

Nov. 23, 1948.

R. K. BRAUNSDORFF

2,454,270

BASING ELECTRIC BULB

Filed April 10, 1945

2 Sheets-Sheet 1

FIG. 1

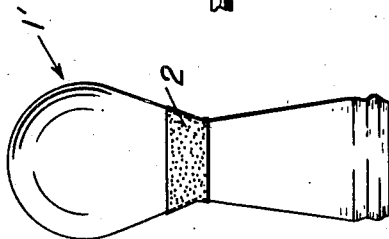


FIG. 2

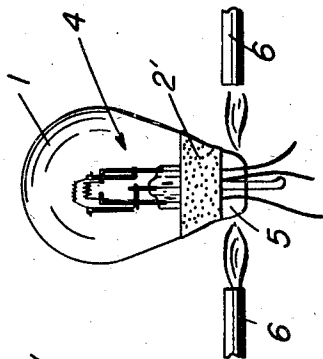


FIG. 3

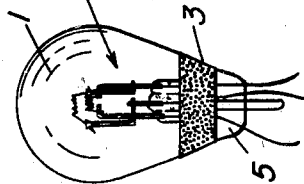


FIG. 4

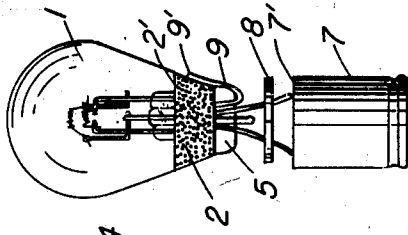


FIG. 5

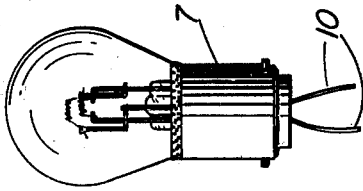


FIG. 6

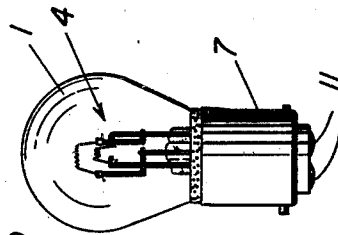
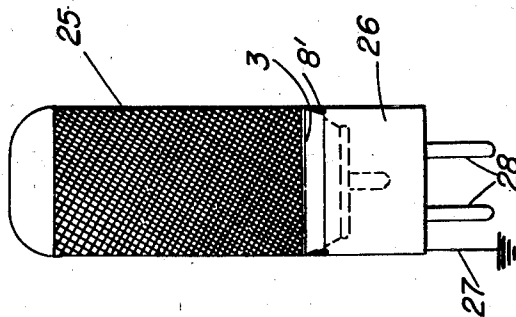


