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B. STAHRMER

2,174,848

LIGHT DEVICE FOR INSPECTING SEALED TRANSPARENT CONTAINERS

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2 Sheets-Sheet 1

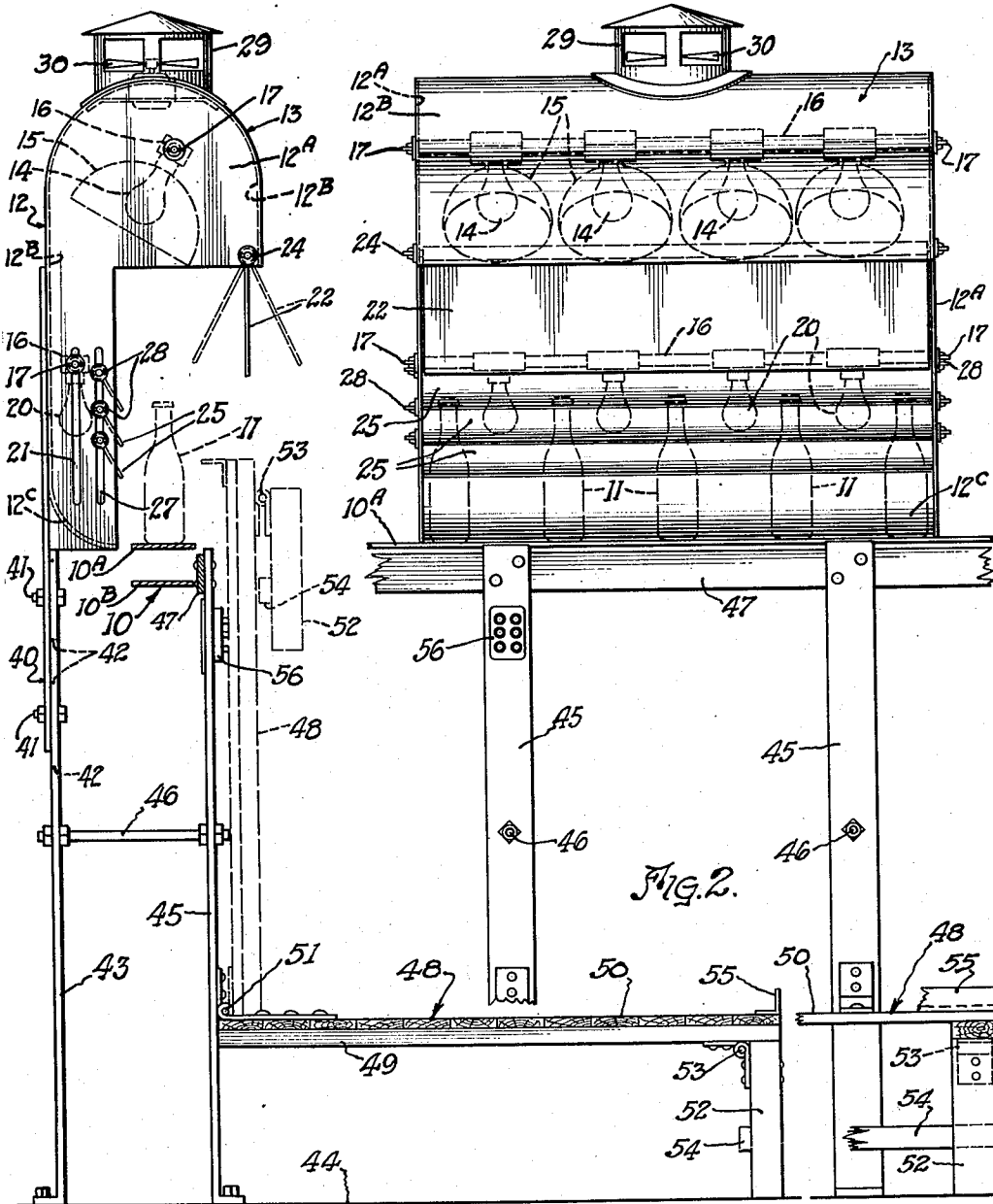


FIG. 1.

Inventor:
Bernhardt Stahrmer.
By: Frank J. Schraeder
Attorney.

