

June 8, 1943.

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2,321,331

CONTAINER INSPECTING APPARATUS

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FIG. 4.

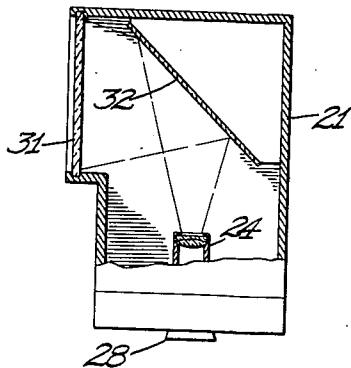


FIG. 1.

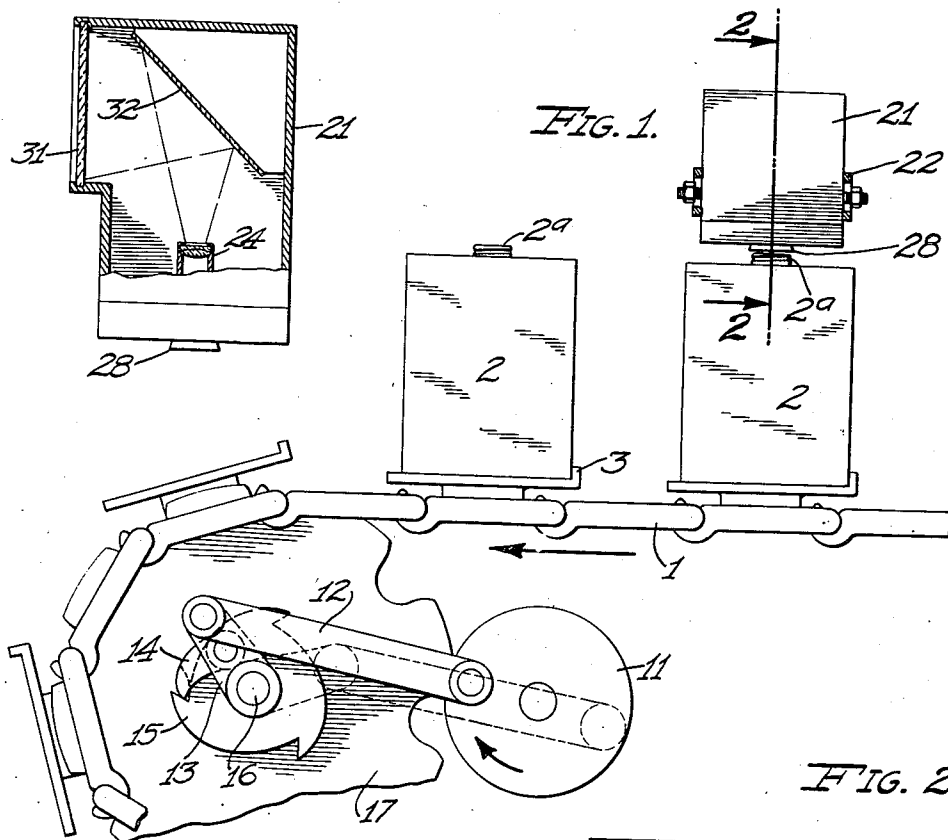


FIG. 2.

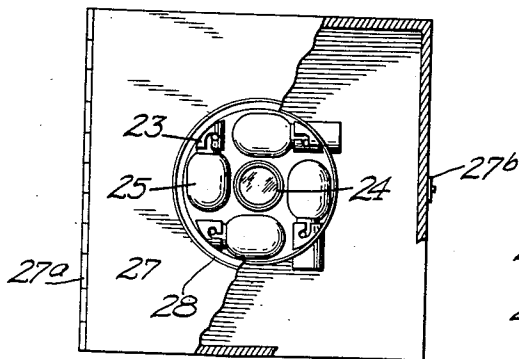
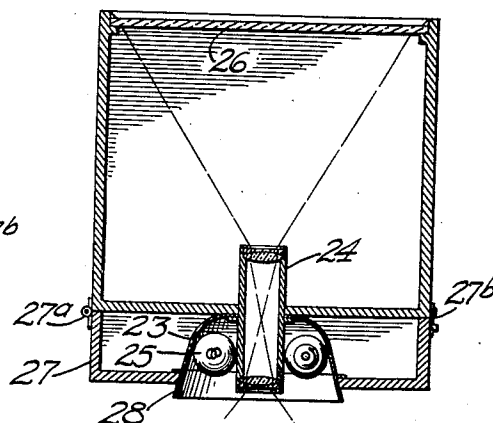


FIG. 3.



