

June 7, 1938.

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2,120,150

INSULATING LINING FOR ELECTRIC LIGHT SOCKETS

Filed July 25, 1935

2 Sheets-Sheet 1

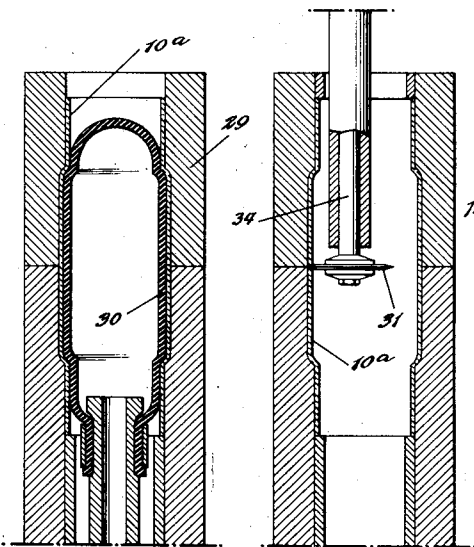


Fig. 10.

Fig. 11.

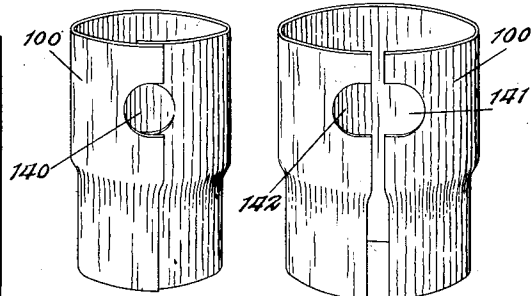


Fig. 1-

Fig. 1^A

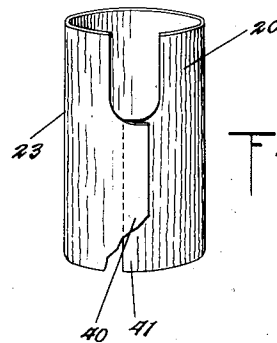


Fig. 2.

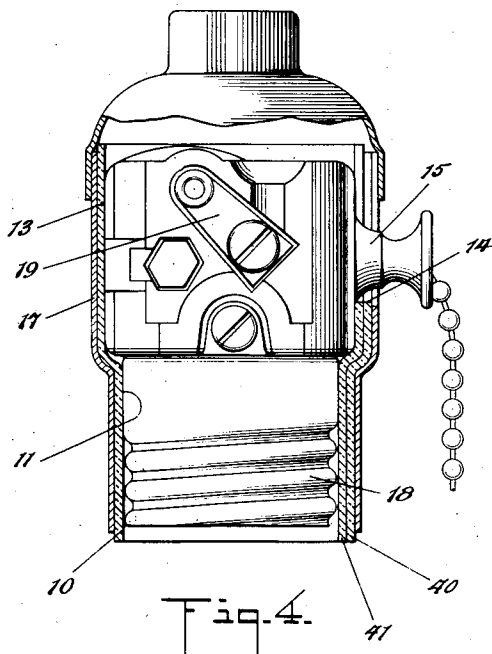


Fig. 4.

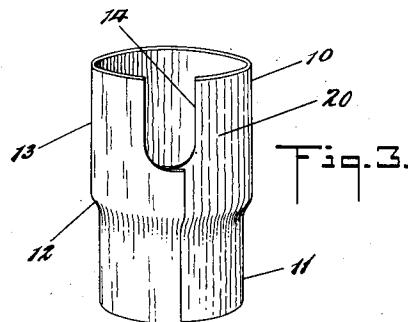


Fig. 3.

