June 14, 1960 S. M. DEL CAMP 2,941,180

NESTING SOCKET ASSEMBLY

Filed June 19, 1957

Fig. 1

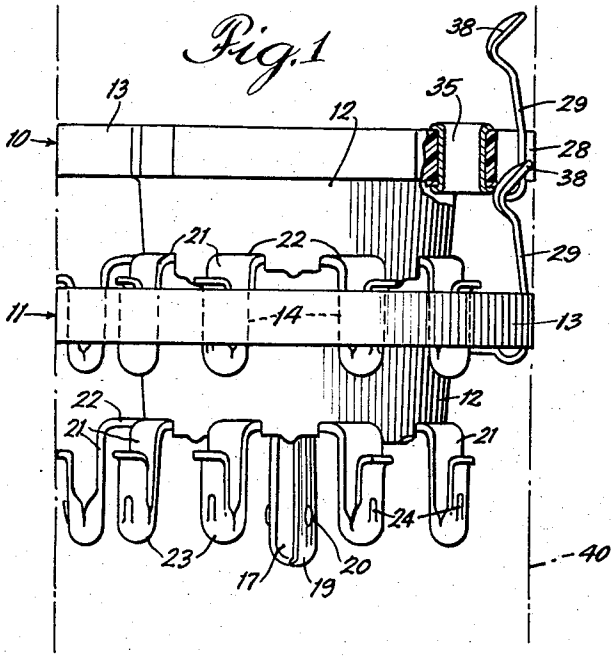


Fig. 3

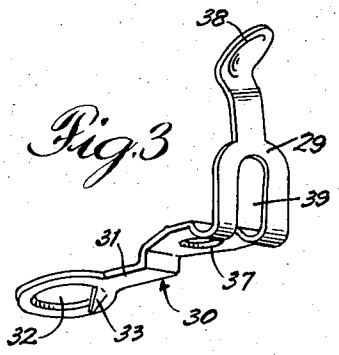


Fig. 2

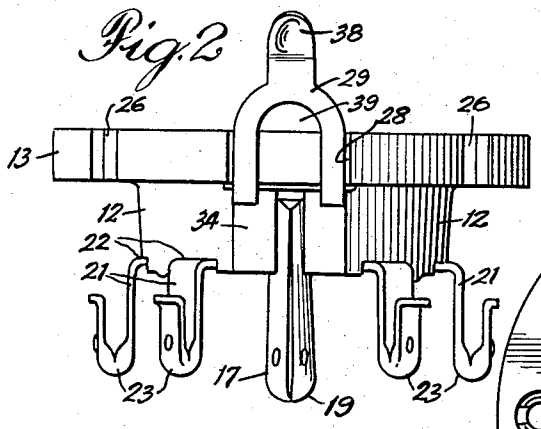
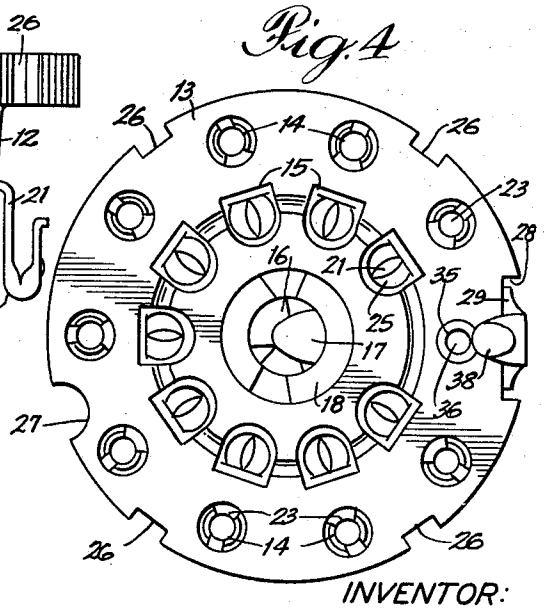


Fig. 4



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NESTING SOCKET ASSEMBLY

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4 Claims. (Cl. 339—14)

This invention relates to a tube socket assembly, and more particularly to a nesting socket wherein a plurality thereof can be stacked in coacting relation within a magazine for singular discharge therefrom.

It has become desirable in connection with the mounting of components on printed wire circuit panels, to machine-mount socket assemblies. That is to say, machines are contemplated which will take socket assemblies one-by-one from a magazine filled therewith, and mount such sockets in the appropriate locations therefor by pressing the socket terminals through apertures provided for such purpose in the printed wire panel. In one type of socket assembly, a ground clip is a part thereof, and as is well known the ground clip is secured to the underside thereof and extends upwardly beyond the socket casting to mechanically engage and establish electrical connection with a metal shield which will be positioned about the tube that is placed in the socket assembly.

In socket assemblies so equipped with ground clips, a particular problem has been created in that the most simple and therefore desirable magazine for the storage of socket assemblies therein, comprises a cylindrical tube; and the ground clips interfere with the free movement of the socket assemblies therethrough because they extend outwardly beyond the normal peripheral limits of the socket assembly in their extension thereabove.