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CONTAINER INSPECTING APPARATUS

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10 Claims. (Cl. 88—24)

My invention relates to a container inspecting apparatus for inspecting the interiors of particularly opaque food or similar containers for foreign matter, or the interior conditions of the container.

One of the principal objects of this invention is to provide an apparatus of this class for quickly and thoroughly inspecting the interiors of opaque containers, particularly while the containers are being conveyed on a continuous conveying means.

An important object of this invention is the provision of novel means for effectively illuminating the inside of the container while viewing the interior thereof, and in which the illuminating means will not interfere with the visual inspection means.

Another important object of this invention is the provision of means whereby the interior of a considerable portion of the container may be inspected, including the bottom and the lower portions of the side walls thereof.

With these and other objects in view, as will appear hereinafter, I have devised a container inspection apparatus having certain novel features of construction, combination, and arrangement of parts and portions, as will be hereinafter described in detail and particularly set forth in the appended claims, reference being had to the accompanying drawing and to the characters of reference thereon which form a part of this application, in which:

Fig. 1 is a fragmentary side view of a continuous belt conveyor showing a means of intermittently operating the same, and showing my container inspection means in association therewith for inspecting the interiors of cans carried by the conveyor;

Fig. 2 is an enlarged sectional elevational view of the inspection means only of my apparatus with the section taken at 2—2 of Fig. 1, and,

Fig. 3 is a view of the under side of the visual inspection means; and,

Fig. 4 is a partial elevational and partial sectional view of a slightly modified form of my apparatus, in which the image of the interior of the inspected can is seen from the side.

The conveyor 1, upon which the containers, designated 2, are to be conveyed, may be of conventional form, and it may carry brackets or cleats 3 for supporting individual containers. In the drawing I have shown diagrammatically a means for causing intermittent movement of the conveyor. Such means is shown as consisting of a crank wheel 11 eccentrically connected by a link 12 to a rocker arm 13 carrying a pawl 14 which engages teeth of the ratchet 15. The rocker arm 13 and ratchet 15 are shown as mounted on the shaft 16 carrying one of the sprockets 17, over which the conveyor belt 1 extends.

Above the conveyor is positioned the visual inspection means of my apparatus. This means is enclosed in an enclosure 21 which is supported on brackets 22 so that it may be vertically adjusted with respect to the conveyor.

The enclosure is substantially box-like. This enclosure has a downwardly directed reflector 23 at its under side. At the axial portion of the reflector is a tubular lens structure or objective 24. Within the reflector and around the objective are located a plurality of electric light bulbs 25, the bulb portions being located within the reflector, and the sockets being located outside of the reflector. At the upper portion of the enclosure is provided a means upon which the image, passing through the objective, is projected. This means is preferably a ground glass 26 located at the upper side of the enclosure.

Over the lower side of the enclosure is removably located a housing 27, the same being hinged at 27^a to one side of the enclosure and removably secured at 27^b to the opposite side thereof. At the central portion of the housing 27 is a reflector member 28 which is outwardly diverging, and when the housing 27 is closed against the enclosure 21, the reflector member forms substantially an outward extension of the reflector 23. The outer end of the objective 24 is located beyond the electric bulbs 25, but slightly inwardly from the outer edge of the reflector member.

The container inspection means just described is located above the conveyor 1 such a distance that the cans or containers 2 just clear the lower portion of the inspection means, or the lower edge of the reflector member 28 carried thereby. The reflector may be of any cross-section, but is preferably round and of substantially the diameter, or slightly larger than, the diameter of the neck of the can surrounding the opening thereof. With this arrangement, substantially all of the illumination from the electric bulbs 25 is directed into the opening of the can, but it will not interfere with or diminish the view of the interior of the can through the objective.

The enclosure 21 is adjustable in a vertical direction so that the inspection means may be lowered to just clear the necks surrounding the openings of cans of different heights.

The structure of Fig. 4 is similar to the one described, except that the translucent screen or ground glass, here designated 31, although shown at the upper portion of the enclosure 21, is located in the plane of the side, that is, in the side of the enclosure. In this instance the image from the objective is projected on the ground glass 31 by any suitable means, such as a reflector 32.

Though I have shown and described a particular construction, combination, and arrangement

of parts and portions, I do not wish to be limited to the same, but desire to include in the scope of my invention the construction, combination, and arrangement substantially as set forth in the appended claims.

