

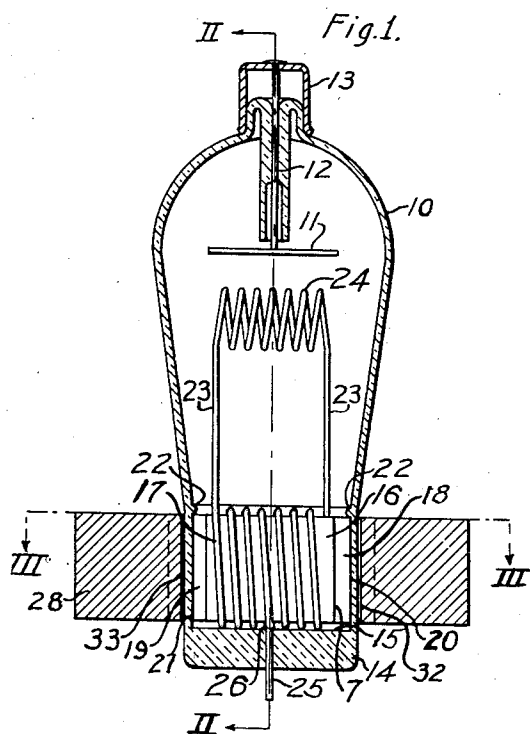
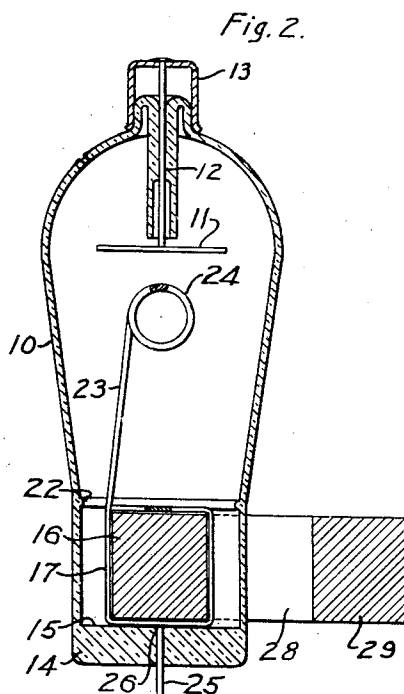
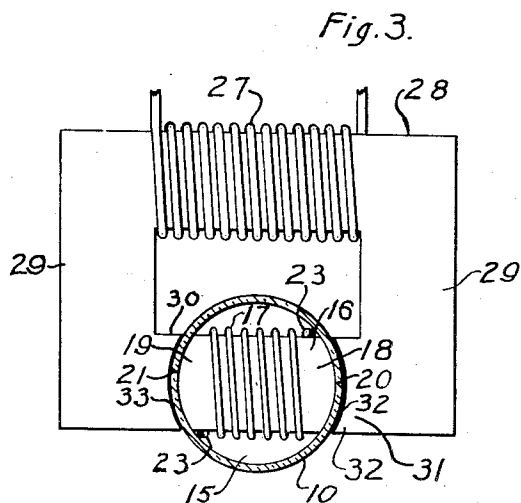
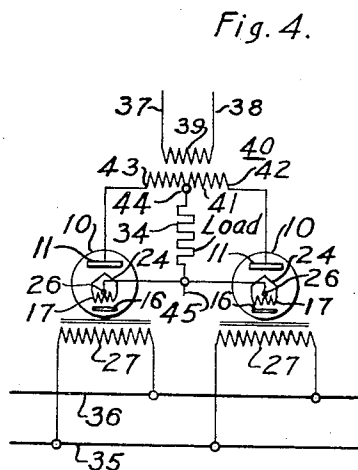
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2,147,429

CATHODE INDUCTIVE HEATING CIRCUIT

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CATHODE INDUCTIVE HEATING CIRCUIT

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4 Claims. (Cl. 250—27.5)

My invention relates to electron discharge de-
vices and especially to the cathode heating cir-
cuit for said electron discharge devices.

5 An object of my invention is to provide cathode
excitation for an electron tube where a high cur-
rent at low voltage is required for the filament.

Another object of my invention is to eliminate
as far as possible seals through the glass casing
of discharge devices of conductors carrying high
10 currents.

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

15 Figure 1 is a view in cross-section through a
discharge device embodying my invention;

Fig. 2 is a view in section taken on lines II—II
of Fig. 1;

Fig. 3 is a view in cross-section taken on line
III—III of Fig. 1; and

20 Fig. 4 is a diagrammatic illustration of a circuit
embodying my invention.

In certain types of tube installations, a cath-
ode is required having an excitation at high cur-
rent, but at very low voltage. Such a require-
25 ment may, for instance, be for a current of 15 to
20 amperes at 2 to 2½ volts. Such a device pre-
sents a problem of sealing current leads through
the casing that will operate at the small voltage
and yet be able to withstand the high current
30 therethrough. This problem is especially acute
where the tube design has to be restricted to a
small volume. In accordance with my inven-
tion, I incorporate in the container itself an
inductive winding connected to the cathode and
35 adapted to excite the cathode by means of a pri-
mary winding on the exterior of the casing.

