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REMOVING TOOL

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Fig. 1

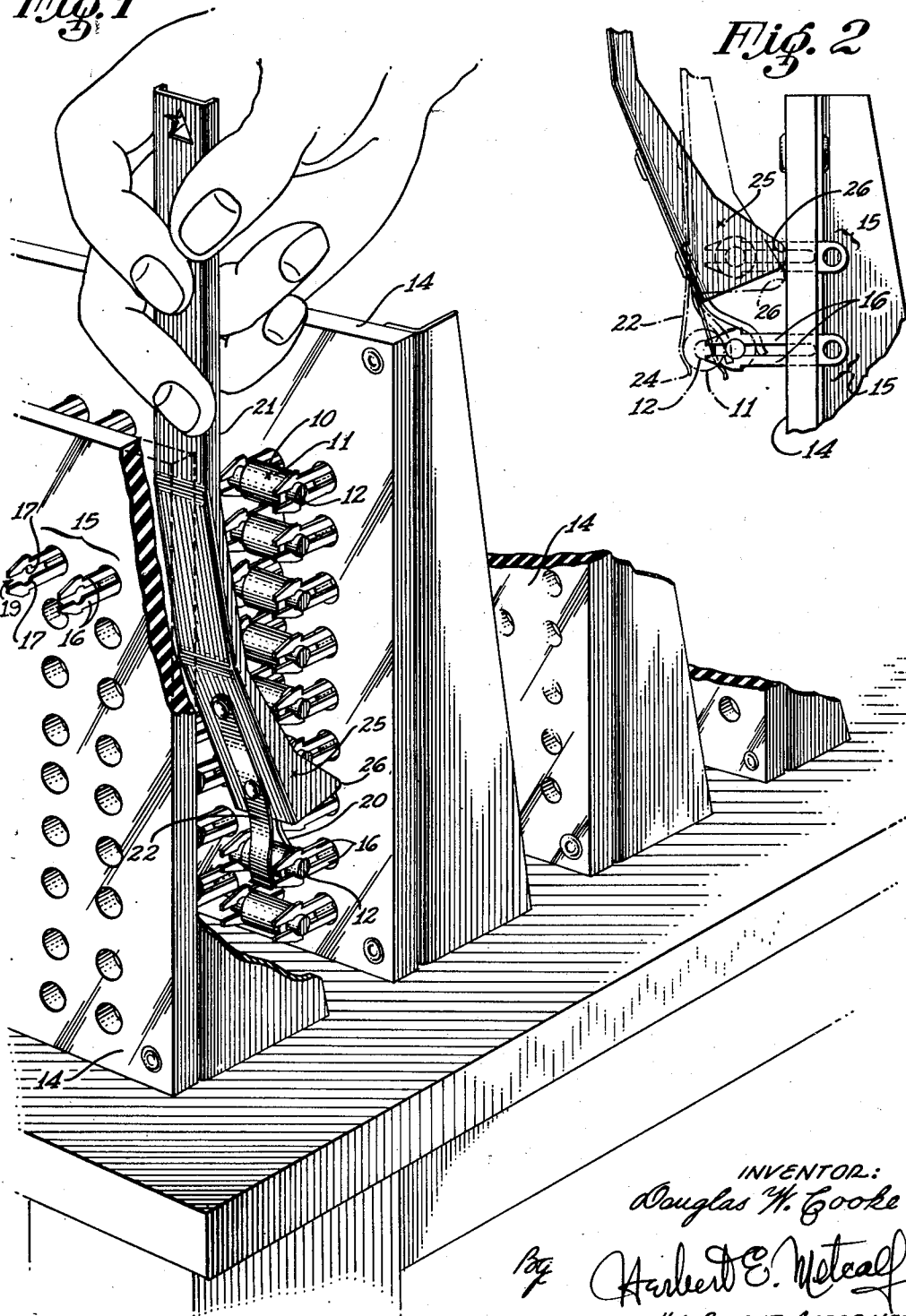
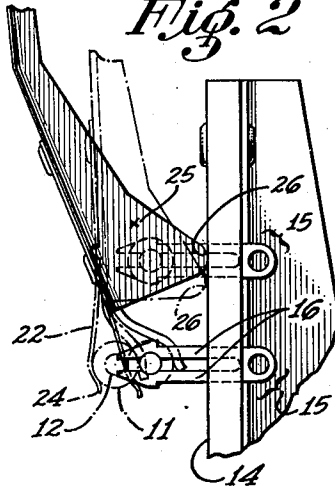


Fig. 2



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REMOVING TOOL

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The present invention relates to tools and more specifically to a novel and useful tool for removing diodes and the like from electronic computers, for inspection or replacement.