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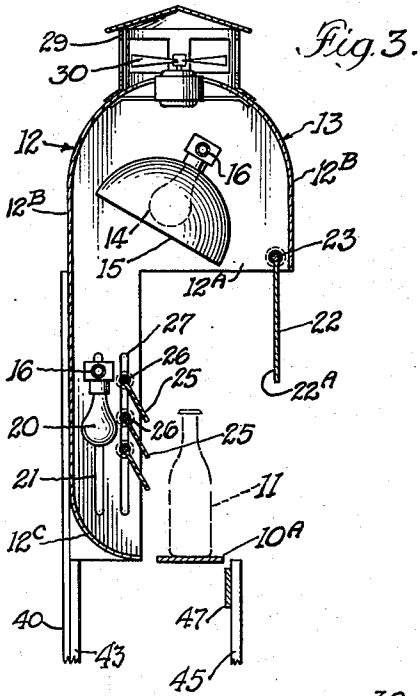
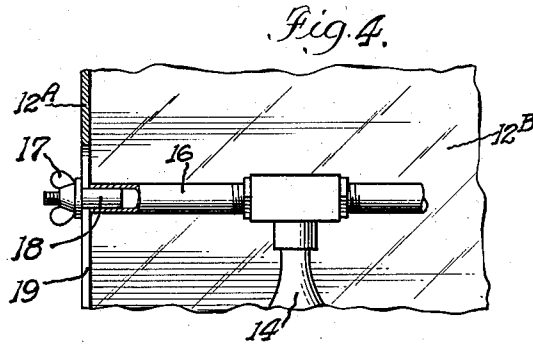
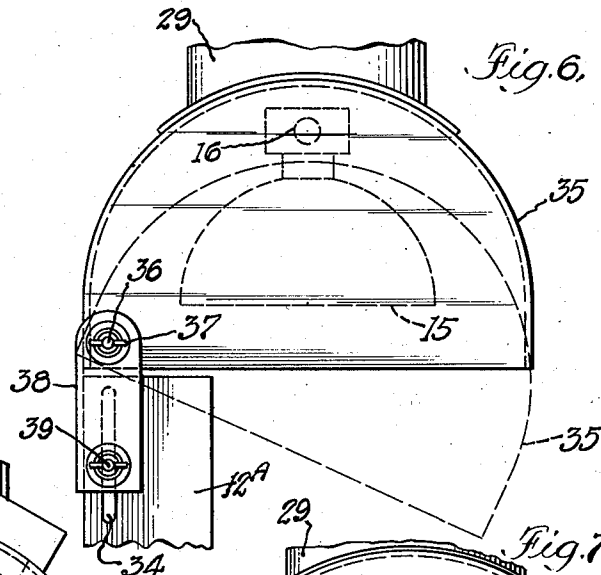
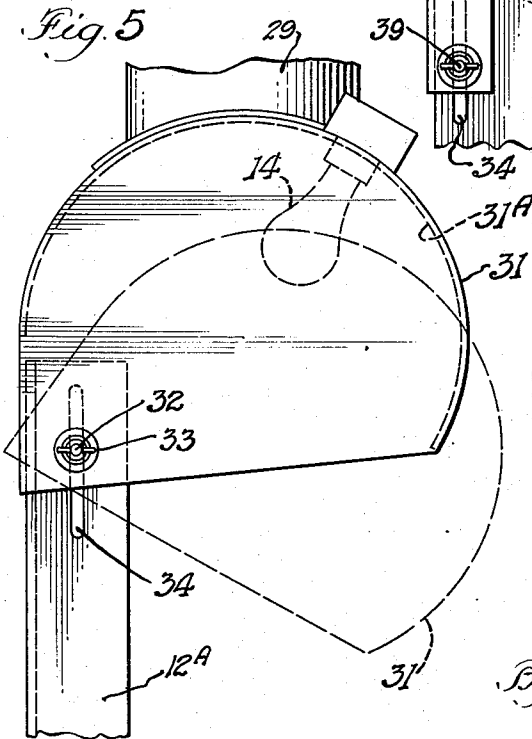
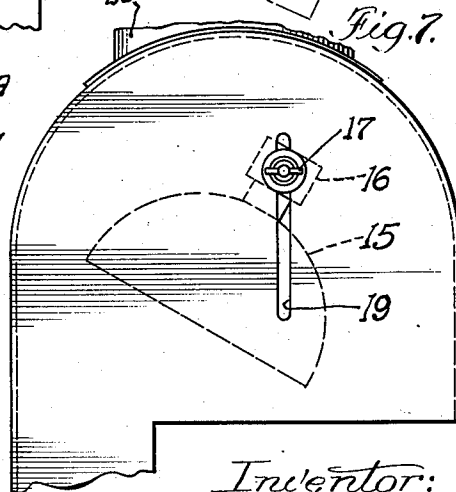
B. STAHLER

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LIGHT DEVICE FOR INSPECTING SEALED TRANSPARENT CONTAINERS

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2 Sheets-Sheet 2



Inventor:
Bernhardt Stahler.
By: *Frank Schaefer*
Attorney.

