United States Patent

Berg

[15] **3,669,332**

[45] **June 13, 1972**

[54] TERMINAL TAB STRIP AND APPLICATOR

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[52] **U.S. Cl.** **227/80**, 227/95

[51] **Int. Cl.** **H01r 9/16**

[58] **Field of Search** ..... 227/79, 80, 93, 95, 96; 29/203 B

[56] **References Cited**

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Primary Examiner—Granville Y. Custer, Jr.
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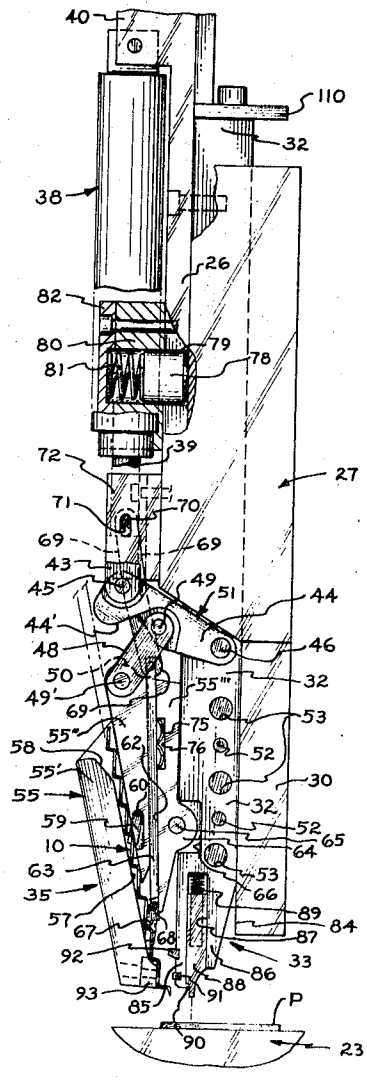
[57] **ABSTRACT**

A flexible strip provides elongated weld tabs integrally connected sequentially and lengthwise, being also grouped in integral transverse sets. The strip is fed downwardly into the guide slot of a feeding, staking and cut-off assembly, which includes a vertically acting feed and cut-off sub-assembly slideably mounting a feed bar, and a tab staking and cut-off punch sub-assembly, to which the first named sub-assembly is pivoted. The assembly is reciprocated vertically, with a slight relative lost motion of the relative stationary feed bar, by means of a reversing air cylinder operation of the staking punch sub-assembly, which in turn drives the feed and cut-off sub-assembly through a toggle unit; and that unit produces a swinging action of the feed and cut-off sub-assembly relative to the other sub-assembly to clamp and unclamp the terminal strip, to cut the latter into tab sets, and to stake the tabs into a printed circuit panel.

