

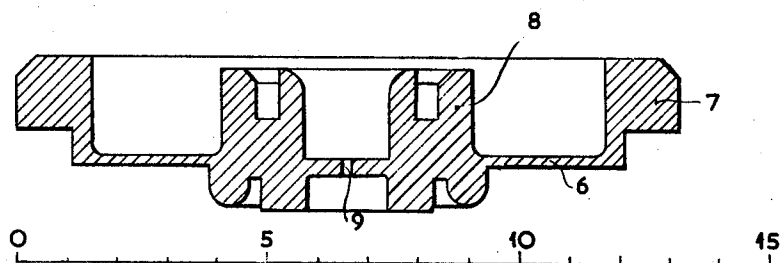
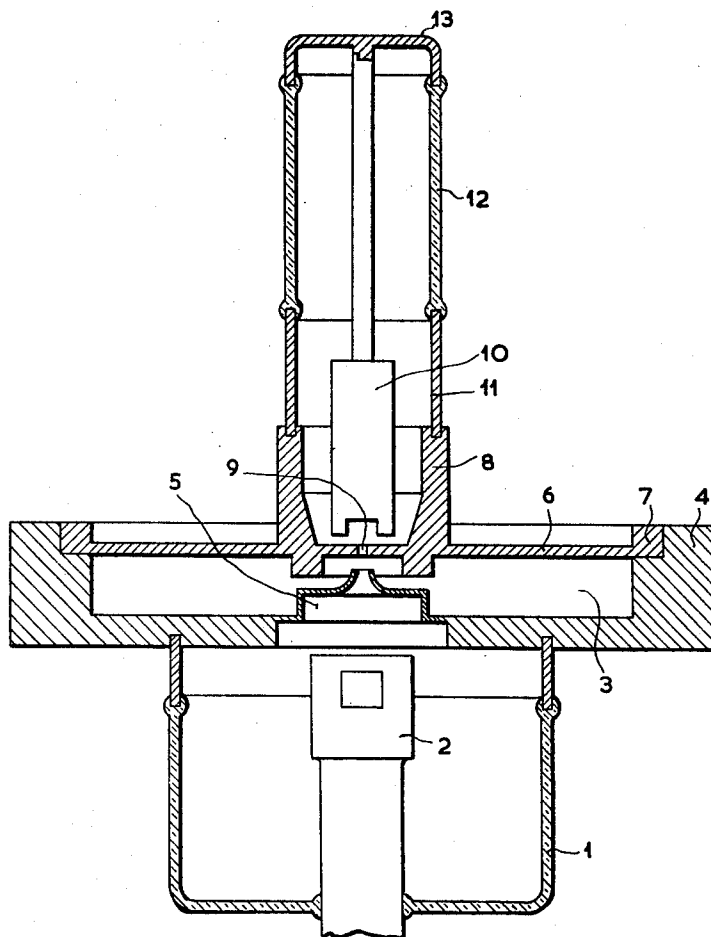
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3,060,342

REFLEX KLYSTRON HAVING A CAVITY RESONATOR WITH A MOVABLE WALL

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3,060,342
REFLEX KLYSTRON HAVING A CAVITY RESONATOR WITH A MOVABLE WALL
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4 Claims. (Cl. 315—5.22)

This invention relates to reflex klystrons, the reflector portion of which is secured to a movable wall of the cavity resonator which can be adjusted for controlling the natural frequency of the klystron.

It is common practice for the movable wall to be constituted by a diaphragm which is obtained by drawing and cold deforming sheet metal in templates. The diaphragm is soldered in position in the rigid portion of the wall of the cavity resonator, the reflector portion likewise being soldered to the diaphragm.

The known structure has the disadvantage that cracks are liable to occur in the being diaphragm drawn, whilst the diaphragm readily becomes brittle due to the solder flowing on too far and breaks off as a result of the rather considerable deformation which occurs in changing the frequency of a klystron. The length of life expressed in the number of possible changes of frequency is thus small.

