United States Patent

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[73] Assignee **Owens-Illinois, Inc.**

[54] **GLASS CONTAINER INSPECTING APPARATUS**
3 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **198/19,** 198/33, 198/22, 250/223
[51] **Int. Cl.** **B65g 47/24**
[50] **Field of Search** ..... 198/33, 33 (R2), 22, 29, 19; 156/571, 572; 250/223 (B)

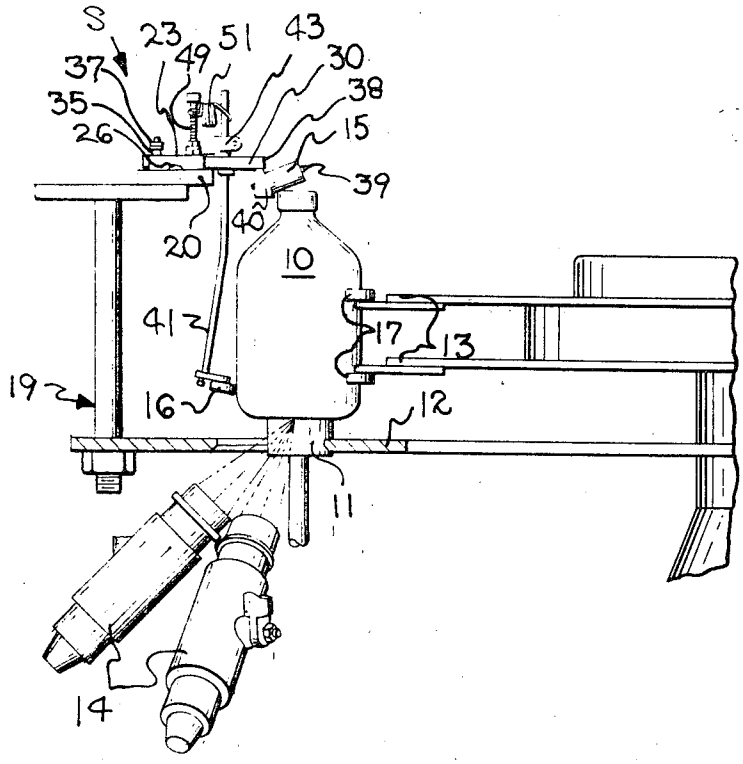
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ABSTRACT: This is a device incorporated in apparatus for detecting defects in glass containers, such device serving to stabilize an upright container, a bottle for example, while resting upon a rotating spinner pad at a selected inspecting station to which such containers are brought in succession by said pads and an associated intermittently rotating starwheel. The steadying device embodies a spring-loaded holddown roller which engages the top end of the container neck as a direct result of upward movement of both the pad and container thereon, so that the latter is grasped firmly between the pad and roller. A second roller yieldingly engages a side surface area of the container in response to slight upward travel of the first roller due to the container's initial upward movement with the pad, the second roller acting to yieldingly hold the container in contact with antifriction means in the pockets of the starwheel.



