Oct. 28, 1958 B. HÖVER 2,858,416

ILLUMINATED INSPECTION DEVICE

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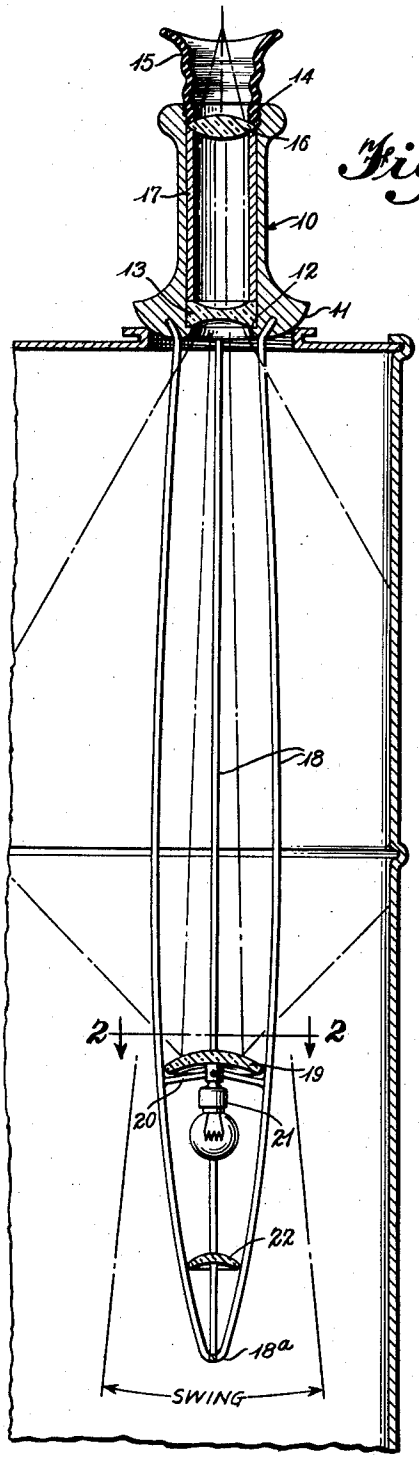


Fig. 1.

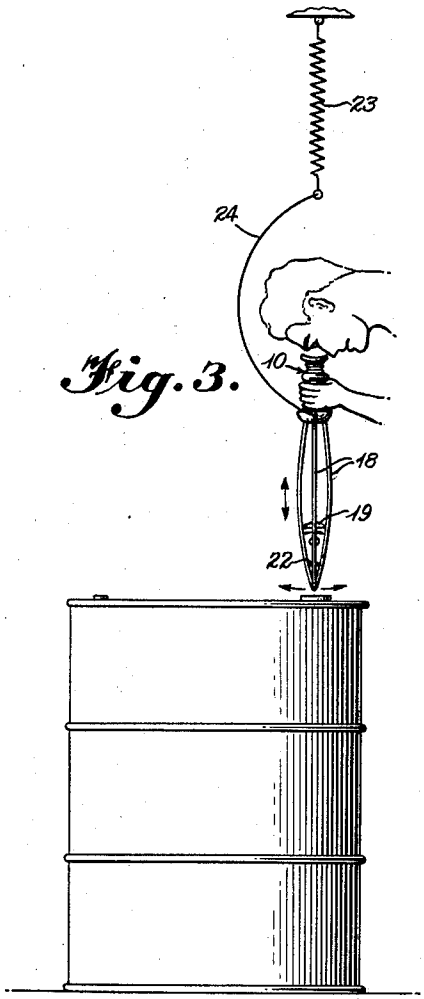


Fig. 3.

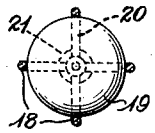


Fig. 2.

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5 Claims. (Cl. 240—2.18)

The present invention relates to an illuminating inspection device and more particularly to one adapted for the visual inspection of the interiors of shipping or storage containers such as drums for oil or other liquid products.

When drums are being employed for the first time or are being reused, it is generally desirable to inspect their interiors prior to placing them in use in order to make certain they are clean and free of contaminants for the liquid product about to be placed therein. This operation is frequently handicapped by the absence of sufficient and/or suitable viewing orifices through which the interior may be inspected. It is generally desirable to utilize for this purpose an orifice which already exists for some utilitarian purpose such as for attaching a connecting conduit for filling or the like. At present such inspections are made by an inspector who merely inserts a small light on a cord through the opening in the container to determine whether or not the container, if new, has been made properly in the beginning or, if used, is in a condition to be reused. By this method of inspection, however, one cannot view more than one-half of the container interior and often may not see any of the interior at all. Moreover, even at best the portion of the interior adjacent the inspection orifice is not within the inspector's field of vision. Light rods have also been employed to make such interior inspections but these have been found to be impracticable and in many cases to interfere with the inspector's ability to see the interior of the container due to the backlighting effect.

