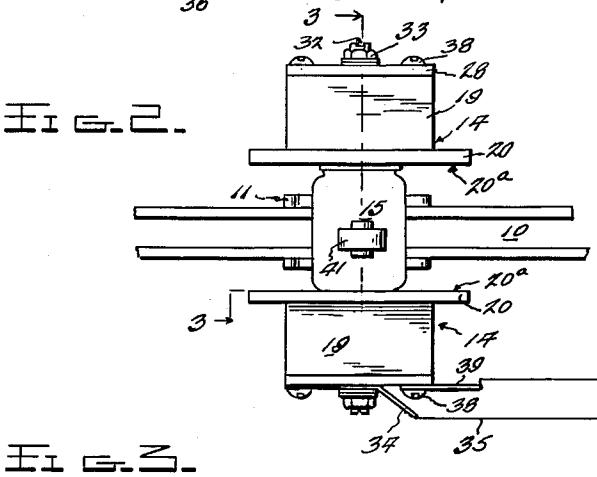


FIG. 6.

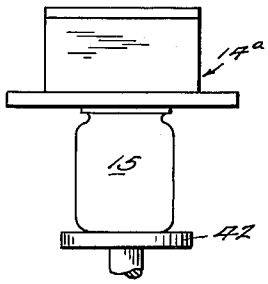


FIG. 3.

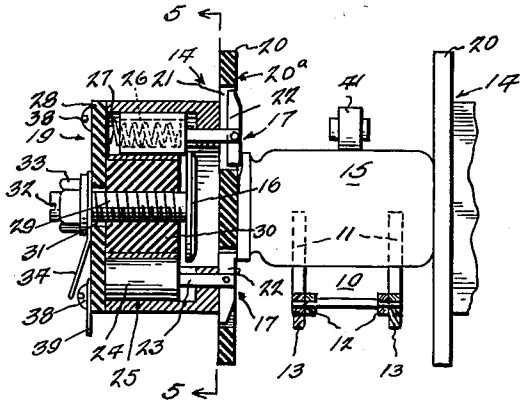


FIG. 4.

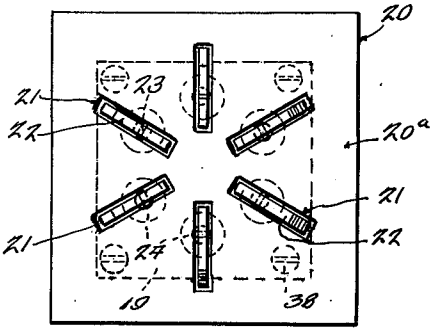
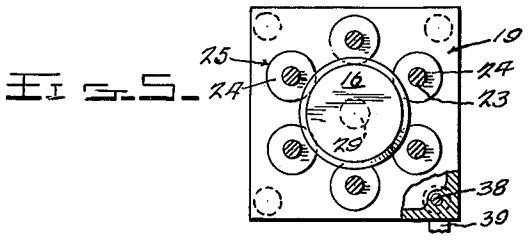


FIG. 5.



INVENTOR.
A. F. UHLIG
BY W. A. Schaich
and J. R. Nelson
ATTORNEYS

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GLASS CONTAINER INSPECTING APPARATUS

Albert F. Uhlig, Oakland, Calif., assignor to Owens-Illinois Glass Company, a corporation of Ohio

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3 Claims. (Cl. 33—174)

My invention relates to apparatus for inspecting glass containers, such, for example, as jars, bottles, etc., to detect intolerable deformations in the top and/or bottom ends, and bent necks in bottles.

In the production of glass bottles, jars and the like articles, there are found from time to time articles in which either or both the top and bottom are deformed, such, for example, being a dip, or recess of substantial proportions, or perhaps a bent neck in a bottle, either of which is a serious defect preventing normal handling, filling and closing. If the bottom is defective in a manner as just indicated, it is most probable that the container cannot occupy a normal upright position for movement through filling and closing zones. Should the top end be deformed, or the neck bent sufficiently, such container in all probability could not be filled, or in any event would not be capable of properly accommodating a closure cap so as to be hermetically sealed.

It is an all important object of my invention to provide simple, reliable means for inspecting and if present, detecting any such deformations and if they are sufficiently serious, causing their ejection from a conveyor line.

Another object of my invention is the provision of means whereby adjustment may readily be effected to insure ejection of only those articles in which deformation is of a predetermined magnitude. Thus, ware in which the deformation is of such minor nature as not to affect normal handling, filling, sealing, etc., will not be discarded.

Other objects will be in part apparent and in part pointed out hereinafter.

In the accompanying drawings forming a part of my application:

FIG. 1 is a fragmentary side elevational view showing my invention associated with an endless cradle-type conveyor.

FIG. 2 is a top plan view including the electrical circuitry.

FIG. 3 is a sectional elevational view taken substantially along the line 3—3 of FIG. 2.

FIG. 4 is a front elevational view of the article engaging reference plate.

FIG. 5 is a sectional elevational view taken substantially along the line 5—5 of FIG. 3.

FIG. 6 is a side elevational view illustrating a further adaptation of my invention.

In FIGS. 1 through 5 I have illustrated my invention in conjunction with an endless cradle-type conveyor 10 which is moved intermittently by any conventional means (not shown) to bring jar supporting cradles 11 to a gauging or inspecting station G. The cradles may be mounted upon endless sprocket chains 12 or belts, and associated with each cradle I have, as an example of an electrical circuit closing device, shown a pair of switch actuating cams 13 or fingers, the manner of functioning of which will be apparent presently. Other actuating devices may, of course, be used.

