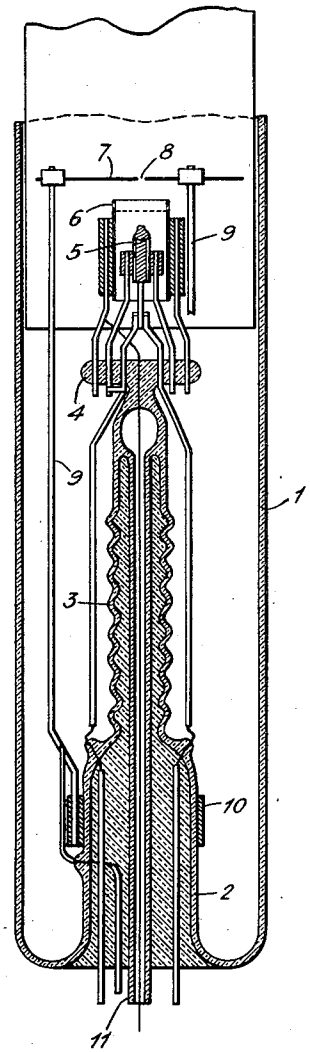
April 27, 1937. M. KNOLL 2,078,449

BRAUN CATHODE RAY TUBE

Filed March 6, 1934



INVENTOR
MAX KNOLL
BY W. G. Howell
ATTORNEY

Patented Apr. 27, 1937 2,078,449

UNITED STATES PATENT OFFICE

2,078,449

BRAUN CATHODE-RAY TUBE

Max Knoll, Berlin, Germany, assignor to Telefunken Gesellschaft für Drahtlose Telegraphie m. b. H., Berlin, Germany, a corporation of Germany

Application March 6, 1934, Serial No. 714,262
In Germany March 11, 1933

3 Claims. (Cl. 250—27.5)

In cathode-ray tubes in which for the generation of a sharply focussed luminous spot of reduced dimensions a narrow pencil of cathode-rays is produced upon a fluorescent screen, one chief desideratum consists in extremely exactly centering of the electrode mounting inside the discharge space in order that the cathode-ray pencil may be caused to pass through the narrow aperture of the anode or other diaphragms without appreciable losses. In oscillographs recourse has often been had to other means in order that, even during actual operation, the operator may be enabled to insure exact centering of the electrodes in a way and for a purpose as above indicated. Among these belong devices adapted to insure movement or shifting of the electrodes inside the vacuous space by electrostatic or magnetic auxiliary field for the object of adjusting the cathode-ray pencil.

For Braun tubes which are to be used as receiver tubes for television work means of the said sort are not serviceable, indeed, it is absolutely imperative that the proper centering should be secured once for all after completion of the tube without the provision or use of any special auxiliaries.

According to this invention this is accomplishable in a very simple and reliable manner by having the electrode system for the production of cathode-rays, that is to say, the cathode, and optionally also focusing electrodes such as the so-called Wehnelt cylinder, so supported inside the neck of the tube by the aid of an elastic or springy intermediate link that slight shifting in reference to the anode or to the diaphragms is feasible with a view to securing exact centering. Once exact centering has been effected the electrode system may be locked into final position. Such an elastic link most suitably consists of a corrugated glass tube or stem which supports on a suitable foot or press the whole electrode system, and which for insuring centered position is filled with a hardening compound or cementing mass.

One embodiment of the invention is shown by way of example in the drawing which forms a part of this application. The cylindrical glass envelope 1 of the Braun tube is provided with an inverted glass stem portion 2 to the inner end of which a corrugated glass tube 3 is connected. The latter has a glass foot or press 4 at its inner end on which are supported the indirectly heated cathode 5 and the Wehnelt cylinder 6. The anode 7 having a narrow aperture 8 is supported by the aid of three stays or brace members 9 (only 2 being shown) by means of the ring 10 clamped onto the glass stem 2. In the neighborhood of the glass foot or press 4, interiorly of the corrugated glass tube 3 is welded by fusion a glass rod 11 which projects outwardly. The centering of the electrode system 5, 6, in reference to the aperture 8 of the diaphragm 7 may be effected by the aid of this glass rod 11 with which a suitable centering device is engaged. After centering has been perfected, by observing the spot thrown on the fluorescent screen, the glass stem 2 and the adjoining corrugated glass tube 3 may be filled with a mass or substance which after solidification insures final fixing of the system. In this manner it is feasible to manufacture on a large scale Braun tubes for television work whose electron-ray pencils are in no need of adjustment when in use.

What I claim is:

1. An electron discharge tube comprising an envelope provided with a reentrant stem, said stem having a relatively rigid portion and a corrugated portion capable of relative movement and adjustment with respect to the rigid portion, an electrode rigidly and independently supported from each of said stem portions, means attached to the corrugated portion and extending outside the envelope whereby the stem portions and thereby the electrodes supported therefrom, may be adjustably positioned with respect to one another, and means cooperating with said stem portions to maintain them in fixed adjustable position, said last mentioned means comprising a molten mass which solidifies after the above mentioned adjustment has been made.

2. A Braun cathode-ray tube comprising a cathode, a cooperating electrode provided with an aperture, and means for aligning the cathode with the electrode aperture, said means comprising a stem having a relatively rigid portion which supports one of said electrodes and a flexible portion which supports the other of said electrodes, and a member attached to the flexible portion and extending through the stem for adjusting said portion with respect to the rigid portion to said position that the cathode and the electrode aperture will be in alignment.

3. A Braun cathode-ray tube comprising a cathode, a cooperating electrode provided with an aperture, and means for aligning the cathode with the electrode aperture, said means comprising a stem having a relatively rigid portion which supports one of said electrodes and a flexible portion which supports the other of said electrodes, a member attached to the flexible portion and extending through the stem for adjusting said portion with respect to the rigid portion to said position that the cathode and the electrode aperture will be in alignment, and a molten mass introduced into the stem which upon solidifying causes the adjustment to be permanently maintained.

MAX KNOLL.