March 7, 1944. M. M. LÉVY ET AL 2,343,779

HOLDER FOR THERMIONIC VALVES

Filed April 23, 1942

2 Sheets-Sheet 1

Fig. 1.

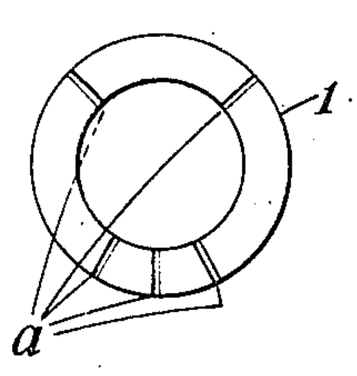

Fig. 2.

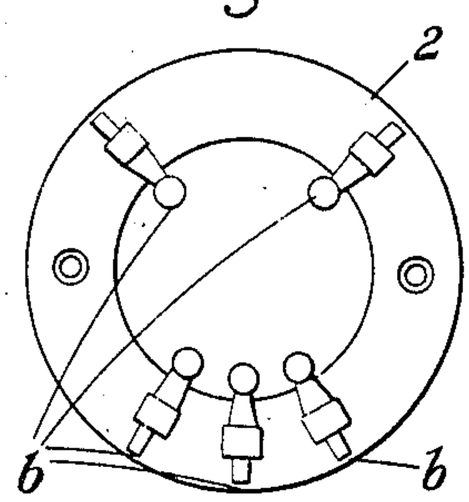

Fig. 3.

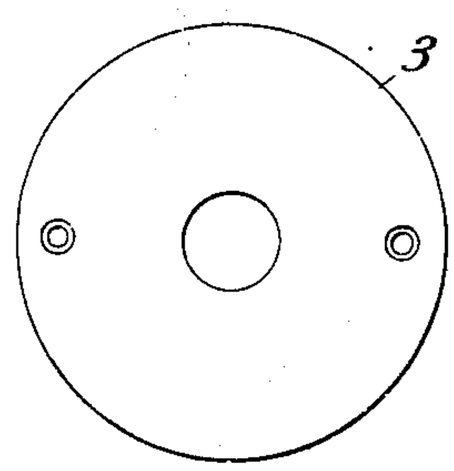

Fig. 5a.

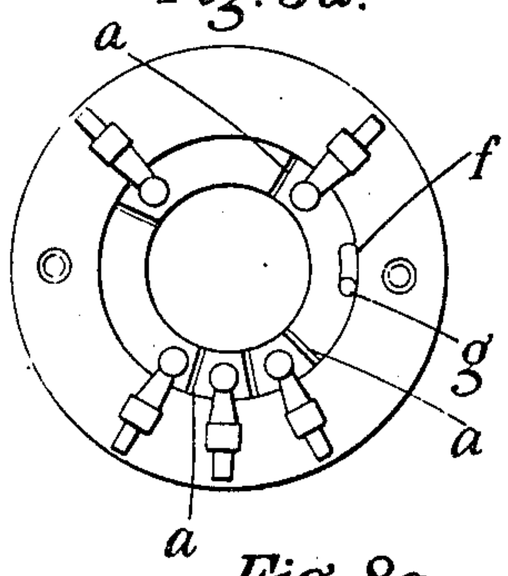

Fig. 5b.

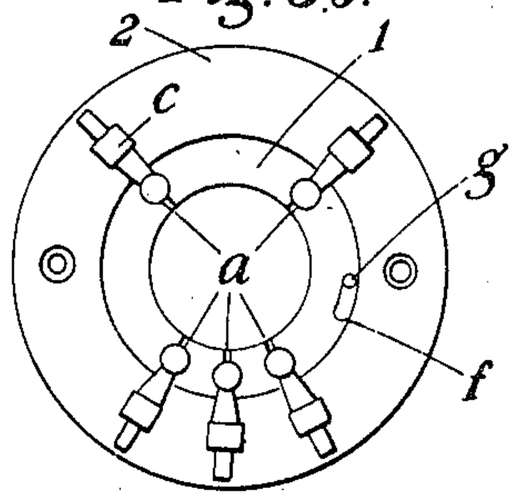

Fig. 6a.