An object of the present invention is to provide a socket assembly wherein such difficulties are remedied without the necessity of resorting to complex and costly magazine design. Another object of the invention is in the provision of nesting socket assemblies wherein one coactingly nests within another in providing a stack thereof, and in which ground clips carried by the various socket assemblies are contained within the perimetric dimensions thereof and also within the perimetric dimensions of sockets nesting therewith.

Still another object is that of providing a plurality of like sockets, each having elements coactively engageable with complementary elements of another such socket, and in which the ground clips carried by the respective sockets have upper portions thereof which nest within the ground clip of the sockets thereabove. Yet another object of the invention is to provide a plurality of socket assemblies having interengaging elements securing each to the other to define a stack thereof receivable within a magazine therefor, and wherein ground clips provided by the socket assemblies are maintained within the perimeters thereof whereby hollow, tubular magazines may be used for storage of the socket assemblies.

Yet a further object is that of providing a socket assembly having a terminal-equipped casting provided with apertures therein alignable with the terminals of a like socket for receiving the same therein, in which each socket is preferably provided with a ground pin having a depending end receivable within the open upper end of the corresponding ground pin in such a like socket assembly, and in which a ground clip carried by the socket is constructed and arranged so as to partially nest within a corresponding

ground clip provided by a like socket assembly so that each ground clip is not only contained within the circumferential dimensions of its socket assembly, but also within the same limits of an identical socket assembly. Additional objects and advantages of the invention will become apparent as the description proceeds.

An embodiment of the invention is illustrated in the accompanying drawing, in which—

Figure 1 is a side view in elevation of a pair of socket assemblies embodying the invention, shown in nesting relation and in which a tubular magazine therefor is illustrated in broken lines; Figure 2 is a front view in elevation of one of the socket assemblies; Figure 3 is a perspective view of a ground clip; and Figure 4 is a top plan view of a socket assembly.

A pair of socket assemblies are illustrated in Figure 1, and for differentiation are denoted with the numerals 10 and 11. Each comprises a casting or socket body 12 provided at the upper end thereof with an outwardly extending annular flange 13 having, as is shown best in Figure 4, a plurality of apertures or openings 14 extending therethrough in spaced apart relation along a circular arc having its center at the midpoint of the casting. Spaced inwardly of the apertures 14 are a plurality of openings or passages 15 that extend through the casting body and lie along a circular arc of smaller radius than the one heretofore described, in spaced apart relation and in radial alignment with the respective apertures 14. In the specific illustration there are nine openings 15, and similarly nine apertures 14. The casting is also provided with a central bore or opening 16 therethrough.

Mounted within the central opening 16 is a center or ground pin or terminal 17 having an outwardly swaged flange 18 at its upper end and a depending lower end 19 that may be formed of three individual legs turned inwardly at the lower end thereof to provide an inwardly compressible ground pin structure. Preferably, one or more of the various legs that define the lower end portion 19 of the ground pin 17 has an outwardly extending protuberance 20 thereon so as to engage a printed wire carried upon the underside of a printed wire panel.

Extending through the openings 15 are the respective terminals 21 that have outwardly turned portions 22, that lie along the respective radii defined by the aligned openings 14 and 15, which terminate in depending ends 23 which, as shown in Figure 1, are receivable in or extensible through the apertures 14 of a like or corresponding socket assembly disposed therebelow. More specifically, the depending ends 23 of the terminals provided by the socket assembly 10 extend through the apertures 14 in the annular casting flange of the socket assembly 11. The depending ends of the various terminals have locking protuberances 24 extending outwardly therefrom for engagement with the underside of a printed wire panel, and the upper end portions thereof are generally tubular for receiving the pins of a tube therein and are swaged over as shown at 25 to confine the same within the openings 15.

As shown in Figure 4, the perimetric or circumferential edge of the flange 13 has a plurality of notches 26 and 27 formed therein which are useful in processing of the casting 12, and along one side thereof a portion of the flange is removed to provide a recess or flattened area 28. Extending upwardly therealong is the upper leg 29 of a ground clip 30 which has a generally horizontal leg 31 terminating in a ring-shaped end 32 that passes the ground clip therethrough and establishes electrical connection therewith by means of the pointed finger 33.

The horizontal leg 31 of the ground clip extends radially outwardly along the underside of the flange 13 through a channel 34 provided therefor in the casting

12, and is rigidly secured to the casting by means of a hollow rivet 35 that extends through an opening 36 in the flange 13 and through an opening 36 in the horizontal leg 31 of the ground clip which is aligned therewith. The generally vertical leg 29 of the ground clip slants inwardly slightly, as shown in Figure 1, and terminates in a generally V-shaped end 38 intended to establish electrical contact with a tube shield.

The leg 29 of the ground clip is enlarged adjacent its intersection with the horizontal leg 31 and is open centrally to provide a channel or recess 39 adapted to receive the turned end 38 of another ground clip therein, as shown in Figure 1. It is apparent that when the end 38 of one ground clip is received within the channel 39 of another, the end is at the same time partially nested within the recess or flattened area 28 of a socket casting thereabove. The ground clip has a spring-like resilience so that it firmly bears against and thereby establishes a good electrical connection with a tube shield. It provides a flow path for electrostatic and electromagnetic energy from such tube shield to the ground pin 17, which in turn will be electrically connected to a ground wire of a printed circuit panel.

