March 16, 1926.

1,576,638

J. S. ELLIOTT

ELECTRICAL SOCKET

Filed Oct. 28, 1922

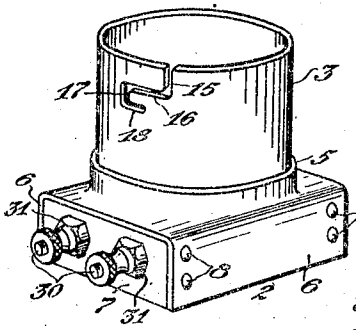


Fig. 1.

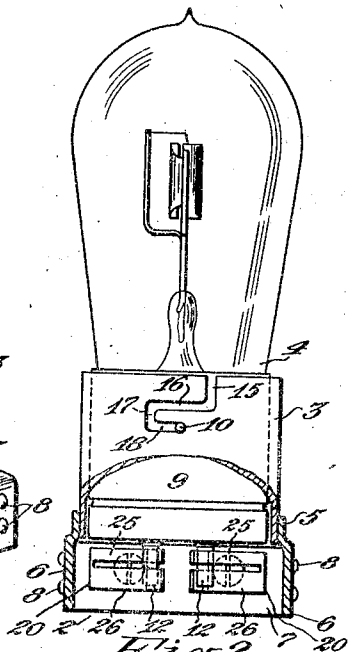


Fig. 2.

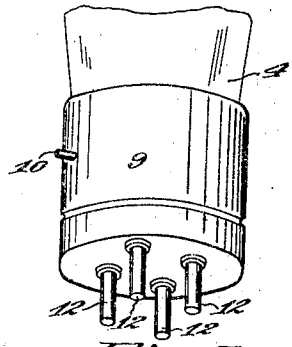


Fig. 3.

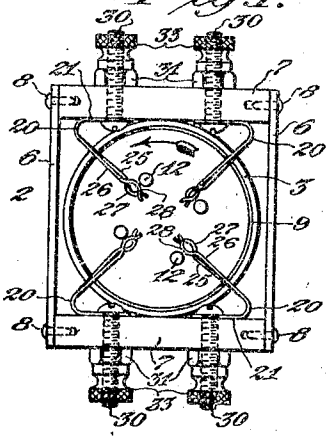


Fig. 4.

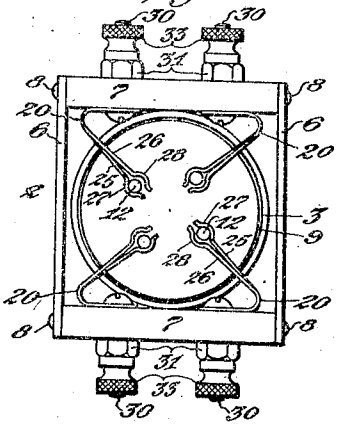


Fig. 5.

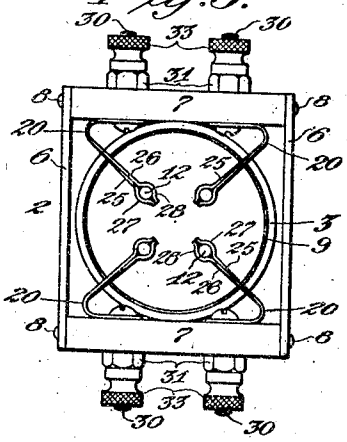


Fig. 6.

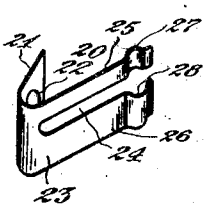


Fig. 7.

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UNITED STATES PATENT OFFICE.

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ELECTRICAL SOCKET.

Application filed October 28, 1922. Serial No. 597,500.

To all whom it may concern:

Be it known that I, JOHN S. ELLIOTT, a citizen of the United States, residing at Providence, in the county of Providence, State of Rhode Island, have invented certain new and useful Improvements in Electrical Sockets, of which the following is a specification.