Diodes are generally used in great numbers in electronic computers, for example, and the type used in the present example consists mainly of small cylindrical members having short poles extending axially from each end thereof, mounted in banks in friction clips on panels which are usually interspersed throughout the computer. In many cases the panels are situated in areas of the computer which are highly inaccessible. Furthermore, in the interest of compactness and practicability the panels to which the diodes are fastened are usually spaced closely together, making removal of most of the diodes by hand extremely difficult. Also, because of the construction of the friction clips which will be described later in this specification, the diodes can be removed from the clips at right angles to the panel only, which necessitates special consideration as to the action of any satisfactory removal tool.

An object of this invention is, therefore, to provide a tool for easily and efficiently removing diodes and the like, which are located in various regions of a computer for example, which will also maintain a firm hold on the diode after removal and prevent its accidentally falling into the innermost regions of the mechanism.

Briefly, the present invention, in one preferred form, is a tool which employs a pair of wing-like fulcrum elements having a rigid lever member connected thereto which is curved to partially encircle the periphery of a germanium type diode fastened to a panel by friction clips at each end thereof. A spring member is positioned adjacent the lever member to cooperate therewith, by maintaining a grip on the diode during the removal thereof. When the lever member is applied to the diode, the fulcrum elements bear on the panel surface on each side of the clips retaining the diode; the lever usually being positioned between the panel and the diode to pry the diode in a direction away from the panel.

Means for rotating the lever member is connected thereto, and as the lever member is rotated, the fulcrum elements bearing on the panel surface rockably slide thereon toward the clips thus forcing the diode outwardly from the clips at substantially right angles to the panel. The lever rotating means can conveniently be a handle.

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understood by referring to the specification drawings, wherein:

Figure 1 is a perspective view, with some of the panels partially cut away, of one preferred form of the present invention.

Figure 2 is a somewhat diagrammatic view showing the tool of Figure 1, in profile, in two steps of the removal of a diode.

Referring first to Figure 1, germanium type diodes 10, in one embodiment such as are commonly used in electronic computers, consist mainly of a relatively small cylindrical body 11 having a pole 12 of substantially smaller diameter than the body 11, extending axially from each end thereof. The diodes 10 are usually mounted closely adjacent a panel 14 firmly positioned between a pair of friction clips 15 fastened in the panel 14 in uniform rows thereon, and projecting at right angles outwardly therefrom. Each clip 15, as best shown in Figure 2, is usually in the form of an elongated rectangular member divided axially into two parallel elements 16, which are joined at one end only, and spaced slightly closer together than the diameter of a diode pole 12. A somewhat arcuate portion 17 is cutaway from each element 16, one opposite the other, adjacent the open end 19 of the clip, to fit around opposite sides of the periphery of the diode pole 12.

The pairs of clips 15 are spaced apart, one parallel of the other, by a distance slightly greater than the length of the diode body 11.

The diodes 10 in the present example are usually inserted into the clips 15, the poles 12 being placed at the openings 19 intermediate the parallel elements 16 and pressed inwardly toward the panel 14 spreading the clip elements 16 on each side of the opening 19 apart. When the poles 12 are firmly seated in the arcuate portions 17, the clip elements 16 resume their normal positions.

To remove the diodes 10 from the clips 15, the present invention in the embodiment shown in Figures 1 and 2 employs a rigid lever member 20 positioned at one end of an elongated handle 21 of relatively non-resilient material. The lever member 20 is curved to fit around a portion of the periphery of the diode body 11b adjacent the panel 14 and intermediate the clips 15 at each end of the diode 10. A substantially resilient spring member 22 is connected to the handle 21 adjacent the lever 20 and in the present example is curved at the outer end thereof to fit around the opposite side of the diode body 11. The tips 24 of spring 22 and lever 20 are flared in oppo-

The present invention will be more clearly

site directions to permit the diode 10 to be inserted and gripped therein-between.

