

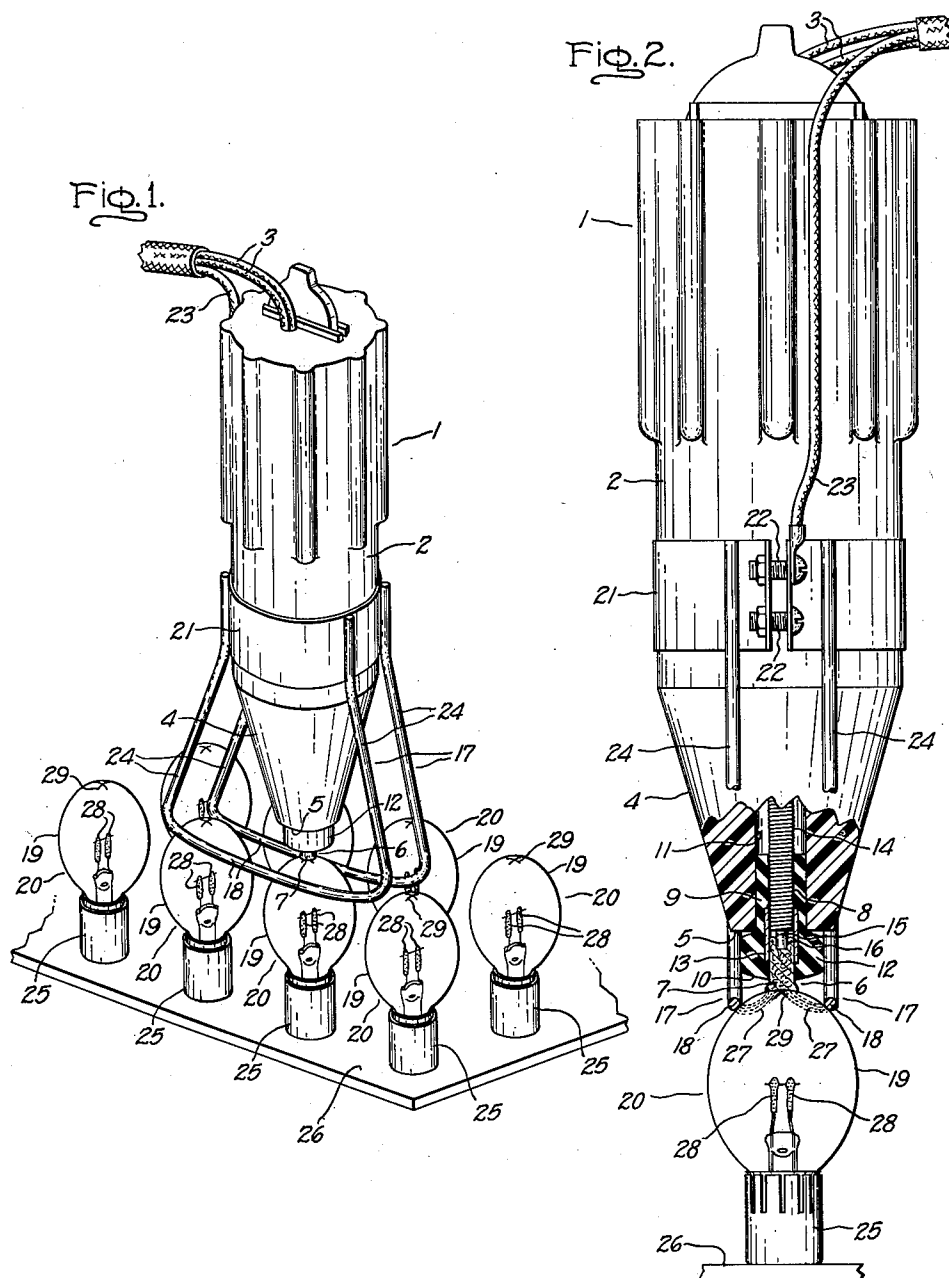
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APPARATUS FOR GLOW TESTING SEALED ENVELOPES

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APPARATUS FOR GLOW TESTING SEALED ENVELOPES

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My invention relates to apparatus for the production of a high frequency glow discharge within a sealed container. More particularly, my invention relates to apparatus for testing photoflash lamps of the well-known type used for photographic purposes for the presence of air within the sealed bulb thereof by the production of a high frequency glow discharge therein. The invention is especially useful in testing photoflash lamps of the so-called primer type disclosed in U. S. Patent 2,291,983, Marvin Pipkin, dated August 4, 1942, in which the source of actinic radiation is constituted by one or more beads or coatings of a radially ignitable fulminating material disposed on the tips of the inner leads of the lamp.