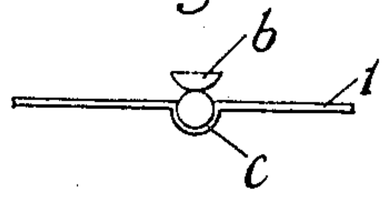

Fig. 8a.

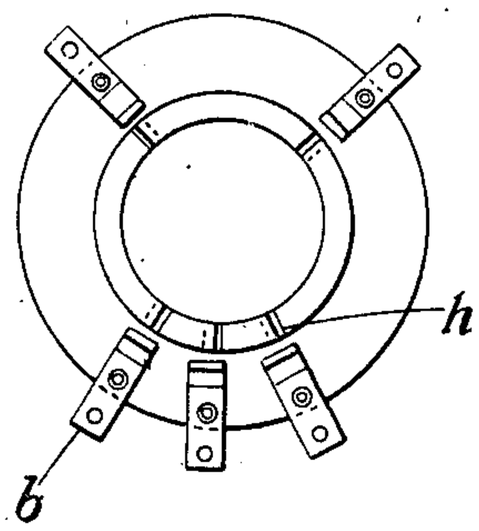

Fig. 8b.

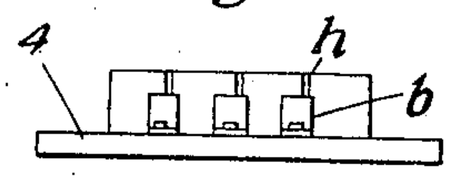

Fig. 9a

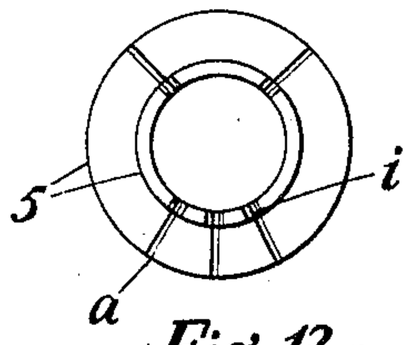

Fig. 11a.

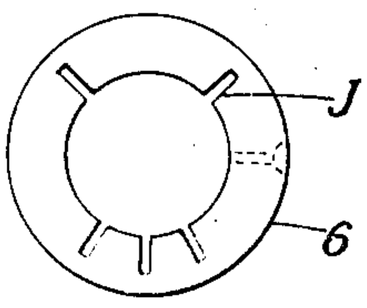

Fig. 11b.

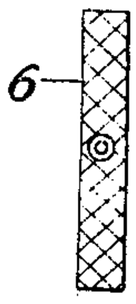

Fig. 12.

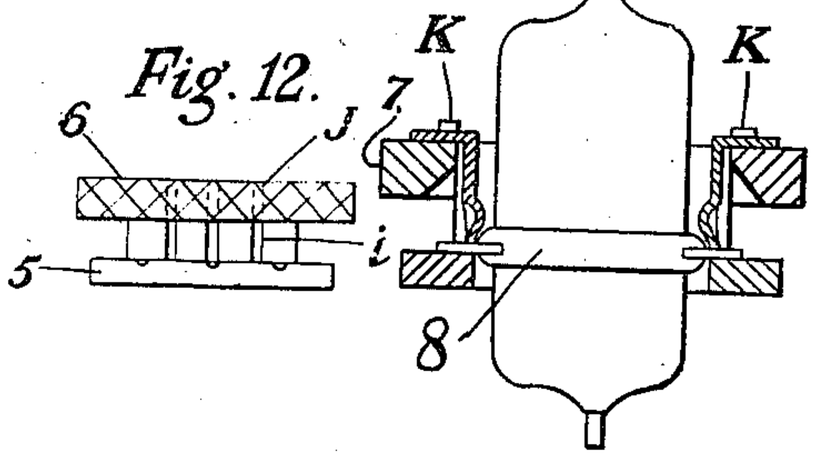

Fig. 13a.

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Fig. 4a.

