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A. KAUFFELDT
SEAL FOR ELECTRON DISCHARGE DEVICES

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Fig. 1

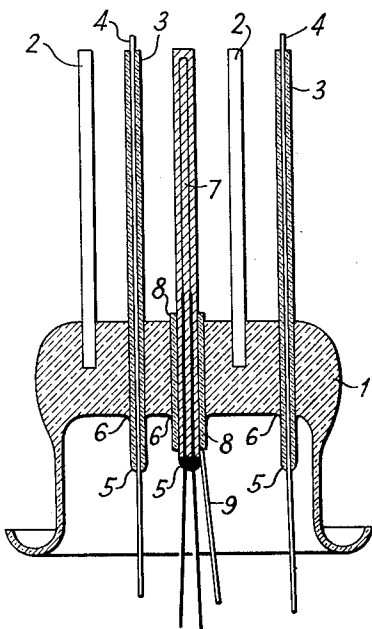


Fig. 2

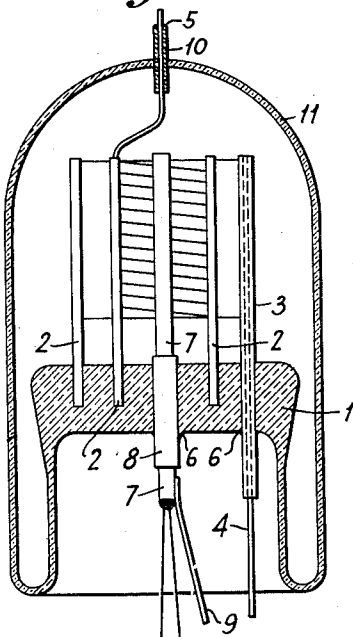
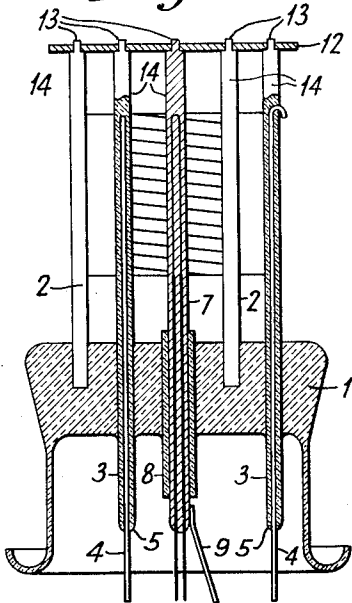


Fig. 3



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SEAL FOR ELECTRON DISCHARGE DEVICES

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4 Claims. (Cl. 250—27.5)

This invention relates to lead-in seals for elec-
tron discharge devices, particularly to seals for
reducing electrical losses in insulating parts of
the device between energized metallic members.

It has been found that considerable energy may
be dissipated and destructive electrolytic action
may take place in the glass press of a discharge
device, especially at high frequencies. In ac-
cordanance with the invention, lead-in conductors
are passed through ceramic tubings which are
passed through and sealed gas-tight in the press.
The metal conductors are sealed vacuum-tight in
the ceramic tubes in the known manner, prefer-
ably at the bottom end of the tubes and outside
the press. It is also advantageous to enclose
the conductors in ceramic tubes when they are
sealed into the envelope at points removed from
the press. The ceramic tubes may conveniently
be extended inwardly and employed to support
electrodes within the envelope.

The novel features which are believed to be
characteristic of my invention are set forth with
particularity in the appended claims, but the in-
vention itself will best be understood by reference
to the following description taken in connection
with the accompanying drawing in which the
three figures are sectional views of electron dis-
charge devices embodying the invention.

The invention is applicable to many types of
electron discharge devices, some of which will
be described in connection with the drawing. In
Figure 1 is shown a conventional form of press
at 1, and at 2 are electrode supporting posts
which may be ceramic rods embedded at their
lower ends in the press. According to the in-
vention, lead-in conductors 4 are sealed vacuum
tight in ceramic tubes 3 at the places 5. The
ceramic tubes in turn are fused vacuum tight in
the glass press at the places 6. Layers of flux
or glass or the like may, if desired, be interposed
between the metal conductors and the ceramic to
facilitate sealing. In case of indirectly heated
cathodes 7 it is advisable to pass these through
the press with enclosing short ceramic tubing 8
separating the cathode carrier from the glass of
the press. The ceramic tubing 8 may be soldered
or sealed to the cathode carrier in any desired
manner, leaving at the bottom sufficient room
for the cathode lead-in 9.

Figure 2 shows an electron discharge device in
which the anode lead-in conductor is passed
through the glass press in the usual manner,
while the grid lead is brought in through a cer-
amic tube 10 at the top of envelope 11, in order

to maintain the grid-anode capacity as low as
possible.

A further modification represented in Figure 3
shows all lead-ins brought in through the press
in ceramic tubes which extend inwardly to form
electrode supporting means. A spacer plate 12,
which may advantageously be of metal, is fitted
to the notched ends 13 of the ceramic posts or
extensions 14 of the tubes. The metal plate
12 may take the place of the usual insulating
spacers used with metal posts. Since the posts
may be made of insulating material, and the
spacers of metal, the holes in the spacers can
be accurately formed. To minimize inter-elec-
trode capacities, it has been found desirable to
bring the lead-in conductor out through the side
of the ceramic tube short of its inner end. In
place of the metal plate 12, a plate of the usual
insulating materials such as ceramic or mica
may of course be employed. The metal plates
as well as the insulating plates may be rigidly
connected with the ceramic posts in accordance
with any of the known methods. Ceramic
spacers have the advantage of small heat expan-
sion. Other bridges or spacers may be provided
at the lower end of the electrode system.

According to this invention the metal lead-in
conductors may be provided with a more or less
thick layer or coating of ceramic material which
may be applied in a manner known in the manu-
facture of indirectly heated cathodes. To fur-
ther reduce the detrimental influence of the dif-
ferent heat expansion coefficients of ceramic ma-
terial and metal, the lead-in conductor may be
formed as a thin metal wire wound into a helix
coated with ceramic material and sealed gas-
tight in the envelope.

Alternatively the metallic conductors may also
be produced by metallizing the inside of the cer-
amic tubings.

The characteristic features of this invention
may advantageously be employed in the construc-
tion of gaseous discharge devices, in which it is
often necessary to surround with an insulator an
electrode supply line passing through the dis-
charge space, so as to prevent discharge thereat.
An electrode assembly may be constructed that is
extremely rigid and substantially free of changes
in electrode spacing caused by temperature vari-
ations.

I claim:

1. An electron discharge device comprising an
envelope with a reentrant stem and a press, elec-
trodes in said envelope, lead-in conductors con-
nected to said electrodes and means for sealing

said conductors gas tight in said envelope comprising ceramic tubes extending through said envelope, said conductors extending through said tubes and sealed therein, and a cathode sleeve 5 embedded at one end in said press, a ceramic tube surrounding the embedded end of said cathode and sealed gas tight to the cathode and to the press.

10 2. An electron discharge device comprising an envelope with a reentrant stem and a press, electrodes in said envelope, lead-in conductors connected to said electrodes and sealed gas tight in ceramic tubes, said tubes extending into the in-

terior of said envelope and mechanically secured to the electrodes, spacer means attached to the inner ends of the tubes to hold the electrodes in cooperative spaced relation.

3. An electron discharge device with electrode supporting tubes as defined in claim 2, joined 5 at their inner ends by a metal spacer.

4. An electron discharge device as defined in claim 2, with the lead-in conductors extending 10 through the sides of the tubes short of the inner ends of the tubes where the spacer means is attached and connected to the electrodes.

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