

Aug. 21, 1928.

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E. T. FLEWELLING

SOCKET

Original Filed Nov. 7, 1923

Fig. 1.

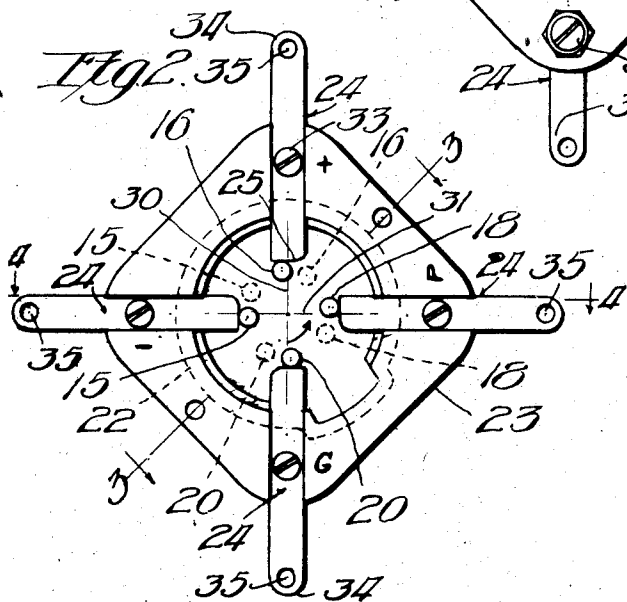
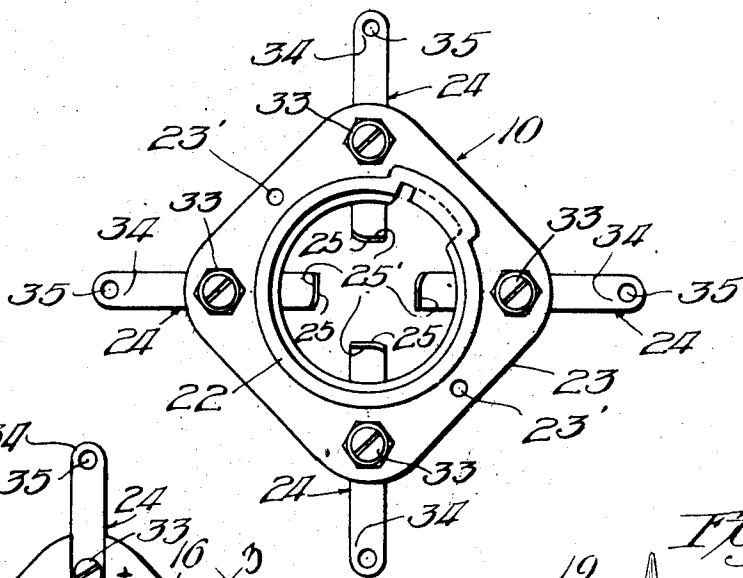


Fig. 4.

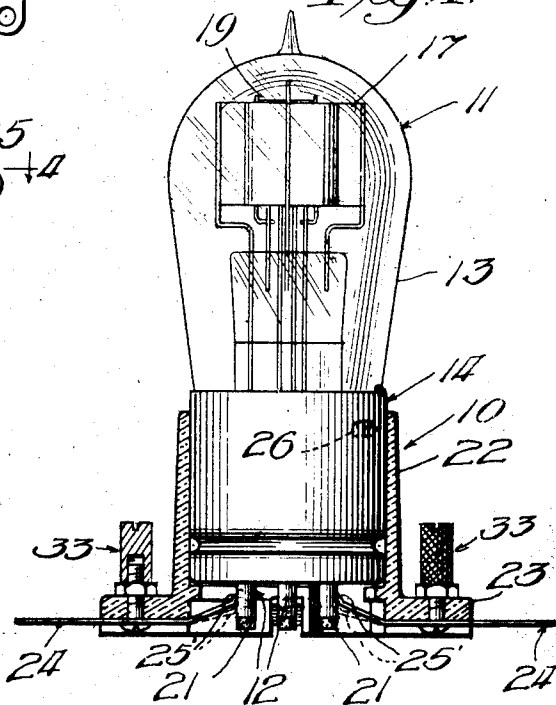
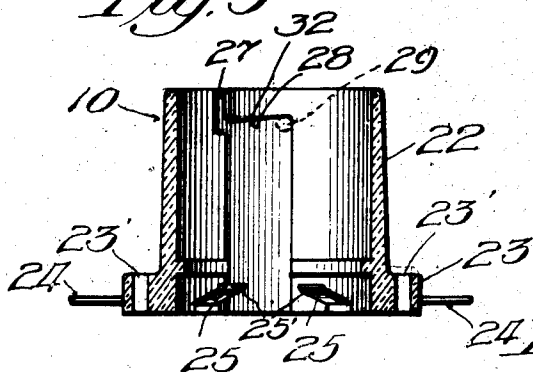


Fig. 3.



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UNITED STATES PATENT OFFICE.

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SOCKET.

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This invention relates to sockets or the like for effecting desired connections with certain electrical appliances or devices.