As a safeguard against explosion of the glass bulb when flash lamps are flashed, it is common practice, in the manufacture of such flash lamps, to test the completed lamp for the presence of air in the sealed bulb. One well-known method of conducting such a test, known as a coil or glow test, consists in the use of high frequency equipment for the production of a high frequency glow discharge within the sealed lamp bulb. By observing the color of the glow discharge produced in the lamp bulb, the presence or absence of air therein can then be readily determined, a pale bluish-green glow discharge denoting a good lamp containing the normal oxygen gas filling with no air present and a purple or pink colored glow discharge indicating a lamp into which air has leaked. However, in conducting such a glow test on flash lamps, and particularly flash lamps of the above-mentioned primer type, it is imperative that the high frequency glow discharge be confined to a region within the lamp bulb remote from the fulminating material therein, since otherwise the fulminating material would be ignited and the lamp prematurely flashed.

While such glow testing of the flash lamps can be performed at any time after the lamp bulb has been hermetically sealed, it is preferable to conduct this operation while the lamps are trayed for outside lacquering of the lamp bulbs, since the trayed lamps are at that time conveniently positioned and collected into large groupings (64 or more lamps for instance) which enables ready and quick glow testing thereof.

It is an object of my invention therefore to provide apparatus of simple construction and effective in operation for producing a localized high frequency high voltage glow discharge in a given region of the space within a sealed envelope.

Another object of my invention is to provide

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apparatus for producing, in a sealed envelope, a high frequency discharge between two relatively closely spaced points on the wall of the envelope by the application of the high frequency electrodes to the external surface of the envelope wall.

Still another object of my invention is to provide apparatus for quickly and effectively testing large numbers of flash lamps for the presence of air therein by the production of a high frequency discharge in the sealed lamp bulb which will not ignite and prematurely flash the lamp.

A further object of my invention is to provide apparatus for producing a high frequency discharge within the sealed bulb of a flash lamp between two spaced points on the bulb surface such that the discharge path within the bulb is remote from the fulminating material disposed therein.

A still further object of my invention is to provide apparatus for quickly and conveniently glow testing the atmosphere within sealed flash lamp bulbs while the lamps are mounted in rows on a tray.

In accordance with the invention, a high frequency high voltage generating device such as the conventional type portable high frequency coil testers in general use at present for producing high frequency electric currents, in addition to having the usual high potential or probe electrode projecting from the end of the coil tester housing, is also provided with a pair of grounded runner or shoe-type electrodes disposed in parallel relation on opposite sides of and slightly beyond the projecting probe electrode and extending transversely to the direction in which the said high potential electrode projects from the housing. Such a coil tester construction can be quickly and conveniently handled and successively moved and positioned by an operator in proper testing relation to a group of flash lamp bulbs when the latter are mounted in rows on a tray, the grounded runners of the coil tester engaging and riding onto the bowl ends or tops of the successive lamp bulbs as the coil tester is transferred by the operator from one lamp bulb to the next in each row whereby to more or less automatically position both the probe electrode and the grounded electrodes in proper testing relation with respect to the bowl ends of the successive lamp bulbs.

Further objects and advantages of my invention will be apparent from the following detailed description of a species thereof and from the accompanying drawing.

In the drawing, Fig. 1 is a fragmentary per-

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spective view of the high frequency high voltage apparatus comprising my invention and showing the manner in which it is used to glow test lamp bulbs for the presence of air therein, and Fig. 2 is an elevation, partly in section, of the said apparatus positioned in testing relation to one of the lamp bulbs.