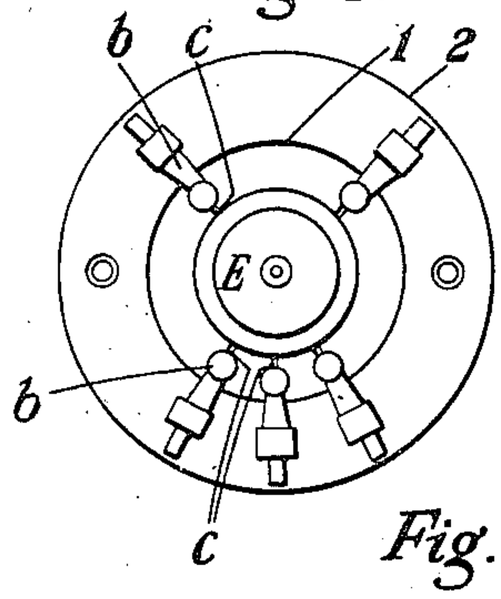


Fig. 4b.

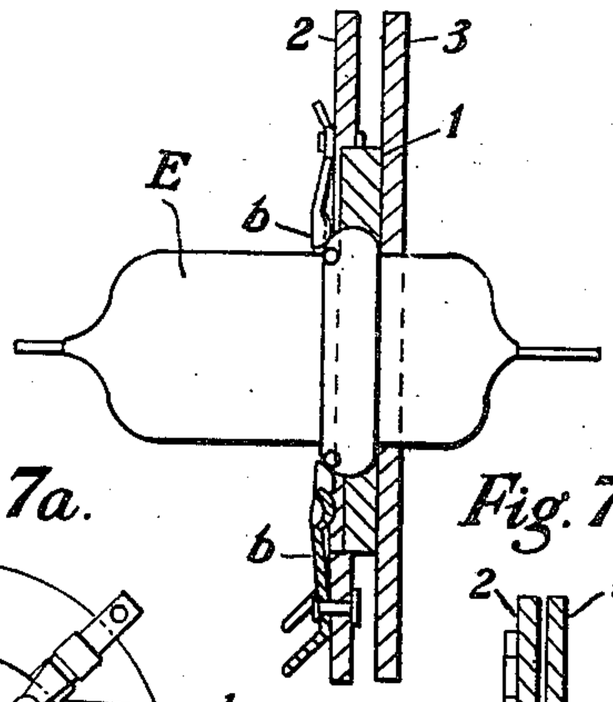


Fig. 7a.

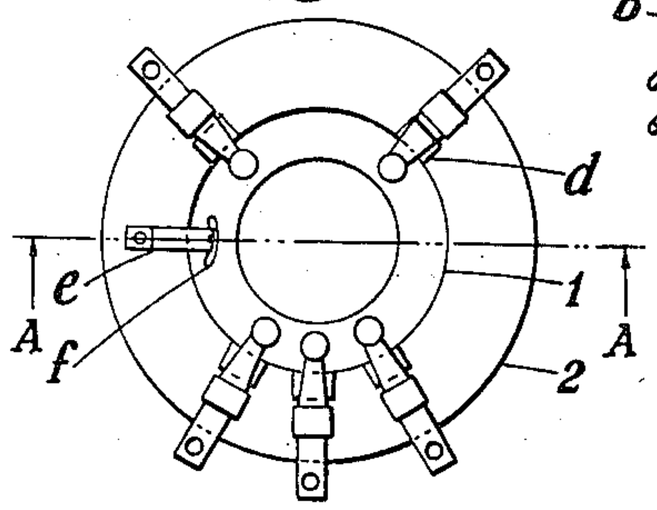


Fig. 7b.

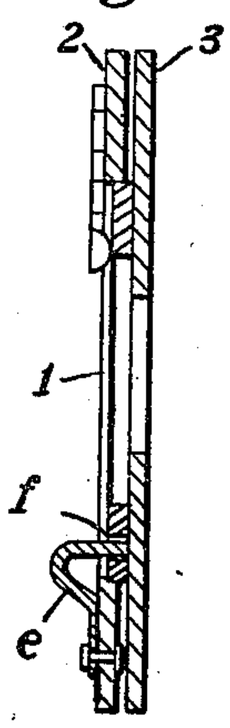


Fig. 6b.

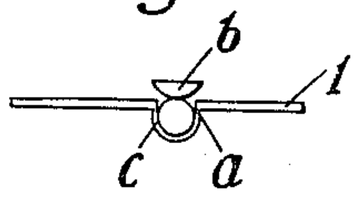


Fig. 10.

