Dec. 21, 1965 S. T. DEAKIN 3,225,323

ELECTRIC SOCKETS AND SOCKET CONTACTS THEREFOR

Filed Aug. 20, 1963 4 Sheets-Sheet 1

FIG. 1.

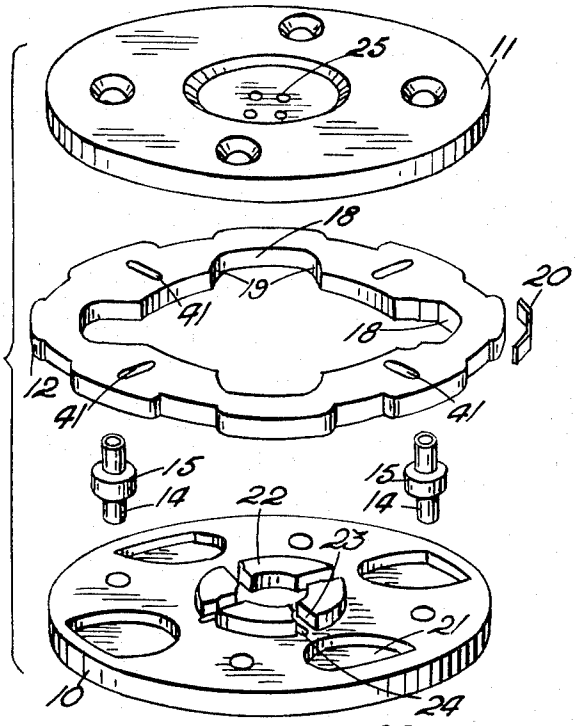


FIG. 4.

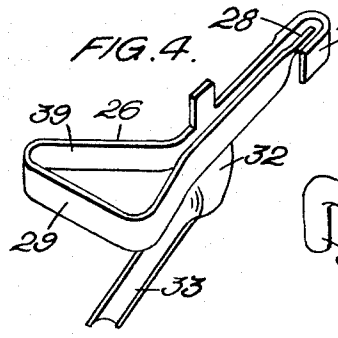


FIG. 5.

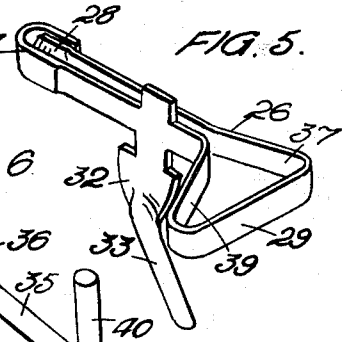


FIG. 6

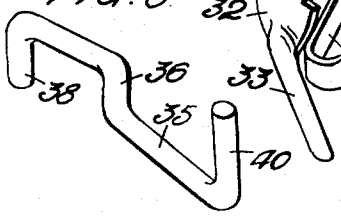
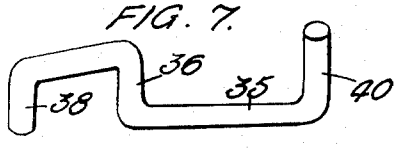


FIG. 7.



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FIG. 2.

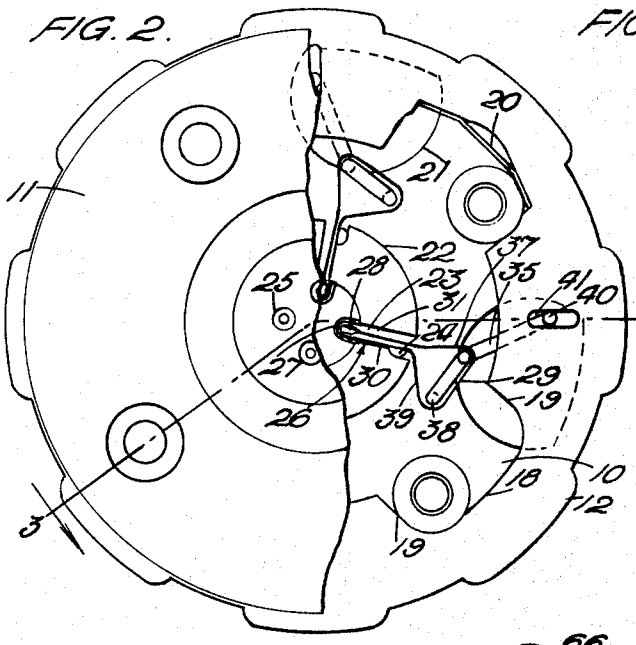


FIG. 12.