In Figs. 1 through 3, I have disclosed a pre-
ferred embodiment of my invention in which the
container 10 is preferably of the usual glass ma-
40 terial forming the container wall. The anode 11,
which may be of any desired form, is located
within the container and has a conductive lead
12 secured through the container to the contact
cap 13. The bottom 14 of the container 10 is
45 preferably of thick glass and also preferably has
a flat interior surface 15. In the bottom portion
of the container is a core 16 of high permeability
iron. Surrounding this core are a plurality of
turns 17 of an inductive winding. The core and
50 windings are adapted to rest on the flat bottom
portion 15 of the tube. The ends 18 and 19 of the
core are preferably shaped so as to fit rather
closely with the adjacent walls of the container
20 and 21, respectively, and to conform thereto
55 in contour. If desired, projections 22 from the

container wall may be located just above the
upper edge of the core to keep it in position in the
container. Standards 23 are preferably connect-
ed with the ends of the core and these standards
support and are connected to the cathode 24. 5
This cathode may be of any suitable type, but I
prefer to utilize a coiled filament as shown and
preferably to coat it with strontium and barium
oxide. The cathode connection 25 for the anode-
cathode current I prefer to seal through the bot-
10 tom portion 14 of the tube to the mid-point 26 of
the inductive windings 17. Other points of con-
nection, of course, may be utilized, if desired.

The primary winding 27 on the exterior portion
of the casing I prefer to mount on a core 28 of 15
high permeability iron. This core is preferably
of a yoke-shape having legs 29 with two pro-
jections 30 and 31 adapted to fit closely about the
bottom portion of the glass container 10 and to
have their adjacent edges 32 and 33 spaced from 20
the edges 18 and 19 of the interior core but very
little more than the wall of the container.

The number of turns illustrated in these figures
are not obviously to scale. As a preferred illus-
tration and not in a limiting sense, the number 25
of turns on winding 27 or a 110-volt circuit might
be 660 turns, and the turns on the winding 17
would be twelve if approximately 2 volts were
desired in the cathode heating circuit. The ex-
30 terior core could be moved away from the in-
terior core if such adjustment is desired.

In Fig. 4, I have illustrated two tube devices
connected in a preferred circuit to provide full-
wave rectification for a load 34. The energy for
the cathode excitation is derived from lines 35 35
and 36 and apply to the coils 27 which are in in-
ductive relation with the coils 17 within the tube
10. The energy or the cathode-anode circuit is
derived from lines 37 and 38 connected to the
primary 39 of a transformer 40 having its second-
40 ary winding 41 with its ends 42 and 43 connected
to the anodes 11 and its mid-point 44 connected
to one end of the load 34. The other end of the
load is connected to the connection 45 extending
45 from one cathode circuit 26 to the other cathode
circuit of the other tube.

It will be noted that by my construction I pro-
vide a high amperage heating current for the
cathode at very low voltage and yet the con-
tainer merely has two leads therethrough for the 50
anode and the cathode connections. It is ap-
parent, of course, that additional electrodes, such
as the ordinary control grid or additional well
known types of auxiliary electrodes, may also be
incorporated in these tubes.

Many other modifications may be made in the preferred embodiment of my device and accordingly I desire only such limitations to be imposed on the following claims as is necessitated by the prior art.

5 I claim as my invention:

10 1. An electron discharge device comprising a container, an anode and cathode within said container, a magnetic core made of two separate units, one of said units being wholly contained within the walls of said container, a heating circuit for said cathode comprising a secondary winding within said container connected to said cathode and linking the last-mentioned one of
15 said units.

20 2. An electron discharge device comprising a container, an anode and cathode within said container, a magnetic core made of two separate units, one of said units being wholly contained within the walls of said container, a heating circuit for said cathode comprising a secondary winding on the last-mentioned unit and con-

nected to said cathode, and a primary winding outside said walls.

3. An electron discharge device comprising a container, an anode and cathode within said container, a magnetic core made of two separate units, one of said units being wholly contained within the walls of said container, a heating circuit for said cathode comprising a secondary winding on the last-mentioned unit and connected to said cathode, and a primary winding outside said walls, the other said unit being linked by said primary winding, and having ends adapted to fit closely said walls opposite the ends of the core within the tube.

4. A discharge device comprising a container, a metal core wholly contained within the walls of said container, an inductive winding on said core, a cathode having its ends connected to said inductive winding and an anode cooperating with said cathode.

WILLIAM F. EAMES.