Dec. 20, 1966 A. F. WOOLSEY, JR 3,293,590

MICROCIRCUIT SOCKET

Filed June 18, 1964

FIG. 1

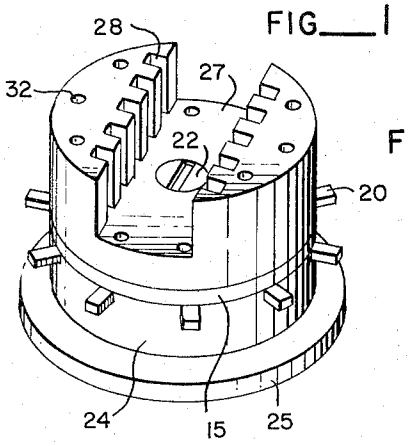
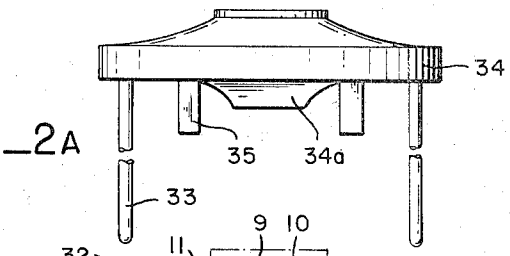


FIG. 2A



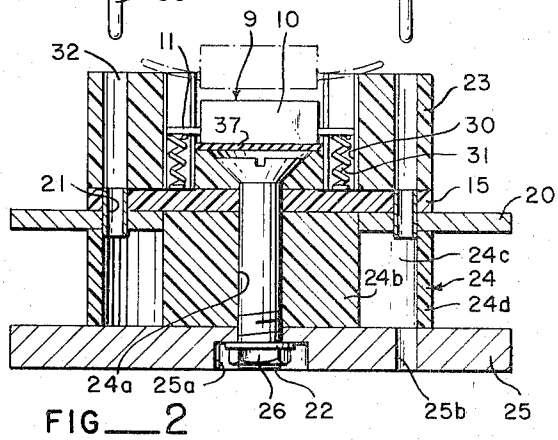
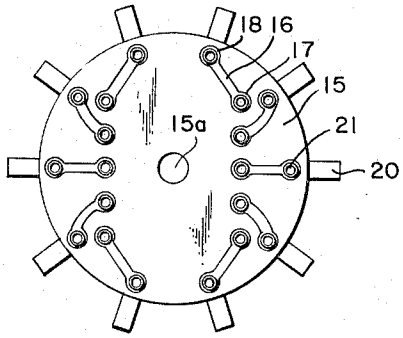


FIG. 2

FIG. 3



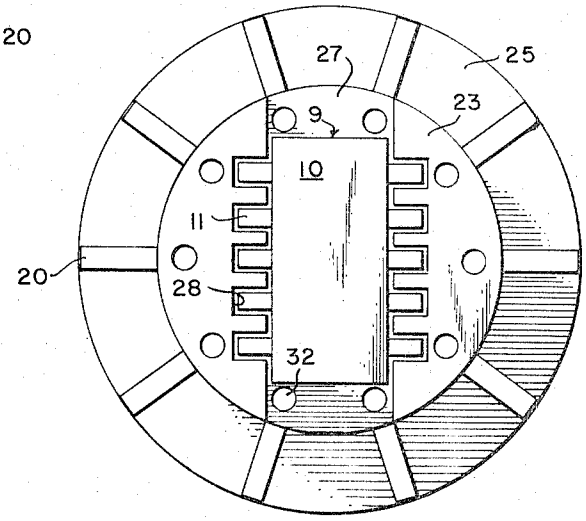


FIG. 4

FIG. 5

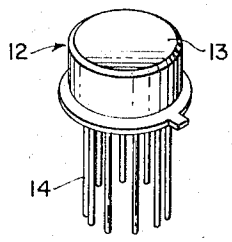
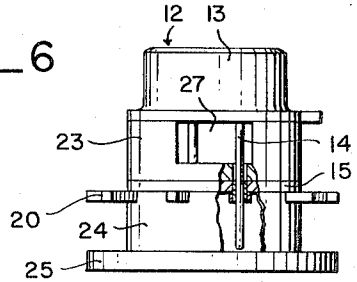


FIG. 6



ALFRED F. WOOLSEY JR.
INVENTOR.

BY Seed & Berry

ATTORNEYS

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MICROCIRCUIT SOCKET

Alfred F. Woolsey, Jr., 120 165th Ave. NE., Bellevue, Wash. 98100

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The present invention relates to improvements in sockets, holders and containers for microcircuits by which they can be safely and expeditiously stored, shipped, tested, programmed and otherwise handled.