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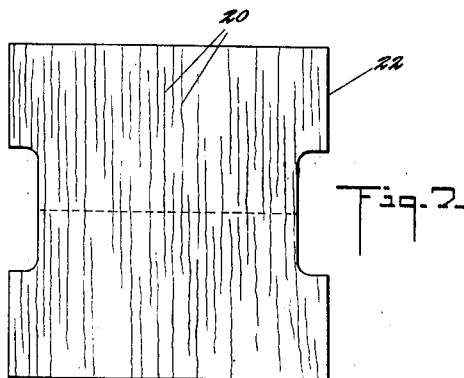
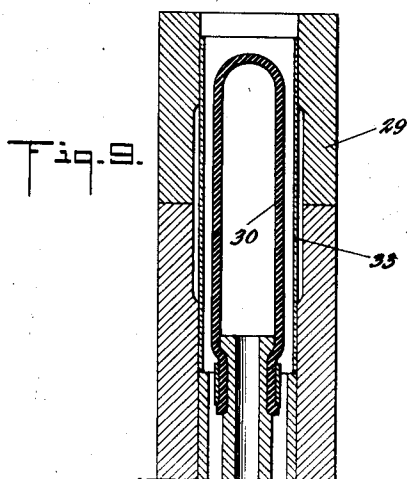
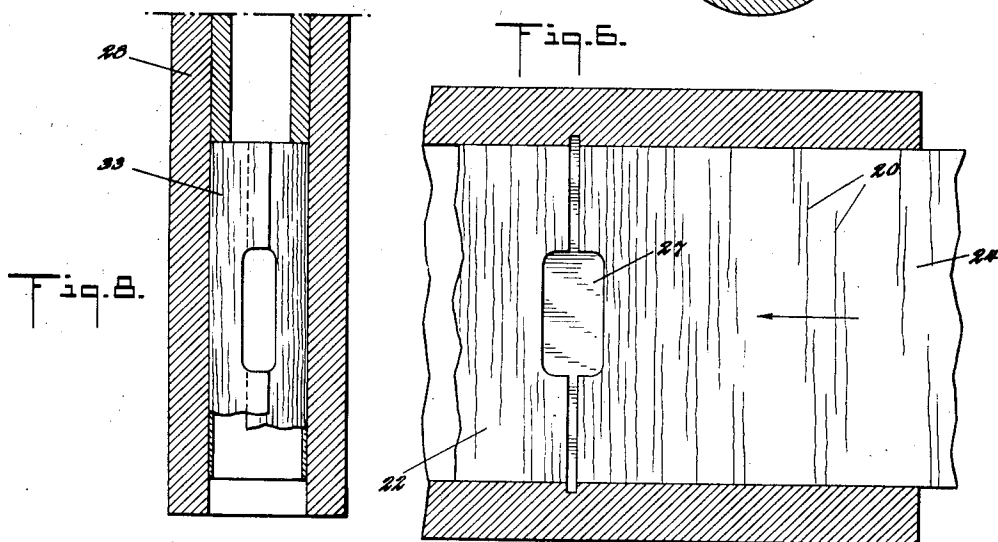
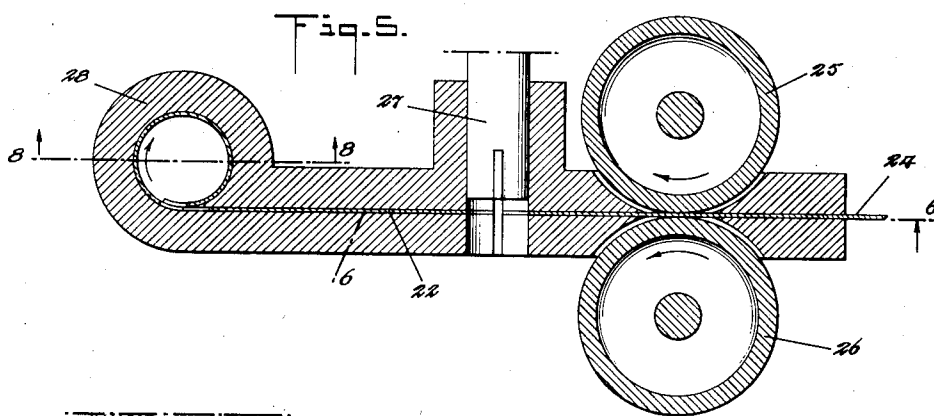
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INSULATING LINING FOR ELECTRIC LIGHT SOCKETS

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2 Sheets-Sheet 2



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2,120,150

INSULATING LINING FOR ELECTRIC LIGHT
SOCKETS

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Application July 25, 1935, Serial No. 33,138

7 Claims. (Cl. 173-362)

This invention relates to insulating linings such as are customarily placed between the outer shell of an electric light socket and the inner current-carrying parts, which latter may include the electrical connections for an electric lamp base or an attachment plug and also the switch mechanism for controlling current flow to said plug or lamp, where a switch is used.

