

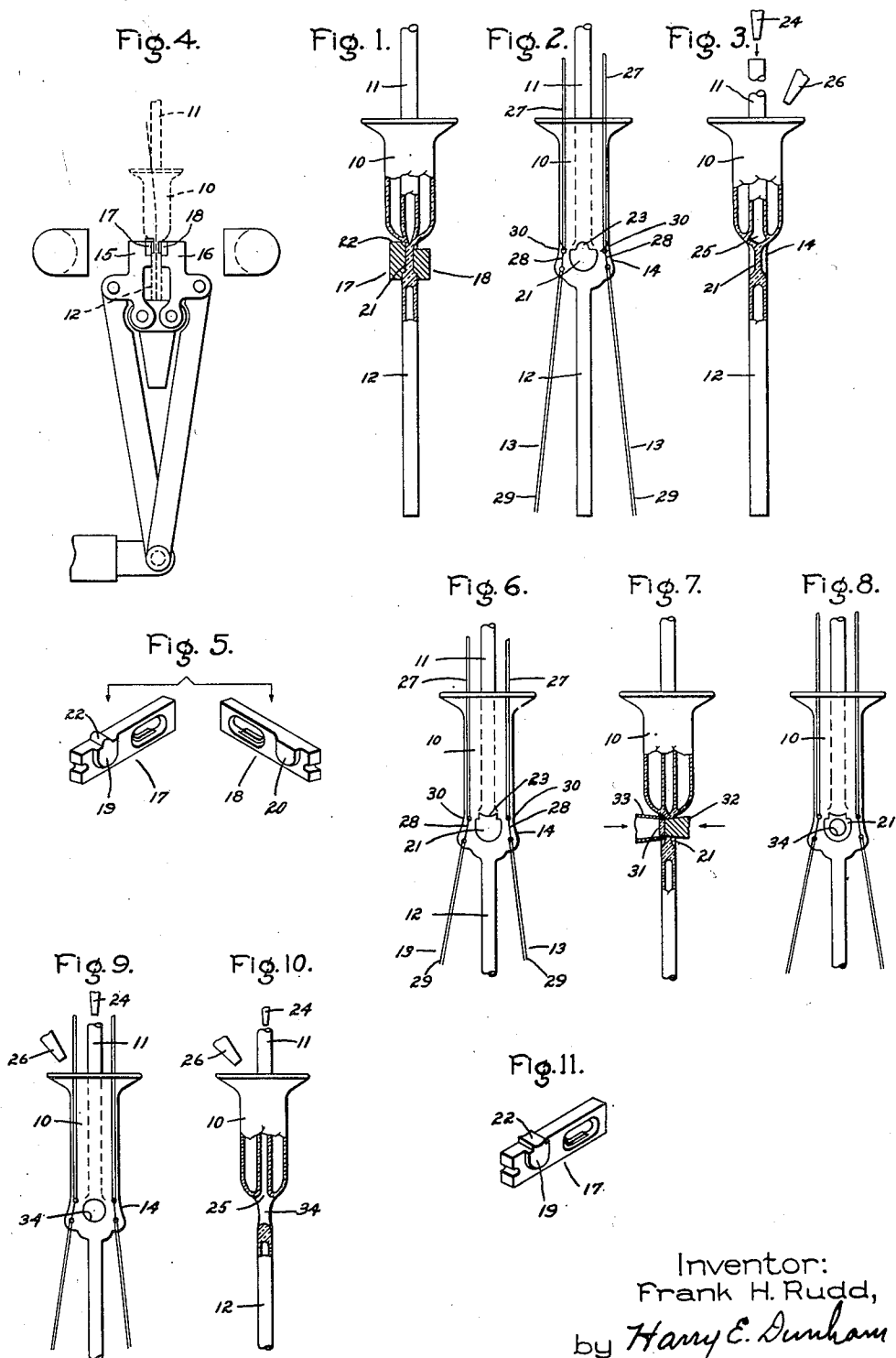
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STEM FOR ELECTRIC LAMPS AND SIMILAR ARTICLES

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STEM FOR ELECTRIC LAMPS AND
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My invention relates to stems for electric lamps and similar devices and to methods of manufacturing the same. Stems as made at the present time comprise a glass tube through which leading-in wires extend, the "inner end" of said stem tube being fused and compressed by clamping around portions of said leading-in wires. This results in a flat solid mass of glass, referred to as the "stem press," at the inner end of the stem tube. The portion of each leading-in wire sealed in the press is generally a short length of special wire, called the "press lead," which has approximately the same coefficient of expansion as the glass of the stem tube and is butt welded at each end to ends of outer and inner leads respectively. The "outer end" of the stem tube is subsequently united to the bulb of the lamp or similar device.

