

The present invention relates to a method for the manufacture of bases for vacuum tubes, which does not require the cutting of the internal conductors after moulding, and to a device for the implementation of this method.

The manufacturing of bases for vacuum tubes usually comprises two distinct stages. Firstly, the pressing stage which consists in embedding electrical conductors between two pieces of molten glass and then in moulding this unit so as to obtain a part with a determined geometry and quality which we shall call "machine-produced base". To do this operation, the metallic conductors are automatically loaded into housings provided for this purpose in lower moulds. The glass parts are then loaded into this same mould and then heated up until they become soft. An upper mould is then pressed onto the glass to shape it. The same heating/pressing operation is then repeated three times in order to obtain a good-quality end product. During the pressing operation, a set of independent, mobile weights presses on each of the conductors to keep them at the bottom of their housings. Secondly, the finishing stage which comprises a certain number of operations, among them the cutting of the "internal" parts of the conductors to give them the desired length, these internal parts being those which are subsequently connected to the various electrodes of the vacuum tubes and which generally have different lengths. This cutting operation, during the finishing stage, has a certain number of disadvantages, especially the embrittlement of the glass of the base in the sealing areas through the creation of stresses and the expensive and difficult maintenance of the cutting tools since the conductors are generally nickel based and therefore difficult to

cut. Such a method is described, for example, in the patent US-A-2 340 879.

The object of the present invention is a simple and quick method which allows to avoid the cutting of the conductors during the finishing stage of the bases.

Another object of the present invention is a device for the implementation of the method which can easily be integrated into an automatic manufacturing process and which is inexpensive.

According to the method according to the invention for the manufacture of bases for vacuum tubes which does not require the cutting of the internal conductors after moulding, each rectilinear conductor is pre-cut to the required length, the conductors are placed parallel to each other by housing their lower ends in respective dead holes made in a lower mould of a known type, the bottoms of the dead holes determining a lower plane, glass parts are arranged on the mould, the upper ends of the conductors are set in respective second holes passing through an upper mould, an adapted distance sleeve is placed in each of the second holes so that the upper ends of the distance sleeves are in an upper plane which is determined by an upper surface of the upper mould and which is parallel to the lower plane and individual weights are arranged on the end of each distance sleeve and the base is then formed in the usual way.

The device according to the invention for the manufacture of bases comprises a lower mould with dead holes for conductors which go through bases, the bottoms of these dead holes determining a lower plane, an upper

mould drilled with through holes for the conductors. corresponding to the housings of the lower mould, identical countersinkings being made coaxially with these holes in the upper surface of the upper mould, distance sleeves being set in these countersinkings, the upper ends of the distance sleeves being in an upper plane which is determined by an upper surface of the upper mould and which is parallel to the lower plane, and individual weights equal, in number, to the conductors being arranged on the distance sleeves. Depending on the length of the connections, the distance sleeves are not drilled or are drilled with dead holes or through holes, the diameter of which is substantially equal to that of the connections.

The present invention will be better understood from the following detailed description of an embodiment, taken as a non-restrictive example and illustrated by the appended drawings, in which :

Fig. 1 is a cutaway drawing of a device for manufacturing bases according to the prior art ;

Figs. 2 to 4 are cutaway drawings of a device for manufacturing bases according to the invention with distance sleeves which are solid and which have through holes and dead holes ;

Fig. 5 is a cutaway drawing of an alternative embodiment of the device with distance sleeves with dead holes.

The method and the device for its implementation, which are described below, refer to the manufacture of bases for electronic vacuum tubes such as television cathode

ray tubes, bases which comprise several metallic conductors which go through a glass slab. When the bases are finished, the conductors are welded to a set of electrodes or to an electron gun, and the glass slab is welded to an electronic tube bulb or a cathode ray tube bulb in which a vacuum is created.

According to the technique of the prior art (fig. 1), a lower mould 1 was used which had an axial drilled hole 2 at the flared outlet 2A with an appropriate shape, in which several dead holes 2B are drilled, all of the same depth and the axes of which are generally equidistant and arranged in the form of a circle. The conductors, such as the conductor 3, which is the only one which is represented in the drawing, are inserted into these dead holes. An upper mould 4, having substantially the form of a disk, comprising, on its lower surface, a protuberance 4A with a shape which is substantially complementary to that of the outlet 2A and, on its upper surface, a coaxial, hollow, truncated cylinder 4B with a circular section, the internal diameter of which is greater than the diameter of the circle along which the axes of the holes 2B are set, is arranged above the lower mould 1, the glass parts with an appropriate form being arranged between these two moulds. The upper mould 4 comprises a series of identical through holes, such as the hole 5, aligned with the holes 2B when both moulds are in the moulding position, enabling the passage of the conductors 3 which protude slightly from the upper face of the mould 4 when the glass parts are positioned. Individual weights 6, shaped like the sectors of thick disks (disks with a diameter which is slightly smaller than the internal diameter of the truncated cylinder 4B and sectors with an angle at center which is substantially equal to the angle at center of two successive holes 5)

are arranged inside the truncated cylinder 4B, each at one end of the conductor 3.

With such a known device, bases are obtained for which the lower parts of the conductors all have the same length. Since the electrodes, to which these lower parts have to be connected, are not all at the same distance from the base, some of these internal parts of the conductors have to be cut. To avoid this cutting operation, which is difficult to perform and which is expensive, the present invention proposes to pre-cut the conductors and to consequently modify the upper mould, as will be seen below with reference to figs. 2 to 4 of the drawing, the lower mould being unmodified. The longest conductors have the reference 3B (figure 3), the shortest have the reference 3A (figure 2) and those with intermediate lengths have the reference 3C (figure 4). To simplify the drawing, only one intermediate length conductor has been represented but it is understood that the base may have several conductors with several different intermediate lengths.