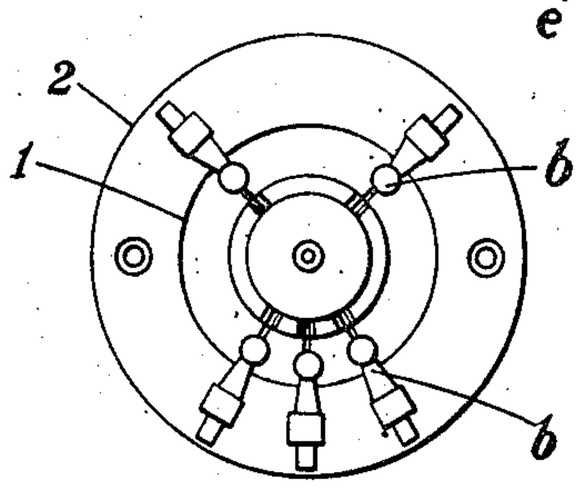


Fig. 9b.

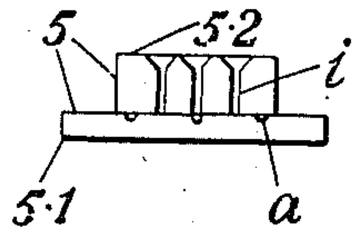


Fig. 14.

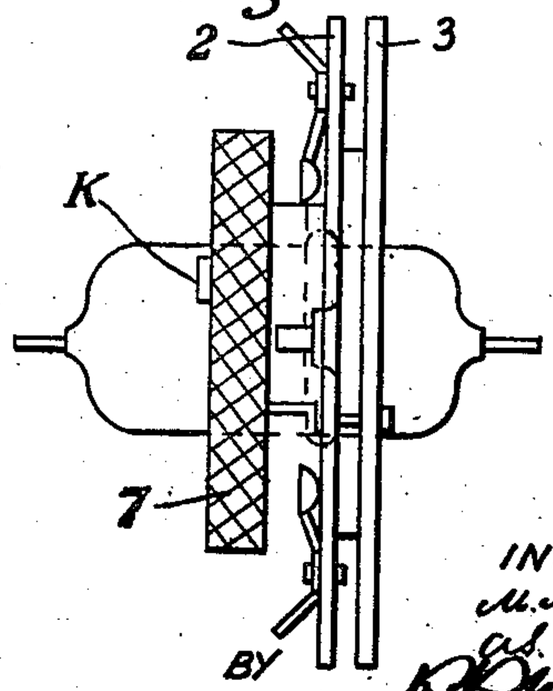
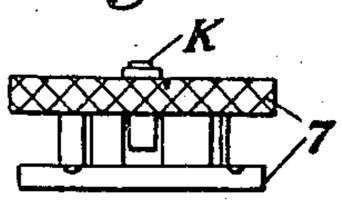


Fig. 13b.



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UNITED STATES PATENT OFFICE

2,343,779

HOLDER FOR THERMIONIC VALVES

Maurice Moise Lévy and Arthur Sydney Merritt, London, England, assignors to International Standard Electric Corporation, New York, N. Y.

Application April 23, 1942, Serial No. 440,164
In Great Britain May 12, 1941

6 Claims. (Cl. 173—328)

The present invention relates to holders for thermionic valves and particularly to holders for valves of the small type generally known in the art as "Acorn" valves, which are provided with electrode terminals which radiate out from and in a plane perpendicular to the axis of the valve.

An object of the invention is to provide a suitable construction which ensures the uniform distribution of the strain on the different terminals when the valve is inserted in or withdrawn from its holder. By attaining this object cracks in the glass envelope of the valve are avoided at the metal-to-glass seals.

Another object is to simplify the operation of inserting a valve in its holder.

Another object is to provide good contact between the valve terminals and the holder terminals.

A further object of the invention is to provide a locking device for the valve in its holder to prevent the valve leaving its holder due to strain or by other causes than manual manipulation.

According to the invention a holder for a valve provided with electrode terminals which radiate out from and in a plane perpendicular to the axis of the valve is provided with a set of contact devices having the same relative positions as the electrode terminals, and with a set of grooves or slots also having the same relative positions as the electrode terminals, the arrangement being such that the valve when placed with its electrode terminals in said grooves or slots in the holder is rotated about its axis to bring said electrode terminals into electrical contact with said contact devices.

