

[54] **DUAL INLINE PACKAGE HANDLING TOOL**

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[51] Int. Cl. **H05k 13/04**

[58] Field of Search **29/203 H, 206, 203 HT**

[56] **References Cited**

UNITED STATES PATENTS

3,628,244 12/1971 Halstead **29/203 H**

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[57] **ABSTRACT**

This tool is especially designed for handling dual inline package components as in removal from sockets and circuit boards, where the terminals are solder connected. The salient feature of this tool is the provision of a pair of flat blades of elongated form, disposed in face-to-face abutting relationship so as to be operable

between the thumb and forefinger of one hand, the blades being pivotally connected together at their upper ends and having finger grip surfaces on their outer sides at the lower end above outwardly projecting jaw portions between which the package to be handled fits, these jaw portions each having on the outer end a downwardly and inwardly extending hook to hook under the end terminals at diagonally opposite corners of the dual inline package, so that the component can be pulled out of the socket or circuit board when the leads are free. The hooks, by virtue of their having contact only with diagonally opposite corners of the component, cannot apply pressure on the center terminals that are close to the integrated circuit chip, and it is a simple matter to open and close the tool between the thumb and forefinger of one hand. In view of the smallness of the tool the operator always has a good view of the entire operation. One size tool will remove several sizes of dual inline packages; for example, the eight, 10, 14, 16, and 18 terminal types. The finger grips enable holding the component quite securely. Closely spaced dual inline packages can be operated upon easily.

