July 14, 1964 R. H. PARSONS 3,141,049

METHODS FOR FILLING ELECTRICAL APPARATUS WITH POTTING MATERIAL

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Fig. 1.

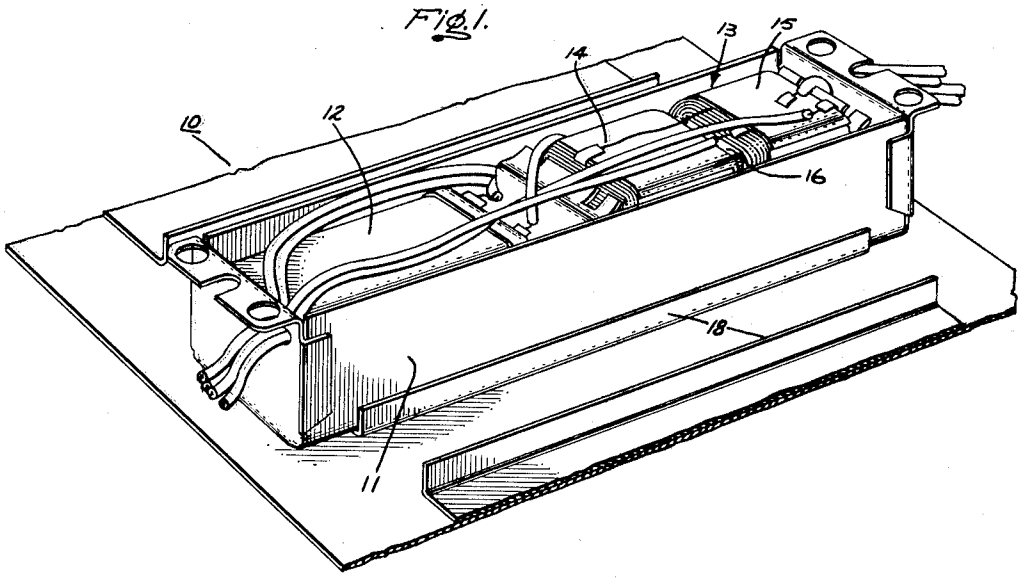
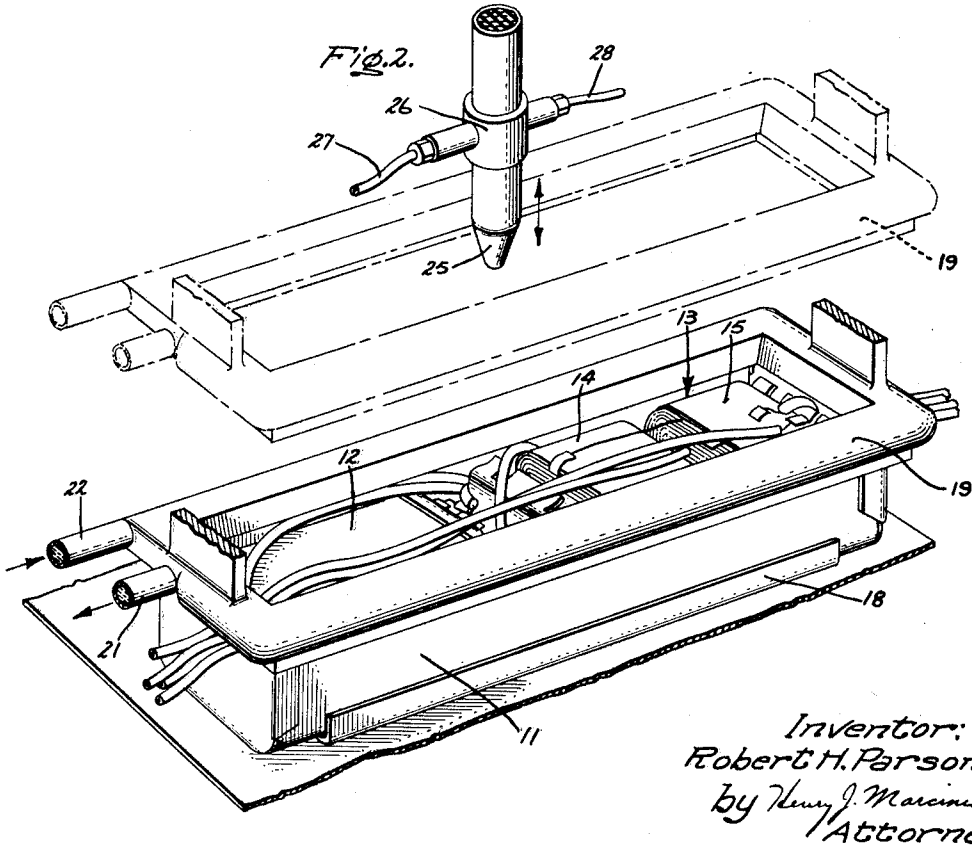


Fig. 2.



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Fig. 3.