According to my invention, a portion of the stem press between the leading-in wires is compressed to a greater extent than the remainder thereof, thereby forcing an excess of glass out around the said leading-in wires and increasing substantially the amount of glass therearound. This results in an increase in the amount of glass around the welded joint between the outer lead and the press lead and prevents exposed joints. It also results in an increase in electrical resistance between the leading-in wires. Measurements of a number of stems have shown that the stems made according to my invention have a resistance of about one and one-half times that of standard stems with an ordinary flat press portion. Another advantage is that the amount of strain in the glass between the leading-in wires is reduced because of the more uniform cooling of the stem press after it has been fused and compressed. Another advantage is that the thinning of the glass between the leads facilitates the blowing out of an exhaust aperture when an exhaust tube is provided on the stem in accordance with the disclosure in Patent 1,423,956, Mitchell and White. Further features and advantages of my invention will appear from the following description of species thereof and from the drawing.

In the drawing, Figs. 1 to 3 are elevations showing steps in the manufacture of a stem according to my invention; Fig. 4 is a fragmentary elevation of a pair of stem clamping jaws; Fig. 5 is a perspective of a pair of clamping jaw matrices used in forming the stem illustrated in Figs. 1 to 3; Figs. 6 to 10 are elevations showing steps in the manufacture of a modified stem; and Fig. 11 is a perspective of one of a pair of matrices used in forming the stem illustrated in Figs. 6 to 10.

The lamp stem illustrated in Figs. 1 to 3 is of the tipless type disclosed in the Mitchell and White Patent 1,423,956, and comprises a flare or stem tube 10, an exhaust tube 11 and an arbor 12. These parts together with a pair of leading-

in conductors 13 are assembled on an automatic stem machine such as disclosed in the Fagan and Staudenmeier Patent 1,655,141. The assembly is then carried by a series of fires which fuse the juxtaposed ends of the stem tube, exhaust tube and arbor thereby forming a solid mass of glass uniting these parts. A pair of clamping jaws (Fig. 4) located in the path of travel of the stem assembly are adapted to then press the fused glass so as to seal the leading-in conductors at this press portion 14.

According to my invention the clamping jaws 15, 16 are provided on their inner faces with matrices 17, 18 (Fig. 5) having bosses 19, 20 on their faces. The said bosses 19, 20 cause the portion of the stem press 14 between the lead wires 13 to be indented on both sides thereby producing a thin portion 21 and forcing the plastic glass to each side to provide more glass around the said lead wires 13. The matrix 17 is preferably also provided with a projection or lug 22 extending from the upper edge of the boss 19 which produces an indentation 23 (Fig. 2) in line with the exhaust tube 11 in accordance with the disclosure in Patent No. 1,659,613, Phelps et al. When air is forced into the exhaust tube by means of the jet 24 (Fig. 3) a blow-out occurs at this indentation 23 forming the aperture 25 as shown in Fig. 3. The thinning of the glass at 21 facilitates the development of the blow-out by reducing the pressure required. It is the practice to force air in around the exhaust tube by means of a jet 26 to round out the junction between the stem tube and exhaust tube and reduce strains.

The leading-in wires 13 shown in the drawing have three parts,—outer leads 27, press leads 28 having the same coefficient of expansion as glass, and inner leads 29. The press leads are butt welded at each end to ends of the outer and inner leads respectively. One of the advantages of thinning the stem press at 21 is that it insures a sufficient amount of glass at the points 30 around the welded joint between the press leads 28 and outer leads 27. This is particularly advantageous where the stem tube 10 is made of thin glass since it prevents the occurrence of exposed weld joints at these points. The squeezing out of the glass from between the lead wires prevents contracting or "bottle-necking" of the stem tube at the side portions 30. By thinning the press at 21 it cools more uniformly after the pressing operation than when it is evenly flattened in accordance with the present practice, thereby reducing the amount of strain in the glass.

Figs. 6 to 10 show a modification in which the press portion 14 of the stem is formed by a pair of matrices like the matrix 17 in Fig. 11. Each of said matrices is similar to matrix 17 shown 60

in Fig. 5 except the protuberances or lugs 22 are preferably made concave at the top rather than convex. The indentations 23 (Fig. 6) formed thereby at the upper edges of the thin portion 21 are correspondingly concave at the top. After the press portion has been formed a slug 31 (Fig. 7) is punched out of the thin portion 21 by means of a punch 32 and die 33, thus forming a hole 34 (Fig. 8) therein. Upon subsequent heating, the hole 34 is rounded off at the edges as shown in Fig. 9 and when air is forced into the exhaust tube 11 through the jet 24, the blow-out occurs at the top of said hole 34 forming the aperture 25 as shown in Fig. 10. The provision of the hole 34 in addition to the excess compressing of the press at 21 provides a still greater uniformity in the cooling of the press at the inside and outside portions thereof. It will be understood that instead of a pair of matrices of the type shown in Fig. 11, matrices of the type shown in Fig. 5 may be used in which case the aperture 25 (Fig. 10) will be blown at the side as in Fig. 3 instead of axially of the exhaust tube 11.