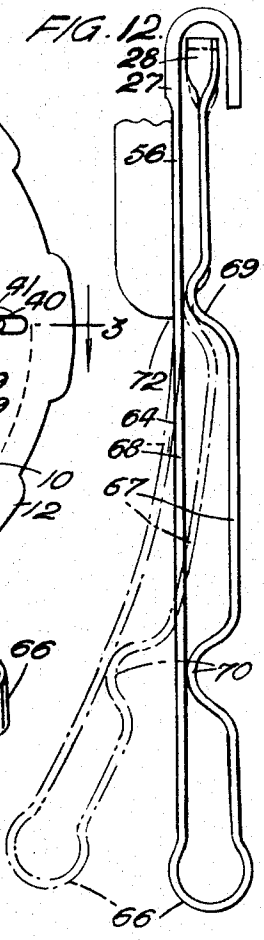


FIG. 13.

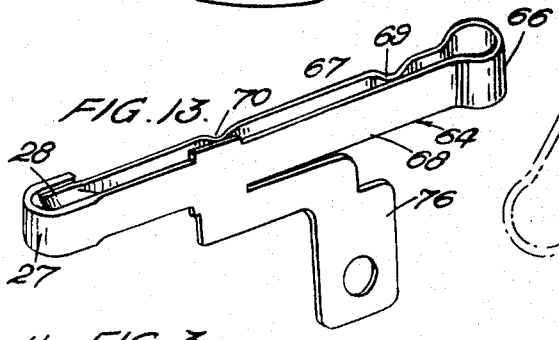
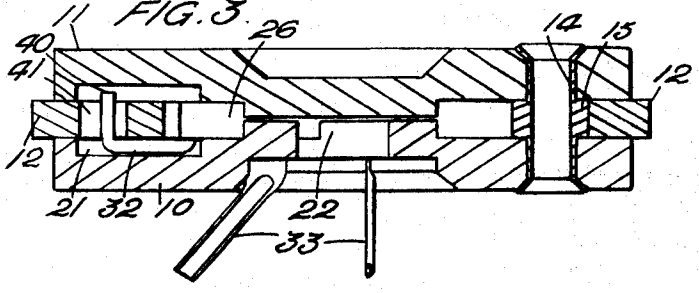


FIG. 3.

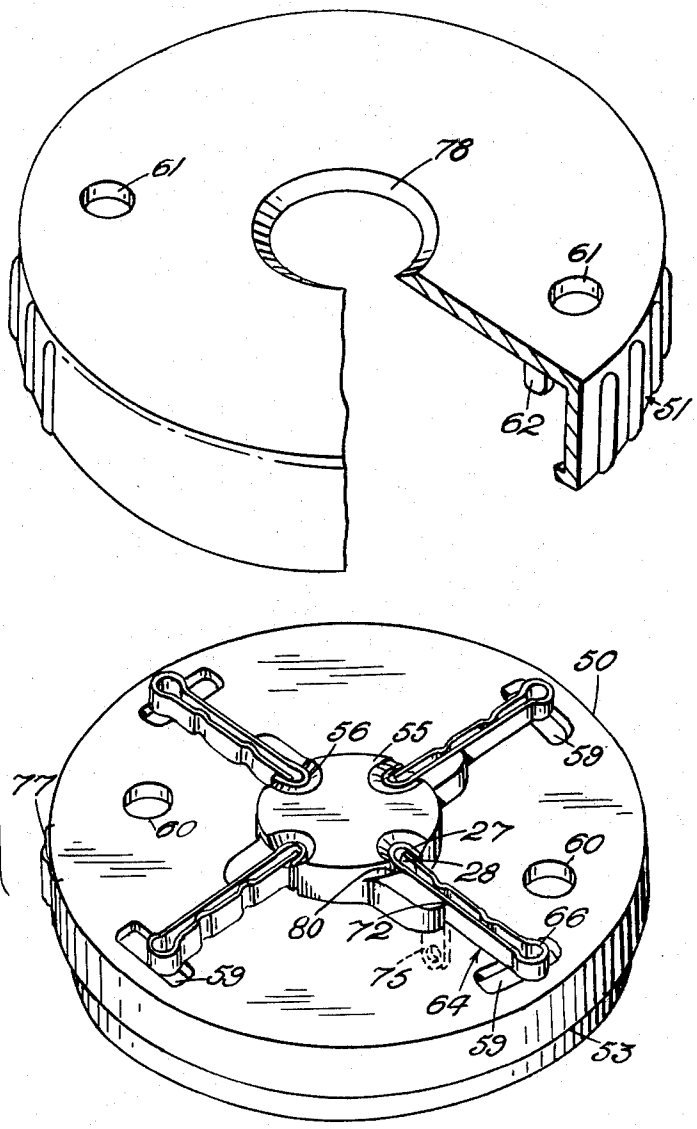


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FIG. 8.



