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K. M. STOLL ET AL

2,814,790

GRAVITY INSERTION TUBE SOCKET

Filed Feb. 17, 1955

2 Sheets-Sheet 1

Fig. 1

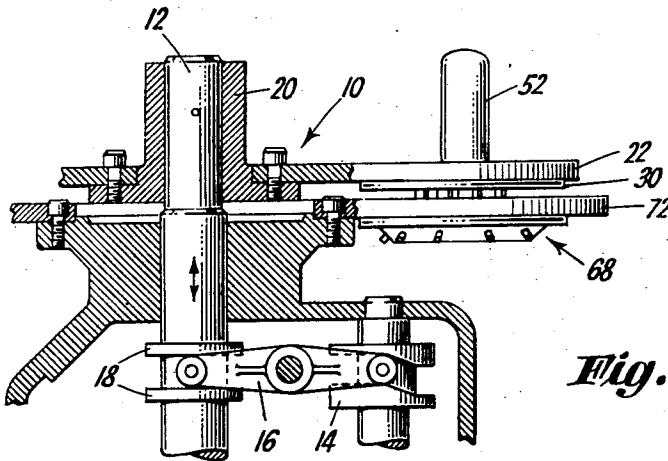
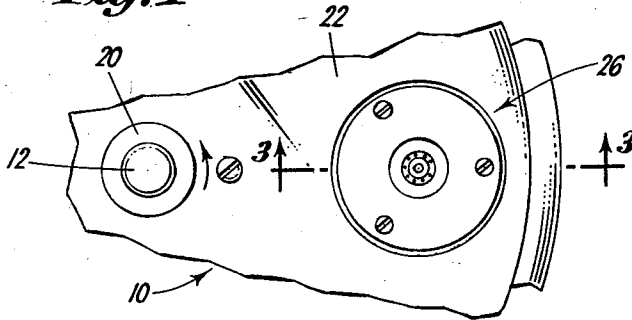
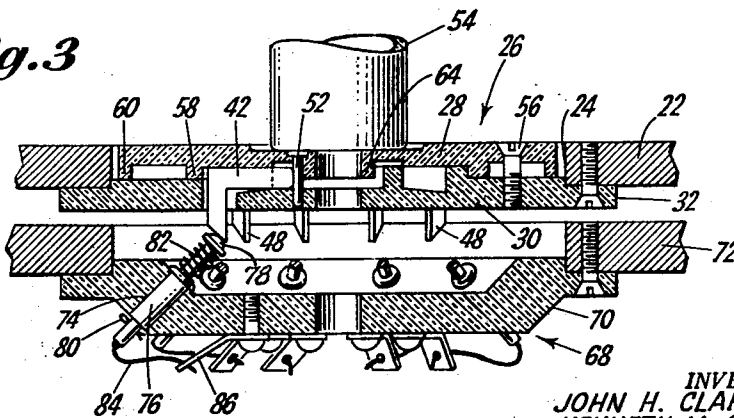


Fig. 2

Fig. 3



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Fig. 4

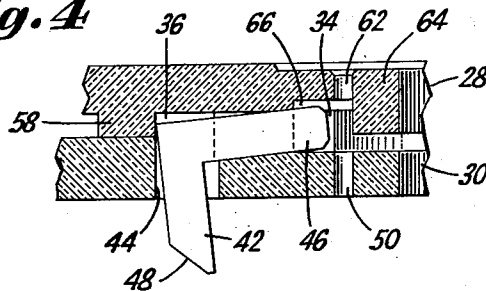


Fig. 5

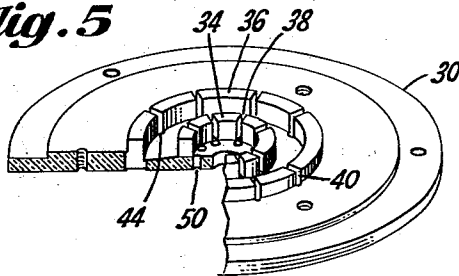
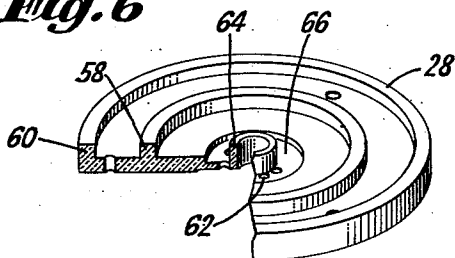


Fig. 6



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GRAVITY INSERTION TUBE SOCKET

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4 Claims. (Cl. 339—193)

This invention relates to electrical sockets such as are utilized in testing equipment for electron tubes, particularly where the socket moves from position to position to have its contacts make electrical connection with successive measuring instruments. In such equipment, the sockets are continuously loaded and unloaded by an operator and it is necessary to provide for easy loading of the sockets, ensurement of good electrical contact between the tube terminals and the socket contacts, good electrical connection between the socket contacts and measuring instrument terminals, and durability of the socket contacts.