Such insulating linings are tubular, but with the diameter of the end which surrounds the screw shell less than the diameter of the other end. A shoulder joins the parts of greater diameter to that of lesser. This insulating lining usually has been made of paper or other insulating material.

These linings were usually made of a seamless tube in order to avoid leakage of electric current through the seam. To make them seamless a construction with layers of paper held together by paste or glue has been employed.

Standard ways of making such paper linings are exemplified in United States Patents No. 750,873 and No. 784,695 granted to Norman Marshall in 1904 and 1905. According to these patents the insulating material was rolled into a cylinder having the diameter required for the larger part of the finished lining. This cylinder was then forced into a die of the required dimensions for the finished lining, and part of the insulating material was compressed into a reduced portion to cover the screw shell. The insulating lining thus formed comprised a portion having a large diameter in which the material was in its normal state, not under strain and a portion under compression, and having a smaller diameter.

A difficulty encountered with this type of lining is that when the cylinder of insulating material is forced into the die to reduce the diameter of one end, the compression tends to break the fibres of the paper insulating material. In the compression process, wrinkles and cracks tend to form in the reduced portion, particularly at the shoulder and also in the portion of lesser diameter, thus reducing the dielectric strength of the insulation.

Another objection to the usual insulating lining is that when atmospheric humidity is high, that lining absorbs a great deal of moisture and expands so that in the factory process of putting the lining into the shell, the parts will jam, causing delay and trouble to either a manual operator or an assembling machine and the same difficulty is experienced by the wiring man in the field. On the other hand, when the humidity is

low that lining shrinks thus preventing, or making difficult, the insertion of the socket and switch mechanism.

These difficulties are done away with in my improved lining, and my lining is also intrinsically superior to the old lining. In order that the finished lining, regardless of atmospheric conditions, may adjust itself to the shell, the edges of my lining are made to overlap and are not secured together but are left free for movement relative to one another. This construction provides the improved lining with a spring action or a tendency to uncoil within the shell and fit snugly therein. On the other hand, the lining may be coiled more tightly if conditions require. The overlapped edges are squeezed together between the outer shell and inner parts of the socket, preventing current leakage at the area of the overlap.

Tests of my improved lining have shown that it will stand twice as much voltage as the old type of lining. It is characteristic of the invention that part of the lining is expanded and that the fibres preferably run lengthwise of the shell, that is, the lengths of fibres are preferably parallel to the axis of tube.

One object of my invention is to provide an insulating lining for electric lamp sockets and the like, which lining will have improved dielectric qualities.

A further object is to provide a lining the construction of which makes it easier to assemble the socket fixture during manufacture, and facilitates the installation in wiring.

A further object of the invention is to provide an improved method of producing such a lining.

In the accompanying drawings,

Figure 1 is a perspective view of a finished lining in normal position;

Figure 1A shows the lining of Fig. 1, pulled slightly open to show its construction;

Figure 2 is a perspective view of an insulating lining in an unfinished stage;

Figure 3 is a perspective view of the completed tubular insulating lining of Figure 2. It is a modification of the lining shown in Figure 1;

Figure 4 is a side elevation, partly cut away of an assembled electric light socket, showing the improved insulating lining in cross section;

Figures 5 to 11, inclusive, show stages in a process of making the improved insulating lining;

Referring more in detail to Figs. 5 to 11, inclusive:

Figure 5 is a diagrammatic cross section of a machine showing a method of cutting insulating

material into blanks for making the linings, and rolling the blanks into cylinders;

Figure 6 is a cross section on line 6—6 of Fig. 5, showing adjacent ends of two blanks after the blanking out operation;

Figure 7 is a plan view of a double blank of insulating material from which two linings will be formed;

Figure 8 is a horizontal view partly in cross section on the line 8—8 of Fig. 5, showing a plan view, partially broken away, of the blank of insulating material rolled into a cylinder;

Figure 9 is a cross section of a forming die, showing the cylinder of insulating material of Fig. 8, and a forming tool in position before it has acted upon the cylinder;

Figure 10 is a cross section similar to Fig. 9, but showing the tube of insulating material and the forming tool after the latter has expanded the blank;

Fig. 11 is a cross section similar to Fig. 10, but showing in place of a forming tool a tool for cutting apart the two insulating linings which have been formed from the double blank shown in Fig. 7.

My insulating lining 10 (see Figs. 3 and 4) is of the same general proportions as insulating linings of the prior art. Like other lighting socket linings, it is tubular and includes a substantially cylindrical portion 11 of such diameter as to fit closely around the usual screw shell 18 for the electric lamp base or plug, and a portion 13 of greater diameter slotted at 14 to receive the insulating base which carries the screw shell and other current-carrying parts, such as the switch mechanism and the guide 15 for the pull chain or other switch-operating member of the socket device. These portions 11 and 13 of the lining are joined at a shoulder 12.

In the assembled socket device the insulating lining 10 is interposed between the outer metallic shell 17 and the inner operating parts of the device. The portion 11 of lesser diameter of the lining is interposed between the current conducting screw shell 18, and the outer shell 17, while the portion 13 of greater diameter is interposed between the switch mechanism 19 and the outer shell 17.

The improved lining 10 is distinguished from the prior art lining which has been commercially standard for the past thirty years or more, in the following:

The new shell is composed of flexible fibrous insulating material, such as paper, and its free edges 40, 41 are preferably made to overlap slightly. The ends are left free so as to give it a property of adjustability and make it cheaper and easier to manufacture. When the lining is assembled into the finished fixture, there is no electrical leak at the overlap.

A further advantage available with my lining having free slightly overlapping edges 40, 41, is illustrated in Figures 1 and 1A in which the opening 140 is of such a shape as to fit closely around the switch outlet 15, instead of extending open to the top of the lining. Figure 1 shows the completed lining 100 with its edges in operative overlapping position. Figure 1A is a view of the same lining pulled slightly open to show substantially semicircular slots 141 and 142 intermediate the ends of the free side edges of the lining.

With this construction the lining will fit closely around the key or switch outlet 15, leaving no exposed surfaces between the shell 17 and in-

terior 18, thus further reducing the possibility of electrical leakage.

The difference in diameter between the portion 11 on the one hand and the portions 12 and 13 on the other, is produced by uniformly stretching or expanding radially beyond normal the material forming portions 12 and 13. This results in a slight thinning of the material in the stretched or expanded portions. By normal is meant the usual physical condition of the material before being worked on to form the lining.

In the construction of my lining I prefer to use a laminated paper having long fibres and containing no sizing or binder. By laminated paper I refer to a paper, which in the process of manufacture has been made up by superposing upon each other a plurality of layers of half-dry pulp, which layers of pulp have then been pressed and dried into a single sheet of finished paper. My improved lining preferably is not however, made of layers of paper, the only overlap being along the edges 40, 41. It is a single layer tube with a slight overlap at the free lateral edges thereof.

I prefer to use a paper having relatively long fibres 20 running substantially parallel with each other and in the direction of the axis of the tube (see Figs. 1 to 3). Among the materials which I have found suitable for making the improved lining is a fibreboard insulating paper. Such a paper may suitably be about a 32-ply paper having approximately one ply to every 1/1000th of an inch. However these dimensions are given only by way of illustration, and it is understood that they do not constitute limits of my invention. The use of such a dense paper produces a lining of much lower absorptive quality than can be produced by the use of layers of thinner paper glued together.