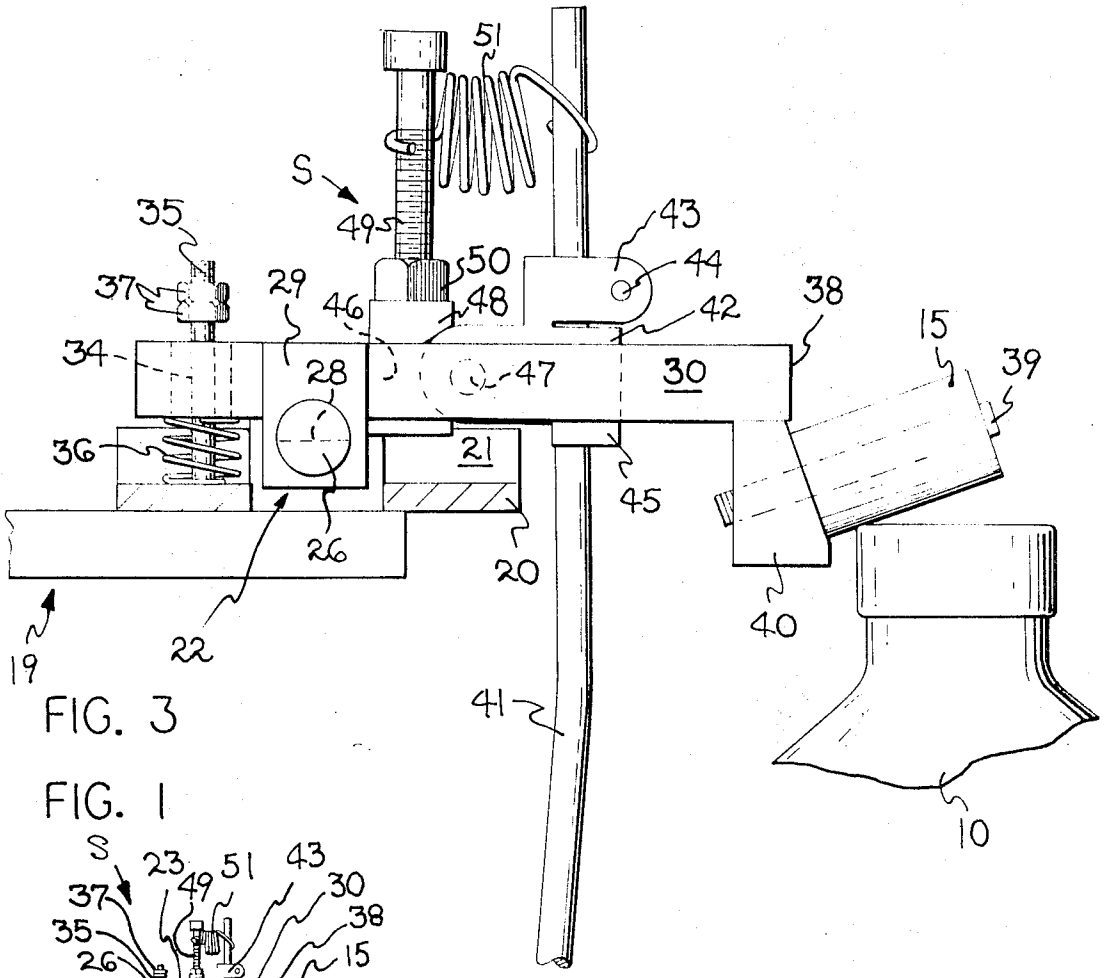
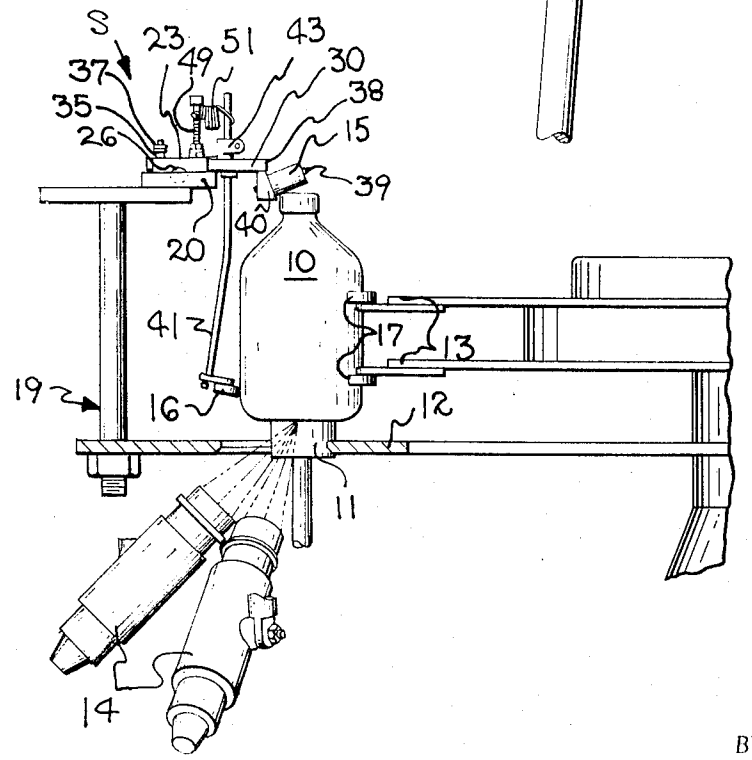


