

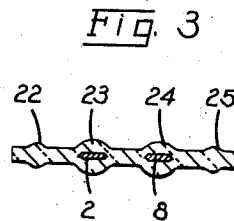
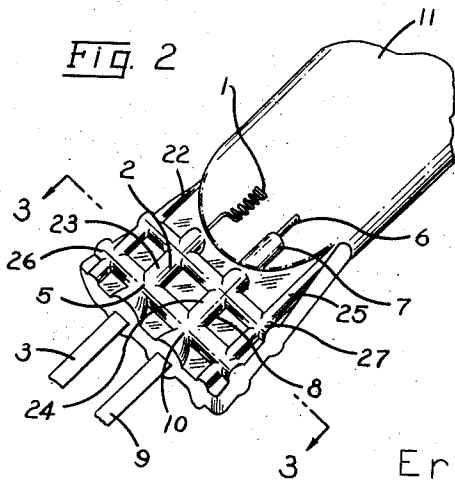
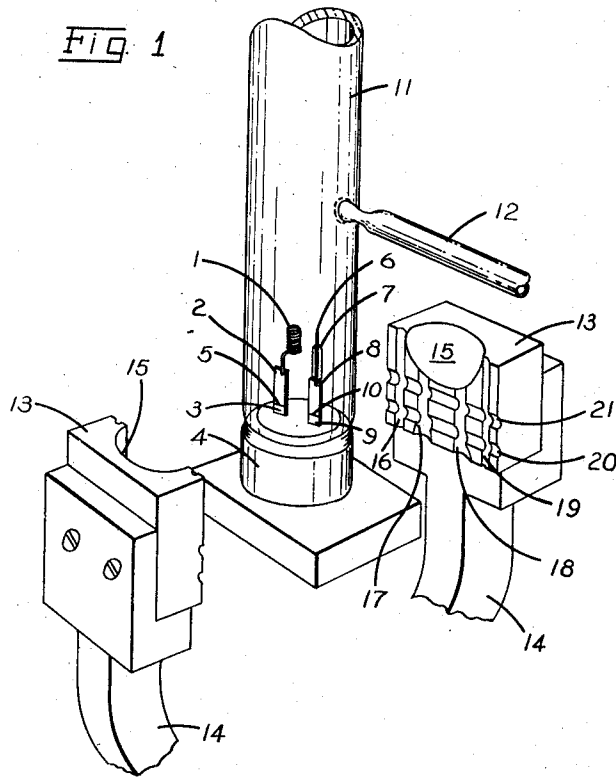
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QUARTZ-TO-METAL FOIL PRESS SEAL

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QUARTZ-TO-METAL FOIL PRESS SEAL

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1 Claim. (Cl. 49—92.5)

This invention relates to the manufacture of quartz-to-metal seals wherein at least one thin strip of metal, which may be connected at one or both ends to a stouter conductor, is supported within a tube of vitreous quartz which is softened by heat at the region of the strip and then pinched or pressed on to the faces of the strip to form a seal by squeezing the said region of the tube between a pair of opposed jaws which are arranged to approach each other at right angles to the plane of the strip. The invention relates also to electric discharge devices, especially high pressure metal vapor discharge lamps, having envelopes of quartz and comprising such seals; the tube and strip may be initially separate from the envelope of the device and the pinched tube subsequently sealed to the envelope, or the tube may initially form part of the envelope and the seal be formed in situ in the envelope.

In such manufactures it is often found that in pinching the quartz tube on to the thin strip of metal, splitting of the strip occurs which renders the seal useless, and the object of this invention is to provide a method and a means for reducing this difficulty. Other objects and advantages of the invention will appear from the following description.

According to the invention, in the manufacture of a quartz-to-metal seal of the kind referred to, the faces of the said pair of opposed jaws are each formed with one or more recesses at or adjacent to the part of the face which lies over the metal strip during the pinching operation.

I have found that by forming the pinching jaws in this way, the quartz of the tube enters the recesses during the pinching operation and this keys the adjacent regions of the quartz tube wall to the faces of the jaws and reduces the possibility of relative lateral movement occurring between the pinched-together sides of the tube, which movement might tear the thin strip as the sides of the tube are squeezed on to it.

Preferably each pinching jaw carries on its operative face an elongated, semi-cylindrical recess or groove which lies over at least the greater part of the length of the thin metal strip during the pinching operation; in this way it is arranged that the flow of quartz into the groove during the pinching operation effectively maintains the strip in compression and further reduces the possibility of it splitting. If there is a plurality of thin metal sealing strips the pinching jaws are preferably each formed with a corresponding plurality of grooves each arranged to lie over one of the strips.

Usually the thin metal strips lie parallel to the axis of the quartz tube, and the corresponding grooves in the pinching jaws, which may be referred to as longitudinal grooves, will then effectively prevent relative movement of the pinched-together sides of the tube at right angles to the axis of the tube, which is the movement most likely to occur.