FIG. 7



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FIG. 12

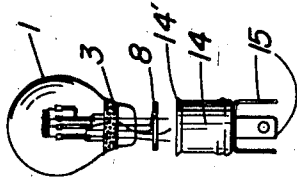


FIG. 17

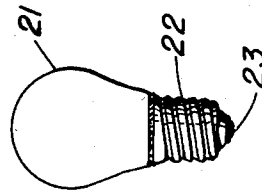


FIG. 11

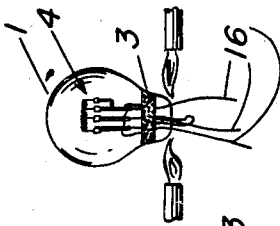


FIG. 16

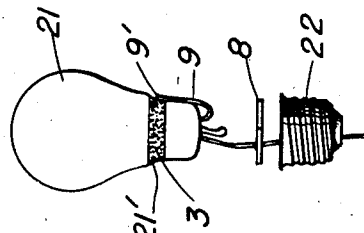


FIG. 10

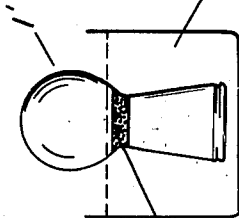


FIG. 15

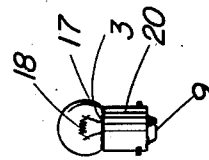


FIG. 9

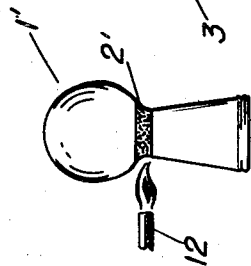


FIG. 14

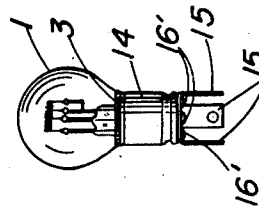


FIG. 8

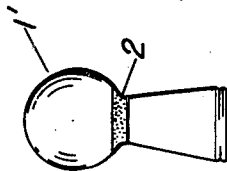
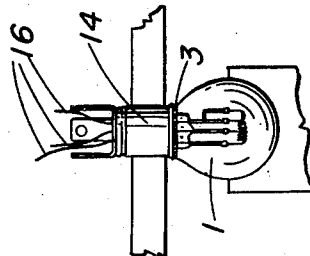


FIG. 13



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BASING ELECTRIC BULB

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Application April 10, 1945, Serial No. 587,497

11 Claims. (Cl. 176—32)

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This invention relates to the basing of incandescent electric lamp bulbs and particularly miniature bulbs, although certain features of the invention are usable to advantage in incandescent electric lamp bulbs of other types.

In the conventional practice of basing miniature incandescent lamp bulbs and other types of bulbs, the bases are cemented to the bulbs with basing cements which are electrically non-conducting and in those types of lamps where one of the terminals must be grounded to the base, this grounding process is effected by bending the ground wire upwards around the seal, causing it to protrude out of the open end of the base and then cutting it off and soldering to the exterior of the base. This grounding step requires an extra operation and in those types of lamp bulbs wherein the base must be precision mounted on the bulb, such precision mounting is rendered difficult by the passage of the wire between the bulb neck and the open end of the base, unless some additional operation is resorted to such, for example, as the forming of a notch in the end of the base through which the ground wire passes. Moreover, in those types of lamps which are to be sealed into projector lamp reflectors, the porosity of the conventional cement used such, for example, as calcium carbonate and shellac results in objectionable breathing of air into and from the reflector through the cement filler. The conventional lamp basing practice presents other difficulties and objections.

One object of the invention is to obviate the above indicated objections to the conventional practice outlined.

A further object of the invention is to simplify the basing process and reduce the ultimate cost of the finished lamp bulbs.

For a better understanding of the invention, reference may be had to the accompanying drawings illustrating the invention, wherein

Figs. 1 to 6 illustrate steps in the method of basing lamp bulbs of one type of bulb and embodying the invention;

Fig. 7 is an enlarged sectional view of the base portion of the finished lamp;

Figs. 8 to 14 illustrate steps in the method of assembling the bulb and the base according to the invention utilizing a different type of bulb;

Fig. 15 shows another type of bulb wherein the invention may be utilized;

Figs. 16 and 17 show the application of the invention to a still further different type of incandescent lamp; and

Fig. 18 shows the application of certain features of the invention to a radio tube.

Referring to Figs. 1 to 7, I have illustrated the invention as applied to a miniature electrical incandescent lamp having a ground terminal to the base. The method includes the forming of a

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metallized band about the neck of the bulb in the vicinity of the open end of the base and soldering the open end of the base to the neck of the bulb at the metallized band with the ground lead wire caught between the interior of the base and the metallized surface on the bulb and embedded in the solder. The finished lamp is shown in Fig. 6. It comprises a bulb 1, a mount 4 and a base 7. The mount 4 is of the double filament type necessitating three lead wires, one of which is grounded to the base 7. Starting with a bulb blank 1' a metallized band is applied and fixed to the neck of the bulb blank 1' at the shoulder of the bulb, and the mount 4 is sealed into the bulb blank ready for assembly with the base 7. Fig. 3 shows the bulb ready for assembly with the base with the metallized band 3 thereon.

Any suitable metallizing process may be employed but in the particular embodiment shown in Figs. 1 to 3 this metallizing process is as follows. This process consists of painting a band of paste material 2 around the neck of the bulb in the vicinity of the base line when the base is applied or assembled therewith. This is shown in Fig. 1. This band of paste material is allowed to dry and to remove volatile solvents. Any suitable materials may be utilized for forming the band of paste material 2. For example, it may be of silver oxide or it may be of a silver paste similar to that used for monogramming purposes. When the band is dry and the volatile solvents removed, the band appears as a band of silver metallic paint because of the silver content, when the particular silver content material is used. After the application of the band of paste material 2 to the bulb blank 1', the next operation, shown in Fig. 2, is to supply sufficient heat to the band 2 to prepare the band of metallic paint 2 by reduction of silver oxide and fusion of ceramic frit causing a firm bond to the glass surface. In this embodiment the heat is derived from the sealing-in burners 6, there being sufficient splash of fire from the sealing heads to thus prepare the band of metallic paint 2 which is now indicated by the numeral 2', indicating that the silver oxide has been reduced and the band bonded to the glass surface. Thus this accomplishes the dual purpose of fusing to the glass and providing metallic content and also simultaneously the mount 4 is sealed into the bulb 1 with the heat from the sealing-in heads utilized for treating the band 2 of paste material.