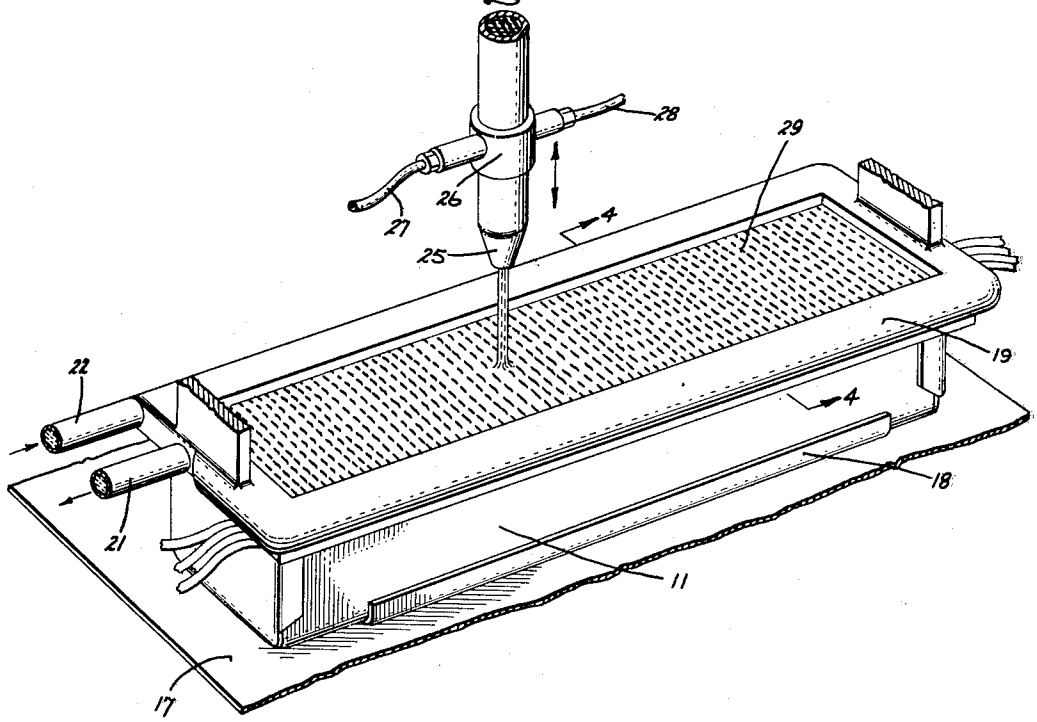
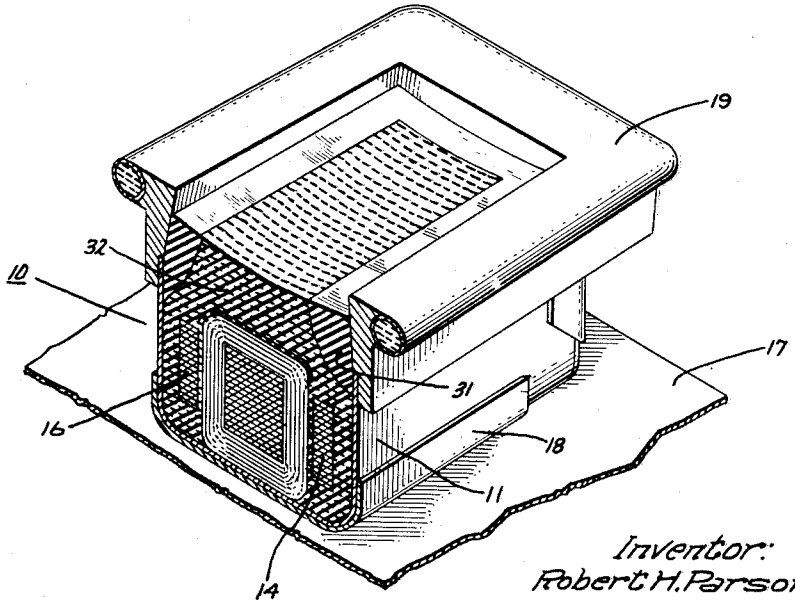


Fig. 4.



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METHODS FOR FILLING ELECTRICAL APPARATUS WITH POTTING MATERIAL

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Fig. 5.