10 Claims, 15 Drawing Figures



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SHEET 1 OF 3

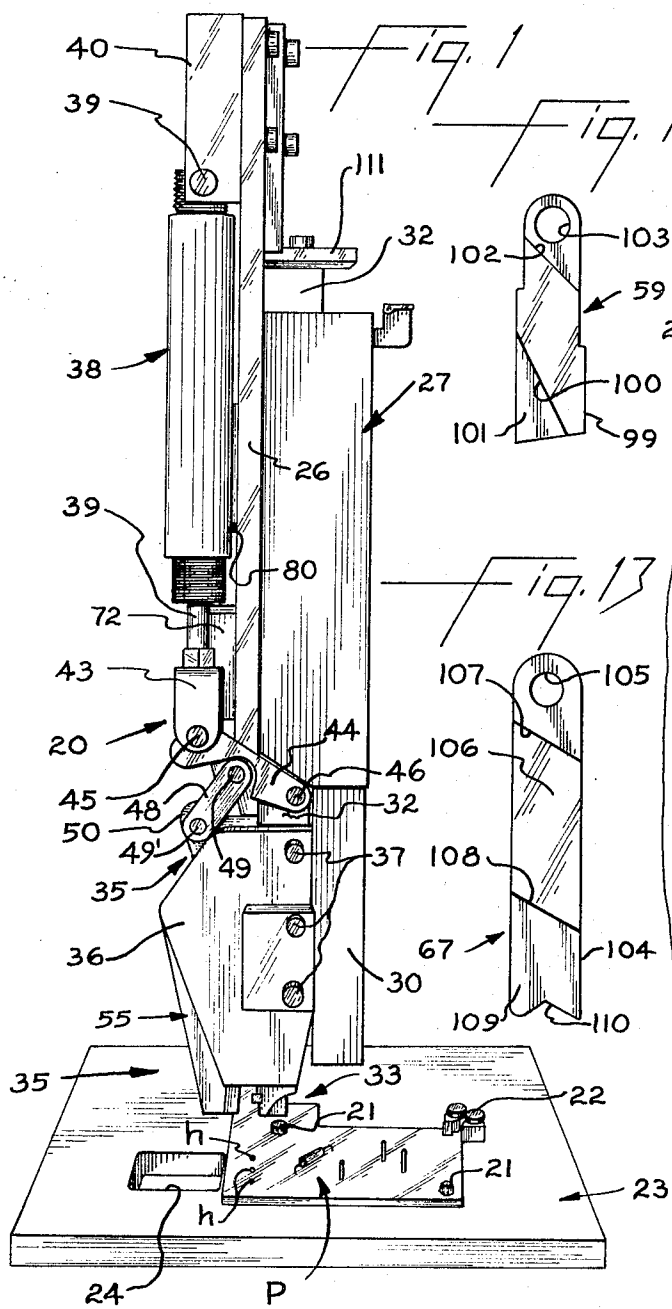

Fig. 1

Fig. 12

Fig. 13

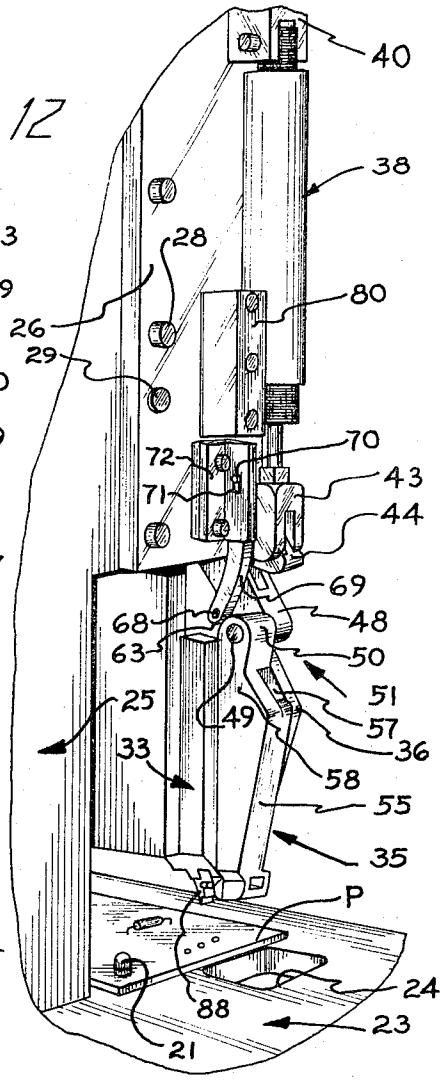

Fig. 2

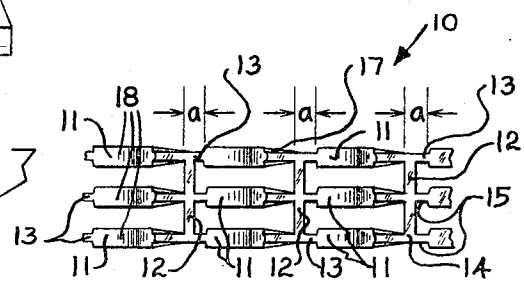

