

The invention relates to a process for producing a heating filament for a cathode of an electron gun for a cathode-ray tube, especially for a colour television tube, and to such a gun.

5 The television receiver is an appliance of domestic use in which it is preferable to have a low consumption of electrical energy. In such an appliance, some of the energy is consumed by the electron guns of the cathode-ray tube, more especially by the heating filaments of the cathode.

10 Moreover, since television tubes are mass produced, this reduction in consumption must not be achieved at the expense of an increase in production complexity.

15 Nor must the reduction in the energy consumption give rise to disadvantages in operational terms, such as an increase in the heating time of the cathodes or a reduction of the temperature of these.

20 The invention makes it possible to provide an electron gun with a low consumption of electrical energy, simple to produce and with a short cathode heating time.

25 It relates to a process for producing a heating filament for an electron gun, according to which the starting point is a core consisting of a wire made of a metal of low electrical resistance, elementary turns of a resistance wire of smaller diameter are wound round this core, lugs and/at [sic] most two active turns of the filament are formed, the elementary turns of each active turn are insulated, the core is made to disappear inside the active turns, and the core is retained in the lugs which short-circuit the elementary turns of the resistance wire. To avoid any confusion, it is stated specifically here that each turn, limited in number, of the active part is formed from a large number of elementary turns.

30 Since the lugs are short-circuited, electrical energy is consumed only by the turns of spirally-wound wire which are located near the surface to be heated. Moreover, since the number of turns is limited to at most two, the distance between the active part of the heating

filament and the emitting surface of the cathode is reduced to a minimum, thereby reducing the heat losses; the spiral arrangement of the wire makes it possible to obtain a high heating resistance in a small volume and also brings about a decrease in the losses. Furthermore, it has been found that the consumption of electrical energy decreases in a surprising way with a filament so shaped, even without providing any thermal insulation of the cathode to be heated. Thus, in one embodiment, the electron gun is fastened to two tabs, forming the longitudinal fixture of the gun/electrode assembly of the tube, by means of metal lugs which are therefore not heat-insulating.

Another advantage of the invention is that the lugs of the heating filament are rigid, that they can be welded easily and that their electrical resistance is independent of their length.

The resistance wire is made, for example, of tungsten and the core of molybdenum.

It is true that there has already been provided (US Patent 3,280,252) a process for producing a heating filament, in which the starting point is a core consisting of molybdenum wire, the tungsten turns are wound round this core, the turns are insulated and the core is made to disappear by chemical attack. But this process, which, in particular, makes use of a plurality of turns, does not allow the reduction in the losses obtained with the present invention.

Other characteristics and advantages of the invention will emerge from the description of some of its embodiments, this being made with reference to the accompanying drawings in which;

- Figure 1 is a diagram of a cathode and of the filament of an electron gun according to the invention,

- Figure 2 is a diagram showing part of a connecting lug of the filament of Figure 1.

- Figure 3 is a diagram on an enlarged scale of part of the turn of the heating filament of Figure 1.

because no special precaution has been taken to insulate the cathode 13 thermally from the other parts of the electron gun. Thus, in the example of Figure 5, the cathode 13 is arranged in a metal receptacle 31 which is connected to two longitudinal fixtures 32 and 33 by means of metal lugs 34. The two fixtures 32 and 33 also support the other electrodes of the electron gun (only the Wehnelt cylinder 35 has been shown in Figure 5). A low consumption has also been obtained with other prior forms of construction, but at the expense of complicating the production with a high degree of thermal insulation of the cathode; in particular, in these prior forms of construction, the lugs for connection to the fixtures are made of insulating material, especially ceramic.

Furthermore, it was found that, despite the small interval p between two elementary turns 30, of the order of 3% of the diameter of the turn 21 or 22, it was possible to ensure, with conventional production techniques (those described in relation to Figure 4 particularly), that these elementary turns 30 do not come in contact with one another, the result of which would be to reduce the electrical resistance of the heating filament.

The small area of the active surface 12 of the cathode, the low electrical resistance of the lugs 23 and 24 and the concentration of electrical energy as near as possible to the surface 12 are particular contributing factors to the low consumption of electrical energy. Moreover, with the filament produced in the way described above, the lugs 23 and 24 can easily be welded in order to connect them electrically to the power supply. Finally, the core 25 of the lugs 23 and 24 makes these rigid. The lugs are thus welded directly to terminal strips, and because of the rigidity the lugs are easily mounted parallel to one another.

CLAIMS:

1. Process for producing a heating filament for an electron gun, according to which the starting point is a core (25) consisting of a wire made of a metal of low electrical resistance, elementary turns (30) of a resistance wire (26) of smaller diameter are wound round this core (25), the lugs (23, 24) and at most two active turns (21, 22) of the filament are formed, the elementary turns (30) of each active turn (21, 22) are insulated, the core (25) is made to disappear inside the active turns (21, 22), and the core (25) is retained in the lugs (23, 24) which short-circuit the elementary turns (30) of the resistance wire (26).

2. Electron gun for a cathode-ray tube, especially a colour television tube of the perforated-mask type with three guns in line, having a cathode (10) with an emitting surface (11, 12) at the end of a cylindrical sheath (13), in which is located a heating filament (14) comprising a resistance wire (20) and lugs (23, 24) for connection to a supply of electrical energy, characterized in that the heating filament (14) is formed according to the process of Claim 1.

3. Electron gun according to Claim 2, characterized in that the resistance wire is made of tungsten.

4. Electron gun according to Claim 2 or 3, characterized in that the core (25) of the lugs is made of molybdenum.

5. Electron gun according to any one of Claims 2, 3 or 4, characterized in that each of the turns (21, 22) of the heating filament extend contains approximately a hundred elementary turns (30) of resistance wire (26).

6. Electron gun according to any one of Claims 2, 3, 4 and 5, characterized in that the two turns (21, 22) of the heating filament extend over a length which is of the same order of magnitude as the diameter of each turn (21, 22).

7. Electron gun according to any one of Claims 2 - 5 or 6, characterized in that the interval between two



elementary turns (30) of resistance wire (26) on each turn (21, 22) of the active part of the heating filament is of the order of 3% of the diameter of the said turn (21, 22).

- 5 8. Electron gun according to any one of Claims 2 - 6 or 7, characterized in that the cathode sheath (13) is connected to longitudinal fixtures (32, 33) of the gun by means of metal lugs 34, without thermal insulation.