FIG. 3

FIG. 1



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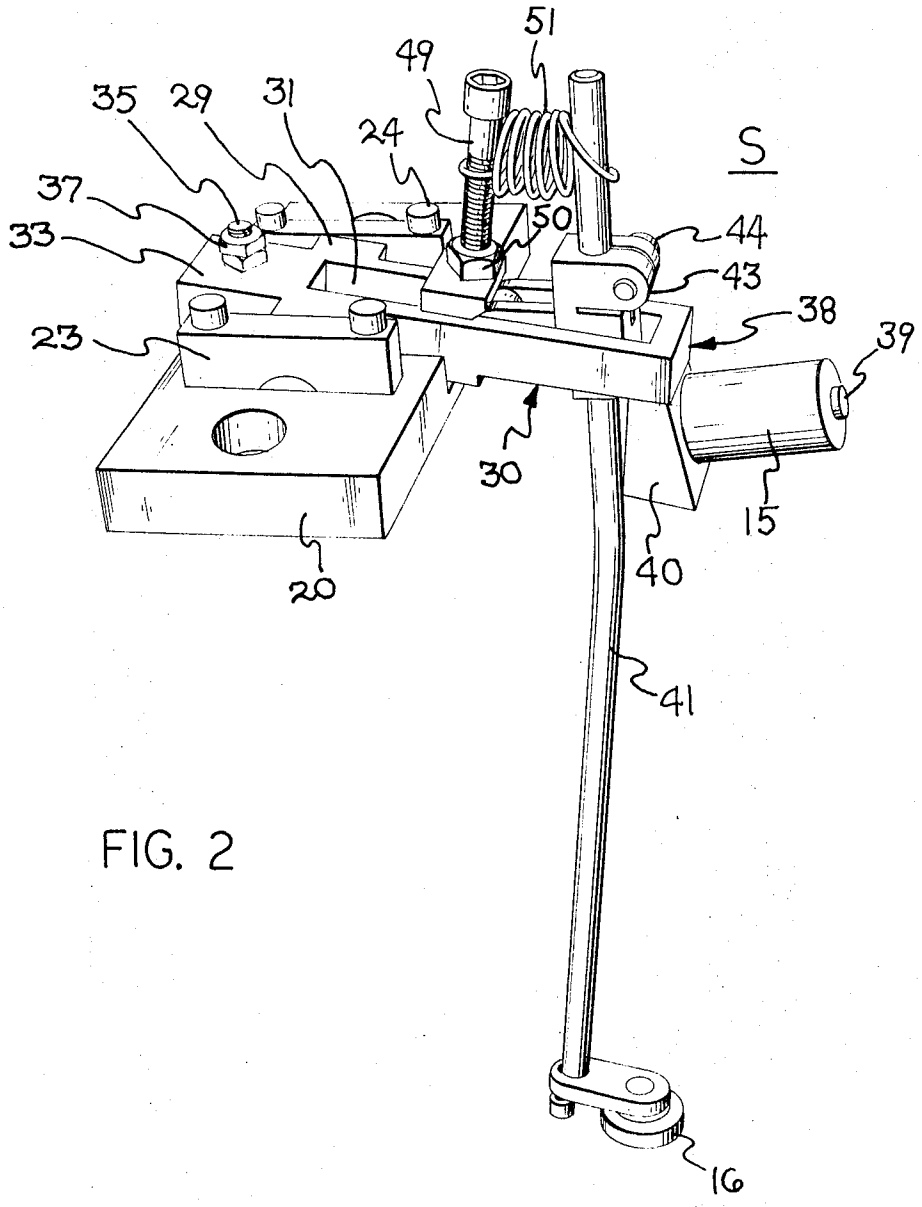