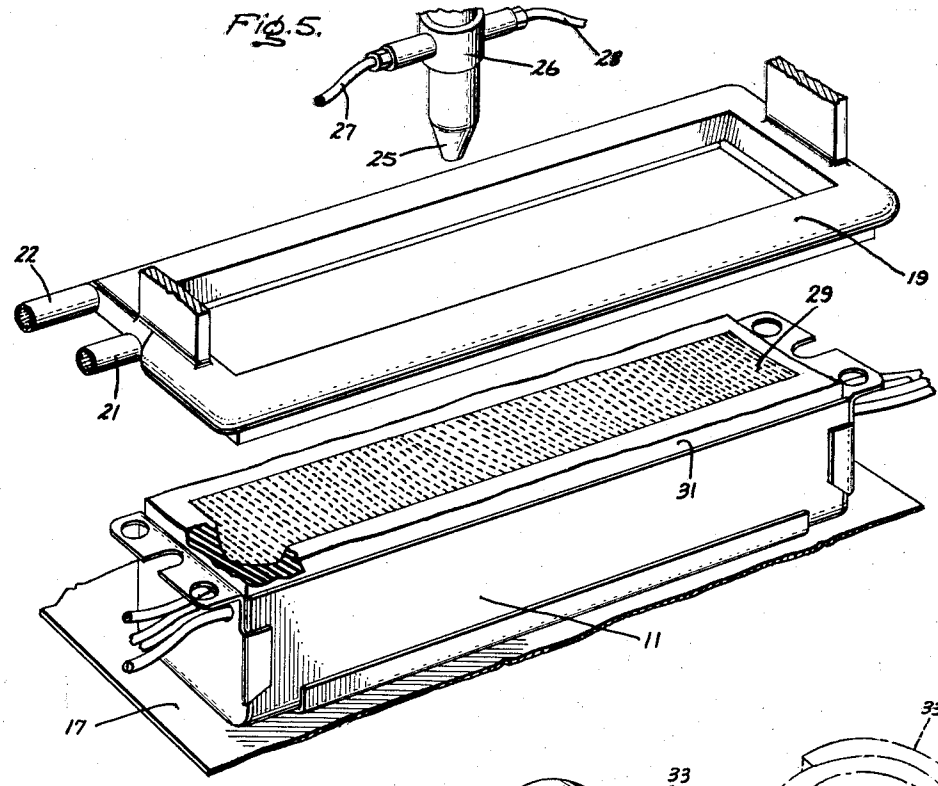
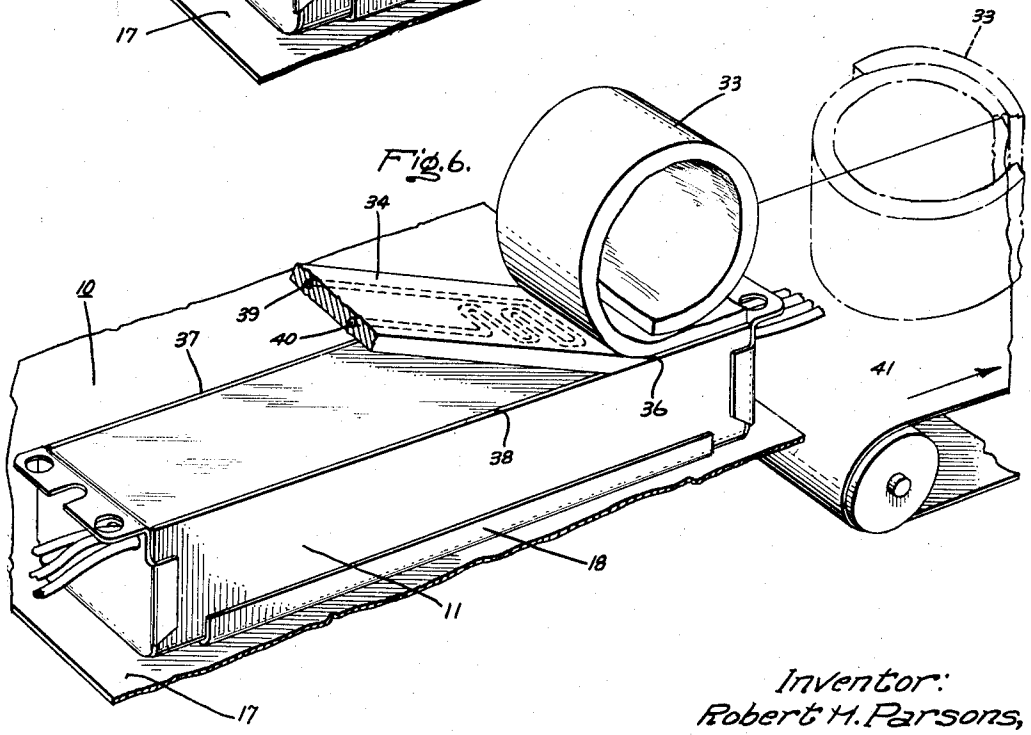


Fig. 6.



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METHODS FOR FILLING ELECTRICAL APPARATUS WITH POTTING MATERIAL

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Fig. 7.

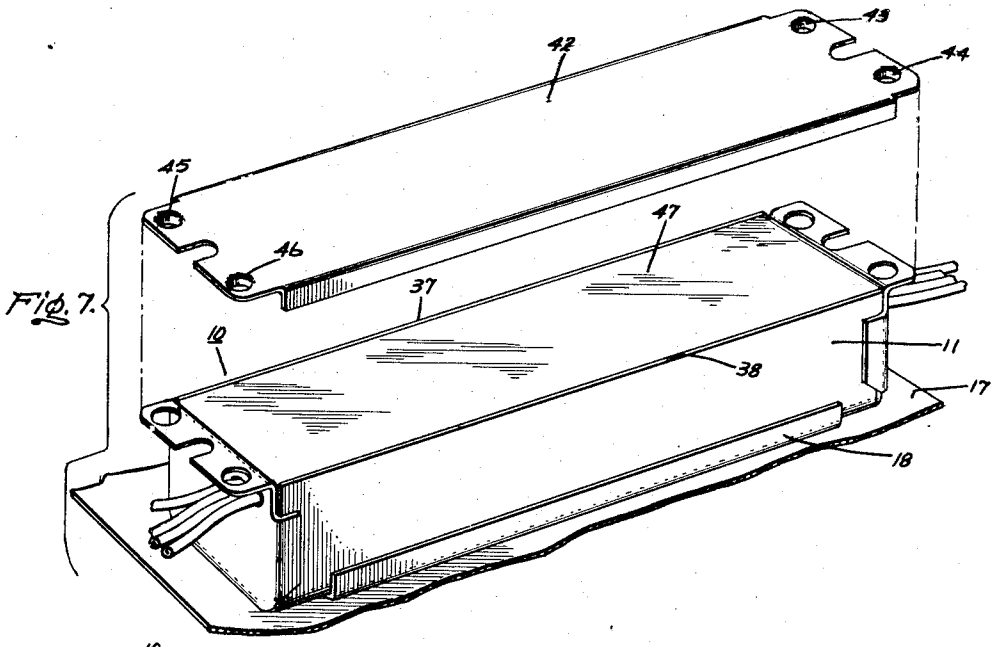
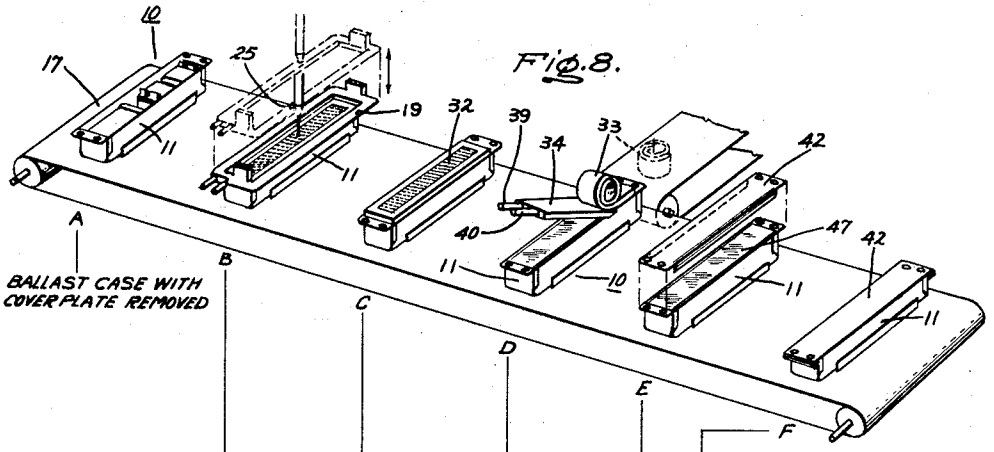