UNITED STATES PATENT OFFICE

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LIGHT DEVICE FOR INSPECTING SEALED
TRANSPARENT CONTAINERSBernhardt Stahmer, Omaha, Nebr., assignor to
Howard B. Graham, Omaha, Nebr.

Application February 2, 1937, Serial No. 123,700

6 Claims. (Cl. 88—14)

This invention relates to new and useful improvements in light devices for inspecting sealed transparent containers, and their contents, and has among its objects to provide a novel and efficient electric light device affording desirable visual inspection of bottled beverages and other fluids or other various materials contained in glass or transparent containers or jars while such bottles, jars or containers are positioned within, or moved on a conveyor before the inspector, through a zone of direct and reflected intense light; the light rays passing outwardly and upwardly of their source beyond the inspection side of the conveyor being interrupted and deflected from impinging upon the eyes of the inspector to thereby minimize or reduce to the minimum certain discomforts and interferences in visibility inherent in many of the light inspecting devices heretofore in common use.

Although canners and bottlers are equipped with various kinds of container washing machinery, flies and other insects, bristles which become loosened from the container washing brushes and other foreign or undesirable matter may creep or pass in the containers or bottles with the goods or beverages and the canners and bottlers of various kinds of goods and beverages must be constantly on the lookout for such foreign particles or matter.

The desirable kind of light inspection apparatus must provide light of great intensity through the entire portion of every bottle or container for a sufficiently long period of time to permit proper, careful inspection of each container as to flaws or cracks in the container itself, proper filling, proper sealing, and for inspection as to the presence of foreign matter or substances, by proper and efficient direction and reflection of the light rays through proper reflectors, baffles and shields to thereby afford efficient illumination of the containers with proper shielding of the eyes of the inspector.

In the case of inspecting bottled beverages, a device of the kind herein contemplated may be installed to operate in connection with the conveyor line between the bottle washer and the bottle filling machine and also in connection with the conveyor line operating between the bottle filling machine and the case packer and preferably after the sealed bottled goods have passed through a bottle turning or mixing machine where the contents of each bottle are thoroughly mixed to produce a uniform mixture of the fluids, juices or materials therein so that the inspection

thereafter is more thorough due to the uniform mixture of the beverage.

An object of my invention is to provide an electric light device comprising vertically and angularly adjustable electric lights cooperating with light reflecting means for producing a high degree of illumination and transparency of a plurality of fluid containers affording means for visually detecting foreign matter within, or imperfections in, such containers, including means for interrupting and deflecting certain of such direct and reflected light rays from the eyes of the inspector.

Another object of the invention is found in the provision of electric lighting means for illuminating an extended length of an inspection conveyor by sources of electric lighting disposed on one side and above the conveyor.

Still another object of my invention resides in the provision of a lighting device adapted to illuminate an elongated or defined area by sources of light positioned above and on one side of such area, including means providing angular adjustment of such light sources relatively to an object in the illuminated area.

A still further object of the invention is found in the provision of a light reflecting wall adapted to be positioned on one side of a conveyor and a source of light adjustably arranged between the reflecting wall and the conveyor, light deflectors between the light source and the conveyor including a hood having a light source and various means for adjusting the hood relatively to the reflecting wall and conveyor.

A further object of my invention resides in the provision of an electric light inspection device adapted to illuminate an elongated area of an inspection conveyor carrying spaced light-penetrable containers, and comprising a casing having adjustably mounted electric light sources disposed above and on one side of the conveyor, light reflecting surfaces associated with said casing arranged for reflecting light rays from said electric light sources on and through the containers and including adjustable light deflectors positioned between the containers and the light sources on one side of the conveyor and an adjustable light deflector disposed on the opposite or inspection side of the conveyor and above the containers.