FIG. 2

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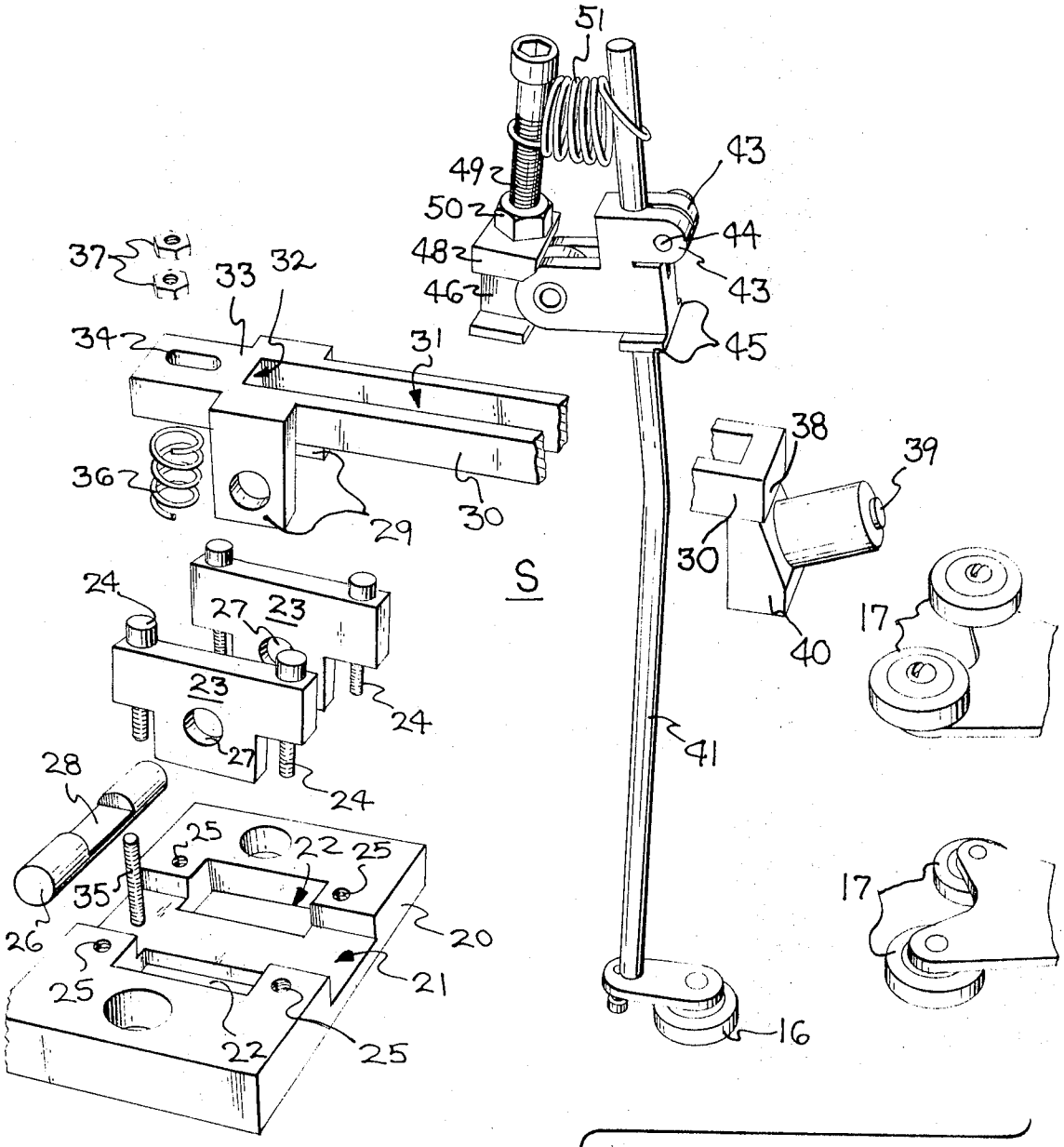


