R. McNEILL.

INCANDESCENT LAMP.

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923,797. Patented June 1, 1909.

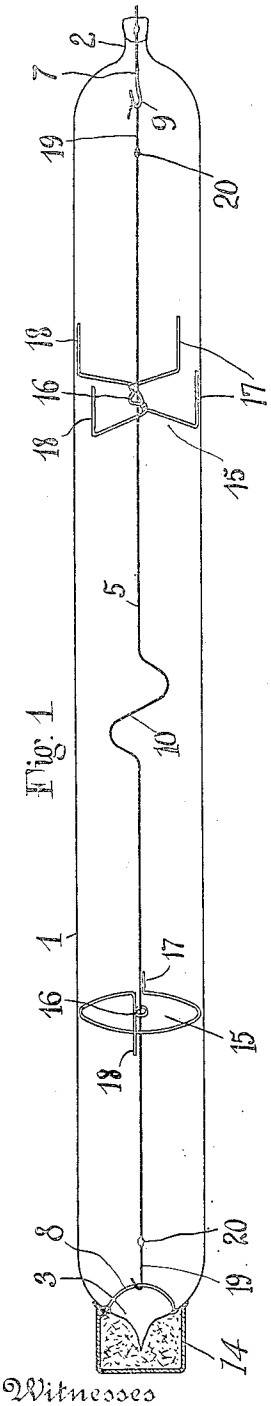


Fig. 1

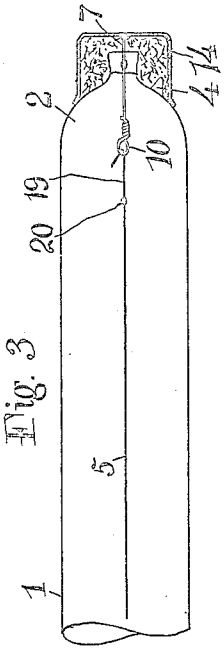


Fig. 3

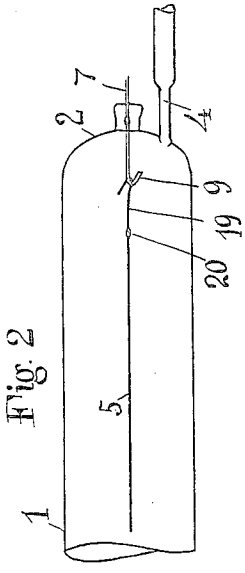


Fig. 2

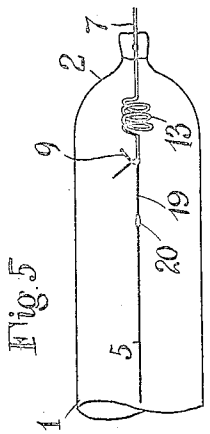


Fig. 5

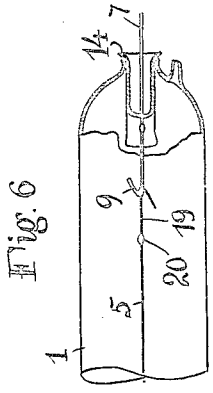


Fig. 6

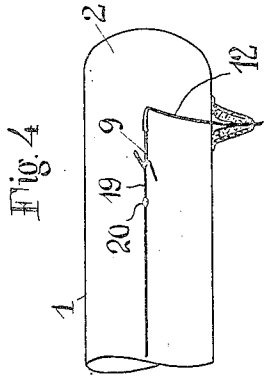


Fig. 4

Witnesses

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UNITED STATES PATENT OFFICE.

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INCANDESCENT LAMP.

No. 923,797. Specification of Letters Patent. Patented June 1, 1909.

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To all whom it may concern:

Be it known that I, RALPH MCNEILL, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Incandescent Lamps, of which the following is a full, clear, and exact specification.

This invention has reference to improvements in incandescent lamps, and has particular reference to incandescent lamps of the tubular type wherein the filament extends from end to end of a glass tube, and connected to leading in wires sealed in the tube.

The invention has for its object to provide improvements in the manner of connecting the filament to the leading in wires, so as to permit of the filament being inserted just prior to the final exhaustion and sealing of the tube, which is not now possible.