Objects of this invention are to provide means for fulfilling the above requirements.

Other objects will be apparent after reading the following specification and claims in conjunction with the accompanying drawing in which:

Fig. 1 is a fragmentary plan view of a turret incorporating a number of the test sockets of the invention, one of said sockets being shown in plan.

Fig. 2 is an elevational view of the part shown in Fig. 1 with parts in section to disclose turret operating means and with an electron tube in the socket ready for test.

Fig. 3 is a section on the line 3—3 of Fig. 1 and with an electron tube in the socket.

Fig. 4 is an enlarged fragmental sectional view through the socket showing the association of a contact with a pocket within the socket.

Fig. 5 is a plan view of the lower contact carrying portion of the contact socket and

Fig. 6 is an underneath view of the upper cap portion of the socket.

Referring to the drawings in greater detail, at 10 there is disclosed a turret fixedly mounted on a shaft 12 which has both a vertical reciprocatory motion of translation and an intermittent rotational movement, as indicated by the arrows in Fig. 2. This shaft may be driven rotationally by a Geneva movement or the like at the lower end of the shaft and may be moved up and down in timed relationship to the intermittent rotational movement by the barrel cam 14, lever 16, and collars 18 fixed on the shaft. On the reduced upper end of this shaft is pinned a flanged collar 20 to which is bolted the table 22 of the turret.

Within this table and spaced circularly near the periphery thereof are a number of recesses 24 within each of which is a two part electrical socket 26 adapted to receive the terminal members of electric devices such as the pins of electron tubes. The two parts of the socket are designated 28 and 30 in Figs. 3 and 4. The lower contact carrying portion of the socket is a circular member provided with a flange 32 attached to the underpart of table 22 by screws or the like. It is also provided with two concentric ridges 34 and 36, each provided with radially aligned slots 38 and 40, the radial slots conforming in number and in spacing to the number and spacing of the terminal members of the electrical element to be tested. In the embodiment illustrated, there is dis-

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closed a number of slots and spacing conforming to that of a miniature 9-pin electron tube, although it will be obvious that other arrangements may be selected.

In each pair of aligned slots there is provided a generally L-shaped metallic contact 42. The longer horizontal arm of the contact lies loosely in the slots of the lower socket portion while the shorter vertical arm extends loosely through an opening 44 in the socket portion, there being one opening 44 aligned with each pair of aligned radial slots in the ridges. Each contact has a rounded end 46 on the horizontal arm and a bevelled end 48, as shown in Fig. 4, on the lower end of the vertical arm. The socket portion 30 is further provided with a circular sloped portion leading downwardly toward the openings 44 so that in normal position of the contacts they will all rest with the horizontal arm slightly inclined upwardly and with the member in a slid position away from openings 50 which are adapted to loosely receive the terminals or pins 52 of the electron tube 54 in the case of long pins and to allow dust and small particles to fall out of a socket. To confine the contacts to their radial slots and make the tube wall of a pocket with the aligned slots for each contact there is provided the upper or cap portion 28 secured to the contact carrying portion of the socket by screws 56 or the like. The cap has concentric ridges 58 and 60 bearing against a surface of the contact carrying member and further has holes or bores 62 aligned with the holes 50 for passage of tube pin terminals therethrough. A rib 64 is provided for strengthening the area adjacent the holes 62. The area adjacent the rib 64 is recessed slightly as at 66 to permit the ends 46 of the contact members to lie in the recess when the contact members are in idle position. When the contacts are in operative position, they are forced into wiping and tight engagement with the terminals of the tube under test to the position shown in Fig. 3 by mechanism to be described.