FIG. 4

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GLASS CONTAINER INSPECTING APPARATUS

BACKGROUND OF THE INVENTION

The invention pertains to apparatus for inspecting glass bottles or other such articles, to detect structural defects, or flaws, therein, such apparatus comprising a peripherally pocketed starwheel and spinnerpads individual to the pockets, for supporting bottles upright in said pockets, together with means for intermittently rotating the starwheel, thereby to bring the bottles one at a time to inspecting stations, at each of which stations the bottles are rotated in the presence of flaw-detecting means, and if found to be defective, are rejected.

Heretofore, to the best of my knowledge, the bottles being inspected have rested freely upon spinnerpads, there being no means for ensuring against undesired lateral displacement, so that if such bottles and spinnerpads are not initially coaxial, the former may be not only improperly positioned for inspection purposes, but in fact may be bodily thrown from the pads by centrifugal force.

Accordingly, my invention provides that each bottle supporting pad, while at a given inspecting station, rotates the bottle and elevates it so that the neck end is firmly pressed against and lifts a spring-loaded "holddown" roller, the latter carried by a vertically rockable arm which in turn carries a "push-in" roller which is so positioned that it can be brought into contact with a side-surface area of the bottle in response to upward movement of said arm, thus firmly holding the bottle against antifriction devices in the starwheel pockets.

An important object of my invention is the provision of simple effective means for positively stabilizing a bottle, or such article, during inspection for defects, where such inspection requires upright positioning of the bottle on a pad and rotating same on a vertical axis in the presence of flaw-detecting means.

Another object of my invention is the provision of apparatus of the above character in which a spinnerpad and bottle supported upright thereon are moved vertically upward, initially to firmly grasp the bottle between said pad and a roller, and if desired, through said roller and a carrier for same, causing a second roller to engage a side surface area of the bottle and yieldingly hold it against antifriction means individual to pockets of an associated starwheel.

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

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view, partly in section, showing my invention functioning to steady, or stabilize, an upright rotating glass container at an inspecting station;

FIG. 2 is a fragmentary detail perspective view of my invention;

FIG. 3 is an enlarged side elevational view with parts in section, of the major portion of the steadying mechanism; and

FIG. 4 is an exploded perspective view of the components of my invention.

The illustrated embodiment of my invention is positioned at an inspecting station to which a bottle **10**, or such article, while standing upright upon a spinnerpad **11**, is brought by means of a padcarrier **12**, or table, there being associated with and located in a plane just above the latter, a pair of superposed starwheels **13** functioning in the manner shown in U.S. Pat. No. 3,313,409 dated Apr. 11, 1967. At the inspecting station the spinnerpad **11** is rotated on its vertical axis by any conventional means, for example, as shown in U.S. Pat. No. 3,313,409, so that light beams from sources **14**, may be directed at an acute angle against the bottom or adjacent surfaces of the rotating container **10**. If a detect is present, a signal is produced and reject mechanism actuated, as in my U.S. Pat. No. 3,327,849 issued June 27, 1967. In addition to being rotated while at the inspecting station, this spinnerpad **11** also is moved axially upward by any suitable means (not shown) in order to actuate the steadying mechanism comprising my invention, as will become apparent presently. It is, of course, understood that there is an annular series of these spinner pads **11** so that bottles advance in succession intermittently to the inspecting station, such being held at said station momentarily for inspection purposes and steadied during rotation, by the present invention.