My invention is not limited to stems of the tipless type as shown in the drawing but of course may be applied in cases where the stem consists only of the stem tube 10 and lead wires 13, the press portion 14 in that case being formed from the glass of the said stem tube 10 alone.

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

1. The method of making stems for electric incandescent lamps and similar devices which consists in assembling a stem tube and a pair of leading-in conductors with the said conductors adjacent the inner wall of said stem tube and on opposite sides thereof, fusing a portion of said stem tube to produce a solid fused mass of glass closing off said tube and enclosing said leading-in conductors, clamping said mass about said conductors and compressing the portion thereof between said conductors to a greater extent than the remainder so as to force the glass thus compressed outward around said conductors and leave the portion of said mass of glass between said conductors of thinner cross-section than the portion around said conductors.

2. The method of making stems for electric incandescent lamps and similar devices which consists in assembling a stem tube and a pair of leading-in conductors with the said conductors adjacent the inner wall of said stem tube and on opposite sides thereof, fusing a portion of said stem tube to produce a solid fused mass of glass closing off said tube and enclosing said leading-in conductors, clamping said mass about said conductors and compressing the portion thereof between said conductors to a greater extent than the remainder so as to force the glass thus compressed outward around said conductors, the said mass thus being thinner in cross-section between said conductors than around them, and removing at least a portion of the thin section of said mass to leave an aperture between said conductors.

3. The method of making stems for electric incandescent lamps and similar devices which consists in assembling a stem tube, an exhaust tube and leading-in conductors with the exhaust tube inside of the stem tube and the leading-in conductors disposed between said tubes, fusing portions of said tubes together to produce a solid fused mass of glass closing off said tubes

and enclosing said leading-in conductors, clamping said mass about said conductors and compressing the portion thereof between said conductors to a greater extent than the remainder so as to force the glass thus compressed outward around said conductors and leave the portion of said mass of glass between said conductors of thinner cross-section than the portion around said conductors, and then blowing through said exhaust tube to form an aperture through said mass adjacent the more highly compressed portion thereof.

4. The method of making stems for electric incandescent lamps and similar devices which consists in assembling a stem tube, an exhaust tube and leading-in conductors with the exhaust tube inside of the stem tube and the leading-in conductors disposed between said tubes, fusing portions of said tubes together to produce a solid fused mass of glass closing off said tubes and enclosing said leading-in conductors, clamping said mass about said conductors and compressing the portion thereof between said conductors to a greater extent than the remainder so as to force the glass thus compressed outward around said conductors, the said mass thus being thinner in cross-section between said conductors than around them, and removing at least a portion of the thin section of said mass to leave an aperture between said conductors, and then blowing through said exhaust tube to form an aperture through said mass adjacent the first-mentioned aperture.

5. A stem for an electric incandescent lamp or similar device comprising a stem tube, leading-in conductors extending through said stem tube, a portion of said stem tube being fused and compressed around said conductors, the portion thereof between said conductors being compressed to a greater extent than the remainder and being thinner in cross-section than the outer portions surrounding said conductors.

6. A stem for an electric incandescent lamp or similar device comprising a stem tube, leading-in conductors extending through said stem tube, a portion of said stem tube being fused and compressed around said conductors, said fused and compressed portion having an aperture there-through transversely of said conductors.

7. A stem for an electric incandescent lamp or similar device comprising a stem tube, leading-in conductors extending through said stem tube, an exhaust tube contained within said stem tube, portions of said stem tube and exhaust tube being fused and compressed around said conductors, the portion thereof between said conductors being compressed to a greater extent than the remainder and being thinner in cross-section than the outer portions surrounding said conductors, and an aperture in said fused portion adjacent said thin portion and communicating with said exhaust tube.

8. A stem for an electric incandescent lamp or similar device comprising a stem tube, leading-in conductors extending through said stem tube, an exhaust tube contained within said stem tube, portions of said stem tube and exhaust tube being fused and compressed around said conductors, said fused and compressed portion having an aperture there-through transversely of said conductors, and another aperture in said fused portion adjacent said first-mentioned aperture and communicating with said exhaust tube.