Various modes of carrying the invention into practice are shown in the accompanying drawings, in which—

Figures 1, 2 and 3 show respectively plan views of three components which when assembled form one embodiment of the invention illustrated in Figure 4*a* in plan view and in Figure 4*b* in side view.

Figures 5*a* and 5*b* show respectively two relative positions of the components shown in Figures 1 and 2, taken during the insertion of the valve in its holder.

Figures 6*a* and 6*b* show alternative locations of the contact electrodes of the valve.

Figures 7*a* and 7*b* show the valve holder of Figures 4*a* and 4*b* with slight modifications.

Figures 8*a* and 8*b* show respectively in plan view and side view another embodiment of the invention.

Figures 9*a* and 9*b* show respectively in plan view and side view a modification of the component shown in Figure 1.

Figure 10 is a plan view of the valve holder incorporating the component shown in Figures 9*a* and 9*b*.

Figures 11*a* and 11*b* show plan and side views of a supplementary detail or manipulating device for use with the components illustrated in Figures 9*a* and 9*b*.

Figure 12 shows an end view of the components shown in Figures 9*a* and 9*b*, 11*a* and 11*b* assembled together.

Figure 13*a* is a section of a component of the holder illustrated in Figure 10 provided with the the manipulating device shown in Figures 11*a* and 11*b*, and with a locking device for locking the valve in the holder.

Figure 13*b* is a side view of the component looking from the left of Figure 13*a* without the valve and

Figure 14 is a side view of the complete valve holder with valve in position and incorporating the components shown in Figures 13*a* and 13*b*.

The valve for which the invention is particularly adapted consists of an evacuated envelope E (Fig. 4) containing the electrodes, and provided with terminals *c* to which the respective electrodes are electrically connected. These electrode terminals *c* comprise lengths of wire or rod or strip, and radiate out in the same plane from the longitudinal axis of the valve as is quite clear from Figures 4*a* and 4*b*.

The first embodiment of the holder according to the invention consists of three essential components represented respectively in Figs. 1, 2 and 3.

A first component 1 (Fig. 1) consists of an annular washer of insulating material with radial grooves *a*. The interior diameter of the washer and the positions of the grooves *a* are such that the valve electrode terminals *c* Fig. 4*a* are engaged in these grooves. The depth of the grooves is such that each electrode terminal when the valve is in position, slightly projects beyond the surface of the washer.

The second component is shown in Fig. 2. It consists of an insulating annular washer 2 whose interior diameter is more or less the same as the external diameter of component 1. This washer has spring pressure contacts *b* mounted thereon by means of clips 15, whereby a dished contact portion 16 of each contact projects beyond the edge of the opening in the washer. The relative

positions of these contacts are the same as the relative positions of the electrode terminals *c*.

The third component consists of an insulating annular disc **3** whose external diameter is more or less the same as that of washer **2**. A centrally located opening in disk **3** is of a suitable size to fit over the envelope of a valve E, Fig. 4*b*.

The complete holder consisting of components **1**, **2** and **3** assembled is shown in Figs. 4*a* and 4*b*. The component **1** is held slidably and rotatably in the opening of washer **2** by the pressure contacts *b* of component **2** and one surface of component **3** so that component **1** can rotate around its axis, its external edge slidably contacting on the internal edge of the component **2**.

The components **2** and **3** are riveted together or secured together in any other way.

To mount the valve on the holder the valve is placed on the holder in such a way that the electrode terminals *c* engage in the grooves *a* in the component **1**, this component being, for example, in the position shown in Fig. 5*a* with relation to the pressure contacts *b*. The component **1** is then rotated by turning the valve in such a manner that the grooves come into position under the pressure contacts as shown in Figure 5*b*. The valve is then in place and the electrodes *c* making contact with the part **16** of contacts *b*. It is necessary, of course, that the contacts *b* should be of a suitable shape so that the electrode terminals *c* should easily catch under them and make good electrical contact. Figures 6*a* and 6*b* show diagrammatically two examples where the grooves *a* of component **1** are of a different depth and the manner in which terminals *c* of the tube more or less project above the surface of component **1** and engage the contact portion **16**. Figs. 6*a* and 6*b* illustrate the manner in which the grooves of contact *b* in rotatable component **1** support tube contacts *c* against radial stress while the tube is being rotated into operating position. This arrangement permits the use of appreciable pressure to be applied by the receptacle contacts on the tube contacts without exerting undue strain on the latter or on the tube envelope.