An object of the invention is to provide a structure which affords advantages with respect to the known type.

According to the invention, in a reflex klystron, the reflector portion of which is secured to a movable wall of the cavity resonator which can be moved for adjusting the natural frequency of the reflex klystron, the movable wall comprises a thin annular portion not obtained by drawing, having a solid edge which is secured by soldering to a portion of the cavity resonator which is not movable, whilst at the centre of the annular portion around the aperture to allow the passage of the electron beam there is provided a rigid cylindrical portion to which the reflector portion is soldered, the two solid portions and the sheet metal portion being manufactured from one piece of material. The soldered edges may readily be shaped so that solder does not flow on to the thin portion, nor to the aperture for the passage of the electron beam. According to the invention, the diaphragm with its two solid portions is preferably manufactured by turning from one piece of material. Manufacture by moulding is also possible.

In order that the invention may be readily carried into effect, one embodiment will now be described in detail, by way of example, with reference to the accompanying drawing, in which:

FIG. 1 shows a reflex klystron having a cavity resonator with a movable wall according to the invention, and

FIG. 2 shows, on an enlarged scale, the separate wall portion before being soldered in position.

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In the figures, reference numeral 1 indicates the base of a bulb in which an electron gun 2 is arranged. A resonant cavity 3 is provided between a solid wall 4, a thin wall 5 matched to the electron gun, and a movable wall portion 6. The movable wall portion 6 is soldered by means of a thick edge 7 to the solid wall 4. A cylindrical extension 8, which is likewise solid, surrounds an aperture 9 to allow the passage of the electron beam. This beam is reflected by a reflector 10, which is supported by a structure comprising a fernico-cylinder which is soldered in position in a groove of extension 8. The fernico-cylinder 11 supports a glass cylinder 12 and a fernico-sleeve 13, to which the reflector 10 is secured. The soldering groove in 8 and the solid edge 7 are bevelled to accommodate a ring of solder. The dimensions of the diaphragm follow from the graduation in millimetres shown in FIG. 2. In this connection, it may be mentioned that the portion 6 is 0.20 mm. thick and the opening 9 has a diameter of 0.25 mm.

What is claimed is:

1. A reflex klystron comprising an envelope, an electron gun within a first portion said envelope, a first wall closing one end of said first envelope portion and having an aperture therein for the passage of an electron beam, a moveable wall spaced from and secured to said first wall, said moveable wall having an aperture therein aligned with the aperture in the first-mentioned wall for the passage of the electron beam, said walls together defining a resonant cavity, a second envelope portion secured to said moveable wall, and a reflector within said second envelope portion positioned to intercept and reflect the electron beam, said moveable wall comprising a thin annular portion of mechanically undeformed material having a rigid edge secured to said first wall portion and a rigid cylindrical portion surrounding said aperture to which the reflector is secured.

2. A reflex klystron as claimed in claim 1 in which the rigid edge is secured to the first wall portion by solder and the reflector is secured to the rigid cylindrical portion by solder, the edges of moveable wall portion which secure the same to the first wall portion and the collector being provided with grooves to prevent the flow of solder over the moveable wall.

3. A reflex klystron as claimed in claim 2 in which the moveable wall is a moulded material.

4. A reflex klystron as claimed in claim 2 in which the moveable wall is a machined piece of material.

References Cited in the file of this patent

UNITED STATES PATENTS

2,420,314	Hansen	May 13, 1947
2,451,813	Dickerson	Oct. 19, 1948
2,874,327	La Plante	Feb. 17, 1959

FOREIGN PATENTS

625,259	Great Britain	June 24, 1949
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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,060,342

October 23, 1962

Hendrikus Wilhelmus van der Voorn et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the heading to the printed specification, after line 8, insert the following:

Claims priority, application Netherlands Nov. 20, 1958

Signed and sealed this 8th day of October 1963.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

EDWIN L. REYNOLDS
Acting Commissioner of Patents