I claim:

1. In a container inspecting apparatus, a belt conveyor having means for conveying containers having openings at the top, and a visual inspection means supported above the conveyor a distance sufficient to allow clear passage of the containers on the conveyor, said means comprising an enclosure, an objective lens at the under side of the enclosure adapted to be aligned with the opening of one of the containers, illuminating means surrounding said objective lens, and means at the top of the enclosure upon which is projected the image passing through the objective lens.

2. In a container inspecting apparatus, a belt conveyor having means for conveying containers having openings at the top, and a visual inspection means supported above the conveyor a distance sufficient to allow clear passage of containers on the conveyor, said means comprising an enclosure, a reflector at the under side of the enclosure and directed downwardly, an objective lens at the middle of the reflector, illuminating means within the reflector around the objective lens and spaced backwardly from the end of the latter, and means at the top of the enclosure upon which is projected the image passing through the objective lens.

3. In a container inspecting apparatus, a belt conveyor having means for conveying containers having openings at the top, and a visual inspection means supported above the conveyor a distance sufficient to allow clear passage of containers on the conveyor, said means comprising an enclosure, an objective lens at the under side of the enclosure adapted to be aligned with the opening of one of the containers, illuminating means surrounding said objective lens, and a translucent screen at the top of the enclosure upon which is projected the image passing through the objective lens.

4. In a container inspecting apparatus, an intermittently moving belt conveyor having means for conveying containers having openings at the top, and a visual inspection means supported above the conveyor a distance sufficient to allow clear passage of containers on the conveyor, said means comprising an enclosure, an objective lens at the under side of the enclosure in alignment with the path of the opening of the containers and adapted axially to align with the opening of one container when the conveyor is at rest, illuminating means surrounding said objective lens, and means at the top of the enclosure upon which is projected the image passing through the objective lens.

5. In a container inspecting apparatus, a conveyor having means for conveying containers having openings at the top, and a visual inspection means supported above the conveyor and capable of being aligned directly with one of the container openings, said inspection means being adjustable in a vertical direction with respect to the conveyor, the adjusted elevation of the inspection means above the conveyor being sufficient to allow clear passage of containers of different heights on the conveyor with the inspection means positioned immediately adjacent said container opening.

6. In a container inspecting apparatus, a con-

veyor having means for conveying containers having openings at the side opposite the conveyor, and a visual inspection means supported outwardly from the conveyor and containers thereon, a distance sufficient to allow clear passage of the containers on the conveyor, said means comprising an enclosure, an objective lens at the side of the enclosure adjacent the container openings adapted to be aligned with the opening of one of the containers, illuminating means surrounding said objective lens, and means at the side portion of the enclosure opposite the objective lens upon which is projected the image passing through the objective lens.

7. In a container inspecting apparatus, an intermittently moving belt conveyor having means for conveying containers having openings at the side opposite the conveyor, and a visual inspection means supported outwardly from the conveyor and containers thereon, a distance sufficient to allow clear passage of the containers on the conveyor, said means comprising an enclosure, an objective lens at the side of the enclosure adjacent the opening adapted to be aligned with the opening of one of the containers, illuminating means surrounding said objective lens, and means at the side portion of the enclosure opposite the objective lens, upon which is projected the image passing through the objective lens.

8. In a container inspecting apparatus, a conveyor having means for conveying containers having openings at the side opposite the conveyor, and a visual inspection means supported outwardly from the conveyor and containers thereon and capable of being aligned directly with one of the container openings, said inspection means being adjustable transversely with respect to the conveyor, the adjustment with respect to the conveyor being sufficient to allow clear passage of containers of different heights on the conveyor with the inspection means positioned immediately adjacent said container opening.

9. In a container inspection apparatus, a belt conveyor having means for conveying containers having openings at the side opposite the conveyor, and a visual inspection means supported outwardly from the conveyor and containers thereon, said inspection means comprising an enclosure, a reflector carried by said enclosure at the side adjacent the conveyor, an objective lens at the middle of the reflector, its outer end being substantially flush with the outer portion of the reflector, illuminating means within the reflector around the objective lens and spaced backwardly from the outer end of the objective lens, and means at the opposite portion of the enclosure from the reflector and objective lens upon which is projected the image passing through the latter.

10. In a container inspecting apparatus, a conveyor having means for conveying containers having openings at the side opposite the conveyor, and a visual inspection means supported outwardly from the conveyor and containers thereon a distance sufficient to allow clear passage of the containers on the conveyor, said means comprising an objective adjacent the container openings adapted to be aligned with the opening of one of the containers, illuminating means surrounding said objective, and means in connection with said objective for receiving the image projected thereby.