Various modifications of the holder make the operation of insertion of the valve more convenient. For example, a stop arrangement may be provided for the component **1** so that this latter can only be displaced from the position shown in Fig. 5*a* to the position shown in Fig. 5*b* and vice versa. For example in Figures 5*a* and 5*b* is shown a slot *f* in the component **1** and a pin or screw *g* located in the slot and mounted on component **3**. The slot *f* is such that component **1** can rotate freely until it is stopped by the screw *g* in one or other of the positions shown by Figs. 5*a* and 5*b*.

Figures 7*a* and 7*b* illustrate a support of the kind described provided with two detail improvements.

The plane of component **1** is slightly set back in relation to that of component **2** as shown clearly in Figure 7*b*. The component **2** is hollowed out at the points *d* under the contact springs *b*. In this way it is easy, if necessary, to increase the pressure of the spring contacts *b* by bending them towards the component **1**, after riveting components **2** and **3** together, for instance.

The stopping arrangement for this embodiment as shown in Figs. 7*a* and 7*b* comprises a metal strip *e* which is bent at its end into a U form, the free end of the U engaging in a slot *f* provided in the component **1**. The spring *e* is fixed on the component **2** by a screw or other means. The length of the slot *f* is such that the two extreme positions of the component **1** are as shown in Figs. 5*a* and 5*b*. The arcuate shape of the slot is such that the spring *e* tends to bring the component **1** towards one or other of these extreme positions according to the initial position of the component **1**.

The essential characteristic of the second embodiment of the invention and shown in Figures 8*a* and 8*b* is that the electrode terminals of the valve are automatically guided into the position which they should have in the holder. In this way the radiating electrode terminals need only be inserted in the holder and rotated around its axis of symmetry, the terminals being guided into position by "guide" slots *h* each having a U shaped portion. The valve is then pressed against resilient spring contacts which force the terminals up to the end of the horizontal short limb of the slot. The valve almost takes up its operational position automatically.

The main limbs of these slots are linear as shown in Figure 8*b* and may be parallel to or inclined to the axis of the holder. Alternatively these main limbs may be curved. The contact springs *b* consist of resilient strips which tend to push the terminals upward when they arrive at the bend of the slots.

Owing to the shape of the guide slots the tube is placed home by pressure and rotation.

In the modification shown in Figures 9*a*, 9*b*, 10, 11*a*, and 11*b* use is made of the principle of movement of the washer **1** in the holder shown in Figures 1–7 combined with the guiding principle of the embodiment shown in Figures 8*a* and 8*b*. The alternative to the washer **1** is the component **5** shown in Figs. 9*a* and 9*b*. This component comprises two parts, the part in the form of the washer **5.1** having the same function as the washer **1**, Fig. 1, and the cylindrical part **5.2** having the function of a guide as the holder shown in Figure 8. The component **5.1** is provided with the radial grooves *a* as the component **1** in Fig. 1; the part **5.2** contains guiding slots *i* in which the electrode terminals *c* of the valve engage. In this way it is easy to insert the valve in the holder and the terminals are easily located in the grooves *a*.

The remaining components of the holder according to this modification are the same as those shown in Figures 2 and 3. The complete holder according to this modification is shown in Fig. 10 in plan view.

In the holder according to Figure 10 the valve is placed home in the component **5** and rotated so that its terminals engage with the spring pressure contacts *b*. It is, therefore, necessary to exercise a force on the valve during rotation. This force is not considerable and does not adversely affect the valve. Nevertheless, if the valve and the holder are compactly mounted it is sometimes difficult to hold the valve between the fingers and rotate it. This disadvantage is avoided by the further modification shown in Figures 11*a*, 11*b* and 12, the required rotation being obtained by exerting the force directly on the component **5**.

