

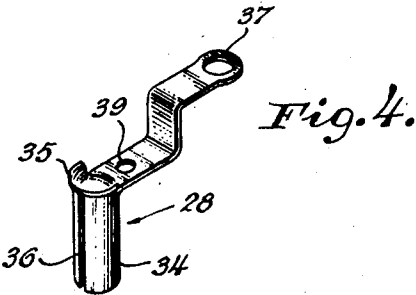
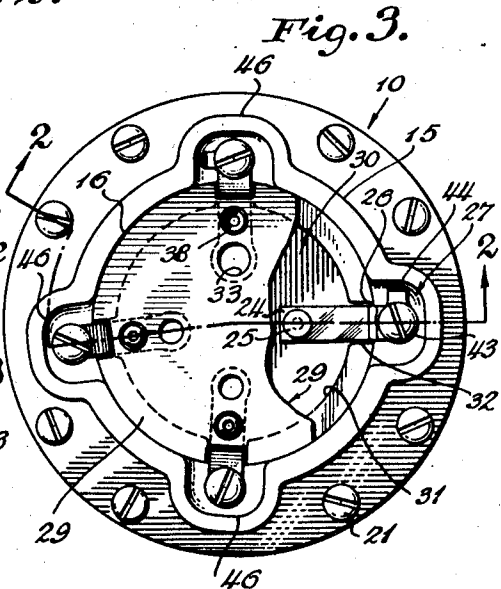
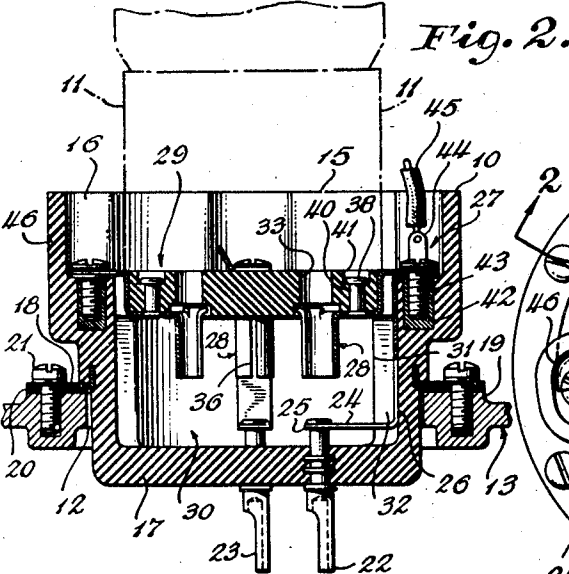
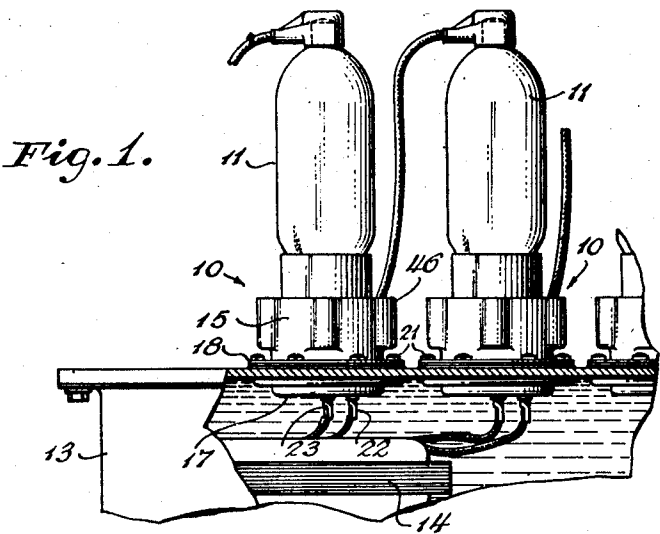
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TUBE SOCKET

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TUBE SOCKET

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This invention relates generally to sockets for receiving thermionic tubes, but has reference more particularly to sockets which also serve to form a closure for openings in fluid containers, such as those employed for housing high potential electrical devices, such as transformers and the like.

The novel socket is particularly adapted for use in connection with high frequency, high voltage radio apparatus at sea level or at high altitudes. Where such high voltages are used, it is necessary to provide heavy insulation to prevent electrical breakdown or arc-over by spacing or placing baffles between the conductors of opposite polarity. In many instances and to avoid arcing or breakdown between terminals or between a terminal and ground, the electrical apparatus which produces the high potential, such as transformers, are placed in a container and surrounded with oil or some other insulating fluid. Being thus enclosed, there is present the problem of making electrical connection between the enclosed devices and exterior associated equipment while effecting a fluid-tight closure of the container, and also of shielding the terminal connections to prevent arcing. Furthermore, in many cases such as in airplane installations, conditions require that all equipment be designed to occupy a minimum of space. By this invention all of these problems are solved by providing a novel socket which forms both a connection and a closure for the fluid container and also a shield or baffle between the terminal connections and between the terminals and adjacent grounded parts.