This steadying device S comprises a holddown roller **15** and a push-in roller **16**, the former, as will become apparent, functioning to apply yielding pressure axially downward upon the neck end of the container so that the latter is firmly held between the roller and pad. The push-in roller **16** moves into contact with the medial side area of the bottle body concurrently with and in response to firm gripping of the bottle between the holddown roller **15** and pad **11**. The push-in roller **16** cooperates with vertically spaced-apart pairs of starwheel-carried antifriction rollers **17** individual to the pads **11**. In some instances I may dispense with the push-in rollers **16** and rely solely upon the holddown roller **15** and pad **11** to steady the container as it rotates at the inspecting station. However, where all rollers are utilized, the supporting and actuating mechanism may well be as follows.

Framework **19** positioned adjacent the inspection station radially outward from the starwheels **13** and said padcarrier **12**, supports the steadying device S which includes a rectangular baseplate **20** (FIGS. 3 and 4), secured to the upper side of the framework **19**. There is a transverse upwardly facing channel **21** medially of the upper side of this baseplate **20**. At each side of this channel **21**, medially its length, is a vertical longitudinal slot **22** extending in part laterally into the floor of said channel **21**. In each such slot **22** is an elongated, substantially T-shaped bearing block **23**, these two being secured to the baseplate **20** by screws **24** threaded into apertures **25** in said baseplate. A horizontal hinge pin **26** has its ends rockably journaled in aligned openings **27** in the pair of bearing blocks **23** and near each end of the notch **28** in one side of this pin **26**, is tightly secured by any suitable means to one of a pair of opposed pendent fingers **29** through which the prime roller-carrying arm **30** is rockably attached to the baseplate **20**. This arm **30** is relatively long, disposed substantially horizontally, and has a central vertical longitudinal slot **31**, or slideway, therein, one end wall **32** of such slot (FIG. 4) terminating near the pendent fingers **29**. Beyond this wall **32** and the hinge pin **26** is an arm extension **33** having a slot **34** therein to accommodate an upright screw-threaded pin **35** rising from the baseplate **20**. A coil-expansion spring **36** encircles this pin **35** between the base plate **20** and said arm extension **33**, such spring being held in compression by nuts **37** threaded upon the pin **35** just above the extension **33**. Thus the free outer end **38** of the arm **30** normally is yieldingly held in its low position.

The previously mentioned holddown roller **15** is journaled on a short rod **39** which is secured at one end to a bracket **40** depending from the free end **38** of the carrier arm **30**. Preferably, the axis of rotation of the roller **15** normally is inclined at about 15° to the horizontal. The push-in roller **16** is rotatably mounted at the lower end of an elongated generally vertical rod **41** which extends through and is supported by a carrier block **42** which is fitted for longitudinal movement in said elongated slot **31** in the carrier arm **30**. Fingers **43** on this block **42** form a clamp for grasping the rod **41** and a screw **44** interconnecting the fingers **43** of this clamp is operable to lock the rod at any desired elevation in said block **42**. Opposed flanges **45** at the base of this carrier block **42** slidingly engage the lower surface of the carrier arm **30** near each side of the slot **31**. A slide block **46** (FIG. 4) is mounted in the slot **31** or slideway of the carrier arm **30**, such being pivoted by a horizontal hinge pin **47** to the aforementioned carrier block **42** which is connected directly to the rod **41**. This slide block **46** includes a separate headplate **48** through which an upright threaded rod **49**, carried by the block proper extends freely. A locknut **50** on this rod serves to secure the slide block **46** at any desired point along the slot **31**, the point of setting being determined by the diameter of the container body. A coil pull spring **51** interconnecting the upper end portion of the rod **41** and the rod **49** just mentioned, functions to yieldingly hold the push-in roller **16** firmly against a container body at times.