With the above and other objects in view, my invention consists in the novel combination, construction and arrangement of the parts and members of my improved light inspection device shown in preferred embodiments in the attached

drawings, described in the following specification and particularly pointed out in the appended claims.

In the drawings in which like reference characters indicate like or corresponding parts:

Fig. 1 is an end elevation of an electric light inspection device embodying my invention and particularly adapted for my improved method of inspection;

Fig. 2 is a side elevation of my inspection device with parts of the supports and platform broken away to avoid overlapping of the adjacent illustrations;

Fig. 3 is a vertical section through the lighting portion of my device;

Fig. 4 is a slightly enlarged fragmentary sectional view of one end of the hood and one end of one of the adjustable electric wire conduits adapted for supporting a battery of lights;

Fig. 5 is an enlarged side view of a modified adjustable light hood;

Fig. 6 is an enlarged side view of another modification of an adjustable light hood; and

Fig. 7 is an enlarged side view of a modification of the light hood shown in Figs. 1, 2 and 3.

In the preferred embodiment of my invention as illustrated in the attached drawings, the container conveyor 10, usually provided in bottling plants, includes the upper run 10^A and the lower return run 10^B. This conveyor 10 may be of any suitable design and construction adapted to convey the filled and sealed containers 11, here shown by broken lines in the form of glass beverage bottles.

As above pointed out, the conveyor 10 may be one that is employed to convey washed containers to the filling machine or one that is used to convey the containers from the filling machine to the case packer.

It may be noted here that my device may be used as a means of lighting for inspection purposes without necessarily conveying or moving the goods within or through the zone of illumination. For purposes of illustration, I have preferred to show my device as applied to a bottle or beverage container conveyor such as used in various bottling establishments. Its uses and adaptations are many, as for instance, it may be used for inspection of various transparent containers of glass, Cellophane or other materials and their contents, or it may be used as a stationary lighting device for inspecting various manufactured parts or materials as the gist of my invention is in the provision of an illuminated field or area by direct and reflected light rays, and in the provision of baffles constituting shields affording substantial protection for the eyes of the inspector against direct and reflected rays, in other words, the device is designed to provide a maximum of interruption of vision-impairing light rays and the deflection and reflection of such light rays upon the work or thing inspected.

The device as shown in the illustrations consists of a suitable case 12 for containing or supporting an electric light or lights, for reflecting and directing the light therefrom and including means, preferably adjustable, constituting baffles for interrupting substantially laterally and upwardly directed light rays.

The case 12, preferably made of metal, as shown in Figs. 1, 2, 3 and 7 consists of end wall plates 12^A and a rear wall plate 12^B extended upwardly and downwardly in the front to constitute a hood 13.

As shown in Figs. 1 and 2, the hood 13 is adapt-

ed to receive and support therein one or more electric light bulbs 14 and reflectors 15 on a laterally extending electric wiring conduit 16 suitably oscillatably supported in the end walls 12^A as by means of adjustable wing nuts 17 threaded on the outer ends of pins 18 which are secured in the ends of the conduit 16 and which pins 18 extend through openings in the walls 12^A, or through slots 19 as shown in Figs. 4 and 7 whereby such light bulb or light bulbs 14 are not only adjustable angularly about the longitudinal axis of the conduit 16 into desired angular or tilted positions but which battery of lights 14 by provision of slots 19 is also vertically adjustable relatively to the bottles 11 under inspection.

As clearly shown in Fig. 3, the end walls 12^A extend fully across the ends of the hood 13 but the widths of the walls 12^A below the hood are narrowed to clear the conveyor 10. The rear wall 12^B extends upwardly to form the top and front of the hood 13 and the wall 12^B is curved at its lower end, as at 12^C.

The inner face of the wall 12^B is provided with a highly light-reflecting surface as by means of light-reflecting and light-diffusing white paint or chromium plating or by other suitable means.

The device, as shown, is also preferably provided with one or more light bulbs 20 near the lower end of the case 12 which bulbs 20 are suitably supported on the lower conduit 16, the ends of which are supported on pins 18, similar to those shown in Fig. 4, which extend through slots 21 in the end walls 12^A for vertical adjustment of the light bulbs 20 and wing nuts 17 are provided for securing the conduit 16 in place. Thus the light bulbs 20 are not only oscillatably adjustable about the axis of their electric wire supporting conduit 16 but are adjustable as a unit up and down relatively to the objects to be inspected.