This invention relates to electrical receptacles or sockets and consists in improvements in the construction and arrangement of the parts thereof.

One object of the improvement is to provide a simple, compact socket structure which is staunch and durable in use and capable of being manufactured at a minimum cost.

Another object of the improvement is to provide a socket having its contacts adapted for more secure engagement with the terminals of the bulb, tube, or other electrical device held therein.

Another object of the improvement is to provide a form of spring contact for the socket which is less liable to be bent or sprung out of place or to lose its spring tension.

Another object of the improvement is to provide a construction of socket which will invariably insure a proper inter-engagement between the contacts and terminals when the tube is applied to place therein.

Further objects of the improvement are set forth in the following specification which describes a preferred embodiment of the invention as illustrated by the accompanying drawings. In the drawings:

Fig. 1 is a general view in perspective of my improved socket;

Fig. 2, a vertical elevation of the socket with its base shown partly in section, and also illustrating the vacuum tube held in the socket;

Fig. 3, a perspective view of the base of the vacuum tube showing its terminal contacts;

Fig. 4, an inverted, plan view of the base of the socket showing its spring contact-fingers;

Fig. 5, a similar view showing the contact-fingers in the first position of engagement with the terminals on the tube;

Fig. 6, a similar view illustrating the final or complete engagement of the contact-fingers with the tube terminals; and

Fig. 7 a perspective view of one set or pair of the contact-fingers.

My improved socket as herein shown is intended for use particularly for holding vacuum tubes to connect them in circuit with radio apparatus. It will be obvious, however, that the structure and arrangement of the socket is susceptible of modification within the scope of the present invention to adapt it to other uses as an outlet for connecting various electrical devices with their circuits.

As shown in Fig. 1 the socket comprises a base 2, which may be either rectangular or cylindrical in shape, and surmounting the base is an annular flange or cup 3 for receiving the base of the tube or bulb 4, see Fig. 2. For the sake of convenience and economy in manufacture the base 2 is preferably constructed from a strip or blank of sheet-metal which is pierced at the center and struck up in suitable dies to form a cylindrical rim or collar 5 on the top. The ends of the strip are bent down at right-angles to form the sides 6 of the rectangular base, the cooperating end-strips 7 providing a box-like structure as shown in Fig. 4. Preferably, the end-strips or filler-pieces 7 are constructed of insulating material, such as fibre, hard rubber, or suitable composition, and are held in place between the metal side-pieces 6 by means of pins or rivets 8 driven through holes therein. The end-pieces 7 being of dielectric material provide a convenient means for mounting the binding-posts and contact-elements of the socket as later described.

Referring to Figs. 1 and 2, the ring or cup 3 may be constructed from a short section of tubing of appropriate diameter, being received snugly within the collar or rim 5 on the base 2 to which it is secured by brazing, soldering or other suitable means. Fig. 3 illustrates the base of the vacuum tube 4 which is provided with a metal sleeve 9 adapted to fit within the ring 3, and projecting from its side is the usual pin 10 which serves as a detent to secure the tube in place in the socket. As shown in Fig. 2 the pin 10 is adapted to be entered through a slot 15 in the side of the ring 3 to effect a locking engagement between the tube and socket somewhat similar to that of a bayonet joint. It is to be particularly noted that the slot 15 has a peculiar formation,

extending inwardly from the edge of the ring 3 in an axial direction; then at right-angles or circumferentially of the ring in the branch 16; next at right-angles in the axial branch 17; and finally at right-angles again in the reverse bend or branch 18. This arrangement of reverse bends in the slot is for a purpose as later explained.