Among other objects, the invention is intended to provide an improved device of this character for making reliable electrical connections with various appliances, and for securing improved circuit conditions particularly with high frequency currents.

The invention may be readily understood by reference to one illustrative device, in this instance a socket, embodying the invention and shown in the accompanying drawing.

In said drawing:

Fig. 1 is a plan view of the socket alone; Fig. 2 is the bottom plan view of the socket showing the manner of making connections with the terminals of a device applied to the socket;

Fig. 3 is a vertical section of the socket alone, taken along the line 3—3 of Fig. 2;

Fig. 4 is a vertical section of the socket, taken along the line 4—4 of Fig. 2, carrying in this instance, a typical vacuum tube.

The illustrative socket 10 is constructed and arranged, in this instance, to receive a typical vacuum tube 11 having four terminals 12 projecting from the bottom of the tube. Such a tube comprises the usual vacuum bulb 13 and base 14. Within the tube is a heating filament, the ends of which are connected with two of the terminals 12, (designated for convenient reference, 15 and 16). Also within the tube is a plate 17, so-called, connected with another one of the terminals 12 (designated for convenience 18) and a grid 19, so-called, connected with the remaining terminal 12, marked for convenient reference 20.

The extreme ends of the terminals 12 of the typical tube herein illustrated are sealed with lead or some other suitable metal, formed into cylindrical terminal portions 21.

The socket 10 is provided with a suitably shaped part, in this instance the tubular portion 22, for receiving the particular appliance intended to be engaged with the socket, and with a base 23 having suitable means such as openings 23' to serve for fastening the socket to a support. The socket may be made of any suitable dielectric or insulating material, such for example as bakelite, from which it may be fashioned in any suitable manner.

Projecting into the tubular portion of the socket are contact devices 24 ordinarily corresponding in number with the number of

terminals 12 on the appliance which the socket is designed to receive. In this instance, these contacts are four in number, intended respectively for the positive and negative terminals of the filament, and the plate and grid terminals.

Preferably, the contact members 24 are relatively thin, being in this instance relatively narrow sheet metal strips of brass or the like. These are arranged edgewise to each other with their flat surfaces substantially in one plane, thereby presenting minimum areas to corresponding areas of adjacent contact members.

The contact devices are arranged in the socket to engage the respective terminals 12 with their ends 25 which may be slightly bent up or curled, as at 25' to provide greater contact. In this instance, these ends 25 are arranged to engage portions of the terminals 12 which are as remote as may be from corresponding portions of other terminals, thereby permitting as great a separation or isolation of one contact member 24 from the other as the sizes and design of the socket will permit.

For properly connecting the respective terminals 12 with the corresponding connecting members 24, the base 14 and the socket are provided with co-engaging parts, in this instance, a projection 26 and a groove 27 relatively located to require a correct positioning of the terminals. These co-engaging parts preferably are arranged to secure an initial positioning of the terminals 12 between the contact members as indicated in dotted lines in Fig. 2.

To permit the socket and tube to be rotated relatively to bring the terminals 12 into electrical connection with the connecting members 24, the groove 27 is extended laterally as at 28. Thus when the pin or projection 26 on the base 14 reaches the bottom of the longitudinal portion of the groove 27, the tube and socket may be rotated relatively, in the direction of the arrow (Fig. 2), to bring the pin 26 in the position indicated at 29 in Fig. 3. In such position the respective terminals 12 occupy the positions indicated at 15, 16, 18 and 20, respectively, in Fig. 2. Preferably such positions are each slightly beyond (in the direction of rotation) the center lines 30 and 31 perpendicular to the contact faces 25 of the connecting members 24.

As indicated in Fig. 4, the ends 25 of the

connecting members 24 preferably project inwardly slightly more than sufficient to make just a bare contact with the terminals 12. Thus as the socket and tube are rotated relatively to effect electrical connections, the various terminals 12 deflect or bend the contact members 24 slightly, thereby insuring a reliable connection maintained by the pressure exerted by the deflected contact member.

This relative arrangement of terminals and contact members insures a contact of all terminals with their respective contacts regardless of slight inaccuracies in the location of the ends of the contact members or terminals.

Preferably the contact members are arranged to contact with the metal (usually brass) above the lead terminal portion 21 of each of the terminals 12, thereby insuring a better connection than if the contact were made with the lead terminal portions. The connection thus made has the character of a wiping connection which is self cleaning. There is no opportunity in this mode of effecting a connection, to overstress the flexible contact members to a position where they will remain permanently and where they cannot contact with the terminals 12.

Since the positions occupied by the terminals 12, as indicated in full lines in Fig. 2, are beyond the center lines 30 and 31 (the direction of rotation to secure this being counter clockwise in Fig. 2) the socket 11 cannot be rotated in the opposite direction to release it without exerting a sufficient force to deflect or distort the contact members 24 still more than is indicated in Fig. 4. This greater distortion must take place because the distance between the faces 25 and the center of the rotation of the tube is less than the distance from the respective terminals to the axis of the tube.

