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M. VON ARDENNE
ARRANGEMENT FOR PRODUCING FILTERS
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Fig. 1

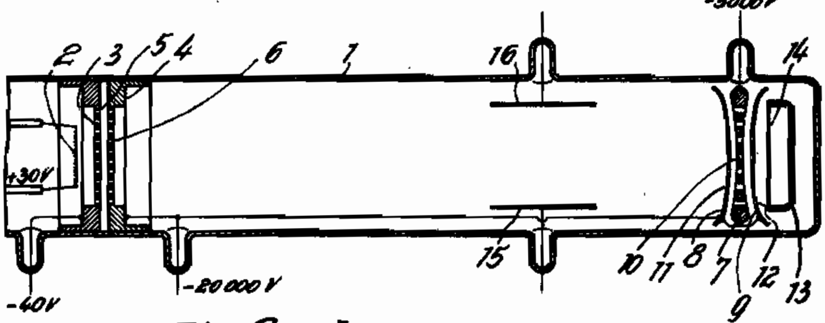
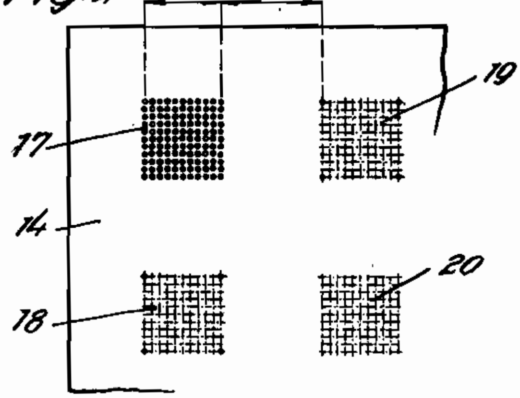


Fig. 2



Inventor:
Manfred von Ardenne
By Richardson and Geier Att'ys

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ARRANGEMENT FOR PRODUCING FILTERS

Manfred von Ardenne, Berlin-Lichterfelde-Ost, Germany; vested in the Alien Property Custodian

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This invention relates to an arrangement for producing filters.

To produce surface filters and ultra-filters which have the properties of an ideal filter it is known in the art to burn in a foil with the aid of ion rays perforations of constant magnitude and form and in a desired spaced relation from one another.

The object of the present invention is to provide an arrangement, whereby the greatest possible number of very fine perforations are burnt in a filter film so as to reduce the filter resistance (resistance to flow). This may be accomplished according to the invention by the fact that the cross-section through which pass the ion rays issuing from the ion emitting source is projected by means of an electrostatic multiple lens on the foil to be perforated. To this end, a short focus multiple lens is preferably employed in front of the foil. By providing the electrostatic multiple lens with a plurality of accurately aligned perforations, it is also possible to burn when producing filters a corresponding plurality of perforations in the foil. In carrying the invention into practice a multiple lens is preferably employed consisting of two electrodes impressed with a high negative potential and provided with a plurality of perforations and of an electrode interposed between these two electrodes and impressed with a lower negative potential and also provided with perforations.

Since the distance between the individual elements of the multiple lens is relatively great, perforations are obtained in the foil during the burning operation between which there may be relatively broad stripes of the foil which are not perforated. In order to provide also these stripes with perforations to the greatest possible extent, the arrangement according to the invention is so designed that the ion rays may be deflected after the first burning operation by means of deflecting magnetic fields in a corresponding manner.

A further possibility of increasing the number of perforations obtainable with one burning operation consists according to the invention in the fact that the ion emitting source is provided in a known manner with two electrodes having a plurality of perforations which form a plurality of cross-sections for the passage of electron rays. By means of the multiple lens not only a single ion ray cross-section but a plurality of ion ray cross-sections are therefore projected simultaneously.

In the accompanying drawings, Fig. 1, is shown an embodiment of the invention in diagrammatic form. 1 denotes a canal ray tube in which is arranged an oxide-coated incandescent cathode 2. Directly in front of the incandescent cathode are disposed two series-arranged electrodes 3 and 4. These electrodes are each provided with a plurality of accurately aligned perforations 5 and 6 respectively. These electrodes are spaced from each other a distance of about 3 mm. The electrode 3 may, for instance, be impressed with a voltage of −40 Volts and the electrode 4 with a voltage of −20,000 Volts. Hydrogen of 10^{-2} vacuum is, for instance, supplied to the tube. The arc gas discharge resulting therefrom may, for instance, burn at a potential of 40 Volts. In this known arrangement an ion emitting source is provided by means of which a plurality of fine ion rays corresponding to the number of perforations 5 and 6 is produced. The ion rays leave the ion emitting source at a very uniform electron speed under a sufficiently large angle, 7, 8, 9 denote an electrostatic short focus multiple lens which serves to project the numerous cross-sections for the passage of the ion rays on a foil 14 arranged directly behind the multiple lens. To this end, the foil 14 is stretched on a carrier 13. The three electrodes of the multiple lens are each provided with a plurality of perforations 10, 11 and 12. In this manner a number of elements of the multiple lens are obtained corresponding to the number of the perforations. The central electrode 7 is, for instance, impressed with a potential of −5,000 volts, whereas the other two electrodes 8 and 9 with a potential of −20,000 volts.

In Fig. 2 is shown a top view of a portion of the foil film 14 provided with perforations obtained by the burning process. 17, 18, 19 and 20 denote fields of filter perforations, each produced by one element of the multiple lens. A perforation in such a field corresponds to the projection of each perforation in the electrodes 3 and 4 of the electron emitting source. Since from a constructional point of view the distance *a* between the individual fields of the perforations produced by each element of the multiple lens is great in proportion to the width *b* of the field, also the portions of the foil not yet provided with perforations may be perforated by the use of electromagnetic deflecting fields which may be, for instance, produced by deflecting plates 15 and 16 which deflect the ion rays in a corresponding manner. With the aid of the above-described arrangement the greatest possible number of fine, nay ultra-microscopic filter perforations may be attained. Assuming, for instance, that in the electrode 4 there are one hundred perforations of a diameter of 0.5 mm. and that the electrostatic multiple lens has 50 perforations, 5,000 perforations are obtained at the same time in the filter foil with one burning operation.

When carrying the invention into practice it is particularly advantageous to use such ions which react with the filter substance. This is, for instance, the case when employing oxygen and pyroxylin foils.

MANFRED von ARDENNE.