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FIG. 9.

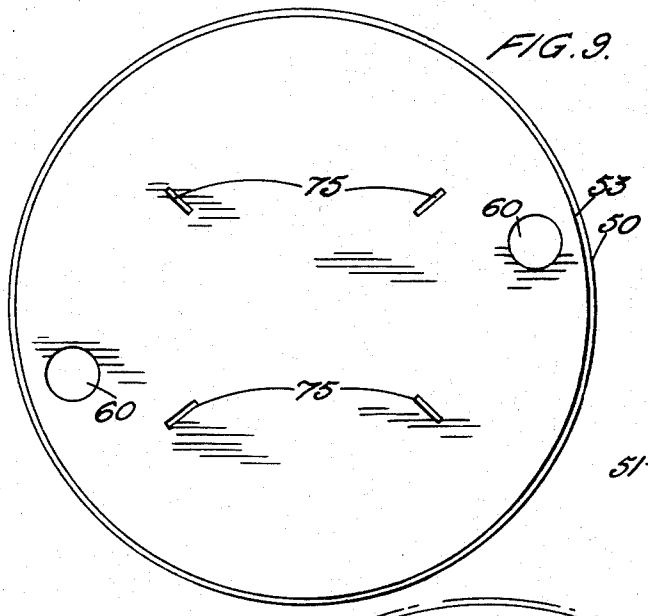


FIG. 11.

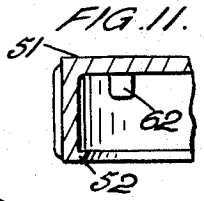
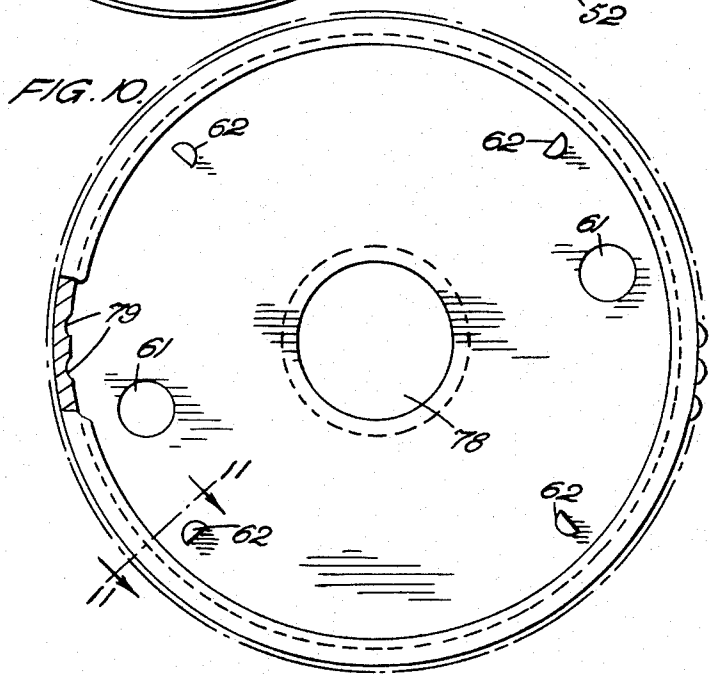


FIG. 10.



United States Patent Office

3,225,323

Patented Dec. 21, 1965

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ELECTRIC SOCKETS AND SOCKET CONTACTS THEREFOR

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Claims priority, application Great Britain, Aug. 21, 1962, 32,115/62
2 Claims. (Cl. 339—174)

The invention relates to electric sockets and contacts therefor. One of the objects of the invention is to provide a socket having a contact which, on the one hand, will provide effective contact pressure even on a plug or wire of quite small diameter and, on the other hand, will not offer such resistance to insertion or removal of the plug contact as would damage the surface thereof or result in the bending or fracture of the plug or its support. The invention is not however restricted in its application to sockets and contacts for small plugs.

The invention provides an electrical socket having a socket contact which is bent from strip material of which one end portion is bent on itself about a transverse axis or axes to U-form (or equivalent V-form) adapted to receive a plug contact inserted between its arms transversely to the length of the strip and of which the other end portion enters into the mouth of the U or V to engage a plug contact therein and resiliently to press it against the bottom of the U or V, said socket also having means for withdrawing said other end of the strip away from the bottom of the U or V to facilitate insertion or withdrawal of a plug contact.