The next step of the embodiment of Figs. 1 to 7 is to build up a metallic layer upon the band 2' and in Fig. 3 this metallic layer is indicated by the numeral 3. This layer 3 may be of copper deposit formed by electroplating upon the previously applied ceramic fused metallic band 2'. Thus the bulb, as shown in Fig. 3, is ready to have applied thereto the base 7 of the lamp. This

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band 3 may be of any suitable width and I have obtained good results by the use of a band as narrow as one-eighth of an inch. This band 3 is shown slightly of an exaggerated width. The step of exhausting the bulb and sealing the same off forms no part of the present invention. This may be effected between the steps of Figs. 2 and 3 or between the steps of Figs. 3 and 4, as may be desired.

After the metallized band 3 is applied to the bulb at the shoulder thereof or at the base line thereof, the bulb and the base 7 are assembled together with the circular edge 7' of the open end of the base 7 engaging the metallized band 3 on a line just below the upper edge of the band while a ring of solder 8 is caught between the metallized band 2 and the interior surface of the base 7 near the edge 7' thereof. For facilitating this assembly the solder ring 8 may be positioned inside the open end of the base 7 just below or at the peripheral edge 7' of the base so that with the peripheral edge 7' engaging the metallized band 2 the solder 8 is frictionally held between the band and the interior of the base 7 at a point just below the open end of the latter. During this step of assembly the ground wire 9 is bent upwards around the seal 5 of the bulb and trimmed to extend upwardly to a point just below the upper peripheral edge of the band 3 so that in assembling the base 7 upon the neck of the bulb the end 9' of the ground wire 9 is caught between the solder ring 8 and the metallized band 3 about the bulb. With the parts thus assembled the assembly is baked in any conventional manner to melt the solder ring 8 and to cause the base 7 to firmly adhere to the neck of the bulb. Fig. 5 illustrates the lamp after the baking operation, with the two lead wires 10 extending out through the end of the base 7. Fig. 6 shows the completed lamp bulb with the terminal wires 10 fastened to the contact buttons 11 as by soldering. Fig. 7 shows an enlarged sectional view which roughly illustrates the structure after the completion of the basing operation. The ring 8 of solder has been melted to form a solder filler 8' between the inner surface of the base near the open end thereof and the neck 5 of the bulb with the metallized surface 2 forming contact with the edge 7' of the base, the end of the wire 9, and the solder 8'.

The objectionable conventional basing cement is thus eliminated and the solder 8' is not porous but, on the contrary, forms a perfect seal against breathing which has heretofore never been adequately accomplished. The inconvenient outside soldering of the ground wire to the base is avoided and a concealed ground connection is obtained. Moreover, with the conventional basing practice referred to, the extension of the ground wire 9 about the edge 7' of the base makes impossible the uniform mounting of the base upon the bulb with the precision desired in projector use, and by means of the method above set forth, the base and the bulb may be aligned and oriented with uniformity, with less disturbance to base dimensions, more uniform dimensions and less irregularities and straighter and truer basing operations. The metallizing of the surface of the bulb neck enables a firm mechanical fastening between the base shell and the neck of the bulb with a minimum of soldering material 8, 8' and with the confinement of the solder to the area within the vicinity of the open end of the base shell. The electrical lead-in conductors are thereby prevented from coming in contact with the metallic solder 8, 8',