Since the inspector is usually seated in front of the device it is of utmost importance to provide means for shielding the eyes of the inspector and such shields must provide the maximum of protection for the inspector's eyes and the minimum of obstruction of the light rays to the objects under inspection and the objects under inspection must be fully visible to the inspector. All of these advantages and features are embodied and provided in the device shown herein by the novel construction and arrangement of the parts and members.

As a shielding, reflecting, deflecting and directing means for the light rays emanating from the battery of the upper light bulbs 14, the battery of lower light bulbs 20 and those rays which are reflected from the case reflecting wall portions, I provide in the device, as shown, a combined reflector and shield 22 in the form of a plate pivotally suspended on rod 23, the ends of which rod 23 extend through openings in the end walls 12^A and which reflector and shield 22 can be angularly adjusted into desired position and securely held in such adjusted position by wing nuts 24. The inner face 22^A of the plate 22 is preferably highly polished or chromium plated to reflect the light rays to the rear wall 12^B or toward the object under inspection and such means also includes one or more, preferably two or three, light reflecting baffles and shields 25 for the lower battery of light bulbs 20.

These baffles 25 are of similar construction to the baffle 22, except that they are narrower in width and that their supporting rods 26 extend through slots 27 for vertical adjustment relatively one to the other and relatively to the ob-

ject inspected and the eyes of the inspector. Suitable wing nuts 28 are provided for securing these baffles 25 in their desired tilted and relatively spaced positions. The lower or undersides of these baffles are also provided with highly light-reflecting surfaces, as a light reflecting and diffusing white paint, but their outer or upper faces may be coated with a reflecting paint or coating, or preferably, with a white, light-diffusing, non-glare paint.

In the event large or high power electric light bulbs are used, I prefer to provide the hood 13 with a ventilator 29 equipped with an electrically driven exhaust fan 30 which will to a great extent withdraw and exhaust the excessive heat from the lighting bulbs into open space above the inspector or into a suitable exhaust pipe which could be readily coupled with the ventilator.

In the modification shown in Fig. 5, the hood 31 is constructed as a separate adjustable unit which is pivotally mounted on bolts 32 provided with wing nuts 33 and which bolts 32 extend through vertical slots 34 in the end walls 12A to provide vertical adjustment of the hood 31 as well as pivotal adjustment.

The curved wall 31A is provided with a highly light-reflecting inner face since one of the features of this modification is that such hood 31 functions as a reflector for the electric light bulb or bulbs 14 which are suitably supported therein.

In the modification shown in Fig. 6, I attain further flexibility as to the adjustment of the hood 35 which is pivotally mounted on bolts 36 having tightening wing nuts 37 and extending through the upper ends of angle irons 38 and mounted at the upper corners of the walls 12A and which angle irons 38 are supported on bolts 39 extending through vertical slots 34 in walls 12A to thereby provide vertical adjustment of the angle irons 38 and hood 35 as well as angular adjustment of the hood 35 about the pivotal bolts 36. In this design the electric light bulbs 14 are provided with suitable reflectors 15 suspended from suitable connections on the electric wire conduit 16.

It will be readily apparent that while I have shown well known electric light bulbs for lighting purposes, any other suitable lamp or light transmitting device, as for instance a mercury-vapor lamp, may be substituted for specific or particular adaptation of my invention to a desired particular use.

It is also readily apparent that while I have shown my device of a length to accommodate four large upper horizontally aligned lights so that a substantially long area may be brightly illuminated for the purpose of bottle or jar inspection, I do not wish to limit my invention to such particular construction and arrangement as it is obvious that the upper lights could be relatively staggered or arranged in a plurality of rows and also that the device could be extended in length or shortened to a single section, that is, one light above and one below, as for instance, for certain inspection work where the objects are not necessarily moved on a conveyor but where my invention is utilized simply for lighting purposes. The device may be obviously supported in any suitable manner but as an additional feature of my invention I have preferred to provide the case 12 with a pair of spaced vertical bars 40 which are suitably secured to the back face of the case 12 and provided with bolts

41 extending into slots 42 within a pair of spaced supporting bars 43 bolted to the floor 44. The case 12 is therefore adjustable vertically in such slotted openings 42.

Suitably spaced from bars 43, to clear the conveyor 10, is another pair of supporting bars 45 aligned with bars 43, connected to bars 43 by cross-rods 46 and also fixed to the floor 44. A horizontal bar 47 usually forming part of the conveyor equipment is utilized as a support for the upper ends of bars 45.