Fig. 8.



A — BALLAST CASE WITH COVER PLATE REMOVED

B — FILLING UNTIL OVERFLOW OF POTTING MATERIAL OBTAINED AT TOP OF CASE AND SIMULTANEOUSLY COOLING OUTER EDGE OF OVERFLOW TO SOLIDIFY POTTING MATERIAL ADJACENT THERE TO AND FORM A CONFINING BARRIER FOR LIQUID POTTING MATERIAL

C — SOLIDIFYING THE LIQUID POTTING MATERIAL UNTIL SUFFICIENTLY HARDENED SO THAT THE POTTING MATERIAL CAN BE SLICED OFF.

D — SLICING OFF THE OVERFLOW OF POTTING MATERIAL AND SIMULTANEOUSLY COOLING THE CUTTING BLADE

E — APPLYING COVERPLATE TO BALLAST CASE

F — ASSEMBLED AND POTTED BALLAST

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3,141,049

METHODS FOR FILLING ELECTRICAL APPARATUS WITH POTTING MATERIAL

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Filed June 5, 1961, Ser. No. 114,855
8 Claims. (Cl. 264—138)

The present invention relates to methods for filling electrical apparatus with potting material and more particularly, to such methods especially usable with ballast apparatus. It relates specifically to such methods wherein hardenable liquid potting material is poured over the ballast apparatus and is solidified to provide a suitable encapsulant for the components of the apparatus.

Ballast apparatus or ballasts for starting and operating fluorescent lamps are generally housed in metallic cases or canisters which serve as receptacles for the potting material in which the apparatus is embedded and as protective enclosures for the components and internal circuit connections thereof. Commonly used potting materials are mixtures of mineral filler and asphaltic compounds. The asphaltic compounds are acceptable constituents of the potting materials since they possess good dielectric properties. Also, they possess good sound dampening characteristics and relatively low melting temperatures. Sand is used primarily as a filler. Since the potting materials are applied to the apparatus in a liquid state by pouring, it is required that they have relatively low melting temperatures so that the liquid potting material will not cause damage to the components of the apparatus.

In order to obtain good heat dissipation and to minimize noise produced by the electromagnetic components of the ballast apparatus, it is necessary that the potting material filling the ballast case be free of voids and that the ballast case be completely filled with the potting material to provide good thermal contact between the potting material used and the ballast case. Void formations impair the ability of the potting material to dampen noise developed in the components and also serve as an insulating barrier to the transfer of heat from the components. Generally, the heat generated by the components of the ballast apparatus is dissipated through the potting material and the case to the lamp fixture to which the ballast apparatus is attached and also to the surrounding environment of the ballast case and lamp fixture. Unless the heat generated is effectively removed, premature failures of the ballast apparatus may occur.

The cover plate of the ballast case usually serves as the mounting surface for attaching the ballast apparatus to the lamp fixture. In some applications the coils of the ballast transformer are arranged so that the coil sides are disposed close to the coverplate to provide for more effective dissipation of heat to the lamp fixture which serves as a heat sink. In such applications it is particularly important that the coverplate of the ballast case be in good thermal contact with the potting material.

In order to insure that good thermal contact is obtained between the coverplate and potting material when it is assembled thereon, it is necessary that the ballast case be completely filled with a potting material up to the upper edges of the sides forming the ballast case so that when the coverplate is applied to the top thereof, there is no air space between the coverplate and the upper surface of the potting material filling the case.

Heretofore, the methods employed for filling a ballast case with potting material have not provided a suitable means for assuring that the potting material was filled up exactly to the level of the coverplate and in good thermal contact therewith. Conventional methods for filling apparatus with potting material by gravity flow and relying on manual control have the inherent disadvantage that the level of the potting material in the ballast cannot be precisely controlled. In such methods of filling, the potting material must be poured very rapidly into the ballast case in order to prevent hardening that would interfere with good penetration of the potting material into the apparatus. Frequently, the hot potting material bubbles and splatters. Also, the supply of liquid potting material must be turned off before the level of the liquid potting material reaches the top edges of the sides of the ballast case and spills over. Thus, the potting material generally does not completely fill the ballast case.

After the supply of potting material is turned off, the potting material is allowed to cool and solidify. During the cooling period a certain amount of penetration of the potting material into the components of the ballast apparatus continues to take place. Also, the potting material itself shrinks during cooling. Consequently, the level of the potting material in the ballast case is lowered. When the coverplate is assembled on the ballast case, the potting material does not completely fill the ballast case and an air space or void exists between the upper surface of the potting material and the coverplate.