Fig. 3

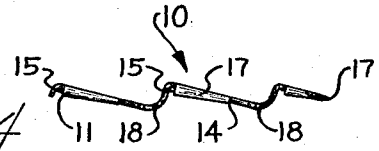

Fig. 4

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Fig. 5

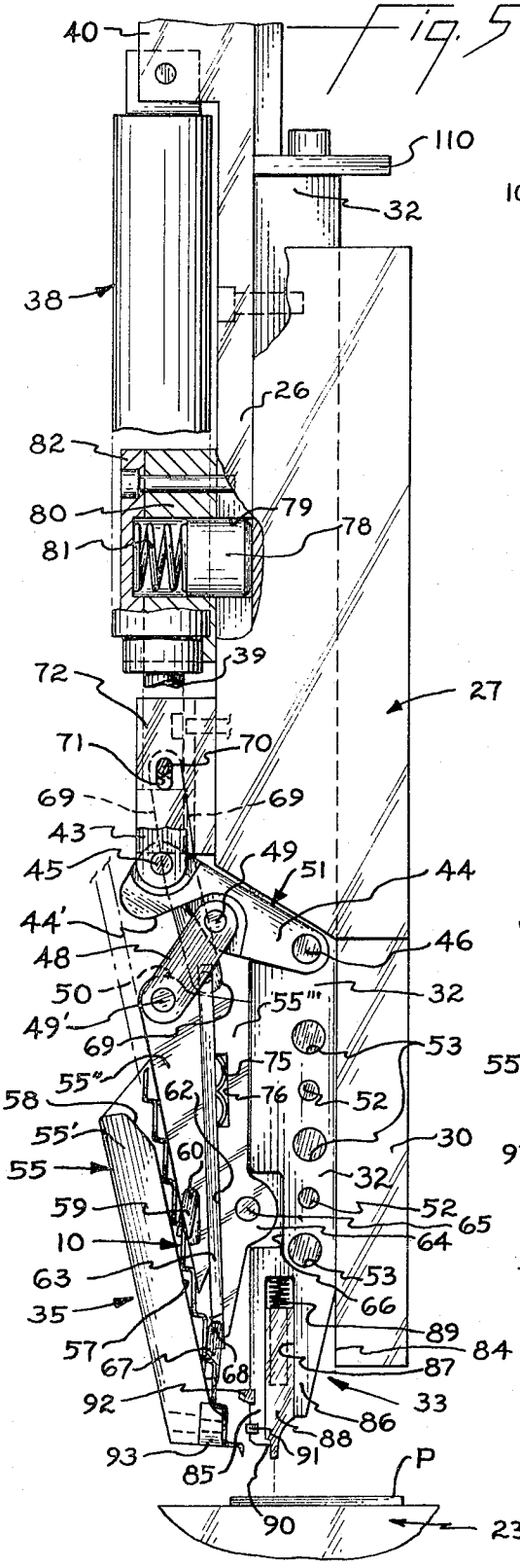


Fig. 6

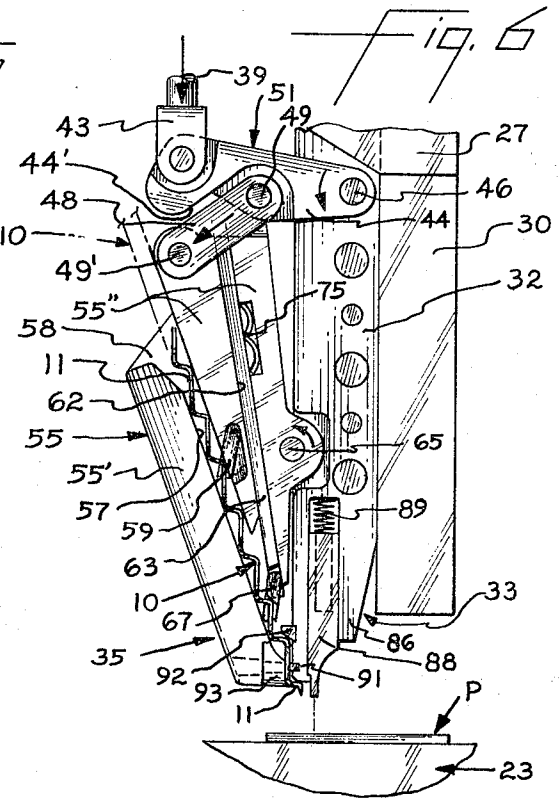
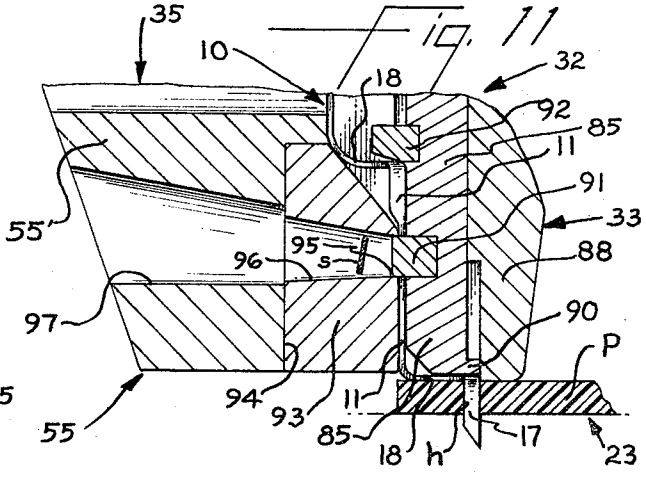