In the adaptation shown in FIGS. 1 through 5, two identical gauging units 14, each embodying my invention, are utilized. One such unit is mounted at each side of the path of travel of the cradles 11 in order to gauge or inspect both the top and bottom end of each jar 15, or bottle, brought to the gauging station G. Since both units are identical as to structure and mode of operation, the ensuing detail description will refer to one such unit only. As best shown in FIGS. 3, 4 and 5, each gauging unit

comprises a stationary main electric contact 16, encircled by an annular series of individually movable electrical contacts 17, any one of which may be engaged with the main contact 16 by reason of its entering a depression in an end of a bottle, or jar, or because of a bottle having a bent neck being presented at the gauging station G. When such engagement between one or more of the movable and stationary contacts occurs, a circuit is closed, as will be brought out hereinafter, and in response to such closing an ejection device (not shown) of known character will function to remove the defective article. Examples of ejecting means adaptable for use herein will be found in patents to Owens, No. 2,481,863, September 13, 1949, Fedorchak et al., No. 2,352,091, dated June 20, 1944, and Frey et al., 2,689,409, dated September 21, 1954, all being owned by the assignee of the present application.

These electrical contacts 16 and 17 are mounted in a holder 18 which comprises a box-like housing 19 of generally rectangular form. The front of this housing is closed by a reference plate 20 which is of somewhat greater peripheral dimensions than the housing proper. This reference plate may be welded, or otherwise secured in place with its front or exterior surface 20^a disposed in a plane to simultaneously contact all of the extreme end surface areas of a perfectly formed bottle or jar. This reference plate, in the illustrated form of my invention, is provided with an annular series of radial slots 21 which extend through the thickness of the plate, these slots at least in part being in register with marginal portions of the normally open front end of the housing. In each of these slots 21 is a feeler 22, or finger. This feeler is part of the movable electrical contact 17, such also including a rod 23 connecting the feeler 22 to a short metal cylinder 24. This cylinder 24 is slidingly mounted in a longitudinal guide 25 and is cored to provide a coil spring accommodating chamber 26. A coil expansion spring 27 which is confined in this chamber and at its outer end bears against a cover plate 28 at the rear of the housing, yieldingly urges the movable contact forwardly for engagement with the stationary main contact 16. This is the structure of each of the annular series of contacts, as best shown in FIGS. 3, 4 and 5.

The stationary main electrical contact 16 is a metal disk-like element carried by a screw-threaded axial rod 29, which extends through an insulating block 30, or guide, and thence through an aperture 31 in the cover plate 28. This rod is in threaded engagement with said block 30. At its outer end this rod is formed with a kerf 32 or groove, to accommodate a screw-driver, or similar tool, which may be used to rotate the rod and thereby axially adjust the position of the contact 16 relative to the reference plate 20. Thus the device may be adjusted to detect defects of predetermined magnitude. A lock-nut 33 at the outer end of the rod serves to lock or clamp the main contact in any adjusted position.

An electrical connector 34 is clamped beneath the lock-nut 33 and is intended for attachment to one lead 35 of an electrical circuit. In this side of the circuit may be a source 36 of electric power and a normally open micro-switch 37. To one of the cover plate retaining screws 38 is secured an electrical connector 39 to which is attached a lead 40, this being grounded.

In operation, the two gauging units may be positioned as shown in FIG. 2. A jar, lying in a recumbent position in a cradle, enters the gauging station G. Up to this point the micro-switch 37 is open and all of the movable contacts 17 are in engagement with the main stationary contact 16. Immediately upon complete entry of a jar into the gauging station G and opening all of the contacts in the gauging unit, the micro-switch 37 is closed by one of the cams or fingers 13. The jar then is rotated by a driven roll 41 or the like device. With both ends of the

jar rotating in contact with the reference plates and in contact, at least in part, with the feelers 22, it is apparent that unless the extreme ends of the jar are entirely, or in part out of the desired plane, the movable contacts 17 will remain out of engagement with the main contact. If, however, an end surface has a deep recess or wave, or perhaps in the case of a bottle, the neck is bent badly, one or more of the feelers will move through the openings or slots 21 in the reference plate. Thereupon the electrical circuit will be closed and a reject device (not shown) set in motion.

In FIG. 6 I have shown my gauging unit 14a mounted above a rotating jar supporting pad 42, such as is incorporated in certain popular types of container gauging devices. The gauging unit per se is the same as that described above.

Modifications may be resorted to within the spirit and scope of the appended claims.

I claim:

1. In Apparatus for detecting abnormalities in the plane of a generally circular area of an external end surface of a substantially cylindrical article, means for supporting an article in a recumbent position at an inspecting station, means for rotating the article about its axis while at said station, inspecting apparatus at said station comprising a reference plate having a flat work-contacting surface lying in a plane normal to the axis of the article for engagement with said end surface of the latter, said plate having a plurality of apertures opening through the work-contacting surface and positioned at least in part opposite the area to be inspected, a gauging finger shiftably mounted in each aperture, means yieldingly urging the fingers to positions for engagement with said circular area, a main electrical contact comprising a disk with which the article is axially aligned for testing, electrical contacts individual to and movable with the fingers and arranged in an annular series about the axis of said main contact and so positioned relative to the main contact that movement of any finger a predetermined distance beyond the work-contacting surface brings the corresponding contact into circuit closing engagement with the main contact and means for moving the main contact axially thereby to regulably predetermined the extent to which a finger must move relative to the reference plate to close the circuit.

2. Apparatus as defined in claim 1, the main contact being a disk-like head, a rod carrying said head, the axis of said rod and that of the circular series of contacts being in register, and means whereby the rod and head may be moved axially to vary the normal spacing between the main contact and series of contacts.

3. Apparatus as defined in claim 1, the main contact being a disk-like head, a rod-like holder for the head coaxial with said series of contacts, and the margin of the head being positoned in the path of movement of the series of contacts.

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