

The present invention relates to a device for welding a cathode for an electron gun, which can be principally applied to the field of manufacturing colour television tubes.

5 In the manufacture of guns, welding heads are used in an apparatus which enables mounting of the various constituent parts of the electron gun to be performed. The mounting equipment comprises equipment for inserting the cathode and initially enables the distances
10 between each electrode making up the gun to be adjusted, a cathode rod to be arranged in its support and the whole then to be immobilized, optionally after a dimensional check, on the one hand by welding the cathode rod in its support and, on the other hand, by bead-welding the
15 various electrodes of the gun together. The finished product is an electron gun ready to be assembled with the remainder of, for example, a colour television tube.

 Such equipment is described in particular in the document FR-A-2,205,738 which relates to a method for
20 assembling an electrode in a cathode-ray tube. The various stages of an assembly method are described therein. In particular, a welding unit is described comprising four air cylinders and four welding guns extending radially towards the position for fastening the
25 cathode rod in its support. The air cylinders operate at a given moment under the action of an operator so as to apply a pressure by the welding guns, also termed welding needles.

 The document "Soudure par résistance, Théorie et
30 Pratique" [Resistance welding, theory and practice] October 1958, pages 24-32, published in Brussels, discloses a device for welding thick metal sheets, comprising two compressed-air cylinders, the second cylinder exerting an additional "forging" pressure, which is
35 omitted for welding small elements such as cathodes for electron guns.

 An object of the present invention is to enable the welding to be improved by proposing a novel solution which enables the simultaneous contact and welding of the

which enables the simultaneous contact and welding of the cathode, which is disadvantageous, to be avoided. Another advantage of the present invention is that it enables the welding to be automated.

5 The present invention in fact relates to a device for welding a cathode for an electron gun, the cathode comprising principally a rod in a envelope, the device being of the kind in which at least one head performs the butt-welding, each welding head being situated laterally
10 relative to the envelope and comprising a welding needle mounted in a support and provided with a first pneumatic-type drive device acting via a piston mounted on a shaft coaxial with the movement of the needle, thus ensuring a contact pressure of the needle on the envelope, the
15 device is characterized in that it comprises a second drive device mounted on the shaft supporting the needle and actuated by the same piston in order to create subsequently a weld pressure, the said second device being of the calibrated spring type.

20 Other features and advantages of the present invention will emerge from the description and the attached figures, in which:

- Figure 1 shows a diagram of a welding device according to the prior art; and

25 - Figure 2 shows a diagram of a welding head according to the invention.

 In Figure 1, a welding device according to the prior art is shown. The cathode 13 comprises, at the level of the welding which is the subject of the invention, a rod 14 arranged in a envelope 15. The rod 14
30 comprises two cylindrical bodies connected to each other, the first cylindrical body being force-fitted into the cylindrical envelope of the support 15. The whole is coaxial with the axis 16 which will be the central axis
35 for the emission of electrons for the completely finished gun.

 Perpendicular to the axis 16, along the axis 17, a welding head, composed principally of a support 1 and a needle 10, acts along the axis 17. In the neutral

pneumatic equipment 6 in a chamber 2. In the position 12, the pneumatic equipment 6 exerts a contact and welding pressure which performs the welding operation. The needle 10 is mounted in a part 18 of a carriage 3 which slides in an opening 19 of the support 1. The rear part of the carriage 3 receives the fastening of a shaft 9, for example fixed in a tapped hole via a threaded end of this shaft. The shaft passes through a suitable opening in the support 1 in order to finish on a piston 4 arranged in a compression chamber 2. Pneumatic equipment 5-8 enables the pressures to be created so that the welding operation can be performed. An operator controls these operations manually.

It has been noted that, during the welding operation, the machine caused the welding head to strike against the cathode. Wear results on the needle, which leads to a reduction in the quality of manufacture of the guns.

The invention overcomes these disadvantages by providing, in particular in Figure 2, a particularly high-performance exemplary embodiment. The same cathode unit 13, consisting of the rod 14 in its envelope 15, has been shown. The needle 10 is mounted on a support 22. A first drive device 25-31 enables a pressure to be exerted bringing the needle into contact with the envelope. It is thus possible to control, by electropneumatic means, the arrival of the needle on the envelope 15 at a suitable speed. A second drive device 23-23A subsequently creates a weld pressure.