Referring to the drawing, the apparatus according to the invention comprises a conventional portable type high frequency high voltage coil tester 1 such as is in general use at present in the electrical industry and comprising a more or less cylindrical housing 2 of suitable insulating material, such as a molded plastic for instance, containing any of the well known electrical means (not shown) connected by current supply wires 3 to a suitable source of electric power for generating a high frequency high voltage electric current. The housing 2 of such conventional type high frequency coil testers is, in general, small enough in size (around 2 inches or so in diameter and 7 or 8 inches in length) to permit convenient grasping by an operator in one hand, and it is provided with a tapering end portion 4 from the outer end 5 of which protrudes a probe electrode 6 constituting the high potential terminal of the high frequency electrical circuit of the coil tester.

For the particular purposes of the invention, I have found the form of electrode 6 illustrated to produce the best results. Referring to Fig. 2, the particular high potential electrode 6 illustrated comprises a tip portion 7 in the form of a short cylindrical length of cellulose sponge or similar cellular water-absorbent material which is received within a bore 8 in a rubber sleeve or bushing 9 and projects a slight distance (around $\frac{1}{8}$ inch or so) outwardly from the outer end 10 of the bushing. The said rubber bushing 9 is fitted within an axial bore 11 in the tapered end portion 4 of the housing 2 so as to be held in place therein, and it is formed with an enlarged head portion 12 which projects a short distance (around $\frac{1}{2}$ inch or so) from the end 5 of the housing 2. The bore 8, inwardly of the end 10 of the bushing 9, is lined with a short glass sleeve 13 into the outer end of which the sponge tip 7 is fitted to retain it in place in the bushing. The inner end of the glass sleeve 13 is fitted over the outer end of the usual closely coiled wire electrode 14 with which conventional type high frequency coil testers are customarily provided, such wire coil 14 extending through the bore 11 of the housing 2 and into the bore 8 of the rubber bushing 9. At its outer end the wire coil is provided with a short metal rod extension 15, such as a short length of welding rod for instance, which is suitably secured and electrically connected to the wire coil, as by soldering or welding, and which fits into a well or socket 16 in the inner end of the sponge 7 so as to be in contact with the latter. During the use of the coil tester 1 according to the invention, the sponge tip 7 of the high potential electrode 6 is thoroughly moistened or saturated with water or other suitable liquid so as to render it a good electrical conductor and permit it to be flattened down against the curved outer surface of the glass flashlamp bulb or other sealed envelope to be tested so as to make good contact therewith.

Mounted on the housing 2 and projecting endwise from the tapered end 4 thereof are a pair of grounded electrodes 17 which, in the particular case illustrated, are each formed of a length of suitable metallic rod, such as brass rod or welding rod of around $\frac{1}{8}$ inch diameter or so, bent

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into a more or less U shape and having extended or elongated base portions 18 which (as shown in Fig. 1) are of slightly outward bowed or convexly curved shape in the plane of the U to thereby constitute runners or shoes for riding and resting on the curved top portions of the sealed glass bulb 19 of the flash lamp 20 or other article to be tested. The grounded electrodes 17 are supported on the housing 2 in a suitable manner, as by a clamp ring 21 which is clamped around the housing 2 by screws 22, 22 and to which the two free ends of each electrode rod 17 are welded or soldered. The electrodes 17 are connected to ground potential by a conductor wire 23 connected to one of the clamping screws 22 of the clamp 21.

The grounded electrodes 17 are mounted on the housing 2 in parallel relation with each other, with their runner or shoe portions 18 disposed in spaced parallel relation on opposite sides of and slightly beyond the outer end of the probe electrode 7 and extending transverse to the direction in which the probe electrode projects from the housing, in other words, transverse to the longitudinal axis of the housing 2. The electrode runner or shoe portions 18 are preferably so positioned relative to the outer end of the probe electrode 7 as to slightly space the said outer end of the latter from the tip of the glass bulb 19 when the coil tester 1 is brought into testing relation therewith (as shown in Fig. 2). By reason of their relatively extended length, the arm portions 24 of the electrodes 17 are therefore slightly springable to enable the runner or shoe portions 18 to be spread slightly apart, by pushing the coil tester down against the end of the bulb 19, a distance sufficient to bring the outer end of the probe electrode 7 into contact with the tip of the bulb.