One method of making my improved insulating lining 10 comprises the following:

A blank of suitable predetermined portions is cut from a sheet of flexible fibrous insulating material. The paper or other sheet material used should preferably contain some moisture. By way of illustration I mention that from 6 or 7% to 10 or 12% of the weight of the material may be moisture. However these proportions are given by way of illustration only. It is not usually necessary to add moisture to the paper, provided it is not stored in too dry a place.

I prefer to cut the blank 22 (Fig. 7) from the sheet in such direction that the fibres 20 will run lengthwise, that is, parallel with the axis of the finished lining or tube. The blank is then rolled until its lateral edges 40, 41 overlap to form a cylinder 23 (Fig. 2) having the same diameter as that required for the smaller portion 11 of the finished lining 10 (Fig. 3). The amount of overlap may be varied according to the difference between the inner diameter of the shell 17 on the one hand and the outer diameter of the socket 18 and switch mechanism 19 on the other. The greater the difference between the two diameters, the more overlap is desirable in the lining. Under most conditions when the limits of the shell 17 and of the interior parts do not vary greatly, about a fourth of an inch overlap will insure proper fit in the socket and prevent electrical leakage.

The rolled cylinder 23 is then placed in a suitable die having the shape of the finished lining, and, by pressure of any suitable forming tool, such as a wooden or metal mandrel, or hard rubber, or hydraulic-pressure soft rubber core, one end of the cylinder is expanded or stretched radially

in a direction substantially at right angles to the length of the fibres 20, until the shoulder 12 and larger portion 13 of the finished lining 10 are formed.

5 In the lining thus formed, the fibres 20 in the smaller portion 11 will remain unmoved, while the fibres in the shoulder 12 and larger portion 13 will have been spaced apart further than normal. By normal spacing of the fibres is meant
10 their usual spacing in the material used to make the lining before operations of making the lining have been practised upon the material. The lining will present a smooth unwrinkled appearance at all points.

15 When quantity production is desired, it is useful to cut more than one blank at one operation, leaving several blanks wholly or partially united. The method outlined above is then followed in forming several linings at a time, and a further
20 final step is added, of cutting the finished linings apart. For example, Figs. 5 to 11 show the formation of two linings at a time, from a double blank 22.

Means for following the process by machine are diagrammatically illustrated in the drawings.

Figures 5 and 6 show a sheet 24 of flexible fibrous material being fed into a punching and coiling machine.

Sheet 24 may be propelled through the machine
30 by suitable means such as rollers 25, 26, which force it under a punch 27 and then into a coiling or rolling cylinder 28. The punch 27 is so shaped and its action is so timed in relation to the speed of the rollers 25, 26 that a blank 22 of prede-
35 termined dimensions will be formed.

As illustrated in the drawings, blank 22 (Fig. 7) is a double blank, for the formation of two cylinders 23. A single blank, or more than two
40 blanks could be thus formed and used for quantity production if desired.

In the coiling cylinder 28 (Figs. 5 and 8) the double blank 22 of insulating material is coiled into a cylinder 33 having the minimum diameter of the finished lining 10.

45 From the coiling cylinder 28 (Figs. 5 and 8) the cylinder 33 of insulating material is transferred to a forming die 29 (Fig. 9) internally shaped to form two adjacent finished linings. When the cylinder 33 has been positioned in the forming die 29, a forming tool 30 is introduced
50 into the cylinder 33 and caused to exert pressure within cylinder 33 until the latter is stretched or expanded to conform to the forming die, and becomes two unsevered linings 10a. Any suitable
55 forming tool may be employed. The tool illustrated in the drawings, Figs. 9 and 10, is a soft rubber, hydraulically operated tool.

Finally, any suitable cutting tool 31 is employed to cut the unsevered lining 10a in two, forming
60 two complete linings 10. Such a tool may be composed of a cutting disc 31 mounted on the end of a rotating shaft 34 which extends into the die 29 and is gyrated about the axis of the die 29 by any suitable mechanical means.