It is, therefore, an object of the present invention to provide a combined tube socket, adapted to receive the prongs of a thermionic tube such as, for example, a rectifier tube, and a closure element adapted to provide a fluid-tight closure of an opening in a fluid container through which electrical connections are made between said socket and a high potential electrical device or devices immersed in the fluid in said container.

It is another object of the present invention to provide a combined tube socket and closure element comprising a diaphragm or shelf disposed within the socket housing and below the open top thereof, to form a compartment therebeneath which provides a space where electrical connections can be made to the contacts engageable by the prongs of the tube.

It is another object of the invention to provide a combined tube socket and closure element wherein the electrical terminals are so arranged within and disposed below and in sufficiently

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spaced relation to the open top of the socket housing that the walls of said housing form a baffle between the terminals and the surrounding equipment thereby to prevent any electrical breakdown or arc-over.

It is another object of my invention to provide a combined tube socket and closure element which is so constructed as to provide a shielded terminal adapted to be electrically connected with a conductor leading to other equipment exterior of the fluid container.

It is still another object of my invention to provide a combined tube socket and closure element which is so constructed as to enable the tube element to be removed and replaced without performing any mechanical operation.

Other objects and advantages, not particularly enumerated in the above, will be understood from the following detailed description of this invention taken in connection with the accompanying drawings.

An illustrative embodiment of the invention is shown in the accompanying drawings wherein:

Fig. 1 is an elevational view partly in section, showing the novel tube socket used in connection with a fluid container;

Fig. 2 is a vertical sectional view of the socket alone, taken on line 2—2 of Fig. 3;

Fig. 3 is a plan view partly in section of the novel socket; and

Fig. 4 is a detail view of one of the terminal connections of the socket.

Similar characters of reference are employed in the above described views to indicate the corresponding parts.

The tube socket and closure element is generally indicated by reference character 10 which is shown as supporting a thermionic tube, such as a rectifier 11. The socket 10 is adapted to close an opening 12 in the fluid container 13 shown as a housing for a transformer 14.

The socket 10 comprises a substantially cylindrical, cup-shaped receptacle 15 moulded from electrical insulating material such as Bakelite. The receptacle 15 is open at the top 16 thereof, to permit entrance of the base of the thermionic tube 11. The base of receptacle 15 is closed as shown at 17 thereby forming a plug or closure for the opening 12 in the fluid container 13. A flange 18 is molded or otherwise firmly fixed to the side walls and slightly above the base of the receptacle 15 and extends outwardly therefrom to provide means for attaching the socket 10 to the fluid container 13. The flange 18 rests on a shoulder 19 surrounding the opening in container 13 and a

gasket 20 is interposed therebetween. Screws 21 serve to clamp the flange 16 and gasket 20 to the shoulder 19 to form a fluid-tight seal between the tube socket and the container.

The base 17 of receptacle 15, by virtue of the position of the flange 18, extends below the underside of the upper container wall 13 and into the fluid in the container. Pin terminals 22 and 23 are moulded in the base 17 to which connections may be made between the contacts disposed interiorly of receptacle 15 and the electrical devices within the fluid container 13. It will be understood, however, that there may not be only two such terminals but a plurality of them according to the kind of tube employed or to the number of connections to be made from within the fluid container to the outside thereof.

In considering these terminal connections, only one circuit will be described as the others are similar and need not be discussed in detail.

To conduit electrical current from pin terminal 22 to the tube 11 and/or to other outside equipment a flat band conductor 24 is soldered or otherwise fastened to the upper end 25 of the pin terminal 22. Band conductor 24 is so formed as to extend laterally from the pin top 25 to the inner wall 26 of the receptacle 15 and thence upwardly along the wall surface to another terminal 27 intermediate the terminal 22 and the tube connecting terminal 28 fixed to a diaphragm member 29.

The diaphragm 29 takes the general form of a shelf or plate moulded from an electrical insulating material such as Bakelite or the like and fits into the receptacle 15 so as to form a compartment 30 underneath it. Compartment 30 provides a space into which the connector prongs of tube 11 project and where bare electrical surfaces are well protected. A shoulder 31 which forms a part of the inner wall 26 of receptacle 15 supports diaphragm 29 and determines its position above the base 17 of the receptacle 15. The shoulder 31 has vertical slots 32, therein, so as to prevent the band conductor 24 from slipping out of place or otherwise moving. The prong of the tube 11 passes through a hole 33 drilled in the diaphragm 29 and is clamped firmly in place by spring connection or contact 28.

A more detailed showing of contact 28 is shown in Fig. 4. Here contact 28 is shown as being stamped from sheet metal and having one end thereof bent into a split cylindrical sleeve 34. At its top 35, the sleeve is outwardly splayed so as to easily receive the prong of tube 11. When the tube 11 is inserted into contact 28 the walls of sleeve 34 are spread apart at the split 36 but will tightly engage the prong and hold it firmly in place. The other end 37 of contact 28 is adapted for connection to the intermediate terminal 27, laterally displaced from the prong receiving sleeve 34. The contact 28 may be fastened to the diaphragm by any suitable means such as rivet 38 which passes through a hole 39 in the contact 28 and a hole 40 in the diaphragm 29, where it is fastened in a recess 41, thereby allowing the tube base to set evenly on the diaphragm 29.