Fig. 11



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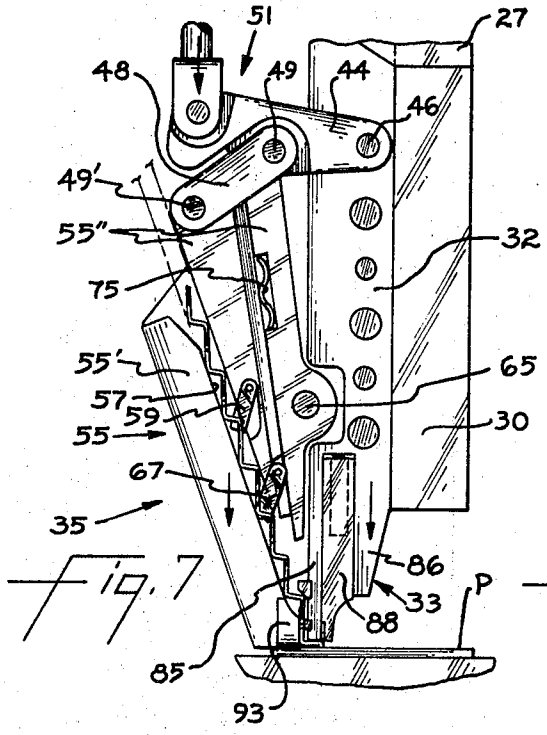