The socket assemblies have the components thereof joined with each other by conventional practices and, as is well known, the casting or body 12 is an insulating material, while the terminals 21 are conductors to connect the pins of a tube with the appropriate wires of a printed circuit panel. After assembly, the sockets may be nested one within another (as shown in Figure 1), and because of the spacing of the terminals 21 and of the corresponding apertures 14, there is only one relative position of the socket assemblies in which they may be so nested—namely, the one illustrated in Figure 1 wherein the ground clips 30 are vertically aligned with each other. The reason for this is apparent from an inspection of Figure 4 which shows that the spacings between each of the terminals are identical except between two thereof, those being at the right-hand side of Figure 4. Consequently, as stated, there is only one relative position between adjacent assemblies, wherein the terminals of one can be inserted into the apertures 14 of another.

When a plurality of socket assemblies are nested one within another to provide a stack thereof, they may be inserted into a substantially tubular magazine such as the one indicated by broken lines in Figure 1 and identified with the numeral 40. It will be appreciated that the inner diameter of such hollow, tubular magazine 40 will be but slightly larger than the outer diameter of the flange 13 so that the stack of socket assemblies can move longitudinally therethrough without canting. While it is not shown, the magazine or the dispensing machine with which it is used will be provided with means for maintaining the stack of socket assemblies within the magazine, while permitting successive separation and withdrawal of the lowermost one thereof.

The socket assemblies cooperatively engage each other, and in effect are in interlocking engagement because of the frictional grip existing between the terminals 21 and walls of the apertures 14, and/or the frictional grip existing between the depending end 19 of the ground pin 17 and the upper end of the corresponding ground pin of the adjacent socket assembly. Therefore, the sockets maintain themselves in longitudinal alignment within the magazine. It will be evident that each ground clip is within the perimetric dimensions of the annular flange 13 of its socket assembly, and is also in its entirety within the curvilinear surface defined by the outer edges of the nested socket assemblies 10 and 11. As a result, the magazine 40 may be a hollow tube which is structurally simple and quite inexpensive.

While in the foregoing specification an embodiment of the invention has been set forth and described in considerable detail for purposes of making an adequate disclosure thereof, it will be apparent to those skilled in the art that numerous changes may be made in those details without departing from the spirit and principles of the invention.

I claim:

1. In a socket assembly adapted to nest with like socket assemblies in the provision of a stack thereof, a casting provided with a plurality of arcuately spaced terminal-receiving openings therein each equipped with a terminal extending downwardly therethrough having a depending end positioned laterally outwardly therefrom, said casting being provided also with a center opening equipped with a hollow tubular ground pin having an end extending downwardly therethrough receivable within the opposite end of a corresponding ground pin in a like socket assembly, said casting having a plurality of apertures therein each radially aligned respectively with one of said terminal-receiving openings and vertically aligned with said depending ends of the terminals for receiving such ends of the corresponding terminals of a like socket assembly therein, and a ground clip secured to the underside of said casting and in contact with said ground pin and having a leg element extending upwardly from the casting, said casting having a recessed area through which said leg element of the ground clip passes, said leg element having an end portion at its outermost end, and said ground clip having a recess therein of sufficient size to receive the end portion of a corresponding ground clip in such a like socket assembly in nesting relation therebelow.

2. In a socket assembly of the character described, a casting provided with a plurality of terminal-receiving openings therein each equipped with a terminal extending downwardly therethrough having a depending end positioned radially outwardly therefrom, said casting being provided also with a plurality of apertures therein each radially aligned respectively with one of said terminal-receiving openings and vertically aligned with said depending ends of the terminals for receiving such ends of the corresponding terminals of a like socket assembly therein, and a ground clip secured to the underside of said casting and having a leg element projecting thereabove, said casting having a recessed area therein through which said leg element of the ground clip extends, said leg having an end portion at its outermost end and said ground clip having a recess therein of sufficient size to receive the end portion of a corresponding ground clip provided by the socket assembly nested in adjacency therebelow.

3. In a stack of socket assemblies oriented one above the other for receipt within a magazine, a plurality of substantially identical sockets having top and bottom surfaces, each of said sockets being equipped with a ground clip having a generally vertical leg extending upwardly therefrom beyond said top surface, said leg having an end portion at its outermost end, each of said ground clips also having a recess therein adjacent the bottom portion of said vertical leg for receiving said end portion therein of the ground clip carried by the socket body disposed therebelow.

4. The structure of claim 3 in which each of said ground clips is provided with a generally horizontal leg extending along the bottom surface of the respective socket bodies, and in which each of said socket bodies has a recessed area along an outer edge thereof receiving said vertical leg of the ground clip therein.

References Cited in the file of this patent

UNITED STATES PATENTS

2,269,605	Smith	Jan. 13, 1942
2,448,452	Morelock	Aug. 31, 1948
2,774,949	Cardani	Dec. 18, 1956
2,825,881	Del Camp	Mar. 4, 1958