Microcircuits come in unusually small delicate packages which must be handled with extreme care. In the past, in order to be evaluated, they have been soldered or mechanically fastened in a fixture or jig preliminary to connection to a test circuit and this handling has not only been objectionably time consuming, but has normally required skilled technicians and precision equipment to avoid damage.

An important object of the present invention is to provide a device by the use of which the components of a microcircuit can be easily, quickly, and accurately programmed and evaluated without endangering the microcircuit, and which also can be used for safe storage and transporting of microcircuits.

Another object is to provide such a device which can accept most microcircuit configuration such, for example, as either a "flat-back" or a "plug-pack" type.

A further object is to provide such a device by which a microcircuit unit can be connected to the rest of an electrical circuit with a minimum of handling and without need for soldering, probing of delicate leads, etc.

Still other aims of the invention are to provide such a device which can be economically produced and yet is readily repairable, and which can be easily modified for special applications.

With yet additional objects and advantages in view which, with the foregoing, will appear and be understood in the course of the following description and claims, the invention consists in the novel construction and in the adaptation and combination of parts hereinafter described and claimed.

In the accompanying drawings:

FIG. 1 is a perspective view of a microcircuit socket embodying the present invention.

FIG. 2 is an enlarged vertical sectional view taken through the center of the socket and with a flat-pack in position.

FIG. 2A is a side elevational view of the cover unit for the socket when retaining a flat pack.

FIG. 3 is a reduced top plan view of the circuit board component of the socket.

FIG. 4 is a top plan view of the socket with a flat pack in position as in FIG. 2.

FIG. 5 is a perspective view of a typical plug-pack type of microcircuit; and

FIG. 6 is a side elevational view, partly in vertical section, of the socket with a plug-pack.

Referring to the drawings, 9 designates a typical flat-pack type of semiconductor network unit having its body 10 of a rectangular plan configuration with two rows of leads 11 projecting from opposite sides thereof. Similarly, 12 denotes a typical plug-pack type of unit having a hat-shaped body 13 from the base of which leads 14 project as parallel prongs arranged in a circular pattern. These microcircuit units 9 and 12 are quite small, the maximum dimension of the body being usually no more than one-fourth of an inch. The number of leads 11 or 14 may vary, and for purposes of example each of the units 12 is shown as having ten terminals.

Continuing to the socket of the present invention, a printed circuit board 15 is provided presenting terminals

formed as flat strips 16 each of which is formed with contacts 17–18 at its opposite ends. The terminal strips are so arranged that their contacts 17 are located in two parallel rows while the locus of the contacts 18 is a circle corresponding in diameter to that occupied by the prongs 14 of the plug-pack unit 12.

Serving as commons for the contacts 17–18 are radially projecting contact strips 20 which are secured against the underside of the circuit board 15 by conducting grommets 21. These grommets extend through alined openings in the contact 18, circuit board 15, and contact strips 20, and are flared at their ends to assure electrical connection between the contact strips 20 and the terminal strips 16 at the contacts 18 as well as securing the contact strips in position.

As best seen in FIG. 2, the circuit board 15 is clamped by a screw 22 between a socket member 23 and a base assembly comprising a wheel-like spacer 24 and a base plate 25 having a central bottom recess 25*a* to house a nut 26 for the screw. The socket 23 has a pocket 27 taking the form of a diametrical slot into the floor of which the head of the screw 22 is countersunk. Along its longitudinal side walls this slot 27 is serrated to provide two rows of stalls 28, each stall having a generally rectangular cross-section. These stalls directly overlie the two rows of contacts 17 and continue thereto by respective bores 30 for the passage of conductive contact coil springs 31 which are seated on the contacts 17 by solder connection and project upwardly into the stalls. The purpose of the stalls is to house the leads 11 when a flat-pack 9 is used while the function of the springs 31 is to electrically interconnect these leads 11 with the underlying contacts 17.

Also formed in the socket member is a set of vertical through-bores 32 arranged in a circular pattern to register with the grommets 21 and related contacts 18. The primary function of these bores 32 is to receive the prongs 14 when a plug-pack 12 is used. A secondary function is to receive matching prongs 33 depending from a cover plate 34 (FIG. 2A) which may be used to close the top of the slot 27 and the stalls 28 when a flat-pack 9 is used. The cover plate 34 also has two rows of depending fingers 35 which match the stalls 28 to project thereinto when the cover plate is in closure position.