As indicated in Figs. 3 and 4 the contact members 24 are deflected upwardly, in this instance. Such an arrangement tends to prevent the tube 11 from being pushed farther down into the socket but does permit the tube to be withdrawn if sufficient force is exerted to overcome friction of the contact members 24 against the terminals 12. This construction may be utilized further to lock the tube securely in the socket. For example, the upper face 32 of the lateral passage 28 may be inclined upwardly (see Fig. 3) to the end of the passage toward the position 29 occupied by the pin 26 when the tube is in connected position. Thus in removing the tube, it is necessary to force the latter down slightly against the resistance of the contact members 24 because of the inclined face 32. Since this rotation requires force to distort the contact members, it is impossible for the tube to become disengaged accidentally.

Except as limited by the sizes of the typical tube 11 or other appliances which the socket may be designed to receive, and by the separation of its terminals 12,—the individual contact members 24 are separated a maximum distance. This arrangement is particularly advantageous in high frequency currents because it reduces to a minimum the capacity effect of the terminal and contact members. In general the capacity of adjacent members varies inversely as the square of the distance between them and directly as the area of the opposing surfaces. Thus, the maximum separation of the contact members reduces the capacity effect of the socket to a minimum. The capacity is further minimized by arranging the contact members so that their edge faces alone are presented to adjacent and opposite contact members.

The terminal members may be cast into the material of the socket or may be attached thereto after the socket has been formed. For example, they may be secured thereto by suitable bolts or other fastening devices represented by the binding posts 33. In the illustrative socket the contact devices are arranged to extend a distance from the socket, as at 34, and provided at the ends with means represented by the holes 35 for connecting with other devices or apparatus. Preferably, these extensions 34 are made long enough so that the device may be connected directly (without the use of connecting wires or other conductors of indefinite length, arrangement and shape) with another piece of apparatus, to accomplish which, the extensions may, if necessary, be bent or twisted. This is particularly advantageous when the device is used in connection with high frequency currents because it minimizes the unknown and uncontrolled capacity and inductance effects produced by connecting wires or other conductors of indefinite or variable length, shape and arrangement. The provision of the connecting extensions makes necessary a definite arrangement of apparatus, the capacity and other electrical properties of which is reasonably constant and is not subject to uncontrolled variation (characteristic of apparatus employing connecting wires or the like of indefinite length, arrangement and shape, the inductance or capacity of which are unknown and which varies greatly with each apparatus). Since these terminal extensions require a definite arrangement and spacing of apparatus, the inductance and capacity effects of the various parts and locations of the apparatus itself become reasonably fixed and constant for similar arrangements of apparatus and, furthermore, are not subject to possible variations in a given apparatus such as is incident apparatus employing connecting wires or the like. In other words, these connecting extensions provide a means of minimum capacity effect, whereby apparatus of which the inventive device forms a part may be readily assembled into that standard or designed ar-

rangement in which the apparatus will operate most efficiently.

Obviously the invention is not limited to any particular construction and the details of the illustrative device may be variously modified. Furthermore, it is not indispensable that all the features of the invention be used conjointly, since they may be used to advantage in various combinations and sub-combinations.

Having described one embodiment of my invention, I claim:

1. In a socket for electrical appliances, the combination comprising means for receiving the electrical terminals of said appliances, a plurality of flat metallic contact strips projecting into said socket and arranged to be engaged at their ends only by the respective appliance terminals upon rotation of the appliance in said socket, the ends of said strips being arranged tangentially to the arcs travelled by the respective terminals upon rotation of said appliances, and projecting inwardly a distance somewhat greater than necessary for mere contact whereby said strips are distorted by said terminals when the appliance terminals are brought into contacting position.

2. In a socket for electrical appliances, the combination comprising means for receiving the electrical terminals of said appliances, a plurality of flat metallic contact strips projecting into said socket and arranged to be engaged at their ends only by the respective appliance terminals upon rotation of the appliance in said socket, a bayonet joint or the like for locking said appliance in said socket,

said joint being arranged to force said appliance to distort said strips to disengage said appliance, whereby said strips act to resist the disengagement of said appliance.

3. In a socket for electrical appliances, the combination comprising means for receiving the electrical terminals of said appliances, a plurality of flat metallic contact strips projecting into said socket and arranged to be engaged at their ends only by the respective appliance terminals upon rotation of the appliance in said socket, a bayonet joint or the like for locking said appliance in said socket, said joint having its lateral passage inclined to force said appliance downwardly toward said strips to disengage said appliance, whereby said strips act to resist the disengagement of said appliance.

4. In a socket for electrical appliances, the combination comprising means for receiving the electrical terminals of said appliances, a plurality of flat metallic contact strips projecting into said socket and arranged to be engaged at their ends only by the respective appliance terminals upon rotation of the appliance in said socket, said strips having their ends inclined relatively to the socket, means for locking said appliance in said socket comprising an inclined cam surface which acts to force said appliance to increase the inclination of said strips during the disengagement of said socket, whereby said strips act to resist the disengagement of said appliance.

In testimony whereof, I have signed my name to this specification.

EDMUND T. FLEWELLING.