The present invention overcomes the disadvantages of the presently employed inspection devices and enables the inspector to view the entire interior of the container.

It is, therefore, a primary object of this invention to provide an apparatus or device which makes it possible to inspect the interior of a closed container through a relatively small orifice in the wall thereof.

Other objects and advantages of the invention will become apparent from the following detailed description when read in conjunction with the accompanying drawings, wherein:

Figure 1 is a partial sectional view of the device of this invention when positioned on and in a container, the interior of which is to be inspected;

Figure 2 is a partial, cross-sectional view taken on the line 2:2 of Figure 1; and

Figure 3 is a front elevational view showing how the device of the present invention may be utilized in the inspection of the interior of containers.

Referring now to the drawings and more specifically to Figure 1, there is shown the device of the present invention which comprises an open-ended handle **10** having at one of its extremities a convex portion **11** of larger diameter than the opening of the container to be inspected. This convex portion functions as a pivot for the inspection device when it is inserted in the container for the inspection of the interior thereof. At the same extremity of the handle **10** is an interior annular flange **12** covering a portion of the opening through the handle

and upon which is seated a double concave lens **13**. The other extremity of the handle **11** is internally threaded at **14** for receiving an externally threaded rubber eye piece **15**. Between the concave lens **13** and the eye piece **15** are a double convex lens **16** and spacing tube **17**. Spacing tube **17** prevents longitudinal movement of lenses **13** and **16** toward each other and maintains the lenses the proper distance apart in relation to their focal lengths. Affixed to and depending from handle **10** are a number of relatively long spring steel rods **18**, for example four, which are arcuate in shape and joined at their far ends at **18***a*. Between the ends of rods **18** and supported by and within them is a convex spherical mirror **19** which, in combination with the lens system including lenses **13** and **16**, enables the inspector to view the upper, and heretofore relatively inaccessible, portions of the container top for visual inspection from without. Between mirror **19** and the junction **18***a* of rods **18** is spider **20** which is supported by rods **18** (see Figure 2). Spider **20** in turn supports light assembly **21**. Light assembly **21** illuminates the interior of the container and may receive current from any source (not shown) such as wires entwined around one of the spring steel rods or by a suitable battery (not shown) disposed beneath the spherical reflecting mirror **19**. Between the light assembly **21** and the junction **18***a* of rods **18** is a second convex spherical mirror **22** which reflects the light emanating from the light assembly to the upper portion of the container. The exact length of the rods is not critical provided they are long enough to place the mirror-light system sufficiently far into the container so as to enable the inspector to examine upper interior portions of the container that have not heretofore been amenable to inspection. The lower portion of the container is, of course, illuminated directly by the light assembly. The mirrors **19** and **22** and the spider **20** are, of course, smaller in diameter than the orifice that is available for inspecting the drum or other container.

With the device thus described, the inspector upon placing his eye to the eye piece **15** may visually inspect the entire interior surface of the container, including the upper portion of the interior of the container not heretofore visible by prior devices, but, of course, not including the portion immediately below and in line with the mirror-light system. In order to see what is directly below the mirrors it is only necessary to pivot slightly the inspecting device.

Figure 3 shows how the inspection device may be suspended from a roof or beam by a spring **23** and an arcuate member **24** which is attached to one end of the spring and the handle of the inspection device. This permits the mass inspection of large numbers of containers (e. g., on a moving belt) without unnecessarily tiring the inspector since he does not have to manually support the entire weight of the inspection device during the inspection operation.

While the invention has been described in terms of a preferred embodiment thereof, it is to be understood that considerable variations from the details disclosed might be made without departing from the true scope and spirit of the invention.

Accordingly, the invention is to be limited only by the claims set forth hereinafter.

What is claimed is:

1. A device for inspecting the interior of containers comprising a lens assembly, first and second reflecting means, said first and second reflecting means having reflecting surfaces unidirectionally facing said lens assembly, lighting means positioned intermediate said first and second reflecting means, and supporting means comprising an open framework which carry said first and second reflecting means and lighting means and depend from said lens assembly.

2. The inspection device of claim 1 comprising in addition a suspending means attached to said lens assembly.

3. The inspection device of claim 1 wherein said lens assembly comprises an eye piece, a double convex lens adjacent said eye piece, a double concave lens coaxially spaced from said convex lens, and holding means supporting said eye piece and lenses.

4. The inspection device of claim 3 wherein said holding means has at one extremity a convex surface for pivoting about the circumference of an orifice of a container to be inspected.

5. A device for inspecting the interior of containers comprising a lens assembly, a first and second reflecting means spaced coaxially from said lens assembly, lighting means positioned intermediate said first and second reflecting means, said first reflecting means being positioned intermediate said lighting means and said lens assembly and having a greater reflecting surface than said second reflecting means, and supporting means comprising an open framework which carry said first and second reflecting means and lighting means and coaxially depend from said lens assembly.

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