Projecting from the bottom of the porcelain base of the tube 4 are four terminals or contact-pins 12 such as usually employed for connecting the tube with the circuits of radio sets. The contact-pins or terminals 12 are adapted to be engaged by an equal number of contact-elements 20 arranged within the base of the socket in the manner as next described. Referring to Fig. 7, the contact-elements 20 are preferably constructed from sheet-metal, such as brass or copper, cut into strips and bent at an acute angle to form a flat securing piece 21 which is pierced with a hole 22. The opposite, angular extension 23 of the strip is cut away or slitted longitudinally at 24 to provide two opposite spring-arms 25 and 26. The outer ends of the arms 25 and 26 are bent or curled around to form opposed concavities or sockets 27 and 28 which are adapted to receive the terminal pins 12 on the base of the tube 4.

Referring to Fig. 4, the contact-members 20 are secured in place in the base 2 of the socket by means of their binding-posts 30 which extend through holes in the fiber or rubber end-pieces 7. The binding-posts 30 may consist simply of screws which are inserted through the holes 22 in the flat portions 21 of the contact-members 20 and then projected outwardly through corresponding holes in the strips 7. Suitable nuts 31 are screwed onto the outer ends of the screws 30 to draw their heads against the bent-over ends 21 of the contact-members 20 whereby the latter will be clamped snugly against the inner faces of the end-strips 7. The usual binder-nuts 33 are then placed on the ends of the screws 30 for use in connecting the conductor wires to the binding-posts. It will be observed that the contact-elements 20 are thus held securely in place in the base of the socket and insulated from the metal thereof, while being electrically connected with their respective binding-posts. The inclined arms 25 and 26 of the contact-members 20 project radially inward toward the center of the socket with their recessed ends disposed in spaced relation to adapt them to embrace the contact-terminals or pins 12 on the tube 4 when the pins are brought into engagement therewith in the manner as later explained.

The improved socket may be attached to its support by any suitable fastening means, not herein shown, and when in use operates in the manner as next explained: The bulb or vacuum tube 4 is applied to the socket by inserting its metal base 9 in the cup or ring 3 while entering the pin 10 on the side of the tube in the slot 15 of the ring. As the base of the tube is pushed into the socket the pin 10 will bring up against the edge of the lateral branch slot 16 in the ring 3, at which juncture the terminal-pins 12 will be projected down into the base of the socket opposite the arms 25 of the contact-elements 20, but free from engagement therewith as indicated in Fig. 4. The tube 4 is then turned or rotated slightly in the socket to carry the pin 10 through the branch slot 16 until it reaches the axially-extending branch 17. This turning movement of the tube 4 carries the terminals 12 at its base across the top of the contact arms 26 and into engagement with the concaved ends 27 of the arms 25, while causing the latter to be sprung back slightly with respect to the arms 26 as shown in Fig. 5. The tube 4 is next pushed farther into the socket to carry the pin 10 through the branch-slot 17, which movement brings the terminals 12 into opposite relation with the lower arms 26 of the contact-elements 20, as shown in Fig. 2. The tube 4 is then rotated in a direction opposite to that first described to carry the pin to the end of the branch slot 18. This latter turning movement of the tube will carry the contacts into the depressions 28 on the arms 26 while bending the latter back slightly against their spring tension; the pressure on the upper arms 25 being released slightly so that they swing back to substantially first position as shown in Fig. 6. It will be noted by reference to Fig. 4 that the arms 25 and 26 of each contact-element 20 extend normally in different planes, being inclined with respect to each other so that their terminal sockets 27 and 28 are closed together, so to speak. This provides that when the contact-pins 12 are finally carried into position against both of the arms of each contact-element the arms will have a firm pressure on the pins due to their inherent spring tension. It is to be further observed that the lower arms 26 of the contact elements 20 are somewhat wider than the upper arms 25. This provides that the upper arms may yield easily when the tube 4 is rotated to release it from the socket, while the lower arms have a greater stiffness to increase their spring pressure on the terminal pins with which they engage. In this way a positive electrical connection is insured which cannot be broken or disrupted by jar or vibration. Each contact-member 20 is held in secure connection with its respective binding-post 30, and with the lead wires from the different circuits connected thereto the several terminals of the tube 4 will be properly connected in circuit as required.