The first drive device shown in the drawing principally consists of pneumatic equipment 30, 31, appropriately controlled, which actuates a piston 29 in a chamber 27. The piston 29 is mounted at one end of a longitudinal shaft 28 which penetrates into a chamber 24 of a needle support 22. The shaft 28 is aligned with the axis 17 of the movement of the needle. The other end of the shaft 28 consists of a threaded part 32 mounted in a tapped hole by a means for calibrating the contact pressure. This means for calibrating the contact pressure

pressure. This means for calibrating the contact pressure enables a fraction of the contact pressure to be adjusted as desired without making any changes to the electropneumatic device which is more awkward to adjust. To this end, the calibrating means comprises a part 33 which can be moved in rotation from outside the device so as to effect a relative displacement of the needle 10 and the shaft 28. It will be understood that, in this way, the contact pressure may alter without the electropneumatic equipment 30, 31 being modified. The calibrating means comprises a body 33 integral with the part which can move in rotation and the end of which opposite the part in contact with the shaft 28 has an external screwthread so as to be mounted in a support 21 for the needle 10. The needle 10 is fixed to the support 21 and may be displaced inside the latter by rotation of the part 33 of the calibrating means. To this end, the body 33 is hollow so as to enable a forward movement of the body 20 of the needle 10. The body of the needle 20 comprises a first shoulder 23A which enables a second drive device, intended to exert the welding pressure, to be accommodated.

The second drive device 23 is arranged inside the support 21 between the shoulder 23A and a part 33 which is fixed relative to the support 22. This drive device is an elastic means which is actuated by a second action of the electropneumatic device 31, 30. In the embodiment in the figure, the fixed part 33 consists of the means for calibrating the contact pressure.

In order to effect the welding, the electropneumatic machine 30, 31 emits a first contact pressure with an appropriate calibration by the means 33. The needle passes from the raised position 11 to the welding position 12. A second pressure is then emitted by the electropneumatic device 30, 31 so as to cause the second drive device, consisting of the spring 23, to act. The shoulder part 23A of the body 20 of the needle 10 is displaced towards the inside of the support 21, the other end of the spring 23 being fixed by the end of the body 33 of the calibrating means. The calibrating means 33 is,

in fact, fixed by a screwthread 25 to the support 21 which slides in the support 22.

5 A welding device may, for example, comprise a single head rotating about the cathode to be welded at three or four welding points. In one embodiment, the welding device comprises three coplanar welding heads distributed about the gun to be welded.



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CLAIMS

1. Device for welding a cathode for an electron gun, the cathode (13) comprising principally a rod (14) in a envelope (15), the device being of the kind in which at least one head performs the butt-welding, each welding head being situated laterally (17) relative to the envelope (15) and comprising a welding needle (10) mounted in a support (22) and provided with a first pneumatic-type drive device (25-31) acting via a piston (29) mounted on a shaft (28) coaxial (17) with the movement of the needle (10), thus ensuring a contact pressure (12) of the needle (10) on the envelope (15), characterized in that it comprises a second drive device (23-23A) mounted on the shaft supporting the needle and actuated by the same piston (29) in order to create subsequently a weld pressure, the said second device being of the calibrated spring type.
2. Device according to Claim 1, characterized in that the shaft (28) is mounted, via a means (33) for calibrating the contact pressure, on that end of the body (20) of the needle which is opposite its welding end (11).
3. Device according to Claim 2, characterized in that the calibration means comprises a body (33) having two parts (32, 25) which are screwed onto the shaft (28) and onto the support (21) respectively.
4. Device according to Claim 3, characterized in that the calibration means comprises a part (33) which ensures the calibration by rotation from outside the device via relative displacements of the shaft (28) and the support (21).
5. Device according to Claim 1, characterized in that the second drive device comprises an elastic means (23) inside the support (21), between a shoulder (23A) of the body (20) of the needle and a part (33) which is fixed relative to the support (22).
6. Device according to Claim 5, characterized in



that the elastic means is a helical spring (23).

7. Device according to Claims 3 and 5, characterized in that the part which is fixed relative to the support (22) consists of the body (33) which forms the means for calibrating the contact pressure.