Prior art methods utilizing pressure filling apparatus also pose a problem insofar as complete filling of the ballast case is concerned. In such methods, the liquid potting material is inserted into the ballast case through an opening in the coverplate which is assembled on the ballast case prior to the potting operation. Due to shrinkage and entrainment of air between the ballast case and top surface of the potting material, voids are formed between the top surface of the potting material and the coverplate. Thus, methods of the prior art have not been satisfactory in applications where it is required that the top surface of the potting material filling the ballast be in good thermal contact with the coverplate.

It is, therefore, desirable that a method be provided for filling an enclosed electrical apparatus with potting material wherein the potting material is completely filled to the top level of the ballast case so that the coverplate, when assembled thereon, is brought into good thermal contact with the upper surface of the potting material. Further, it is also desirable that the method be readily adaptable to mass production techniques so that the apparatus can be automatically and continuously filled with potting material in an automated type of assembly operation.

Accordingly, it is a general object of the invention to provide an improved method for filling an encased electrical apparatus with an insulating potting material.

It is a more specific object of my invention to provide an improved method for filling the case of a ballast apparatus with potting material wherein the case is completely filled between the upper surface of the potting material and the coverplate of the ballast case.

It is still a further object of my invention to provide an improved method for filling a ballast apparatus with potting material which is readily adaptable to automated assembly techniques.

According to one form of my invention I have provided an improved method for filling the case housing electrical apparatus with a potting material, such as a mixture of asphalt and sand, which includes the steps of filling the case with liquid potting material until an overflow is obtained at the top thereof. The potting material adjacent to the outer edges of the overflow is solidified or hardened and forms a confining barrier for the liquid potting material. Then, the liquid potting material is allowed to sufficiently harden in order that the overflow of potting material can be removed as by a slicing operation. With the overflow of potting material sliced off, the case is filled with potting material to

the top thereof assuring good contact with the cover plate when it is attached.

In another aspect of the invention I have provided a retaining means for the overflow of potting material at the top of the case. Simultaneously, the retaining means is cooled to a predetermined temperature so that the potting material adjacent to the retaining means hardens to form a confining barrier for the liquid potting material. It has been found that by cooling the retaining means, the potting material does not adhere to the retaining means. The retaining means is removed when the confining barrier of hardened potting material is formed. The liquid potting material is then allowed to harden sufficiently to permit the overflow of potting material to be sliced off. Where a cutting blade is used to slice off the overflow, it has been found that cooling the cutting blade will also prevent potting material from adhering to the blade.

The subject matter which I regard as my invention is particularly pointed out and distinctly claimed in the concluding portion of this specification. My invention, however, both as to organization and mode of operation, together with further objects and advantages thereof, may be best understood by reference to the following description taken in conjunction with the accompanying drawings in which:

FIG. 1 is an illustration of a conventional ballast apparatus with the coverplate removed prior to the potting operation;

FIG. 2 shows the ballast apparatus of FIG. 1 in position at the potting material filling station with the overflow collar in the lowered position;

FIG. 3 shows the ballast apparatus of FIG. 1 wherein the case has been filled with the liquid potting compound until an overflow of potting material was obtained at the top thereof;

FIG. 4 is a sectional view taken along line 4—4 of the ballast apparatus illustrated in FIG. 3 showing how the potting material adjacent to the overflow collar is hardened to form a confining barrier for the overflow of liquid potting material;

FIG. 5 shows the overflow collar in a raised position, the hardened outer edge of potting material preventing the liquid overflow of potting material from spilling;

FIG. 6 illustrates the ballast apparatus at the slicing station wherein the overflow of the potting compound is being removed by slicing off the overflow with a blade which is guided by the upper edges of the sides of the ballast case;

FIG. 7 shows a coverplate being attached to the ballast case in the final assembly operation; and

FIG. 8 illustrates diagrammatically with legends the sequence of the various steps of the method according to one form of the invention, the method being carried out on a continuous conveyor system.

In FIGS. 1 through 7 of the drawings, I have illustrated the consecutive steps of the method in accordance with one embodiment of the invention being performed on a ballast apparatus **10**. As shown in FIG. 1, the ballast apparatus **10** is completely assembled except that the ballast apparatus **10** is not potted. It will be seen that the ballast apparatus **10** includes a ballast case **11** having four sides, a bottom and a top or coverplate which has not been assembled so that potting material can be poured into the ballast case **11**. Disposed within the ballast case **11** are the components of the ballast apparatus **10**, which includes a capacitor **12**, a ballast transformer **13** having a pair of coils **14**, **15** mounted on a magnetic core **16**, and various electrical leads.

It will be noted that the ballast transformer **13** is disposed so that the internal connections to the coils **14**, **15** are made on the top side of the coils **14**, **15**. If desired, the ballast transformer **13** may be inserted in the ballast case in an upside down arrangement wherein the internal connections to the coils **14**, **15** of the ballast

transformer **13** would be on the under side of the coils **14**, **15**. Where the internal connections are made in such a manner, it will be seen that the coils would be disposed closer to the coverplate when it is assembled on the ballast case **11**. In such an arrangement, interference to heat transfer between the coils and the coverplate is minimized. Thus, it will be appreciated that the method of the invention is readily adaptable to various arrangements of the components in a ballast apparatus and it is not intended by the apparatus employed in the illustrative embodiment to limit the invention thereto.

The ballast apparatus **10**, as shown in the drawings, is carried on a conveyor **17** illustrated diagrammatically to show how the method of the invention may be carried out as a continuous operation. A suitable positioning means **18** is provided to maintain the ballast apparatus **10** in position on the conveyor **17** as the method is carried out. Although the steps of the method of the invention are shown performed on a single ballast apparatus **10**, it will be understood that the steps of the method of this invention can be simultaneously performed on a plurality of ballasts.