A pair of wing shaped fulcrum segments 25 are provided on the handle 21 adjacent the lever 20 and are formed to bridge the diode 10 and contact the panel 14 on each side thereof. The contact portions 26 of the fulcrum segments 25 are rounded to permit free sliding of the portions 26 on the panel 14 surface, and are spaced by a distance from the handle 21 to allow the engagement of the lever 20 with the diode 10 placing the opposite end of the handle 21 well forward of the lever 20 so that when the diode 10 is firmly gripped between the lever 20 and spring 22 and the handle 21 is moved toward the panel 14, the fulcrum contact points 26 slidably bear against the panel 14 prying the diode 10 out of the clips 15 away from the panel 14 and at right angles thereto, the diode 10 being firmly gripped in the end of the tool.

It is at once apparent that here is a highly useful tool, which can be made to reach into highly inaccessible areas of complex electronic equipment by bending the handle to various desired angles, and in which even the fulcrum members can be positioned at any point between the ends of the handle, or placed forwardly of the lever member to reverse the removing action. Many heretofore unobvious useful operations in other applications will doubtless become apparent in view of the foregoing disclosure.

What is claimed is:

1. A tool for removing a cylindrical member removably fastened adjacent a panel, between a pair of friction clips, one at each end thereof, comprising fulcrum means adapted to bridge said member to slidably bear on said panel adjacent each end of said member, a lever of relatively non-resilient material connected to said fulcrum means, said lever being shaped to partially fit around said member intermediate said member and said panel, resilient means connected to said fulcrum means adjacent said lever, said resilient means being adapted to cooperate with said lever to grip said member when said lever is applied to said member for removal thereof, and actuating means connected to rotate said lever in a direction away from said panel, said fulcrum means sliding on said panel toward said clips prying said member outwardly from said clips in a direction away from said panel.

2. A tool for removing a cylindrical member removably held by friction clips at each end thereof, said clips being mounted closely adjacent to a panel, which comprises an elongated handle of relatively non-resilient material, a rigid lever positioned at one end of said handle, said lever being shaped to partially encircle said member between said clips, said lever being positioned around said member intermediate said member and said panel, resilient means connected to said handle adjacent said lever, said means being formed with respect to said lever, said means cooperating with said lever to grip said member therebetween, and fulcrum means, said fulcrum means being provided on said handle adjacent said lever, said fulcrum means bearing on said panel on each side of said member adjacent said clips, said fulcrum means being spaced by a distance from said handle to permit the engagement of said lever with said member, the end of said handle opposite said lever being positioned forwardly of said lever with said fulcrum means slidably bearing on said panel, whereby when said handle is moved toward said

panel said fulcrum means slide toward said clips on said panel, said lever prying said member outwardly from said clips at right angles from said panel.

3. A tool for selecting and removing a cylindrical member from a plurality of cylindrical members removably retained in frictional engaging means at each end thereof, said engaging means being mounted closely adjacent a surface in a highly inaccessible area, comprising an elongated handle of relatively non-resilient material, said handle being contoured to reach said member, a rigid lever positioned on one end of said handle, said lever being shaped to partially encircle said member around the periphery thereof between said engaging means, a spring of substantially resilient material connected to said handle adjacent said lever, said spring being shaped to admit said member between said spring and said lever, said spring being curved to contact said partially encircled member and firmly grip said member in said lever, and a pair of alar fulcrum elements, said elements being connected to said handle, one on each side of said lever, said elements bearing on said panel intermediate said lever and the center of said handle, said elements sliding toward said clips on said panel when said handle is moved to pry said member linearly from said clips.

4. A tool for use in removing a cylindrical member removably held by spring clips at each end thereof, closely adjacent a panel to which said clips are attached, which comprises a handle of relatively non-resilient material, said handle having at one end thereof a portion curved to fit around a portion of one of said members, a resilient element attached to the same end of said handle curved to fit around an opposite portion of said member, the outer end of said resilient element being flared outwardly to permit separation of said curved portions so that said member can be gripped by said portions, and a fulcrum portion attached to said handle adjacent said curved portion and sized to bear on said panel with said handle at an angle thereto when said curved portions are fitted around one of said members spring clipped to said panel, whereby when said handle is moved to a position more nearly parallel with said panel, said member will be pried outwardly at a right angle from said panel and be removed from said spring clips.

5. Apparatus in accordance with claim 4 wherein said tool is made capable of removing one of said members from a plurality of said members closely spaced with said axes parallel, by having said fulcrum portion made from a pair of wing portions spaced across said handle by a distance where said wing members will bridge the next adjacent member, to bear on said panel on each side of the clip members holding said next adjacent member, and when moved will slide so that fulcrum point is moved toward said member directing said member outwardly at a right angle from said panel.

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