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In Figs. 8 to 14 inclusive, the invention or certain features thereof are illustrated as applied to a slightly different type of miniature lamp, namely, a lamp having a double filament with neither of the three lead wires grounded to the base. In this embodiment of the invention, Fig. 8 shows the band of paste material painted around the neck of the bulb blank 1' in the vicinity of the base line when the lamp is assembled with the base. Fig. 9 shows schematically a heating means in the form of a burner 12 for reduction of the silver oxide and the fusion of the ceramic frit thereby effecting a bond of the band 2' to the glass surface. Fig. 10 shows schematically the dipping of the bulb blank 1' as prepared in Fig. 9 into an electroplating bath 13 for depositing a layer of copper or some other metal upon the band 2'. Fig. 11 illustrates the conventional sealing-in step for sealing the mount 4 in the bulb. Fig. 12 corresponds generally to Fig. 4 above and shows a base 14 which is to be assembled upon and fastened to the bulb 1. This base 14 is provided with three terminals 15 to which the three lead-in wires for the double filament mount are to be threaded through openings in the end of the base 14 and soldered to these terminals. The parts are assembled as described above in connection with Fig. 4, with the peripheral edge 14' about the open end of the base 14 engaging the band 3 at a point just below the upper edge thereof with the solder ring 8 caught between the base 14 and the metallized band 3. Any suitable means for heating the assembled lamp in the vicinity of the band 3, the solder ring 8 and the base 14 may be utilized for melting the solder ring 8 and thereby firmly fastening the base 14 to the bulb 1. If the base 14 is to be precision mounted on the bulb 1 this may be effected by mounting the assembly on the basing reel and aligning jig schematically shown in Fig. 13. This is conventional equipment for holding the lamp and base in aligned position during the soldering of the base to the bulb. The bulb and base may be heated in any suitable manner to effect the soldering operation, as by induction heating.

Fig. 14 illustrates the lamp bulb after the precision assembly in Fig. 3 and after the three lead wires 16 have been soldered to the terminals 15 at 16'. In the embodiment of Fig. 15 the invention is illustrated as applied to the basing of a small miniature bulb 17 having a single filament 18 with one terminal having a center contact 19 and the other terminal ground to the base 20 in accordance with the modification of Figs. 4 to 7.

In the embodiment of Figs. 16 and 17 the invention is applied to an ordinary screw plug lamp having a bulb 21 and a screw base 22. The screw base 22 and the bulb 21 are assembled and fastened to each other according to the method of Figs. 3 to 7 with one of the leads 9 being bent up around the seal of the bulb with the end 9' thereof disposed just below the shoulder 21' of the bulb 21 which is caught between the metallized band 3 and the solder ring 8 and the base 22. After assembly of the three parts shown in Fig. 16 together, and the heating of the bulb and the base in the vicinity of the solder ring 8 to solder the base 22 to the bulb 21, the other terminal wire of the lamp is electrically fastened to a center contact 23 on the end of the base 22 in any suitable manner as, for example, by soldering.

In the modification of Fig. 18 a radio tube is illustrated having a metallized surface 25 and a metallized band 3 formed about the base line

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and the base 26 is soldered to the tube at the metallized band 3. The solder is indicated at 8'. There is a definite advantage in electrically grounding a metal shell base to radio tube to simultaneously provide shielding and basing. The shielding may be extended beyond the base line as shown in Fig. 18 and in the particular embodiment shown, it includes the larger portion of the entire wide wall of the radio tube. This would eliminate certain of the present methods of providing metallic shielding which often in the form of excess parts are placed inside or outside of the tube. The metal spray or metallized surface 25 provides such shielding and if grounded to the base shell 26 provides a very satisfactory method of establishing circuit. A ground wire 27 is illustrated for the metallic base 26 and terminals of the radio tube are indicated at 28.

I have purposely omitted to describe any particular method of heating the base, the solder ring 8 and the bulb 1 for soldering the base to the bulb. Conventional baking may be used for this purpose. Other methods of heating include the use of an oven, open gas flames or induction heating. By the use of oven heat the glass may be heated simultaneously with the base and thereby control the flow of soldering during this operation. The lamp bulb and base are held in proper relation, and when a control temperature is reached solder flows downwardly and establishes bond and seal. If induction heating is used, this would require that the lamp be held in assembled position and an induction coil indexed down over the base, thereby heating the base, transferring heat to the melted solder and bringing the temperature of metallized surface up to soldering temperature. The soldering material 8 may be of any conventional soldering material. I have obtained particularly good results with high tin content solder of lowest melting point. To maintain a temperature increment for later soldering lamps into reflectors, etc., I have found that I can easily use high melting point solders and establish this relation. This would be necessary only for those lamp bases which are to be later soldered into receptacles. Other bases of the pin type and various varieties do not require this temperature resistance. In all embodiments illustrated above I have shown a continuous ring of solder 8 as employed for soldering the base to the bulb. This ring however need not be continuous for those cases where a seal against breathing is not essential and the soldering may be effected by soldering in spaced spots or areas without the necessity of a continuous ring, as for example the pin type of bulb.

