May 18, 1943 W. J. KNOCHEL ET AL 2,319,407

IGNITRON HEADER CONSTRUCTION

Filed Nov. 22, 1940

Fig. 1.

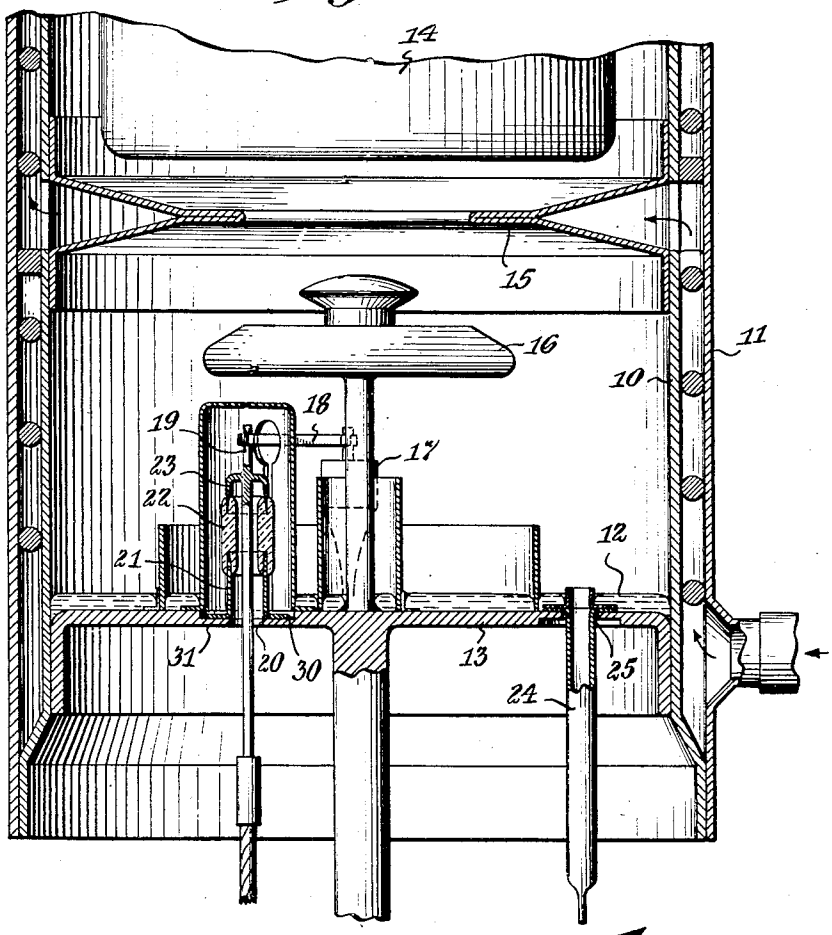


Fig. 3.

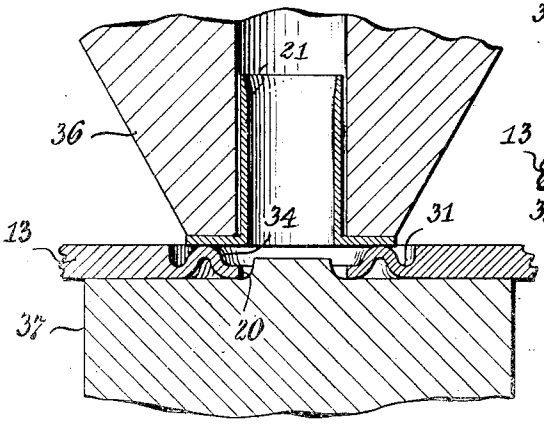
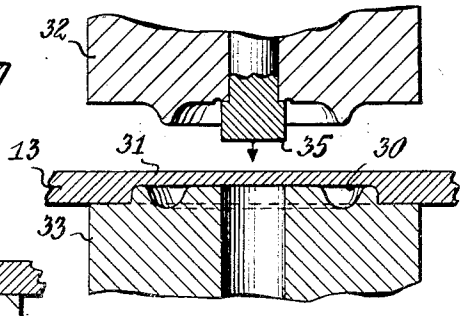


Fig. 2.



INVENTOR
W. J. KNOCHEL
D. E. MARSHALL
BY
ATTORNEY

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IGNITRON HEADER CONSTRUCTION

William J. Knochel, Irvington, and Donald E. Marshall, Allwood, N. J., assignors to Westinghouse Electric Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania

Application November 22, 1940, Serial No. 366,510

6 Claims. (Cl. 219—10)

Our invention relates to metal casing discharge devices, and particularly to the header construction in such devices.

An object of the invention is to provide a header having the strength of thick material headers and yet presenting no difficulties in projection welding of eyelets and other parts welded to the header.

Other objects and advantages of the invention will be apparent from the following description and drawing in which:

Fig. 1 is a cross section of part of a metal casing discharge device to which our invention has been applied.

Fig. 2 is a cross section illustrating a step in the preparation of the header.

Fig. 3 is a cross-sectional view illustrating the welding of an eyelet to the header in accordance with our invention.

Our invention is particularly applied to the metal casing discharge devices, and especially to that type in which a tip of high resistance material, such as boron and silicon carbide, is partially immersed in the mercury pool cathode to act as a make-alive for the discharge between the mercury pool cathode and the anode.

Heretofore, the metal casing of such devices has been of thick material. Various parts were attached to the walls of the device by welding. It was discovered that the thick material introduced difficulties with the projection welding of eyelets and other parts to the header. It was then proposed to make the material thin enough to stand projection welding and then to support the thin header with an additional strengthening member.

Our invention contemplates eliminating this additional step of providing a strengthening member and to utilize a single header member having substantially the strength of the thick material and yet presenting no difficulties in a projection welding eyelet and other parts to the header.