Fig. 7

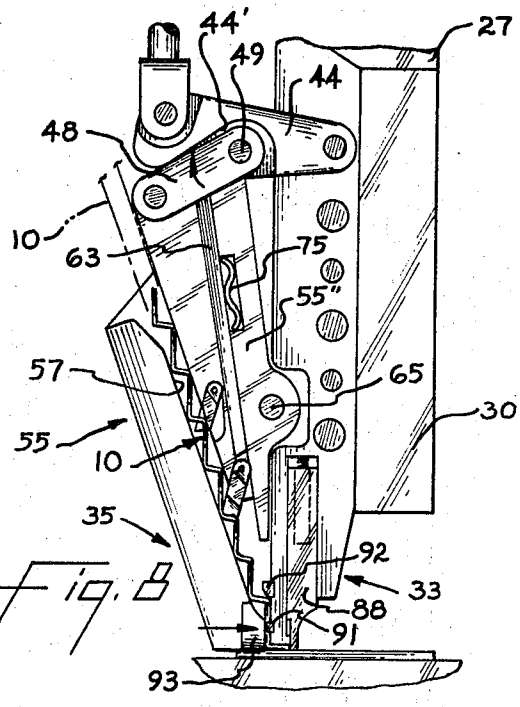

Fig. 8

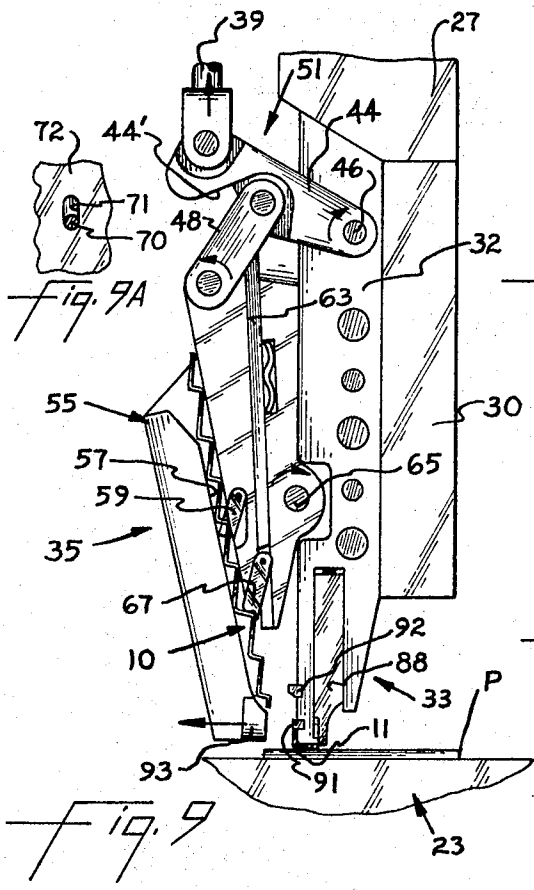

Fig. 9

Fig. 9A

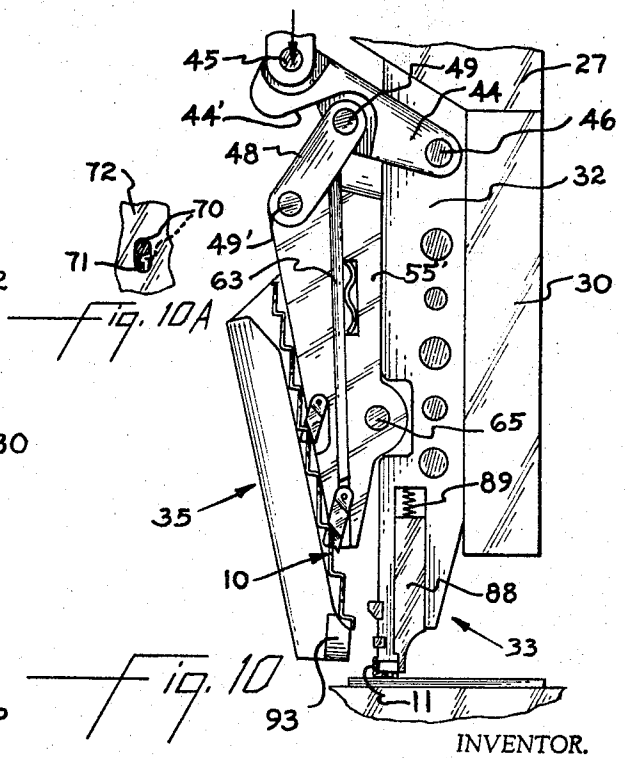

Fig. 10

Fig. 10A

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TERMINAL TAB STRIP AND APPLICATOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

The improved terminal or tab connector strip and the disclosed apparatus for applying cut-off tab components of the same find wide application in the mass production of commonly employed electric circuitry panels, usually at present in the form of printed circuit boards. However, the invention also has utility in the preparation of other panel or like products to which adapter or connector components of one sort or another are desirably applied by unskilled personnel in a fast and efficient way.

2. Description of the Prior Art

The U.S. Pat. to DeShong, No. 3,346,162 of Oct. 10, 1967, generally illustrates a method and apparatus for applying terminal pins to printed circuit boards, although the nature of the product from which the pins are cut and applied and the equipment for applying the same differ materially from what is herein illustrated, described and claimed.

SUMMARY OF THE INVENTION

The invention affords a new and improved type of conductive metal weld tab or terminal means, in the form of a continuous series of identical tab components which are integrally connected end-to-end to one another, usually in the one or more like other series integrally connected in side-by-side parallelism to one another in identical sets. The components and articulating connections of such a one-piece chain or strip are rapidly stamped in the desired outline, which has a longitudinally stepped configuration; and the strip is successively severed into individual tab components as they are staked, usually as a lateral set, into holes of a printed circuit board. Preferably, each tab has a V-shaped sectional configuration adjacent its insertion end to permit it to lug securely in any of a variety of hole shapes or sizes.

The use of a longitudinally progressive tab strip makes it possible to center the connectors precisely in the transverse sense, identically as their position is required in relation to the printed circuit panel design. As so connected, each set of tabs is clamped between the feed and cut-off unit or sub-assembly and the associated staking and punch unit, by which units they are severed into tab sets in the act of being inserted and staked in the board. Electrical connection to the circuitry may later be made by a conventional soldering method.

As for the applicator machine, it is powered for vertical stroked of slight extent under operator or automatic control, preferably by pneumatic reversing cylinder means, during progressive phases of the cut-off and staking cycle, this by the agency of very simple toggle linkage and connector link means. Briefly, the end of the strip is first clamped between the pivotally connected feed and cut-off unit and the staking and punch unit when these two are in their fully elevated position. Next, in an initial portion of the downward stroke of the air cylinder plunger the toggle linkage operatively connecting said plunger to the two mentioned units or sub-assemblies, during which they are drag-restrained from vertical bodily shift, causes the feed and cut-off unit to swing and clamp the bottom end of the tab strip against the staking and punch unit. A further downward stroke increment of the air cylinder plunger causes the two units to travel bodily downward as one, overcoming the previous drag to stake or lug the tab into the board; and directly after this additional pivotal force is applied to the feed and cut-off unit to cause its die member to sever the bottom-most lugged tab from the remainder of the tab strip, acting in conjunction with a punch of the staking unit.