8 Claims, 5 Drawing Figures

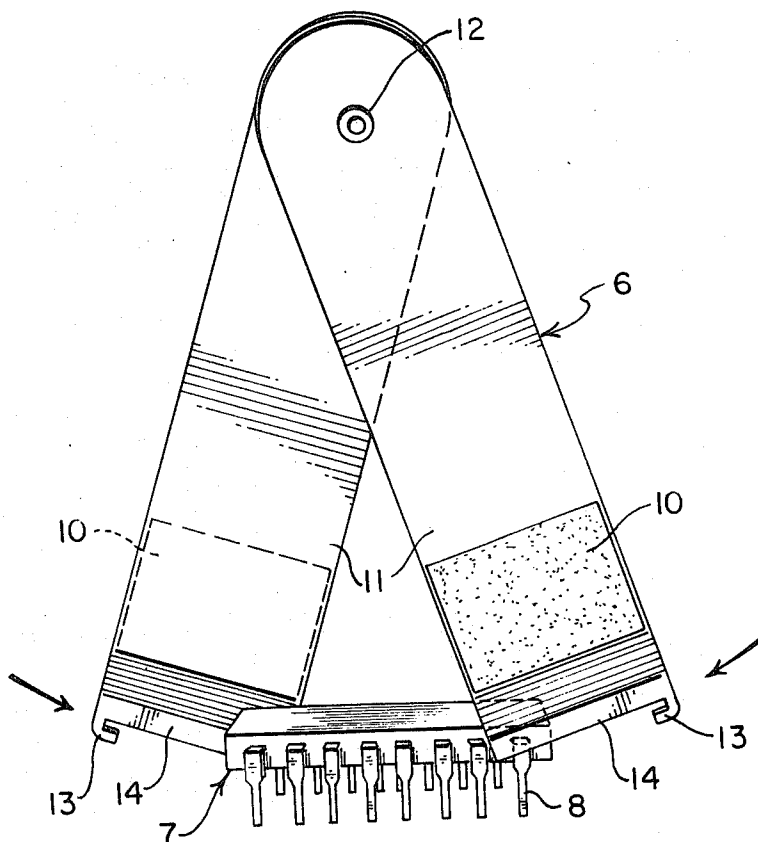


FIG 1

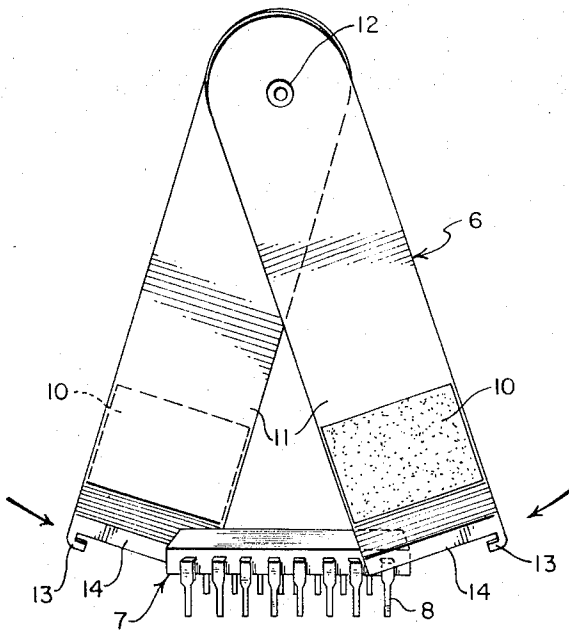


FIG 2

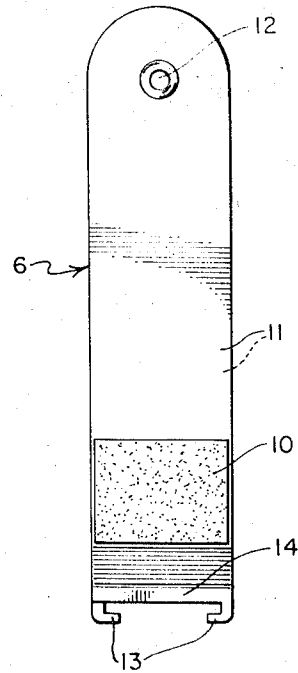


FIG 3

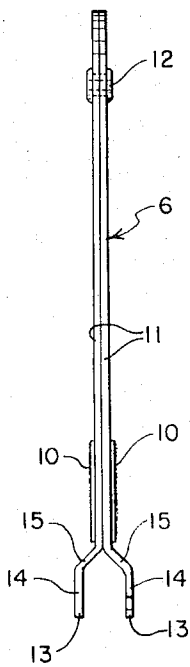


FIG 4

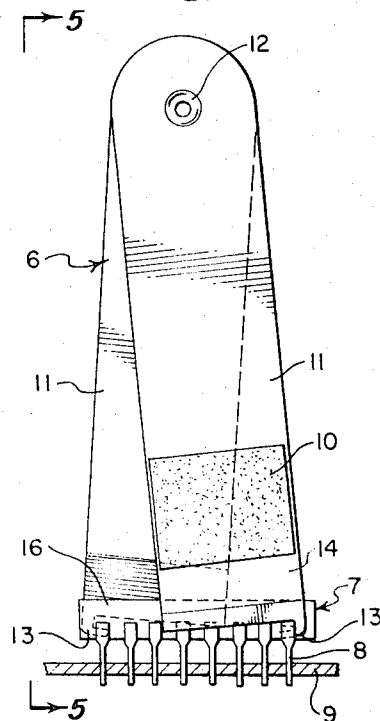
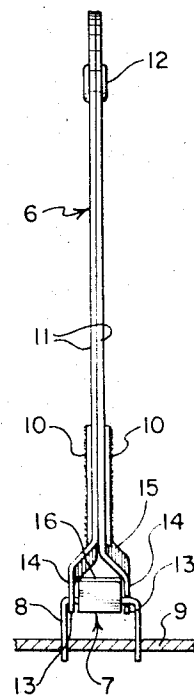


FIG 5



DUAL INLINE PACKAGE HANDLING TOOL

This invention relates to a tool for use with dual inline package components in the removal thereof from sockets and circuit boards where the terminals are solder connected, although the present tool is useful with many devices, so long as the outline thereof is similar to the dual inline package. The design of the tool is such that one size tool will remove several sizes of inline packages having eight, 10, 14, 16, and even 18 terminals, the salient feature of the tool being the provision of jaws on the lower end of the two legs of the tool that are pivotally connected at their upper ends and have finger grip portions on their lower ends adjacent the jaws, enabling holding a component quite securely when the hooks on the diagonally opposite ends of the jaws are hooked under the diagonally opposite corner terminals. This tool avoids the application of pressure on the center terminals that are close to the integrated circuit chip, the tool being so small that it allows the operator to have a good view of the work and remove the package as soon as the leads are free. Dual inline packages are being used more and more for various resistors, transistors, and capacitor circuitry in addition to the original integrated circuit, but the tools that have been used in the field up to the present time are like a pair of pliers or tweezers and are limited in use because of the high density circuitry being designed, whereas the small tool of my invention allows closely spaced dual inline packages to be removed easily.

The invention is illustrated in the accompanying drawing, in which:

FIG. 1 is an action picture of the tool in side elevation, showing how the diagonally opposed hooks on the jaws are adapted to hook under the diagonally opposite corner terminals of a dual inline package by swinging the two legs of the tool in opposite directions, as indicated by the arrows;

FIG. 2 is a side view of the tool with the jaws closed;

FIG. 3 is an edgewise view of the tool;

Fig. 4 is a side view of the tool in use, shown applied to a dual inline package, and

FIG. 5 is a view on the line 5—5 of FIG. 4.

The same reference numerals are applied to corresponding parts throughout the views.