65 In addition to saving time, making more than one lining at a time results in a saving of material by eliminating scraps, and also aids in forming a more perfect tube by tending to hold the cylinders straighter and the edges of the overlap
70 in better alignment, than when one lining at a time is made.

It will be obvious to those skilled in the art that the novel method of forming my new lining
75 is indicated only in a general way, and that many

variations thereof within the scope of my invention will occur to those skilled in the art.

The description of the novel insulating lining is also illustrative rather than definitive, and modifications thereof within the scope of my invention will occur to those skilled in the art.

I claim:

1. A tubular unitary insulating lining for an electric light socket, said lining being made of flexible fibrous insulating material and having
10 two portions of different diameters, the larger portion being expanded and the two portions being joined together by a shoulder.

2. An insulating lining for an electric light socket, consisting of a single sheet of paper in the
15 form of a cylinder, having two different diameters at its two ends with an integral connecting shoulder, the smaller diameter being free from wrinkles and the larger diameter expanded.

3. A unitary insulating lining for an electric
20 light socket comprising a sheet of flexible fibrous material forming a single layer tube having free overlapped lateral edges and having two portions of different diameters, the portion of larger diameter being in a stretched condition and the two
25 portions being joined together by a shoulder.

4. A paper insulating lining for an electric light socket comprising a sheet rolled into a single
30 layer tube with overlapping edges, said lining being unwrinkled and having two unitary portions of different diameters joined together by a shoulder, and having the paper in the larger portion in a laterally stretched condition.

5. The herein described method which consists in forming a unitary insulating lining for electric
35 light socket by forming a cylinder of uniform diameter by rolling a blank of fibrous insulating material until its edges overlap slightly, placing said cylinder of material in a matrix comprising cylindrical portions of different diameter joined
40 by a shoulder, the diameter of the smaller portion of the matrix being approximately the same as that of the cylinder of material, and uniformly stretching a part of said cylinder radially to form a shoulder and a cylindrical portion of increased
45 diameter, and leaving the overlapping edges of the cylinder of material free.

6. The herein described method which consists in forming a unitary insulating lining for electric
light socket by cutting a blank of predetermined shape of flexible fibrous sheet material having
long substantially parallel fibres, said fibres running in the direction which corresponds to the
length of the finished lining, rolling said blank until its lateral edges slightly overlap forming a
55 cylinder, and placing said cylinder of material in a matrix comprising cylindrical portions of different diameter joined by a shoulder, the diameter of the smaller portion of the matrix being approximately the same as that of the cylinder of
60 material, expanding one end comprising about half of said cylinder of material by uniform radial pressure to increase the diameter of said one end to form a shoulder and a cylindrical portion
65 of larger diameter.

7. An insulating lining for electric light socket consisting of a substantially cylindrical single
sheet of paper, said cylinder comprising a portion
of larger diameter for interposition between the
switch mechanism of an electric light socket and
70 the outer shell of said socket, the paper in said portion of larger diameter being thinner than normal; a shoulder integral with and connecting
said portion of larger diameter and a portion of
small diameter; and an integral portion of small
75

diameter for interposition between the current
conducting screw shell and the outer shell of
said socket, the paper in said portion of smaller
diameter being of normal thickness, whereby the
5 dielectrically strongest portion of the lining sur-
rounds the current carrying shell; the walls of
said cylinder slit longitudinally at one point and
the free longitudinal edges of said cylinder being
overlapped, but only adjacent said slit, and said
10 cylinder having a spring action giving it a tend-
ency to uncoil thus insuring the retention of the
lining within the outer shell of the socket, and

insuring a proper fit of said lining within said
outer shell under varying conditions of humidity,
and whereby the thinner parts of the overlapped
edges are held in overlapped relation between
the outer shell and the inner parts of the socket 5
and the normal thickness parts of said overlapped
edges are held in overlapped relation between the
outer shell and the current carrying shell of the
lamp, thereby preventing current leakage at any
point. 10

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