In one form of the invention the strip is bent to provide, at a position along its length between its end portions aforesaid, two spaced-apart opposed surfaces transverse to the direction of withdrawal of said other end, or having a component transverse to said direction, the strip extending from the U or V first to one of the surfaces, then to the other surface and finally to the said other end with the first said surface nearer to the ends of the strip than the other, and the withdrawing means aforesaid act by increasing the separation of the surfaces. One such construction has the strip bent to the form, approximately, of an isosceles triangle with extensions from the two equal sides opposite the base, the extensions being parallel and perpendicular to the base and one being bent at its end to U or V form as aforesaid and the end of the other entering into the U or V. In this construction the withdrawing means may act to increase the angle between the base and the side of which the extension has the U or V form. Accordingly it is not essential that an isoceles triangle be employed. Other shapes may be used which provide such an angle between two sides equivalent to the base and side just described.

The withdrawing means, in the construction just described, may comprise a lever fulcrummed in the angle between the base and the said other side (i.e. the side of which the extension enters into the U or V) and having an arm within the triangle and engaging with the opposite side (i.e. the side of which the extension has the U or V) and having an operating arm projecting outside the triangle. One construction has the extension with the U or V anchored to a base plate and operating means are included for rocking the lever, said means being guided and supported on the base plate.

There may be several (e.g. four) contacts arranged in a circle on the base plate each with its operating lever and the operating means aforesaid may be rotatable about the centre of the circle. There may also be a cover for the base, contacts and operating means, the cover having access holes registering with the U or V contacts for entry of plug pins.

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In another form of the invention the strip material forming the contact is bent on itself intermediate in its length to form two generally parallel limbs spaced away from one another and having their ends as aforesaid and the means for withdrawing said other end operate by so bending the contact that the limb having the U or V end is on the inside of a curve, the other limb being on the outside of the curve.

Two specific constructions of socket according to the invention will now be described by way of example and with reference to the accompanying drawings in which:

FIGURE 1 is an exploded view of one socket omitting the contacts and operating levers,

FIGURE 2 is a plan view of the socket, the cover plate having been partly broken away,

FIGURE 3 is a section on the line A—A in FIGURE 2,

FIGURES 4 and 5 are perspective views of one of the contacts,

FIGURES 6 and 7 are perspective views of one of the operating levers,

FIGURE 8 is an exploded view showing the second socket construction,

FIGURE 9 is an under-plan of the base of the socket,

FIGURE 10 is a view showing the interior of the rotatable socket cover,

FIGURE 11 is a part section on the line 11—11 in FIGURE 10,

FIGURE 12 is a view of one of the contacts, and

FIGURE 13 is a perspective view of one of the contacts, incorporating a slight modification.

The socket forming the subject of each example is intended to receive and hold small electrical components during assembly and testing and it may, if desired, be assembled with similar sockets on a printed circuit board for simultaneous treatment of a number of components.

The socket shown in FIGURES 1–7 comprises a base 10, a cover 11 and, sandwiched between them, an operating ring 12. The cover and base are held in spaced relation by tubular rivets 14 having enlarged centre portions 15. The ring 12 has cut-away parts 18 which bear on the portions 15 to centre the ring and of which the ends 19 act as stops limiting rotation of the ring. A spring 20 fitting in one of the cut-away parts acts on a detent holding the ring at the opposite ends of its movement.

The base has a central boss 22 with four grooves 23 and in the bottom of each groove 23 there is a slot 24. The base also has clearance holes or recesses 21 for the lower part of the operating levers later described. In the cover there are four holes 25 for the plug pins of a component to be tested or assembled.

One of the four socket contacts 26 is shown in FIGURES 4 and 5 and, in position, in FIGURE 2. The contact is bent from strip metal (e.g. beryllium copper) and has one end portion bent to U or V form 27 and the other end portion 28 twisted so that its contact edge is oblique to the width of the remainder of the strip. The bottom of the U or V is aligned with one of the holes 25. Between the end portions, the strip is bent to the form of an isosceles triangle of which the base 29 is perpendicular to the extensions 30, 31 leading to the end portions. The extension 30 has lateral lugs 32 which engage in the slots 24 and in corresponding slots in the cover and serve partly to anchor the contact in place. To complete the anchoring, the extensions 30, 31 are held in a groove 23. The lower lug 32 has an extension 33 which serves as a connection tag.