In order to properly and comfortably position the operator relatively to the conveyor, objects to be inspected and the means for shielding the operator's eyes, the device, as illustrated in Figs. 1 and 2 contemplates that the inspector will be seated on a chair supported on the slightly elevated platform, generally indicated by numeral 48.

The platform 48 consists of a suitable wood frame 49 and wood floor 50, which are hingedly mounted on the inner side to the uprights 45, as at 51, and supported at the outer side by wood legs 52 hingedly mounted to the platform as at 53. A brace 54 connecting the legs 52 may be added for stiffening purposes, and if desirable, an angle iron 55 may be employed as an additional stiffening cross-member and as a safety guard against accidental shifting of the inspector's chair rearwardly off the platform.

The platform 48 and its legs 52 are hinged for the purpose of permitting such platform to be raised, when not in use, to the position shown by the broken lines in Fig. 1. A suitable hook (not shown) may be provided to hook same, when in raised position, to the bar 47.

A suitable button switch 56 may be provided and mounted on one of the uprights 45. As shown, this switch is provided with three sets of buttons for independently controlling the operation of the heat exhaust fan, the upper lights and the lower lights.

I claim:

1. In an electric light inspection device, and in combination, a conveyor adapted to carry spaced glass containers for inspection by an inspector positioned on one side of said conveyor, a casing having a rear wall, comparatively narrow end wall portions extending forwardly of said rear wall to proximity of said conveyor and wider end wall portions extending above and over said conveyor forwardly of said rear wall, said rear wall having an extended portion over the upper ends of said wider end wall portions to thereby form a hood over said conveyor and said rear wall having its lower end portion curved toward the conveyor, said rear wall having a highly light-reflecting inner face portion extending over said curved lower end portion, a pair of parallel vertical slots in both of said narrow end wall portions, a conduit adjustably supported in the pair of said slots nearest said rear wall, a plurality of electric lights supported on said conduit, a plurality of angularly and vertically adjustable deflectors supported in said slots nearest the conveyor, a conduit supported in said hood, a plurality of electric lights supported on said hood conduit, said hood conduit being oscillatable about its longitudinal axis to provide angular adjustment of said electric lights supported thereon, and a pivotally mounted angularly adjustable light shield supported on said hood.

2. The combination with a conveyor carrying objects for inspection, of an elongated lighting

device including upper and lower sources of light offset laterally relatively one to the other and mounted on said device in different horizontal planes and adapted to illuminate an elongated portion of said conveyor and the objects thereon, said device comprising a light reflecting wall cooperating with said upper and lower light sources adapted to reflect light rays therefrom onto objects on the conveyor, and a pair of walls formed at the ends of and right-angularly to said light-reflecting wall each having a pair of vertical slots therein, said lower source of light comprising an electric-wire conduit having threaded ends extending through one of each pair of said end wall slots, clamping means on said threaded conduit ends, said conduit being adjustable vertically and angularly about its longitudinal axis within said slots, and a plurality of electric bulbs supported on said conduit, said upper source of light comprising an electric-wire conduit having threaded ends extending through the upper portions of said pair of end walls and being angularly adjustable about its longitudinal axis, means for securing said upper conduit ends to hold same in adjusted position, and a plurality of light bulbs supported on said upper conduit, lower source light-deflecting means comprising a plurality of vertically spaced plates supported on threaded extensions extending through the other of each of said pairs of vertical slots in said end walls, said light-deflecting plates being vertically adjustable in said slots and relatively angularly adjustable about their longitudinal axes, means on the threaded extensions of said plates for securing said plates in adjusted positions, said light-reflecting wall being extended upwardly to form with said end walls a hood extending over the conveyor, an upper light shield depending from the hood comprising a plate pivotally mounted at its upper side ends on the end walls of the hood, said upper shield being positioned to depend above the side of the conveyor opposite to that side of the conveyor which is adjacent said plurality of light-deflecting plates, and means for adjustably securing the pivoted ends of the upper light shield to hold it in adjusted position.