In FIG. 2, I have shown the ballast apparatus in position at the potting material filling station. As shown in outline, an overflow collar **19** is lowered from an elevated position and brought down in position on the ballast case **11**. Although in the illustrative embodiment of the invention, the overflow collar **19** is inserted on the ballast case **11**, it will be understood that the overflow collar **19** can readily be maintained in a fixed position and the ballast apparatus **10** brought into position under the overflow collar **19**. A cooling means having an inlet **22** and an outlet **21** is provided for the passage of cooling fluid around the overflow collar **19**. In the exemplification of the invention an antifreeze solution having an ethylene glycol base was used as a cooling fluid and was supplied to the overflow collar **19** at a temperature of approximately minus five degrees centigrade.

It will be noted that the overflow collar **19** which serves as a retaining means for the overflow of potting material on the top of the ballast case **11**, has a rectangular configuration that substantially conforms to the configuration of the ballast case **11** so that when it is placed in position on top thereof, it forms an extension of the ballast case **11** and effectively contains or confines the overflow of potting material. The inner sides of the overflow collar **19** were inclined inwardly at draft angle of approximately seven degrees in order to permit the overflow collar **19** to be readily removed from the potting material.

A filling nozzle **25** connected with a tank (not shown) containing the liquid potting material is located above the apparatus **10**. In the exemplification of the invention, a hardenable asphalt and sand mixture was used in the potting operation and was heated to a temperature of 200 degrees centigrade. A valve means **26** is provided to control the flow of the liquid potting material supplied to the ballast apparatus **10**. As seen in FIG. 2, the valve means **26** is in the closed position and no potting material is being injected into the ballast case. Leads **27**, **28** connected with valve means **26** are provided in order that valve means **26** can be actuated either manually or automatically from a remote location.

A shown in FIG. 3, the valve means **26** is open and hot liquid potting material **29** is being poured into the ballast case **11**. In accordance with the invention the potting material **29** is poured until an overflow is obtained, the overflow being contained by the overflow collar **19**. Bringing the liquid potting material **29** up to a level above the ballast case **11** insures that the apparatus is completely filled with potting material **29**. Since a cooling fluid is circulated through the overflow collar **19**, the liquid potting material adjacent to the overflow collar **19** solidifies much sooner than the rest of the liquid potting material in the ballast case **11**. It was found that by cooling the overflow collar **19**, the potting material in contact with

the overflow collar **19** did not adhere thereto, and the overflow collar **19** could be readily removed from the potting material after the potting material adjacent to the overflow collar **19** hardens. Further it was found that by hardening or solidifying the potting compound adjacent to the cooling collar **19**, a confining barrier is formed which can contain the overflow of liquid potting material during the period that the rest of the liquid potting material solidifies. By causing the potting material adjacent to the overflow collar **19** to be initially solidified, it is possible to remove the overflow collar **19** in a relatively short period of time.

In the method used to exemplify the invention, the potting material adjacent to the outer edges of the overflow collar **19** was sufficiently hardened within approximately one minute and the overflow collar **19** was then removed from the ballast case **11**. It will be apparent that the arrangement of the present invention makes it possible to continuously remove and apply the overflow collar **19** in an automated type of assembly operation. Although I have only shown a single ballast apparatus **10** to illustrate the filling step, in the exemplification of the invention a group of ten ballasts were simultaneously filled and cooled at one time. Thus, it will be apparent that the steps of the method of the invention can be performed simultaneously on a plurality of ballasts.

In FIG. 4, I have illustrated a sectional view of the ballast apparatus **10** showing the formation of a confining barrier **31** containing liquid potting material **32**. It will be seen that most of the potting material within the interior of the ballast apparatus **10** is in a liquid state. By initially hardening only the potting material **31** adjacent to the overflow collar **19**, sufficient time is afforded to allow the hot liquid potting material to effectively saturate the magnetic core **16**, the coil **14** and the other components of the ballast apparatus **10**.

Continuing now with the description of the method of the invention, it will be seen that in FIG. 5, I have illustrated the ballast case **11** at the potting material filling station with the overflow collar **19** and the filling nozzle **25** in the raised position. The valve means **26** has been shut off. At this point, only the outer edges of the potting material adjacent to the overflow collar **19** have hardened and the confining barrier **31** of the hardened or solidified potting material now serves as a retaining means for the overflow of liquid potting material **32**. The ballast apparatus **10** is now ready for delivery by the conveyor **17** to the slicing station.

Before the slicing operation can be performed, sufficient time must be allowed to permit the potting material to cool and sufficiently harden or solidify so that the slicing operation can be performed. In the method used to exemplify the invention, it was found that approximately 5 minutes were required for the potting compound to cool at room temperature. If desired, the period of time required for the liquid potting material to harden may be shortened by the provision of a cooling means to increase the rate of heat transfer from the liquid potting material **32**.