It will be observed from the foregoing de-

scription that my invention provides a particularly neat, simple and inexpensive socket which is staunch in construction and consequently more durable in use than similar devices heretofore employed for like purposes. The improved arrangement of the contact-elements of the socket provide for a more secure and efficient electrical connection between the terminals of the tube and the binding-posts, and further insures a proper engagement of the contacts while preventing disruption of the connections under jar or vibration.

Various modifications may be made in the construction and arrangement of the parts of the device without departing from the spirit or scope of the invention, therefore, without limiting myself to the exact embodiment herein shown and described, I claim:

1. In an electrical socket, the combination with means for receiving the base of a vacuum tube or the like on which are a plurality of projecting terminals, of contact-members provided with cooperating spring-arms arranged in offset relation and adapted to engage at different points on opposite sides of the terminals on the tube, when the latter is inserted into the socket and rotated in one direction and then carried farther into the socket and rotated in the opposite direction.

2. In an electrical socket, the combination with a receptacle for holding a vacuum tube or similar device having terminals, of contact-members each comprising a pair of spring-arms arranged one above the other and adapted to engage the opposite sides of a terminal when the tube is inserted part way into the socket and rotated first in one direction and then carried farther into the socket and rotated in the opposite direction.

3. A receptacle for electrical devices comprising a socket for receiving the base of a vacuum tube or the like having projecting terminals, and contact-members within the socket consisting of pairs of spring-arms, with one of said arms of each pair adapted to be engaged by a terminal when the tube is entered part way into the socket and rotated on its axis and the other arm adapted to be engaged by said terminal when the tube is carried farther into the socket and rotated in the opposite direction.

4. A device of the class specified comprising a cylindrical socket adapted to receive the base of a vacuum tube or other electrical device having projecting terminals, and contact-members in the socket comprising pairs of spring-arms with one arm of each pair arranged axially forward of the other arm to adapt it to be engaged first by the terminal when the tube is entered part way into the socket and turned on its axis, the other arm being later engaged by the terminal when the tube is carried farther into the socket and rotated in the opposite direction.

5. A device of the class specified comprising a cylindrical socket adapted to receive a vacuum tube or other electrical device having terminals projecting therefrom, and contact-members projecting into the socket, said contact-members comprising strips of conducting-material slitted longitudinally to provide pairs of cooperating spring-arms arranged one axially forward of the other to adapt them to be engaged by the terminals at different points therealong and on opposite sides thereof, when the tube is inserted part way into the socket and rotated in one direction and then carried farther into the socket and rotated in the opposite direction.

6. A receptacle for electrical devices comprising a socket having contact-members consisting of strips of conducting-material which are slitted longitudinally to form pairs of overlying spring-arms projecting radially into the socket, one arm being axially advanced in relation to the other arm, and both arms provided with depressions at their free ends adapted to receive the terminals of the device entered into the socket when said device is rotated first in one direction and then in the other in the manner and for the purpose substantially as described.

7. A receptacle for electrical devices comprising a socket, contact-members consisting of flat strips of conducting-material arranged radially with respect to the axis of the socket, said strips being slitted longitudinally to form pairs of cooperating arms which are inclined with respect to each other, and with one arm of each pair located axially in advance of the other arm to adapt said arms to engage on opposite sides of the terminals of a vacuum tube when said tube is inserted into the socket and rotated first in one direction and then in the other in the manner and for the purpose substantially as described.

8. A receptacle for electrical devices comprising a cylindrical socket having a slot in its side formed with axially-extending portions and oppositely-extending circumferential portions adapted to receive the detent-pin on the side of the vacuum tube or other device to be held in the socket, and contact-members comprising spring-arms extending radially inward from the sides of the socket, said arms arranged in pairs one above the other so that when the tube is pushed into the socket and its pin carried through the slot thereof the terminals on the tube will be carried into position with the spring-arms engaging their opposite sides.

In testimony whereof I hereunto affix my signature.

JOHN S. ELLIOTT.