The tubular lamps now on the market have the filaments permanently connected to the leading in wires, before insertion into the tube, after which the leading in wires must be properly centered and sealed at each end, and then the lamp is exhausted through a tube left for this purpose, and finally sealed by melting off the tube. As will be seen, such lamps undergo considerable handling after the filament is inserted and the wires sealed in, so that breakages frequently occur between the filament and the leading in wires, in the filament itself, or the ends of the leading in wires may break off, rendering the lamp worthless. Such breakage is especially likely to occur at the joint between the filament and the leading in wire, which is usually a lap joint surrounded by carbon, either "deposited" by decomposing a hydrocarbon, or "cemented" by a mixture commonly composed of graphite and burnt sugar for a binder, which carbonizes when the current is turned on. The deposited joints are expensive to make, and the process involves considerable fire risk, so that there are restrictions upon its use, and the cemented joint is largely used at the present time. Such a joint is, however, soluble, and the presence of moisture tends to weaken it to such an extent that the tension of the filament breaks it. The moisture from the breath of the glass blower in sealing the leading in wires frequently causes such breakage, and atmospheric moisture may do the same thing. As such lamps commonly have anchors or intermediate supports for the filament which are customarily inserted after the filament is inserted, an additional possibility of breakage presents itself. As a consequence, the number of defective lamps considerably increases the cost of production.

According to this invention, I have devised a novel manner of detachably connecting the filament and the leading in wires, whereby the leading in wires can be inserted and sealed independently of the filament, and the filament inserted just before the tube is finally exhausted and sealed, after all the other operations have been completed. By means of this improvement, I have devised a novel method of making an incandescent lamp, whereby the loss in manufacture will be reduced, and also the cost. Furthermore, by this invention a new filament can be easily substituted for a broken one without requiring splicing, disturbance of the leading in wires, or shortening of the filament. It is possible to carry out the invention by reason of the fact that in lamps of this class, the filament is under a certain amount of tension when cold, which maintains the filament taut when it is heated, and the invention is illustrated herein in connection with various means for exerting a tension on the filament and thereby always securing good contact at the detachable connection between the filament and the leading in wires.

In lamps of this class it is customary to employ supports or "anchors" for supporting the intermediate portions of the filament, and this invention further has reference to an improved form of anchor for this purpose, which will be cheaper to make and insert than those in common use, and equally effective.

The invention will be more fully understood in connection with the description of the accompanying drawings, wherein—

Figure 1 is a view of a lamp embodying the invention and made according to the method thereof, Fig. 2 is a view showing a lamp in condition for exhaustion and sealing, Fig. 3 shows a slightly modified leading in wire, Fig. 4 shows the invention applied to a form of lamp wherein the leading in wire exerts the tension on the filament, Fig. 5 shows a modified form of tension device embodying the invention, and Fig. 6 shows a further modification.

Referring first to the features of construction, 1 represents a glass tube which is cut off in predetermined lengths and then drawn

down at the ends 2, 3, leaving adjacent one end, as 2, in Fig. 2, a small projecting tube 4, through which the filament 5 is inserted, and also to permit the attachment of a pump for exhausting the interior, the tube 4 being then sealed between the pump and the main tube 1 to hold the vacuum.

7, 8 represent leading in wires, which are respectively sealed in the tube 1 after the ends are drawn down and the anchors inserted, if the latter are used. A feature of novelty resides in the fact that the leading in wires are looped or coiled so as to interlock with the filament when inserted, either having a hook, or eye 9, as in the right hand end of Fig. 1, or as the wire 8, at the left hand end of Fig. 1. It will be understood that in practice, both ends will be alike, though such is not necessarily the case. As is well understood, the leading in wires are usually made of platinum, and the ends sometimes break off close to the glass, so the form 8 has an advantage in that if one end breaks the other end can be used for connecting with the ferrule or socket, and thence to the line wires. Also the tube or tip 4 can be at the end between the wires, thereby reducing the liability of breakage when sealing. Such lamps ordinarily have the filament under tension in order to prevent its sagging by reason of expansion, when heated, the tension being produced in Figs. 1, 2 and 3 by a coil 10 in the filament itself.

In Fig. 4, the leading in wires 12 are made as springs tending to hold the filament under tension. In Fig. 5 is shown a coil 13 in one or both of the leading in wires, for the same purpose. It will be understood, however, that my invention is not restricted to a lamp wherein the filament is under tension, since it may be supported to prevent contacting with the glass by other means than tension, as by anchors as in Fig. 1.