The part **5.2** of component **5** may be fragile as a result of the guide slots *i*. In order to make it more resistant and easier to operate it is provided with a manipulating device.

One manipulation device comprises a ring **6**

(Figs. 11*a* and 11*b*) which is fixed on the part **5.2** of the component **5**. This ring is of sufficiently large radial width to contain grooves *j* on the internal surface so as to allow of the passage of the valve electrode terminals through the ring. The external surface of the ring is roughened to render it rotatable by hand without undue pressure.

Ring component **6** is mounted on component **5**, as shown in Fig. 12, so that the grooves *j* align up in position with the corresponding slots *i*. Components **5** and **6** may, of course, be turned from a single piece or moulded in one piece.

Figures 13*a* and 13*b* show an arrangement for locking the valve in position once it is inserted into the component **5—6** Fig. 12.

This locking feature applicable to all the embodiments is useful since the valve cannot move after insertion in the mounting when the component **7** comprising **5—6** is rotated. If, for example, the valve is to be removed out of the component **7** it will have a tendency to fall out during the rotation of component **7**, in the absence of the locking arrangement.

Two locking springs K having curved ends convex inwards are fixed on the part **7**. The convex ends contact with a peripheral protuberance **8** on the envelope of the valve as clearly shown in Figure 13*a*. If the valve is pressed home these springs will tend to remain in position. Slight force will be necessary to overcome the resistance of these springs to disengage or release the valve. A complete holder of this type is shown in Fig. 14, with the component **7** assembled together with components **2** and **3** shown in Figures 2 and 3.

Whilst several embodiments have been described by way of example, modifications thereof will be apparent to those skilled in the art without departing from the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. A holder for thermionic valves provided with electrode terminals which radiate out from and in a plane perpendicular to the axis of the valve comprising an annular member provided with radial grooves spaced to receive said terminals, a second annular member co-axially disposed thereto provided with contacts spaced to correspond to the spacing of said electrode terminals and positioned for engagement with the terminals, and means for rotatably securing said annular members together whereby by turning the first of said members in respect to the second, said terminals may be made to engage with or become disengaged from said contact.

2. A holder for thermionic valves provided with electrode terminals which radiate out from and in a plane perpendicular to the axis of the valve comprising a plurality of annular members, including an inner and outer annular member, a third annular member secured to said outer annular member, said inner member being provided with radial grooves having the same relative disposition as the electrode terminals of the valve to be held in the holder, spring contact members having the same relative disposition as said grooves mounted on said outer member so as to overlap said inner member and to retain said inner member in sildable contact with said third member.

3. A holder for thermionic valves provided with electrode terminals which radiate out from and in a plane perpendicular to the axis of the valve comprising a plurality of annular members including an inner and outer annular member, a third annular member secured to said outer annular member, said inner member being provided with recesses having the same relative disposition as and to receive the electrode terminals of the valve to be held in the holder, spring contact members having the same relative disposition as said recesses mounted on said outer member so as to overlap said inner member in a plane for engagement with the terminals and to retain said inner member in slidable contact with said third member, and a stopping device arranged to limit the movement of said inner member relative to the other-mentioned members.

4. A holder for thermionic valves according to claim 2 wherein a tubular member is mounted on said inner member and said tubular member is provided with longitudinal slots having the same relative disposition as the electrode terminals of the valve to be held by the holder and aligned with the grooves in said inner member.

5. A holder according to claim 2 wherein a tubular member is provided on said inner member and said tubular member is provided with longitudinal slots having the same relative disposition as the electrode terminals of the valve to be held by the holder and aligned with the grooves in said inner member and wherein said tubular member is provided at its end opposite said inner member with a coaxial ring member provided with longitudinal grooves in alignment with the slots in said tubular member to enable the electrode terminals to pass through said ring member.

6. A holder for thermionic valves provided with electrode terminals which radiate out from and in a plane perpendicular to the axis of the valve comprising a rotatable supporting member provided with radial grooves spaced to register with said terminals and of a depth partially to receive the terminals, a second supporting member coaxially disposed thereto and provided with contacts spaced to correspond to the spacing of said electrode terminals and positioned for engagement therewith and means for rotatably securing said supporting members together whereby by rotating the first of said members relative to the second, said terminals are made to engage or become disengaged from contact.

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