Thus, it will be understood that coincident with arrival of a spinner pad supported bottle **10** at the inspection station and with the container already contacting the antifriction rollers **17** of the starwheels **13**, the pad is rotated on its axis and elevated to bring the neck end of the container into firm engagement with the holddown roller **15**. Continued upward travel of the pad and container as a unit for a short distance moves the roller **15** upwardly for the two-fold purpose of firmly grasping the container between the pad and roller **15** and through the latter moving the arm **30** on the axis of the pivot pin **26**, causing the rod **41** to move the push-in roller **16** carried thereby, into contact with one side of the container body. Thus the container body is firmly, through rotatably, held between the push-in roller **16** and the antifriction rollers **17** of the starwheels **13**. The springs **36** and **51**, as is apparent, provide for yielding engagement between these rollers **17** and **51** and the container **10**. Variations in the diameter of containers being inspected, requires proper setting of the rod carried block **42** in the arm slot **31**, such involving loosening the locknut **50**, shifting the block and supporting rod to the desired position and then tightening the locknut to secure the block and rod in place.

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

I claim:

1. In combination a bottle inspection apparatus wherein bottles are moved in succession into and out of inspection station by a rotatably indexed starwheel arrangement having a plurality of bottle-engaging pockets formed therein and a bottle, bottom-engaging spinner pad at at least one said inspection station for lifting the bottle and rotating the bottle about its vertical axis; and a bottle-steadying means at the inspection station, the improvement in said steadying means comprising a horizontally extending arm, means mounting said arm for pivotal movement in a vertical plane, a holddown roller on the extending end of said arm overlying a bottle in the inspection station, said roller being engaged by a bottle upon raising of the bottle by the spinner pad, means biasing said arm in the bottle-engaging direction, a push-in roller mounted at the lower end of a vertical rod and movable into engagement with the side of the bottle opposite to the starwheel pocket, means mounting said rod on said horizontal arm for limited pivotal movement of the push-in roller toward and away from the bottle, and means connected between said arm and rod for biasing said push-in roller toward the bottle in response to upward movement of the holddown roller by engagement by a raised bottle.

2. In combination, an annular series of vertically upwardly movable rotatable spinnerpads for supporting glass bottles in upright position and operable to bring them in succession to an inspecting station, there being a peripherally pocketed starwheel to aid the pads in advancing the bottles intermittently, antifriction means in each starwheel pocket for contact with pad supported bottles, and a bottle-steadying device at said station comprising a vertically rockable, generally horizontal arm, a holddown roller at the free end of said arm for rolling contact with the upper end of a bottle resting upon a pad, said roller and bottle being interengaged and the roller moved upwardly in response to upward movement of the pad and bottle, a push-in roller below and supported by said arm and movable into contact with the side of a bottle in an area generally opposite said antifriction means in response to upward movement of said arm and the roller carried thereby, a slide block mounted for movement longitudinally of the arm, means for locking the slide block at any desired point along said arm, a carrier block pivoted to the slide block, a rod connected near one end to and depending from the carrier block and supporting the push-in roller at its lower end, said rod extending above the carrier block and a coil pull spring interconnecting the rod above said carrier block and a portion of the slide block locking means, for yieldingly urging the push-in roller into engagement with the bottle.

3. In combination, an annular series of vertically upwardly movable rotatable spinnerpads for supporting glass bottles in upright position and operable to bring them in succession to an inspecting station, there being a peripherally pocketed starwheel to aid the pads in advancing the bottles intermittently, antifriction means in each starwheel pocket for contact with pad supported bottles, and a bottle-steadying device at said station comprising a vertically rockable, generally horizontal arm, a holddown roller at the free end of said arm for rolling contact with the upper end of a bottle resting upon a pad, said roller and bottle being interengaged and the roller moved upwardly in response to upward movement of the pad and bottle, a push-in roller below and supported by said arm and movable into contact with the side of a bottle in an area generally opposite said antifriction means in response to upward movement of said arm and the roller carried thereby, a slide block mounted for movement longitudinally of the arm, means for locking the slide block at any desired point along said arm, a carrier block pivoted to the slide block, a rod connected near one end to and depending from the carrier block and supporting the push-in roller at its lower end, means pivotally supporting the arm for movement in a vertical plane, spring means urging the arm about its pivot to yieldingly interengage the holddown roller and bottle, and spring means acting upon said rod to yieldingly interengage the push-in roller and bottle.