In Fig. 1 we have disclosed a portion of a discharge device to which we have applied our invention. This discharge device is more particularly described in our copending application, Ser. No. 358,474, filed September 26, 1940, for "Discharge device with water cooled baffles." This device comprises inner cylindrical walls 10 surrounded by a water jacket wall 11, and having a mercury pool cathode 12 resting on a header 13, closing the bottom portion of the device. An anode 14 is located in the upper portion of the device and has a connection passing through a header similar to the header 13. A water cooled baffle 15 projects from the wall of the device, and another baffle 16 intercepts all straight line paths between the mercury pool cathode 12 and the anode through the central opening of the water cooled baffle 15.

The boron and silicon carbide high resistance material 17 has its conical tip partially immersed in the mercury pool and is supported by an arm 18 welded to a connection 19, passing through an opening 20 in tne lower header. An eyelet 21 of a nickel-cobalt-iron alloy, sold under the trade-dark "Kovar," is welded to the upper portion of the header and has its upper cylindrical edge sealed in a cylinder of boron silicate glass 22, which in turn is sealed to a cylindrical flange 23 projecting from the make-alive conductor 19. A metal tubulation 24 is also welded to another portion of the header about an opening 25.

As previously mentioned, the header such as 13 was made of thick steel to provide strength. In welding the thin eyelet 21 to this thick steel material, difficulties were encountered in making a suitable vacuum-tight seat there-between. In order to eliminate the difficulties in connection with this welding, we first counterbore a small area 30 slightly larger than the foot of the eyelet in the upper portion of the header. This counterboring reduces the thickness of the header 13 at 31 surrounding the opening 20 to less than half the thickness of the header.

The next step is illustrated in Fig. 2. Two dies 32 and 33 are applied to the thin portion 31 to emboss it, preferably with a raised annular ring 34, illustrated in Fig. 3. If desired, the hole 20 can also be made in the header at this time by having a cutter projection 35 on one of the dies 32. The eyelet 21 of iron-nickel-cobalt alloy is then placed on the header with its foot resting upon the crest of the ring 34. A projection welding apparatus is then applied to the header and eyelet, and the jaw 36 of this apparatus is illustrated pressing the foot of the eyelet 21 down on the ring 34 to flatten it to the bottom wall of the header which is supported on the other jaw 37 of the welded apparatus.

The embossing and projection welding of the eyelet on this thin portion of the header insures a tight vacuum seal between the header and the eyelet and also presents no welding difficulties in view of the substantial equivalency in thickness of the two parts welded together. The main portion of the header, however, provides the strength needed by the header.

A similar construction may be used in apply-

ing the tubulation 24 to the header 13. A construction may be utilized in the connection to the anode 14 passing through the upper header which is similar to the connection 19 passing through the opening 20 in the lower header 13. The seal surrounding this anode connection is preferably on the outer portion of the header.

It is not intended to limit the application of the invention to the specific type of discharge device illustrated in Fig. 1. In fact, the invention may be applied to other modifications and, accordingly, we do not intend to limit the invention except as necessitated by the spirit and scope of the following claims.

We claim:

1. The method of welding together a pair of metal members of which one member is relatively thick, comprising counterboring an area in said thick member slightly bigger than the area to be welded thereto of the second member, said counterboring thinning the thick metal at the area to be welded, said thinning being continued until said area is substantially as thin as the part of the other member to be welded thereto, and welding the second member to the said thick member against the thinned portion of the thick member.

2. The method of welding together a pair of metal members of which one member is relatively thick, comprising counterboring an area in said thick member slightly bigger than the area to be welded thereto of the second member, said counterboring thinning the thick metal at the area to be welded, said thinning being continued until said area is substantially as thin as the part of the other member to be welded thereto, embossing the thinned area, and welding the second member against the embossed thinned portion of said thick member.

3. The method of welding together a flanged eyelet and a relatively thick member, comprising counterboring and centrally punching an area in said thick member and forming a depression therein slightly bigger than the flange area of the eyelet, said counterboring thinning the thick metal to provide a thinned portion of substantially the same area and thickness as the said flange of the eyelet, embossing an annular area of the thinned portion of substantially the area of the flange of the eyelet, and welding the flange of the eyelet to the thinned embossed portion of the thick member.

4. The method of welding together a flanged eyelet and a relatively thick member, comprising counterboring an area in said thick member and forming a depression therein slightly bigger than the flange of the eyelet, said counterboring thinning the thick metal to provide a thinned portion, punching an opening through the thinned portion at a mid-part thereof, embossing an annular ring portion of the thinned portion surrounding the punched opening, and welding the said flange of said eyelet to said annular embossed thinned portion while simultaneously temporarily closing the punched opening and eyelet, thereby preventing the welding from materially altering the size and shape of openings in said member and eyelet.

5. A welded structure comprising an eyelet having a flange at the end thereof, a relatively thick member having a counterbored area slightly bigger than the area of the flange, the bottom of said counterbored area being thinned with respect to the adjacent surrounding portion of the member to a thickness substantially equal to the thickness of the flange of the eyelet, and said eyelet having its flange within said counterbore and welded to the thinned area at the bottom thereof.

6. A welded structure comprising an eyelet having a flange at the end thereof, a relatively thick member having a counterbored area slightly bigger than the area of the flange, the bottom of said counterbored area being thinned with respect to the adjacent surrounding portion of the member to a thickness substantially equal to the thickness of the flange of the eyelet, said thinned area having a central hole therethrough, and said eyelet projecting through said hole and having its flange welded to the thinned area on the face thereof opposed to the counterbore.

WILLIAM J. KNOCHEL.
DONALD E. MARSHALL.