In FIG. 6, the ballast apparatus **10** is shown at the slicing station where the step of slicing off the overflow **33** of hardened potting material is carried out. A cutting blade **34** having a cutting edge **36**, is passed along the edges **37, 38** of the side walls of the ballast case **11** and the overflow **33** is sliced off in this way. The cutting edge **36** may, preferably, be shaped or contoured so that the potting material is above the edges **37, 38** of the ballast case **11** and so that a good contact is assured when the coverplate **42** is attached. It was found that by simultaneously cooling the cutting blade **34** by circulating cooling fluid through ducts **39, 40** formed therein, it was possible to prevent potting material from adhering to the cutting blade thereby permitting the blade **34** to be used in a continuous operation. The outer edges **37, 38** may be used to serve as a guide means to insure that the overflow **33** is cut off precisely at the level of or at a level slightly higher than the upper edges **37, 38**. When the coverplate of the ballast case **11** is placed in assembled relation on the ballast case **11**, a good physical contact is obtained between the coverplate and the potting material. It will be seen that when the overflow **33** is completely sliced off, as is shown in outline in FIG. 6, the slicing off overflow **33** falls off on a conveyor **41** where it can be conveniently returned to the tank (not shown) containing the liquid potting material and reused.

In accordance with the method of the present invention, it was possible to fill a ballast case used to house a conventional ballast used to start and operate two 40 watt rapid start fluorescent lamps with 11.6 ounces of asphaltic potting material. By manually filling an identical ballast apparatus, it was found that the ballast case could be filled with approximately 9.6 ounces of asphaltic potting material. Thus, it will be appreciated that the method of the present invention makes it possible to fill a ballast case with 20 percent by weight more asphaltic potting material than by manually controlled gravity flow methods. Thus, it is apparent that the ballast case **11** is more completely filled with potting material by the method of the present invention. Since the potting material is sliced off at or above the level of the upper edges **37, 38** of the sides of the ballast case, the top surface of the potting material is brought into good thermal contact with the coverplate and potting material which completely fills the case **11**. This arrangement provides the advantage that the heat generated by the ballast components can be more effectively dissipated from the ballast apparatus, particularly in applications where the fixture is utilized as a heat sink and the coverplate is attached to the fixture.

Referring to FIG. 7, there is illustrated the ballast apparatus **10** which is now filled with potting material. It will be seen that the coverplate **42** is attached to the ballast case **11** by attaching the eyelets **43, 44, 45, 46** thereto and that the coverplate **42** covers the top surface of the hardened potting material **47**. Since the top surface of the hardened potting material **47** is level or slightly higher with the upper edges **37, 38** of the sides of ballast case **11**, good physical contact results when coverplate **42** is assembled thereon.

Having reference now to FIG. 8, I have illustrated therein diagrammatically the combined sequence of steps of the method according to one form of the invention and have briefly summarized in the legends, the sequence of the operations performed. As shown therein, the ballast case **10** is positioned on the conveyor **17** at station A with the coverplate removed. At station B, the overflow collar **19** and the filling nozzle **25** are lowered in position over the ballast case **11**. Liquid potting material is poured into the ballast case **11** until an overflow of potting material is obtained at the top thereof. Simultaneously, a cooling fluid is circulated through the overflow collar **19** in order to harden the potting material adjacent thereto and to form a confining barrier for the liquid potting material. After the potting material adjacent to the overflow collar **19** has hardened sufficiently so that it can retain the liquid potting material, the overflow collar **19** and filling nozzle **25** are raised. At station C, further solidification of the liquid potting material is carried out. Depending upon the particular potting material used, the step of solidification may be carried out at room temperature, as was done in the hereinbefore described exemplification of the invention wherein the potting material contained asphaltic compounds as a constituent thereof. It will be noted that during the solidification operation the overflow of liquid potting material is contained by the confining barried **31** formed of hardened potting material. As previously mentioned, if it is desired to shorten the period of time required to solidify the potting material so that the overflow can be readily sliced off, the ballast apparatus **10** can be passed through a suitable cooling means.

When the potting material has sufficiently solidified so that it can be sliced off, the ballast apparatus 10 is conveyed to the slicing station D. The cutting blade 34 has a cutting edge which is passed along the sides of the ballast case 11 to slice off the overflow 33 of potting material. Simultaneously, the cutting blade 34 is kept at a relatively cool temperature by circulating cooling fluid through the tubes 39, 40. After this step is completed, the coverplate 42 is assembled on the top of the ballast case 11 as shown at station E. At station F the assembled and potted ballast apparatus 10 is shown.

In the exemplification of the invention, a potting material containing 53 percent silica and 47 percent asphaltic compounds was employed and was poured into the ballast case 11 at a temperature of 200 degrees centigrade. Although I have described my invention in connection with an asphaltic potting material, it will be appreciated that the other hardenable insulating materials, which can be rendered liquid at relatively low temperatures and solidify at room temperature either with or without catalyst, may be employed. The method is particularly adaptable to the potting materials containing asphaltic compounds which are difficult to handle. A principal advantage of the method of the invention is that a ballast apparatus can be readily filled to the level of or slightly above the upper edges of the sides thereof to provide a good thermal contact between the upper surface of the potting material and the coverplate of the ballast case. Another advantage of the method of the invention is that the overflow of potting material takes up the shrinkage that normally occurs during cooling. Splattering caused by the bubbling of the hot potting material during filling is minimized by the overflow collar. Further, the method readily lends itself to automated assembly techniques.

It will be apparent that the sequence of steps of the method which I have described herein by way of an exemplification of the invention may be changed or varied without departing from the principle of the invention. It is to be understood, therefore, that I intend by the appended claims to cover all such changes and modifications that fall within the true spirit and scope of the invention.

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

1. A method for filling the case of a ballast apparatus with potting material comprising the steps of applying a retaining means on the ballast case for containing an overflow of potting material, pouring liquid potting material into the case so that the potting material fills the case and overflows within said retaining means, causing the potting material adjacent to said retaining means to harden sufficiently so that the overflow of liquid potting material can be contained by said hardened potting material without said retaining means, causing said retaining means to be separated from said ballast case and said potting material, allowing said liquid potting material to harden, and slicing off the overflow of said potting material so that the potting material fills the ballast case, and attaching a coverplate to the case so that the coverplate lies along the surface formed by slicing off the overflow of potting material.