The circuit board 15 has a center opening 15*a* for passage of the clamping screw 22 and this is matched by a center bore 24*a* in the hub section 24*b* of the spacer 24. Spoke-like webs 24*c* radiate from the hub section to a rim section 24*d* which is notched at the top at regular intervals to receive the contact strips 20. The inner end portions of the contact strips alternate with the webs 24*c* to occupy the cavities therebetween. One or more of these cavities may be intersected by ports 25*b* through the base plate 25 for the passage of a lead wire as an optional method of connecting the microcircuit on the board 15 to external grounds, voltages, etc.

The socket member 23, circuit board 20, spacer 24, and base plate 25 can be fabricated from any suitable dielectric material such, for example, mica-filled phenolic resin, and the contact springs 31 may be made from beryllium copper, gold, or nickel plated copper with gold flash-over if desired. Beryllium copper is also suitable for the grommets and they may be of the spring-clip variety.

The terminals 16 on the circuit board may be formed by etched foil bonded to the board or in any other manner well known in the art.

Although the contact springs 31 have been illustrated as being a coil type, they may be leaf or bellows type springs, the preferred result being to have spring-loaded contacts.

In the use of the socket of the present invention a board **20** with the proper circuit for the microcircuit unit to be evaluated is installed. If the microcircuit is a flat-pack **9** it is carefully lowered into the pocket **27** with its leads **11** occupying the stall extensions **28** of the pocket. As the body **10** of the flat-pack is lowered the leads **11** come into engagement with the upper ends of the contact springs **31**. The cover **34** is then applied by first inserting the tips of the prongs **33** into the bores **32** to properly aline the fingers **35** with the stalls **28**, and then pressing down the cover to bring the fingers **35** into engagement with the upper faces of the flat-pack leads **11** in opposition to the underlying contact springs **31**. A shim, as for example a resilient pad **37**, may be placed between the body **10** of the flat-pack and the floor of the pocket **27** to allow for variances in thicknesses of flat-packs and differences in the level of the flat-pack leads **11** relative to the bottom face of the flat-pack body **9**. By this arrangement, the flat-pack is gripped between a foot extension **34***a* of the cover **34** and the bottom of the pocket **27** while its leads **11** are kept in engagement with the contact springs **31** by the fingers **35**. The flat-pack and socket can then be safely handled as a unit without fear of damaging the flat-pack. When programming of the flat-pack is desired it can be readily connected to an external hookup merely by clipping or otherwise connecting the external leads to proper of the radially projecting contacts **20**. This completes the circuit to the flat-pack leads **11** via the grommets **21**, terminals **16**, and contact springs **31**.

If the leads **11** of the flat-pack **9** are too long to fit the stalls **28**, and it is not desired to clip them, the flat-pack can be tested by lowering it only partly into the pocket **27** as indicated by the broken line position in FIG. 2 and permitting the leads **11** to bend upwardly at their tips until engagement with the contact springs **31** is achieved at the root end portions of the leads.

As shown in FIG. 6, when a plug-pack **12** is to be used it is plugged by its prongs **14** into the bores **32** of the socket. These prongs project into the grommets **21** and thereby are in electrical connection with both the programming leads **20** and the terminals **16** of the circuit board **15**. Thus it is seen that the socket member of the present invention is adapted to receive either a flat-pack or a plug-pack microcircuit.

It is believed that the invention will have been clearly understood from the foregoing detailed description of my now-preferred illustrated embodiments. Changes in the details of construction may be resorted to without departing from the spirit of the invention and it is my intention that no limitations be implied and that the hereto annexed claims be given the broadest interpretation to which the employed language fairly admits.

What I claim is:

1. A socket for a microcircuit package of the type having a body with two parallel sides from which two rows of leads project laterally in opposite directions, said socket comprising a non-conductive socket member having a base and having a pocket thereabove with two parallel sides interrupted by respective series of lateral pocket extensions open to the top of the socket, said pocket being adapted to receive said package with the leads thereof occupying said extensions, a circuit board mounted on the base of said socket member and having circuit board leads and respective terminals connected to said circuit board leads, openings in said socket member from said pocket extensions through the base of the socket and registering with respective of said terminals, and compressible spring conductor means extending through said openings from operative engagement with said terminals into said pocket extensions so as to be compressed by said leads of the microcircuit package.

2. The socket of claim **1** in which said socket member has a removable cover for holding said microcircuit package in the pocket.

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EDWARD C. ALLEN, *Primary Examiner.*

J. H. McGLYNN, *Assistant Examiner.*