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A. BÜNGER
GLASSWORKING APPARATUS

2,334,604

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Fig. 1.

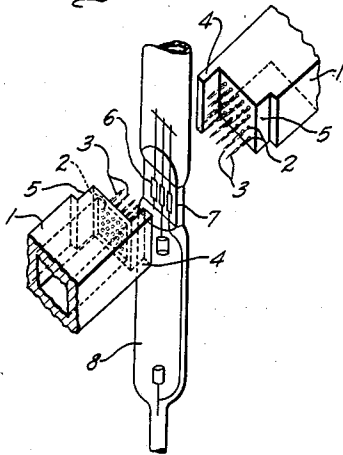


Fig. 3.

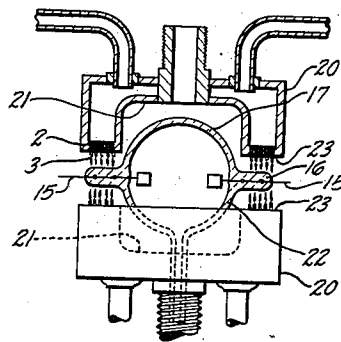


Fig. 2.

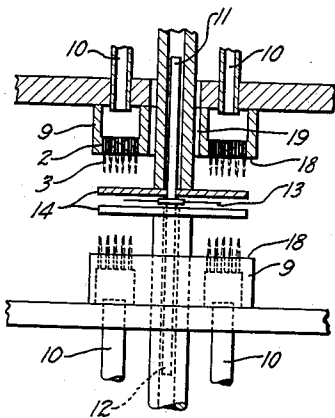
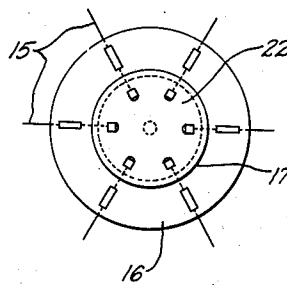


Fig. 4.



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UNITED STATES PATENT OFFICE

2,334,604

GLASSWORKING APPARATUS

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1 Claim. (Cl. 49—7)

My invention relates to apparatus for sealing metal conductors in vitreous material, such as quartz or glass, and more particularly to heating and pressing means for heating the vitreous material and pressing the same around the metal conductors.

Heretofore, when fusing conductors in quartz glass, it has been the practice to use molybdenum foil inserted in small quartz tubes, the tubes being evacuated and heated externally until the quartz glass was pressed, by the external air pressure, around the molybdenum foil. Such seals, however, remain airtight only when the metal foil is very thin, not more than 20 microns in any case.

According to the invention, it is possible to fuse metal foils or flat wires whose thickness is considerably more than 20 microns, for example 30 or 50 microns, in quartz glass or similar hard glasses having a small expansion coefficient, provided the quartz glass, softened by heating, is pressed against the conductor with a high mechanical pressure of, for example, 10 atmospheres. In order to prevent the softened quartz glass from being squeezed away from the seal by the pressing jaws, the latter are so designed that they surround all the free surfaces of the quartz glass during the pressing operation. In these pressing operations, in which the quartz glass has to be heated to about 2000° C., it is important to keep the quartz glass temperature from dropping during its contact with the pressing jaws. This is accomplished, according to the invention, by providing the working surfaces of the pressing jaws with holes for the heating flames, that is, the pressing jaws themselves are designed as burners. The jaws preferably consist of hollow metal bodies which are provided with gas connections, and whose facing walls are provided with burner holes.

The apparatus may be so designed that the heating flames will be extinguished, when the jaws are applied, either by shutting off the gas at the same time, or by the extinguishing action of the jaws themselves when pressed against the quartz glass. In the latter case, especially, the pressing operation is a direct continuation of the heating operation, two operations which, when using the old type of burner, always involved an intervening time lapse. The traces left upon the quartz glass by the fine burner perforations in the working surfaces of the jaws are of no importance; the finished seal shows only small elevations, which, from the technical point of view, are no drawback, and under cer-

tain conditions they even cause a desirable cooling of the seal, owing to an increase in the surface area. If necessary, however, these elevations may be avoided by inserting pins, during the pressing operation, into the holes until they are flush with the working surface; or they may be eliminated by smoothing the surface immediately after the operation.

Further features and advantages of my invention will appear from the following description of species thereof and from the accompanying drawing in which:

Fig. 1 is a fragmentary perspective view of apparatus comprising my invention; Fig. 2 is an elevation, partly in section, of a modification of my invention; Fig. 3 is an elevation, partly in section, of another modification; and Fig. 4 is a top view of a lamp having a seal produced by the apparatus shown in Fig. 3.

Referring to the drawing, the apparatus shown in Fig. 1 comprises a pair of hollow metal members or jaws 1, made of a metal having a high melting point, whose opposed faces have a large number of fine holes 2, say about 30 holes each, whose diameter is about 0.5 mm. at the central portion of the faces and about 0.7 mm. at the edge portions. The heating flames 3 come from these holes. Each jaw 1 is provided on one side with a rib or flange 4, and on the other side with a corresponding slot or recess 5, which are designed to interfit when the two jaws are closed so as to make it impossible for the quartz glass to flow out sideways, even when very high pressures are used. The drawing shows the sealing of three molybdenum wires 6, 30 microns thick and flattened out by rollers, in a tube extension 7 of a quartz-glass high-pressure vapor lamp 8. For the sake of clarity, the seal has been represented the way it looks when completed, i. e., after the fusing and pressing operations.

In the device according to Fig. 2, jaws 9 are used having the shape of hollow rings and provided with gas tubes 10. The jaws 9 are arranged to move towards and away from each other and are provided with a multiplicity of burner openings 2 in their opposing walls 18. This form of the invention is arranged to fuse and press a molybdenum disc 13 approximately 40 microns thick and welded onto current leads 11, 12, between quartz discs 14, 14. The leads 11, 12 extend in opposite directions from the molybdenum disc 13 and are received in the central openings 19 in the burners or pressing jaws 9.

The modification shown in Fig. 3 is similar to

that of Fig. 2 and comprises a pair of drum-shaped burners or jaws 20 having enlarged centrally-located recesses 21 in their opposing faces for the accommodation therein of the spherical portion 22 of a high-pressure lamp 17. The opposed annular walls 23 constituting the working surfaces of the jaws are provided with a multiplicity of burner openings 2 as in the previous forms of the invention. The combination burners and pressing jaws 20 are arranged to seal at least six radial current leads 15 between two annular flanges 16 on the bulb halves of the spherical high-pressure lamp 17, as shown in Fig. 4.

If desired, the apparatus according to the invention may also be used for sealing current leads in other kinds of glass, or simply for shaping glass or quartz bodies. The pressing jaws may have any desired shape; their working surfaces may be curved or angular. The desired heat action on the work may be easily achieved with the new device by the proper construction

and arrangement of the holes in the working surfaces, that is, by their number, position, diameter and direction. In order to prevent the harmful effects of mutual heating between the burners, they may be cooled by an outside water jacket.

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

Apparatus for heating and compressing vitreous material comprising a pair of movable hollow gas burner pressure jaws, the jaws having work engaging faces adapted to press against the vitreous material, and said faces being provided with a plurality of fine holes for the gas flames communicating with the interior of the hollow jaws, whereby the jaws serve both as burners and as mechanical compressing elements, said jaws being provided with conduits for conducting gas into the interior thereof and through said holes.

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