For reducing movement of the pinched-together sides of the tube in the direction of the axis of the tube, pref-

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erably each face of the pinching jaws is formed with at least one shallow transverse groove arranged to lie at right angles to the tube axis, and hence to the longitudinal groove or grooves; if the thin metal strip is joined at one or both ends to a stouter conductor, preferably each junction is arranged to lie beneath one of the transverse grooves as well as beneath one of the longitudinal grooves; preferably also the longitudinal grooves extend with somewhat greater width and depth along the length of each stouter conductor within the pinch.

It will be appreciated that other grooves than those lying over the strip or strips and conductor or conductors may also be provided in the faces of the pinching jaws; for example, each face may carry a further pair of longitudinal grooves arranged one at each side of the face for controlling the outward spread of the quartz during the pinching operation, so as to improve the uniformity of the edge of the pinch.

In the drawing accompanying and forming part of the specification an embodiment of the invention, forming part of the manufacture of a tubular high pressure metal vapor electric discharge lamp, is shown schematically by way of example in which Fig. 1 is a perspective view of the relevant parts of a seal assembly prior to the pinching operation at the end of the tubular envelope of the lamp, Fig. 2 shows in perspective an enlarged view of the pinched or pressed seal obtained with the arrangement of Fig. 1, and Fig. 3 shows a section in the plane 3—3 of Fig. 2.

Referring to Fig. 1 of the drawing, an electrode lead or metal conductor assembly consisting of a tungsten wire helix 1 having its straight end welded to one end of a thin foil sealing strip 2, such as a molybdenum foil strip, which at its other end is welded to a stout tungsten or molybdenum strip conductor 3, is supported in the conical head of a jig-block 4 by the insertion of the conductor 3 in a slit in the jig-block, the junction 5 between the strip 2 and conductor 3 lying above the surface of the block. Similarly an auxiliary electrode lead or metal conductor assembly consisting of a straight tungsten wire section 6, surrounded by a thin quartz tube 7 and welded to one end of a thin sealing molybdenum foil strip section 8 which at its other end is welded to a stout tungsten or molybdenum strip conductor section 9, is supported in the jig-block 4 by the entry of the conductor 9 in a second slit in the jig-block so that the junction 10 between the conductor 9 and strip 8 lies above the surface of the block 4 at about the same level as the junction 5, the strips 2, 3, 8 and 9 all lying in the same plane so as to become embedded in the medial plane of the press as illustrated in Figs. 2 and 3.

Over the assembly and resting on the conical end of the block 4 is placed a quartz tube 11 which is provided with a side-stem 12 through which an inert gas, such as nitrogen, can be blown during the heating and pinching operations, the upper end of the tube (not shown) being closed by a stopper, or possibly by a previous pinch sealing of that end of the tube.

On either side of the assembly are pinch jaws arranged to approach at right angles to the plane of the strips 2, 3 to predetermined positions (the jig approach mechanism not being shown) and each consisting of a pinch block 13 screwed to a carrier 14. The operative face of each pinch block is formed at its upper edge with a part-spherical recess 15 (which recesses are adapted together to form a curved end to the tube 11), and each face is traversed by four longitudinal grooves 16, 17, 18, 19 and two transverse grooves 20, 21. The central two longitudinal grooves 17 and 18 are relatively wide and are placed so as to lie over the strips 2 and 7 respectively during the pinching operation, while the transverse grooves 20 and 21 are placed so as to lie over, respectively, the junctions

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5, 10 and the junctions between electrodes 1, 6 and strips 2, 8, respectively. The grooves 17 and 18 are slightly deepened and widened at their lower ends which are arranged to lie over the stout conductors 3 and 9 during the pinching operation.

In forming the seal the lower end of the tube 11 is heated to softness by oxy-hydrogen flames (not shown) while nitrogen is passed through the tube via the stem 12, and the pinch jaws are then firmly closed one or more times as required to press in the sides of the tube and form a pinch or press of the kind shown in Figs. 2 and 3, in which the same numerals represent the same parts as in Fig. 1.

During the pinching operation quartz enters the grooves 16, 17, 18, 19, 20 and 21 in the pinch blocks to form respectively the ridges or elongated embossments 22, 23, 24, 25, 26, and 27 in the completed seal. The grooves 17, 18, 19 and 20 serve to protect the strips 2, 8 and their junctions with the conductors at each end, while the grooves 16 and 19 serve to control the flow of quartz at the edge of the pinch to enable a substantially uniform edge to be obtained.

A similar pinch or press seal, possibly omitting the auxiliary electrode assembly, may be formed at the other end of the tube and the manufacture of the lamp completed in the usual manner.

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

A quartz-to-metal seal comprising a generally flat thin quartz press and a metal conductor extending through said

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press, said conductor having relatively stout end sections emerging from said press at either end joined to a thin metal foil center section completely embedded in and hermetically united with said press substantially in the medial plane thereof, said press being provided with embossments in the form of narrow ridges, one of said embossments being longitudinal to the press and overlying said conductor and others of said embossments being transverse to the press and overlying the junctures of the foil section with the end sections of said conductor, said embossments serving to limit plastic flow of quartz in molding the seal and to strengthen said press.

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