Referring to the drawing, the reference numeral 6 designates the tool of my invention generally, and 7 a typical dual inline package, having a plurality of terminals 8, and shown in FIGS. 4 and 5 as mounted on a circuit board 9. The tool 6, which is designated to be held in one hand between the thumb and forefinger, bearing on the non-slip finger pads 10 provided on the opposite sides of the tool near the lower end of the legs 11. These are made of thin-gauge sheet metal for strength and are disposed in face-to-face abutment with one another and pivotally connected near their upper ends as indicated at 12 to swing in parallel planes, as indicated in FIG. 1, to engage the hooks 13 under the end terminals at diagonally opposite corners of the component 7, these hooks 13 being on the opposite ends of the parallel spaced jaws 14, defined on the outwardly bent diverging lower end portions 15 of the two legs 11, between which the rectangular body 16 of the component 7 fits rather freely as appears in FIG. 5.

It is clear that in the operation of the tool the hooks 13 hook under the terminals 8 at diagonally opposed corners of the component 7, where there are no leads

extending from the terminals 8, thus imposing no pressure whatsoever on the center terminals that are close to the integrated circuit chip. While there are only eight terminals shown in the drawing, one size of the present tool 6 serves to remove several sizes of components 7, having eight, 10, 14, 16, and even 18 terminals, inasmuch as it is clear in FIG. 1 how far the legs 11 can be swung open while still keeping the hooks 13 and jaws 14 in the correct relationship to the work. It is clear the tool does not obstruct the operator's view of the work and he can, therefore, tell when the component 7 is ready to be removed from the socket or circuit board, namely, when the leads are free. This same tool permits a new component to be held and inserted easily and much more precisely without danger of damaging any terminals as they are inserted in a circuit board or socket. The tool is of low cost construction and simple design and small enough to be carried in a person's pocket for immediate access when needed. The finger grips 10 are most advantageously located in relation to the hooks 13 and jaws 14 so that when a component 7 is held between the hooks 13 and jaws 14 there is no danger of it being accidentally released.

These dual inline packages are being used more and more for various resistors, transistors, and capacitor circuitry in addition to the original integrated circuit and there is, therefore, an increasing demand for the present tools, those used in the past being similar to a pair of pliers or tweezers and subject to serious objections. Most of those tools find limited use because of the high density circuitry being presently designed. With the present tool it is no problem to handle quite closely spaced dual inline packages and, as stated before, because of the unique way in which the hooks 13 take hold at diagonally opposite corners of the component, there is never any danger of applying pressure on the center terminals that are close to the integrated circuit chip. In other words, the hook-on action is far enough away from the critical areas to eliminate any danger of damage.

It is believed the foregoing description conveys a good understanding of the objects and advantages of my invention. While a preferred embodiment of the invention has been illustrated and described, this is only for the purpose of illustration, and it is to be understood that various modifications in structure will occur to a person skilled in this art.

What I claim is:

1. In a hand-operable tool of the character described, a pair of flat elongated handles disposed in face-to-face abutment and pivotally connected together at one end for swinging movement relative to one another, the free ends of said handles having spaced jaws defined thereon substantially parallel to one another and to the handles adapted to receive an object to be handled therebetween, the jaws each having an object handling hook provided thereon projecting inwardly toward one another from the outer ends of the jaws to engage the object from opposite ends.

2. A hand-operable tool as set forth in claim 1 including friction grip surfaces provided on the outer faces of said handles in the vicinity of the jaws to be engaged by the thumb and forefinger, respectively, of one hand.

3. A hand-operable tool as set forth in claim 1 wherein the handles are of a length to reach nearly the length of an operator's fingers and having friction grip surfaces provided on the outer faces of said handles in

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the vicinity of the jaws to be engaged by the thumb and forefinger, respectively, of one hand.

4. A hand-operable tool as set forth in claim 1 wherein the handles are of a length to reach nearly the length of an operator's fingers to permit operation between the thumb and forefinger of one hand.

5. A tool for handling dual inline packages, the tool comprising a pair of connected handles, each handle having a substantially vertical jaw portion on one end to lie alongside the package on the one side whereby to enclose a package to be handled from opposite sides, and each jaw portion having a downwardly and inwardly extending hook thereon in the plane of the related jaw adapted to engage under the end terminals at diagonally opposite corners of the dual inline package.

6. A tool as set forth in claim 5 including friction grip surfaces provided on the outer faces of said handles in the vicinity of the jaws to be engaged by the thumb and forefinger, respectively, of one hand.

7. A tool as set forth in claim 5 wherein the handles are of a length to reach nearly the length of an operator's fingers and having friction grip surfaces provided on the outer faces of said handles in the vicinity of the jaws to be engaged by the thumb and forefinger, respectively, of one hand.

8. A tool as set forth in claim 5 wherein the handles are of a length to reach nearly the length of an operator's fingers to permit operation between the thumb and forefinger of one hand.

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