In the testing of flash lamps 20 such as the primer type lamp disclosed in the aforementioned U. S. Patent 2,291,983 by the use of the coil testing apparatus according to the invention, the lamps are mounted in aligned rows in sockets 25 (Fig. 1) on a tray 26, in the manner customary in flash lamp manufacture for applying the usual outside lacquer coating to the lamp bulb 19. The sponge electrode terminal 7 is then sufficiently moistened with water or other suitable liquid to render it electrically conductive and the coil tester is then connected to a source of electric power and positioned on the top of the first lamp in one of the rows, with the grounded electrode runner or shoe portions 18 extending in the general direction of the row of lamps. By pressing the coil tester 1 down against the glass bulb 19 of the lamp so as to spread apart the runners 18, the tip of the moistened sponge electrode 7 is flattened down against the top of the glass bulb as shown in Fig. 2 so as to make good contact therewith, thereby causing the establishment of a glow discharge 27 in the upper space within the bulb remote from the beads 28 of fulminating material therein, the glow discharge extending between the portions of the bulb engaged by the high-potential probe electrode 7 and the respective grounded electrode runners 18. By observing the color of this glow discharge 27, the observer can then determine a good oxygen-filled lamp free of air from a bad lamp containing air, and can discard the latter. It is also possible to detect "non-leaker" lamps which have not been filled with the proper amount of oxygen. If desired, the formation of the glow discharge within the bulb 19 can be facilitated by providing a suitable electrically conductive medium or auxiliary electrode

29 on the interior surface of the bulb wall at the region of the top thereof, as described and claimed in U. S. Patent 2,316,344 to E. Lemmers, dated April 13, 1943. The said conductor 29 may consist of a thin band or layer of a suitable conductive material, such as aluminum or bronze paint or carbon, applied to the inner surface of the bulb wall.

After the testing of one of the lamps 20 in a row, the coil tester 1 is shifted to the next lamp in the row simply by laterally moving the coil tester longitudinally of the row toward the next lamp therein. In so doing, the electrode runners 18 engage and ride onto the top of the next lamp bulb in the row, thus more or less automatically positioning the coil tester in proper testing relation to such lamp and making it unnecessary to lift the coil tester during its transfer from one lamp to the next. Thus, the coil tester 1 according to the invention provides a simple arrangement for quickly and conveniently glow testing large numbers of flash lamps 20 in an effective manner and with a minimum amount of effort.

While I have shown and described a preferred embodiment of my invention, it will be understood that the invention is not to be limited to the specific construction and arrangement of parts shown, but that they may be widely modified within the spirit and scope of my invention as defined by the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A high frequency high voltage generating device comprising a housing containing high frequency generating means and provided with a projecting high potential electrode, and a grounded elongated shoe electrode mounted on said housing alongside but beyond said high potential electrode with its elongated bearing surface disposed transverse to the direction in which the said high potential electrode projects from the housing.

2. A high frequency high voltage generating device comprising a housing containing high frequency generating means and provided with a projecting high potential electrode, and a pair of grounded elongated shoe electrodes mounted on said housing in parallel relation on opposite sides of but beyond said high potential electrode with their elongated bearing surfaces disposed transverse to the direction in which the said high

potential electrode projects from the housing.

3. A high frequency high voltage generating device comprising a housing containing high frequency generating means and provided with a projecting high potential electrode, and a pair of grounded metal rod electrodes extending from said housing and having extended shoe portions, said rod electrodes being mounted on the housing with their said shoe portions disposed in parallel relation on opposite sides of but beyond said high potential electrode and extending transverse to the direction in which the said high potential electrode projects from the housing.

4. A high frequency high voltage generating device as set forth in claim 3 wherein the said shoe portions of the grounded rod electrodes are bowed slightly outward in the said direction in which the high potential electrode projects from the housing.

5. A high frequency high voltage generating device comprising a housing containing high frequency generating means and provided with a projecting high potential electrode, and a pair of grounded electrodes comprising metal rods similarly bent into approximate U shape with extended base portions of slight convexly extending shape, said U-shaped rod electrodes being secured at their free ends to said housing and being mounted thereon with their said convex base portions disposed in parallel relation on opposite sides of but beyond said high potential electrode and extending transversely to the direction in which the said high potential electrode projects from the housing.

6. A high frequency high voltage generating device as set forth in claim 3 wherein the said high potential electrode comprises an outer end terminal of water-saturable sponge material.

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The following references are of record in the file of this patent:

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