2. A method for filling the case of an electrical apparatus with a hardenable potting material, said method comprising the steps of pouring liquid hardenable potting material into the case until an overflow is contained at the top thereof, restraining said overflow from spilling, hardening the potting material adjacent to the outer edges of said overflow so that the potting material adjacent thereto forms a confining barrier for the liquid potting material, causing the liquid potting material to harden sufficiently so that the overflow thereof can be removed by slicing, slicing the overflow of the potting material so that the case is filled to the top level thereof, and assembling a coverplate on said case so that the coverplate lies along the surface formed by slicing said overflow.

3. A method for filling the case of a ballast apparatus with a hardenable insulating potting material containing an asphaltic compound as a constituent thereof, said method comprising the steps of filling the case with liquid potting material until an overflow is obtained at the top thereof, confining said overflow of potting material at the top thereof, cooling the outer edges of said overflow of material for a period of time sufficient to cause the potting material adjacent to the outer edges to harden and form a confining barrier to contain said liquid overflow and prevent spillage thereof, allowing said potting material to harden sufficiently so that the overflow of potting material can be sliced off, and slicing off the overflow of potting material substantially level with the top of said ballast case and attaching a coverplate to said ballast case so that the coverplate is in intimate contact with the surface of said potting material formed by slicing off the overflow portion thereof.

4. A method for filling the case of a ballast apparatus with a potting material containing an asphaltic compound as a constituent, said material liquefying when heated to a predetermined temperature, said method comprising the steps of heating said potting material to a liquid state, pouring said liquid potting material into the case until an overflow is obtained at the top thereof, cooling the potting material adjacent to the outer edges of said overflow to cause the potting material adjacent to said outer edges of the overflow to harden and form a confining barrier for the liquid potting material, cooling the liquid potting material until it sufficiently hardens so that the overflow thereof can be removed by slicing, slicing off the overflow of potting material whereby the case is filled to the top thereof, and assembling a coverplate so that the coverplate lies along the surface formed by slicing off the overflow of potting material.

5. A method for filling the case of an electrical apparatus with a potting material containing an asphaltic compound comprising the steps of applying a retaining means on the case for confining the overflow of potting material at the top thereof, pouring heated liquid potting material into the case until the potting material fills the case and overflow is contained within said retaining means and simultaneously cooling said retaining means to cause the potting material adjacent to said retaining means to harden and to permit said retaining means to be separated from said potting material without potting material adhering thereto, separating said retaining means from said ballast case and said potting material when said potting material adjacent to said retaining means has hardened sufficiently so that the overflow of liquid potting material is contained by said hardened potting material without said retaining means, causing the liquid potting material to sufficiently harden so that the overflow thereof can be removed by slicing, slicing off the overflow of the potting material substantially level with the top of the case and attaching a coverplate to said case.

6. A method for filling the case of a ballast apparatus with potting material, said case having four sides, a bottom and a coverplate, said method comprising the steps of filling the case with liquid potting material through the opening provided for the coverplate until an overflow is contained at the top thereof, causing the outer edges of said overflow of potting material to harden so that the potting material adjacent to the outer edges of the overflow forms a confining barrier for the liquid potting material, cooling the liquid potting material at least until it is sufficiently hardened so that the overflow thereof can be removed by slicing, passing a cutting blade having a cutting edge along the upper edges of at least two of the sides of the case to slice off the overflow of potting material whereby the case is filled with potting material to the top thereof and attaching the coverplate to the case.

7. A method for filling the ballast case of a ballast apparatus with potting material containing an asphaltic compound as a constituent thereof, said ballast case being formed of four sides, a bottom and a coverplate, said

method comprising the steps of pouring liquid potting material into the case with the coverplate removed until an overflow is obtained at the top thereof, confining the overflow of potting material at the top of said case and simultaneously cooling the outer edges of the overflow in order to harden the potting material adjacent to the outer edges thereof and form a confining barrier for the liquid overflow, hardening the liquid potting material at least sufficiently so that the overflow thereof can be removed by slicing, passing a cutting blade having a cutting edge along the upper edges of at least two sides of said ballast case to slice off the overflow of potting material so that the ballast case is filled to the top thereof, and attaching the coverplate to the ballast case so that the coverplate lies along the surface formed by slicing the overflow of potting material.

8. A method for filling the ballast case of a ballast apparatus with potting material containing an asphaltic compound as a constituent thereof, said ballast case having four sides, a bottom and a coverplate, said method comprising the steps of filling the case with liquid potting material through the opening provided for the coverplate until an overflow is contained at the top thereof, confining the overflow of potting material and simultaneously cooling the outer edges of the overflow to form a confining barrier for the liquid overflow, hardening the liquid potting material at least sufficiently so that the overflow can be removed by slicing, passing a cutting blade having a cutting edge along the upper edges of at least two sides of the ballast case to slice off said overflow and simultaneously cooling said cutting blade to prevent potting material from adhering thereto, and attaching the coverplate to the case so that the coverplate lies along the surface formed by slicing off the overflow of potting material.

References Cited in the file of this patent

UNITED STATES PATENTS

2,063,315	Kuettel	Dec. 8, 1936
2,136,423	Fields et al.	Nov. 15, 1938
2,373,593	Pease	Apr. 10, 1945
2,432,981	Abrahams et al.	Dec. 23, 1947
2,874,407	Chabot et al.	Feb. 24, 1959
2,957,207	Roop et al.	Oct. 25, 1960
2,978,782	Wagner	Apr. 11, 1961