When the turret is raised by the barrel cam 14, it is rotated one step until the next socket is over a pick up contact station indicated in Figs. 2 and 3 as 68. This contact station comprises a dielectric disk 70 fastened by means of its flange to the underside of a stationary portion 72 of the testing machine. This disk is provided with radial inclined bores 74, each lined with an antifriction sleeve of smooth metal 76 and slidably mounting a headed contact pin 78 having a stop cotter pin 80 at one end and a compression spring 82 at the other end, said compression spring reacting between the end of the sleeve and the head of the pin. The pins are equal in number to the number of contacts 42 and are spaced apart so that the heads of the pins lie directly beneath but out of contact with the bevelled ends 48 of the contacts when the indexing movement of the turret has ceased. In this position of the turret, when the drum cam 14 effects a depression of the table 22, the bevelled ends will engage the spring pressed pins, causing the springs to be compressed. The pins will then move downward and laterally, sliding along the bevelled ends 48 thereby affording a good electrical contact between each pin and contact 42. At the same time due to the inclined direction of the force applied to the contact 42, the contact 42 will pivot in the slots of lower socket portion 30 and also slide radially toward the center of the socket. With pins 52 of a tube 54 in the socket, the pivoting and sliding motion of the contacts will cause a wiping action of each contact on its pin 52 as the contact engages the same to afford a good electrical contact therebetween. Thus the action of the socket as it comes down is to provide good electrical connections between the tube terminals and the socket contacts and between the socket contacts and the testing ter-

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minals. Also when the turret is raised, the tube is unrestrained against removal since the contacts slide away from the pins thereby providing for very easy removal of the tube and easy replacement thereof by another. For testing purposes each of the pins is connected by a flexible conductive braid 84 to a lug 86 suitably secured to the underside of the disk, the testing instruments being connected to the lugs.

What is claimed is:

1. A socket for receiving terminal pins of an electrical device comprising a number of vertical bores to loosely receive the pins, a number of radial pockets in said socket, one for each bore and each communicating with its respective bore, and a contact member loose in each pocket so as to be free to pivot and slide therein, said contact member being generally L-shaped, with one arm of the L lying in the pocket and the other arm projecting downwardly below the socket, a bevelled end on the downwardly projecting arm, whereby a thrust at right angles to the bevel will move the contact member radially of the pocket toward a pin in the bore and will pivot the member, said socket having, for each pocket, a bottom wall sloping downwardly and away from its vertical bore, whereby in normal position the contact member will slide to a position where the vertical bore is unobstructed.

2. A socket for receiving terminal pins of an electrical device comprising a socket base and a socket cap, said base having a central recess bounded by a first ridge, a second upstanding annular ridge within the recess spaced from the first ridge, first generally radial slots in said first ridge, second aligned generally radial slots in the second ridge, openings through the base in alignment with the slots in the first ridge, an L shaped contact member in said openings in the base and in the aligned first and second slots, the cap lying on the base and confining the member against removal from the base, the contact member being of a size to freely move longitudinally in the base and to pivot in a vertical plane and said cap being provided with holes, each intersecting, at right angles, a line drawn through aligned radial slots.

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3. A socket for receiving terminal pins of an electrical device comprising a number of vertical bores to loosely receive the pins, a number of horizontal radial pockets in said socket, one for each bore and each communicating with its respective bore, and a contact member loose in each pocket so as to be free to pivot and slide therein, said contact member being generally L-shaped, with one arm of the L lying in the pocket and the other arm projecting downwardly below the socket, and a bevelled end on the downwardly projecting arm, whereby a thrust at right angles to the bevel will move the contact member radially of the pocket toward a pin in the bore and will pivot the member, and means for thrusting against said bevelled end comprising a disk with inclined bores, and spring pressed contacts slidable in said bores and engageable with the bevelled ends upon movement of the socket down toward the disk.

4. A socket for receiving terminal pins of an electrical device comprising a number of vertical bores to loosely receive the pins, a number of radial pockets in said socket, one for each bore and each communicating with its respective bore, a contact member loose in each pocket, said pocket being longer than the length of said contact member to allow longitudinal sliding motion of said contact member, at least a portion of said pocket being of greater height than said contact member to permit movement of the contact member in a vertical plane, an opening into said pocket, said contact member having an end extending out of the pocket through said opening, an operating member having an end engageable with the end of the contact member, one of said ends being bevelled to effect a horizontal displacement and tilting motion of the contact member.

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