The diaphragm 29 is held against upward movement when the tube is removed from the socket by terminal 27 and other similar terminals. Terminal 27 consists of a bushing 42 which is moulded directly in the side wall 26 of the receptacle 15. The bushing 42 receives a screw 43 which holds the end of the band conductor 24 and end 37 of contact member 28 as well as a

terminal member 44 to which may be fastened a lead 45 for connection to other parts of the equipment.

As stated above, the socket receptacle is generally cup-shaped. However, at intervals around the sides thereof, the walls are provided with outwardly extending, hollow projections 46 to surround in part the spaces for the intermediate terminals 27 (see Fig. 3). These projections are thus formed to limit the size of the socket. That is, if the exterior walls of the receptacle 15 were cylindrical and the spaces for terminals 27 included therein, the flange 18 would have to extend even beyond this, in order to make the screws 21 accessible. Therefore, by placing these projections for terminals 27 as illustrated, it is possible to make the flange 18 small and space the screws 21 between the projections.

The terminals 27 are positioned inside the receptacle 15 and a substantial distance below the top 16 thereof. By this construction the "break-down" path or shortest arcing distance between the terminal 27 and ground at the flange 18 is of considerable length, that is, a path which extends from terminal 27 up the inner wall of receptacle 15, over the top 16 and thence downward along the outer wall to flange 18.

Since many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A combined tube socket and closure element adapted for connection to high potentials and to form a closure for a fluid container, said socket comprising a generally cup-shaped receptacle of electrical insulating material open at its top and closed at its base, a diaphragm carried by and fixedly disposed intermediate the open top and the base of said receptacle and forming a cup thereabove and a compartment therebeneath for protecting bare electrical surfaces, first terminal means extending downwardly from said diaphragm into said compartment for receiving and gripping the prongs of a tube, and second terminal means electrically connected to said first terminal means inside said compartment and extending through and exteriorly of the base of said receptacle.

2. A combined tube socket and closure element adapted for connection to high potentials and to form a closure for a fluid container, said socket comprising a generally cup-shaped receptacle of electrical insulating material open at its top and closed at the base, first terminal means disposed on a diaphragm within said receptacle and adapted to receive and grip the prongs of a tube, second terminal means electrically connected to said first terminal means and extending exteriorly of the base of said receptacle, mounting means for said receptacle including a continuous flange secured to and extending laterally from the base thereof, and third terminal means arranged interiorly of said receptacle and electrically connecting said first and second terminal means, said third terminal means serving at least in part to fasten said diaphragm within said receptacle.

3. A combined tube socket and closure element adapted for connection to high potentials and to form a closure for a fluid container, said socket comprising a generally cup-shaped receptacle of

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electrical insulating material open at its top and closed at the base, first terminal means disposed on a diaphragm within said receptacle and adapted to receive and grip the prongs of a tube, second terminal means electrically connected to said first terminal means and extending exteriorly of the base of said receptacle, mounting means for said receptacle including a continuous flange secured to and extending laterally from the base thereof, and third terminal means arranged interiorly of said receptacle but in laterally spaced relation to said first terminal means, said third terminal means providing for connection of said first and second terminal means to an exteriorly extending conductor and serving at least in part to fasten said diaphragm within said receptacle.

4. A combined tube socket and closure element comprising a generally cup-shaped receptacle of electrical insulating material open at the top and closed at the base, first terminal means disposed on a diaphragm within said receptacle and adapted to receive and grip the prongs of a tube, second terminal means adapted to be electrically connected to said first terminal means and extending exteriorly of the base of said receptacle, and third terminal means arranged interiorly of said receptacle in radially spaced relation to said first terminal means, said third terminal means

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simultaneously electrically connecting said first and second terminal means to each other and to an exteriorly extending conductor and serving at least in part to fasten said diaphragm within said receptacle.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

	Number	Name	Date
	1,523,430	Knoop	Jan. 20, 1925
15	1,685,766	Mosher	Sept. 25, 1928
	1,798,367	Burnham	Mar. 21, 1931
	1,819,805	Zuckerman	Aug. 18, 1931
	1,833,984	Bohlman	Dec. 1, 1931
	1,839,633	Alden	Jan. 5, 1932
20	1,850,583	Gage	Mar. 22, 1932
	2,017,940	Bessey	Oct. 22, 1935
	2,111,381	Barton	Mar. 15, 1938

FOREIGN PATENTS

	Number	Country	Date
25	162,367	Great Britain	Apr. 25, 1921
	228,130	Great Britain	Oct. 15, 1925