The new upper mould 7, according to the invention, has the same shape and the same dimensions as that of the prior art and works together with the same individual weights 6.

On the upper surface of the mould 7, at the same positions as those of the holes 5 of the mould 4, circular countersinkings 8 are made, the depth of which is substantially equal to the difference in length between the conductors 3B (the longest ones) and the conductors 3A (the shortest ones). Of course, the thickness of the mould 7 in the region of these countersinkings 8 is greater than that of the holes 5. For example, it is

greater than that of the holes 5 by at least 6 mm. Coaxially to the countersinkings 8, through holes 9 are made with the same diameter as that of the holes 5.

Distance sleeves (10, 11, 12) are arranged in the countersinkings 8, distance sleeves which differ according to the length of the conductors (3A, 3B, 3C respectively), in order to compensate for these lengths. For the shortest conductors (3A), these distance sleeves are solid (10) and for the longest conductors (3B), these distance sleeves (11) are drilled with an axial through hole, the diameter of which is very slightly greater than that of the conductors (like that of the dead holes 2B of the lower mould). These distance sleeves 11 are arranged in the upper mould only in order to position the conductors 3B. For conductors of intermediate length, such as the conductors 3C, there are distance sleeves 12 with an axial dead hole, the depth of which is equal to the difference between the length of these intermediate length conductors and the length of the shortest conductors. Of course, when the distance sleeves are set in the mould 7, these dead holes are pointed towards the lower mould 1.

According to the alternative embodiment of the invention illustrated in figure 5, an upper mould 4 is used which is identical to that of the prior art, but the lower mould 13, which has the same shape and dimensions as the lower mould 1 of the prior art, is drilled with dead holes 14 made along the same axes as the holes 2B. The depth of the holes 14 is slightly greater than that of the countersinkings 8, but their diameter is greater than that of the conductors. The diameter of the dead holes 14 is, for example, equal to that recommended above for the countersinkings 8. In the dead holes 14,

distance sleeves have been set which are similar to those used in the embodiment illustrated in figures 2 to 4. For example, in the case of figure 5 which refers to an intermediate length conductor 3C, a distance sleeve 12A is used, similar to the distance sleeve 12 of figure 4 but slightly longer than the latter, i.e. with a length which is substantially equal to the depth of the hole 14. For, in the case of the shortest conductors (3A), drilled distance sleeves could be used, but then the conductors, such as the conductor 3A, would be positioned only at their upper end by the holes 5 of the upper mould 4. To avoid this, the distance sleeves used with these shortest conductors are similar to the distance sleeves 12, i.e. they have a dead hole to guide the upper end of these conductors, which is possible because, as specified above, the length of the distance sleeves of this alternative embodiment is slightly greater than that of the embodiment of figures 2 to 4. Of course, to compensate for this increase in the depth of the holes (14) of the lower mould, the distance sleeves used with the longest conductors (3B) are drilled, not with through holes but with dead holes, the depth of which is equal to that of the counter-sinkings 8.

Thus, regardless of the length of the conductors fixed in the glass slab of the base, the upper ends of the longest conductors and/or the upper surfaces of all the distance sleeves 10 to 12 reach practically the same level (i.e. are in one and the same plane perpendicular to the common axis of the two moulds 1 and 7), the result of which is that the individual weights 6 play the same role as in the device of the prior art. Of course, since the three dead holes 2B always have the same depth, the parts of the conductors, which form the

external connecting pins of the tube, to which the machine-produced base will be subsequently welded, are all of the same length, while the parts of the conductors which will be inside the tube have different lengths adapted to the same connection to the electrodes of this tube.



C L A I M S

1. Method for the manufacture of bases for vacuum tubes which does not require the cutting of the internal conductors after moulding, method according to which each rectilinear conductor is pre-cut to the required length, the conductors are placed parallel to each other by housing their lower ends in respective dead holes made in a lower mould of a known type, the bottoms of the dead holes determining a lower plane, glass parts are arranged on the mould, the upper ends of the conductors are set in respective second holes passing through an upper mould, an adapted distance sleeve is placed in each of the second holes so that the upper ends of the distance sleeves are in an upper plane which is determined by an upper surface of the upper mould and which is parallel to the lower plane and individual weights are arranged on the end of each distance sleeve and the base is then formed in the usual way.
2. Device for the manufacture of bases for vacuum tubes which comprises a lower mould (1) with dead holes (2B) for conductors which go through bases, the bottoms of these dead holes determining a lower plane, an upper mould (7) drilled with through holes (9) for the conductors, corresponding to the housings of the lower mould, identical countersinkings (8) being made coaxially with these holes in the upper surface of the upper mould, distance sleeves (10, 11, 12) being set in these countersinkings, the upper ends of the distance sleeves being in an upper plane which is determined by an upper surface of the upper mould and which is parallel to the lower plane, and individual weights (6) equal, in number, to the conductors being arranged on the distance sleeves above the upper surface of the upper mould.



3. Device according to claim 2, characterized in that the distance sleeves (11) working with the longest conductors (3B) are drilled with through holes, that those (10) working with the shortest conductors (3A) are not drilled and that those (12) working with the intermediate length conductors are drilled with dead holes, the depth of which is equal to the difference between the length of these intermediate length conductors and that of the shortest conductors.