As stated above, any suitable method and materials may be used for applying the metallized band 3 to the base line of the glass bulb. For example, the step of electroplating with copper or other metal may be dispensed with by applying the metallized band in one step as, for example, by using a frit containing metal which can be applied and soldered direct. This metallized band 3 may contain tin so as to assist in the final soldering which may be incorporated in the original band 2 or may be applied by tin plating. I have obtained good results by using silver as oxide reduced back to silver, and also in the form of powdered silver metal. Any suitable bonding medium which provides sufficient adhesion to glass and at the same time carries the metal to which the base is to be soldered may be utilized for forming the original band 2. This

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may be accomplished in a number of ways as, for example, by including proper metals such as tin, silver, copper or non-oxidizing metals in the original band 2.

The invention described above is an entirely new departure from the conventional base filling and all the operations associated therewith and by the use of this invention substantial savings in cost of manufacture and assembly are effected. In addition, as applied to those lamps which are to be sealed into reflectors, the heretofore difficult breathing problem is solved, as pointed out above. As applied to lamp bulbs wherein one of the leads is to be grounded to the base there are the additional advantages pointed out above in that the tedious operation of soldering the lead to the base is obviated, with the other accompanying difficulties.

Briefly summarizing the advantages of the invention, it permits better alignment of the base with respect to the bulb, the base retains its circular shape and makes a better fit with the bulb, it facilitates maintenance of placement at the base line and the base really becomes self-centering.

The cost of the solder is less than the cost of the conventional basing cements. The bulb blank may be treated at the time of the bulb blowing or thereafter and the metallizing may take place while the blank is being processed. The problem of breathing is eliminated, the solution of which heretofore has been attempted by the use of sealing resins which are unsatisfactory for this purpose. In cases where the breathing is unimportant as, for example, pin types of lamps the soldering need only be in spots. The solder presents a flexibility of control in the choice of the particular soldering and certain advantages may be derived from the use of various alloy solders. The high temperature solder may be used adjacent the bulb where the base is to be soldered into a reflector with a low temperature solder, thus providing temperature control for such differential in use of solders. The conventional basing cements age and deteriorate through moisture content, etc. and the solder joint eliminates this problem. The conventional basing cement also usually contains fillers and resinous materials for bonding which are generally subject to seasoning and ultimate failure with resulting loose bases and the soldering eliminates this problem. The invention also lends itself particularly to induction heating whereby just the proper amount of heat is applied at the desired places with the solder being melted at the base line without disturbing other parts of the base.

I claim:

1. The method of basing electric bulbs which includes the steps of applying a ceramic material with metallic filler on that part of the bulb blank to which the base is to be applied, sealing the mount into the blank and utilizing the heat applied during the sealing step to fix the said material to the glass, applying a metallic surface to said material and then securing the base to the bulb at the metallized surface.

2. The method of basing electric bulbs which includes the steps of applying a ceramic material with metallic filler on that part of the bulb blank to which the base is to be applied, sealing the mount into the blank and utilizing the heat applied during the sealing step to fix the said material to the glass, applying a metallic surface to said material and then securing the base to the

bulb at the metallized surface with a nonporous sealing material.

3. The method of basing electric bulbs which includes the steps of applying a ceramic material with metallic filler on that part of the bulb blank to which the base is to be applied, sealing the mount into the blank and utilizing the heat applied during the sealing step to fix the said material to the glass, applying a metallic surface to said material and then securing the base to the bulb at the metallized surface with an electrical conducting material and with the end of the ground terminal embedded in said material.

4. The method of basing electric incandescent lamp bulbs which includes the steps of applying a ceramic material with metallic filler on that part of the bulb blank to which the base is to be applied, sealing the mount into the blank and utilizing the heat applied during the sealing step to fix said material to the glass, applying a metallic surface to said material and then securing the base to the bulb at the metallized surface with a nonporous soldering material and with the end of the ground terminal grounded to the base by being embedded in said soldering material.