In Fig. 6, is shown a modification, wherein the leading in wire is sealed in a tube, which tube is sealed in the main tube 1. In this form the flared end of the small tube aids the plaster to hold the end ferrule in place. Each end of the tube also has a socket or ferrule 14, covering the ends, and enabling connection to be made with the line wires as is well understood.

A further feature of the invention resides in the provision of an anchor or intermediate support 15, formed of a wire having an eye or loop 16 through which the filament passes, and a plurality of extensions 17, 18, to bear on the inner surface of the tube 1, thereby forming a support for the filament. The anchor or intermediate support 15 shown on the right hand side of tube 1 in Fig. 1 comprises a member having an eye or loop 16 to be engaged by the filament 5, and extensions 17, 18, having a transverse portion bent lengthwise relative to tube 1 to form a foot, which foot frictionally or yieldingly engages the inner surface of the tube 1, thereby positioning anchor 15 in tube 1 and also preventing anchor 15 from upsetting in tube 1. Obviously any number of extensions 17, 18 with transverse feet can be provided for anchor 15. The similar anchor 15 shown on the left hand side of tube 1 in Fig. 1 comprises a central portion having an eye or loop 16, one end of said central portion being bent to form a foot 18 which engages the inner surface of tube 1, the other end is joined to a curved portion which conforms approximately to the inner surface of tube 1, said curved portion having a foot 17 bent lengthwise in the direction of the tube 1. The feet 17 and 18 as in the other type of anchor 15, serve to prevent anchor 15 from upsetting. In lamps of this type, the intermediate supports, where used, are commonly formed of short glass rods, having a loop or eye, usually of wire, at the end, and blown into the tube. This is an expensive process and by this invention, the anchors can be much more cheaply made, and inserted before the filament, and are equally effective when once in place.

To connect the filament with the leading in wires, bent wires 19, preferably of nickel, are employed which are cemented to the ends of the filament by cement 20, the joints being made by lapping the ends of the filament and the intermediate wires and either depositing carbon from a fluid hydrocarbon by passing an electric current, or by carbonizing a paste composed of graphite and caramel. The deposited joint is expensive, and involves a fire risk, so its use is in many places prohibited, and the cemented joint is commonly used. The cement is, however, soluble in water, and such joints between the filament and the leading in wires in lamps made according to processes heretofore practiced, frequently break because of moisture, or in the necessary operations of completing the lamp. When the filament is attached permanently to the leading in wires, it has to be inserted in the tube when the leading in wires are sealed, and much work then remains to be done to complete the lamp. It is in these subsequent steps that breakages have occurred, either in the filament itself, at the splice, or the leading in wires break. After a filament is permanently connected with the leading in wires in processes heretofore known, considerable glass blowing is done, such as inserting the anchors, sealing the leading in wires, and the final sealing. It has frequently happened that the moisture in a glass blower's breath has so softened the joint, that it would give way. These difficulties are obviated with this invention, because the filament is inserted last, just before drying, exhaustion, and sealing, and the tension or anchors, or both, maintain the electrical contact. Furthermore, the detach-

ably connected filament permits of renewal of a lamp or a filament in a very quick and cheap manner, without requiring opening both ends of the tube and resealing the leading in wires, which is an expensive process as now on the market.

Modifications and changes in the specific details herein described may be made without departing from the scope of the invention.

Having thus described my invention, I declare that what I claim as new and desire to secure by Letters Patent, is:—

1. An incandescent lamp comprising a tube having leading in wires sealed at each end, each of said wires having a bent portion, a filament having means at its respective ends for removably engaging the bent portions of the leading in wires, said filament being coiled so as to exert a tension on the filament at said connections with the leading in wires.

2. An anchor for a stretched filament comprising an eye portion, an extension connected therewith adapted to yieldingly engage the interior of a tube.

3. An anchor for a filament inclosed in a tube having a portion for engaging the filament and another portion connected with said first named portion for frictionally engaging the interior wall of the tube at a plurality of points.

4. An anchor for a filament inclosed in a tube having a portion for engaging the filament and another portion adapted to yieldingly engage an inner wall of the tube at separated points, said latter portion including a foot member.

5. An anchor for a filament inclosed in a tube having an eye member for engaging the filament, and extensions from said eye member having a portion thereof positioned to yieldingly engage the inner surface of the tube at separated points.

In testimony whereof I affix my signature, in presence of two witnesses.

RALPH McNEILL.

Witnesses:
JULIAN S. WOOSTER,
GEO. O. HOFFMAN.