Fitting partly inside the triangle of each contact there is a cranked wire 35 which serves as an operating lever. The lever has an upright limb 36 which makes a pivotal engagement in the corner between the base 29 and the side 37 and it has a further upright limb 38 which bears

on the opposite side, 39, of the triangle. Pivotal movement of the lever in the clockwise direction in FIGURE 2 causes the limb 36 and the angle of the contact which it engages to move to the right relative to the limb 38 and side 39. Hence the end portion 28 is withdrawn from the bottom of the U or V.

The lever has a further upright limb, 40, which engages in a slot 41 in the ring 12 so that rotation of the ring between the limits set by the faces 19 rocks the lever to withdraw and release the portion 28 which normally seats on the bottom of the U or V under resilient pressure.

In use, the ring 12 is turned to withdraw the portion 28 of each of the contacts and the plug pins of a component are inserted through the holes 25 into the U-shaped parts of the contacts. The ring is then turned to allow the portions 28 to move inwardly into pressure contact with the pins.

The socket shown in FIGURES 8–12 comprises a base 50 and a cover 51 both moulded of insulating material, the cover being rotatable on the base through a limited angle and being held on the base by a lip 52 sprung under a step 53 or by other means permitting rotation.

The base has a central boss 55 with four slots 56 of which the upper edges are beveled. The base also has, in its bottom surface, four arcuate slots 59 and holes 60 for fixing screws. Holes 61 are provided in the cover for access to the screws.

On the inside of the cover there are four dependent pegs 62 which enter into the slots 59, the ends of which serve as stops limiting the rotational movements of the cover.

One of the four contacts 64 is shown in FIGURES 12 and 13. As in the previous example, the contact is bent from strip metal or from a stamping from sheet metal and has one end portion bent to U or V form 27 and the other end portion 28 entering between the arms of the U or V.

The strip is doubled on itself at 66 and the two limbs 67, 68 are held spaced away from one another by humps 69, 70 on the limb 67. As a consequence, flexing of the contact about a fulcrum in the region of 70, the end 66 moving to the right as seen in FIGURE 12, will partly withdraw the end 28 from the U or V 27, the limb 68 being on the inside of the curve and the limb 67 on the outside.

To effect such flexing, the end 27 is held in one of the slots 56 which also, by the edge 72, provides a fulcrum as aforesaid and the limb 67 of the contact is engaged near its end 66 by one of the pegs 62. Rotation of the cover in the clockwise direction in FIGURE 8 accordingly effects the flexing of the four contacts and withdraws the ends 28 to permit insertion of the contact pins.

The contacts have tags 75 which project through slots in the base and to which lead wires may be soldered. FIGURE 13 shows a modified form in which the tag 76 is cranked to increase the spaces between the four tags.

The return rotation of the cover may be effected by the resilience of the contacts or a separate return spring may be provided. Further a spring detent, e.g., as shown at

77, may be provided and engage in notches 79 in the cover to hold the latter at each limit of its travel.

The cover has a central aperture 78 which fits around a step 80 on the central boss. The edge of the aperture is beveled and together with the curved ends of the slots 56 forms D-shaped holes which act as guides for the contact pins or wires of a device to be tested and entering the ends 27.

The invention is not restricted to the details of the above examples. For instance either more or less than four contacts may be provided. Further there may be a contact at the centre of the ring of contacts described.

I claim:

1. A multi-contact electrical socket comprising an insulating base, an insulating rotatable cover thereon and defining therewith an internal cavity, with a central boss, a plurality of strip metal contacts within the cavity, edge-on to the base and radiating from the boss, each contact being doubled on itself at its radially outer end to provide two spaced apart side-by-side limbs of which the radially inner end of one is hook-shaped and held in a recess in the boss and the radially inner end of the other limb is flat and enters into the hook-shape, and co-operating means on the base and the cover for flexing the contacts on rotation of the cover partly to withdraw the flat end from the hook end, access for contact pins into the hook ends being provided.

2. A multi-contact electrical socket comprising an insulating base, an insulating cover fixed thereon and defining a cavity therewith, a rotatable insulating ring between the cover and the base, a plurality of strip metal contacts within the cavity, edge-on to the base and radiating from the centre of rotation of the ring, each contact being doubled on itself to form a triangle at its radially outer end, the base of the triangle being substantially perpendicular to the direction of radiation of the contact and to form two arms extending towards the centre, one arm being hook-shaped at its radially inner end and the end of the other arm being flat and entering into the hook and, for each contact, a lever engaging in the triangle and with the ring whereby rotation of the ring operates the lever to deform the triangle and partly to withdraw the flat end from the hook, access for contact pins into the hook ends being provided.

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