5. In an article of the character set forth, an envelope having a portion adapted to receive a base, said portion being metallized at least about the base line thereof, an open-ended metallic base shell secured to said envelope at the metallized surface and forming a seal with said portion all the way around the periphery of the base which comprises a ring of non-porous soldering and sealing material caught between the metallized surface and the interior side wall of the base and confined to the area in the vicinity of the open end of the shell, said ring of non-porous soldering and sealing material together with the metallized surface and the interior of the base constituting the sole base attaching means.

6. The method of manufacturing an incandescent lamp having a glass envelope adapted to receive an open ended metallic base shell comprising the steps of metallizing a portion of the envelope at least about the base line thereof, applying the open ended metallic base shell to said metallized portion and forming a seal between said metallized portion and the interior of the base shell near the open end thereof by introducing a ring of non-porous soldering and sealing material in the metal base surface and adjacent the metallized surface of the envelope and applying heat to melt the ring in situ to form a non-porous seal and fastening means all the way around said envelope portion and the interior of the base shell and grounding one wire of said lamp to the base by embedding it in the solder ring.

7. The method of manufacturing a lamp having an envelope adapted to receive a metallic base open ended shell about a base portion thereof comprising the steps of metallizing said base portion at least about the base line thereof, applying the open ended metallic base shell to said portion at the metallized surface and forming a seal between said metallized portion and the interior of the base shell near the open end thereof by introducing a ring of non-porous soldering and sealing material between the metallized surface and the interior wall surface of the base and applying heat to melt the ring in situ to form a non-porous seal and fastening means all the way around said envelope portion and the interior of the base shell and grounding a lead-in wire to the

base shell by embedding it in the mass of non-porous sealing material.

8. The method of basing electric bulbs which includes the steps of applying a ceramic material with metallic filler on that part of the bulb blank to which the base is to be applied, sealing the mount into the blank and utilizing the heat applied during the sealing step to fix the said material to the glass, applying a metallic surface to said material and then securing the base to the bulb at the metallized surface by introducing between the overlying surfaces of the base and the metallic surface a relatively low melting point metal.

9. An electric incandescent lamp having a glass bulb and a metallic base, said bulb having a metallized portion formed integrally with the glass and extending at least partially into the base part, and a ring of solder between the internal meeting surfaces of the base and the metallized portion with at least a part of it adhered to the base and metallized ring to form a seal and the ground wire of said bulb embedded in said ring of solder.

10. In an article of the character set forth, an envelope having a portion adapted to receive a base, said portion being metallized at least about the base line thereof, an open-ended metallic base shell secured to said envelope at the metallized surface by a body of non-porous soldering and sealing material caught between the metallized surface and the interior side wall of the base and extending all the way around the periphery of the base to form a secure sealing between said base and the metallized portion, said body of non-porous soldering and sealing material together with the metallized surface and the interior of the base constituting the sole base attaching means.

11. The method of basing non-metallic envelopes which includes the steps of applying a material having a metallic constituent on that part of the envelope to which the base is to be applied, applying heat to the material to fix said material to the glass, electrolytically depositing a layer of metal on said material and then securing the base all the way around to the metallized portion of the envelope with a low melting point metal to form an air-tight seal therebetween.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
882,258	Merritt	Mar. 17, 1908
905,478	Swan	Dec. 1, 1908
1,301,079	Van Keuren	Apr. 15, 1919
1,871,371	Jackson	Aug. 9, 1932
1,884,665	Greiner	Oct. 25, 1932
2,030,930	Parker	Feb. 18, 1936
2,047,023	Geiger et al.	July 7, 1936
2,119,608	Stewart	June 7, 1938
2,159,812	Malloy	May 23, 1939
2,169,194	Geyer	Aug. 8, 1939
2,259,165	Karasick	Oct. 14, 1941
2,327,622	Craig	Aug. 24, 1943
2,354,642	Anderson	Aug. 1, 1944
2,377,317	Blums	June 5, 1945
2,406,277	Bondley	Aug. 20, 1946

FOREIGN PATENTS

Number	Country	Date
451,547	Germany	Oct. 20, 1927
466,049	Great Britain	May 21, 1937

Certificate of Correction

Patent No. 2,454,270.

November 23, 1948.

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It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 7, line 52, claim 6, after the word "base" strike out "surface"; column 8, line 33, claim 10, for "sealing" read *seal*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 15th day of March, A. D. 1949.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.