3. An inspection lighting device adapted to produce an illuminated zone, comprising a casing having a highly light-reflecting inner face portion, a support spaced from the lower end of said casing for supporting the object to be inspected, an electric light bulb positioned in the lower end of said casing, an electric light bulb having a reflector positioned in the upper end of said casing, means for adjusting said upper electric light bulb and its reflector angularity relatively to said light-reflecting face portion, means for vertically adjusting said lower light bulb relatively to said object support, a light-reflecting shield mounted on said casing and positioned between said lower light and the longitudinal center line of the illuminated zone for preventing reflection of light rays into the eyes of an inspector, a pair of end walls for said casing, each of said end walls having a vertically disposed slot therein, said lower light shield comprising a longitudinally extending plate having end trunnions slidably mounted in said end wall slots for affording bodily up and down adjustment of said plate relatively to said object support, said lower light shield plate being angularly adjustable about said trunnions, means for se-

curing said trunnions to support said light shield plate in the desired adjusted position, an additional light shield plate pivotally mounted on the end walls above said lower light shield plate, said upper light shield plate having end trunnions extending through said end walls to afford angular adjustment thereof about its end trunnions, means for securing said upper light shield plate trunnions adapted to retain said upper light shield plate in the desired angular position, a support for the lighting device, and an elevated platform hingedly mounted to said lighting device support, said elevated platform having a pair of legs hingedly connected thereto.

4. The combination with a conveyor carrying objects for inspection, of an elongated lighting device including upper and lower sources of light offset laterally relatively one to the other and mounted on said device in different horizontal planes and adapted to illuminate an elongated portion of said conveyor and the objects thereon, an elongated light-reflecting wall on said device cooperating with said upper and lower light sources adapted to reflect light rays therefrom onto objects on the conveyor, means for adjusting said sources of light relatively one to the other and to said wall and to said conveyor, said sources of light and said means for adjusting said sources of light comprising an end wall at each end of said light reflecting wall disposed transversely to said wall, a single electric-wire conduit carried by the lower ends of said end walls and adjustably mounted therein, a plurality of electric light bulbs supported on said conduit, a single electric-wire conduit mounted in the upper ends of said end walls, a plurality of electric light bulbs on said upper conduit, and means for adjusting said upper conduit angularly about its longitudinal axis to position its electric light bulbs in different positions relatively to said conveyor.

5. An inspection lighting device adapted to produce an illuminated zone, comprising a casing having a highly light-reflecting inner face portion, a support spaced from the lower end of said casing for supporting the object to be inspected, an electric light bulb positioned in the lower end of said casing, an electric light bulb having a reflector positioned in the upper end of said casing, means for adjusting said upper electric light bulb and its reflector angularly relatively to said light-reflecting face portion, means for vertically adjusting said lower light bulb relatively to said object support, a light-reflecting shield mounted on said casing and positioned between said lower light and the longitudinal center line of the illuminated zone for preventing reflection of light rays into the eyes of an inspector, said casing comprising end walls disposed angularly to said light-reflecting inner face portion, said end walls each having a vertical slot therein, and cylindrical extensions carried by said light shield and adjustably mounted in said slots for vertical and angular adjustment.

6. The combination with a conveyor adapted to carry transparent containers for inspection, of a stationary elongated hood mounted on one side of and extending above said conveyor, said hood having a light-reflecting side wall extending arcuately over the conveyor and end walls provided with recessed portions through which the conveyor extends, a plurality of lower light sources supported on the hood near its lower part between said light-reflecting side wall and the lon-

5 longitudinal center line of the conveyor, a plurality
of upper light sources supported in the upper part
of said hood above the conveyor, said lower and
upper sources of light cooperating with said
5 light-reflecting side wall for projecting light rays
onto and across the conveyor and for illuminat-
ing the elongated portion of the conveyor within
the end walls of the hood, a shield adjustably
carried at the front of said hood for shielding
10 the eyes of an inspector, the rear portion of
said shield providing light reflecting means for
said upper light sources, a plurality of adjust-
able light deflectors mounted on said hood and
spaced from the side wall, said deflectors longi-
15 tudinally disposed between said lower light

sources and the longitudinal center line of the
conveyor, said lower sources of light comprising
electric light means vertically adjustably mount-
ed on said hood and disposed relatively near the
objects carried by said conveyor, and said upper 5
light sources including a support for electric
light means under said arcuate side wall portion
of said hood, and electric light means carried
by said support, means mounting said support
for angular adjustment about its axis relatively 10
to said light-reflecting wall and vertical adjust-
ment relatively to said hood.

BERNHARDT STAHRMER.