During these happenings the feed finger on the feed bar slidably carried by the feed and cut-off sub-assembly or unit has taken a raised position in relation to that unit, in which the bar is restrained by spring type drag means on said unit, having advanced the tab strip to the latter's lowered position for clamping and cut-off in the previous up stroke. During a

reverse upward stroke of the feed and cut-off and staking punch sub-assembly the feed bar retains the retracted or up position on the former during the up stroke of its ram. At the top position of the up stroke it hits a stop. The cam continues to move upward, now relative to the feed finger, thus advancing the strip one step and presenting the tab strip for an ensuing clamping and cut-off cycle. At the beginning of the up stroke the pivotally articulated assembly is first swung apart to unclamp the strip and permit movement of the assembly relative to the strip.

An applicator of this type, inexpensively produced and operated, may be supplied to a customer for use in the latter's plant, using integrally connected terminal element or tab means according to the improved design. The simplicity of the construction of the applicator much reduces the chance of malfunction or breakdown, as well as insuring better co-ordination with the customer in regard to technological factors touching on the strip and applicator which may arise. It is contemplated that the completion of electrical circuitry involving the weld tabs, as staked in preformed holes of the printed circuit board, will be by means of a flow soldering procedure performed at the plant of the customer.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a substantially side elevational view of the applicator of the invention, showing essential operating units or sub-assemblies thereof as positioned to commence action on a terminal chassis panel, as represented by a printed circuit board mounted on a horizontal locator plate;

FIG. 2 is a fragmentary rear perspective view of the applicator;

FIG. 3 is a fragmentary plan view illustrating a portion of a typical elongated and longitudinally stepped weld tab strip from which individual weld tabs are severed and applied to the board by the subject applicator;

FIG. 4 is a fragmentary view in side elevation of the improved unitary weld tab construction of FIG. 3;

FIG. 5 is a fragmentary view in side elevation showing the applicator, with a side cover plate thereof removed to reveal component sub-assemblies or units therein, the latter being shown, as in FIG. 1, in an elevated starting position for a tab-applying stroke;

FIG. 6 is a similar elevational view illustrating the parts after a first operational phase in which a bottom portion of the tab chain is clamped between a staking and punch unit and a feed and cut-off unit, the parts still being in an elevated position;

FIG. 7 is another side elevational view of the applicator units as driven down to stake the lowermost weld tab component in the circuit panel;

FIG. 8 is a fragmentary view quite similar to FIG. 7, but showing the feed and cut-off unit as its cut-off die is operated to laterally sever staked tab component;

FIG. 9 is still another fragmentary side elevation showing the strip as unclamped from the two units as the initial result of a reverse, up-stroke of the air cylinder operating the applicator;

FIG. 9A is a fragmentary view illustrating the positional relationship of pin and slot-type link and stop control components for the strip feed bar when the units are in the position of FIG. 9;

FIG. 10 is a fragmentary view similar to FIG. 9 showing the staking and punch sub-assembly commencing an up-stroke, in which it bodily lifts the previously fixed feed and cut-off sub-assembly;

FIG. 10A is a fragmentary view similar to FIG. 9A, but illustrating the feed link and stop relationship as altered in the phase of FIG. 10;

FIG. 11 is an enlarged scale fragmentary view in vertical section through the feed and cut-off die unit and the staking and punch unit at the instant that the applied weld tab is being cut off between the two;

FIG. 12 is an enlarged scale view in side elevation of a back latch finger pivotally carried by the feed and cut-off unit; and

FIG. 13 is a similar view in similar scale of a feed finger carried by the feed bar slideably associated with that unit.

DESCRIPTION OF PREFERRED EMBODIMENTS

FIGS. 3 and 4 show the improved flexible weld tab or connector construction of the invention as being in the form of a continuous chain or strip, generally designated by the reference numeral 10. Typically, the strip 10 will be of bronze in a thickness of 0.008 inch, although, of course, the dimensioning will depend upon the nature of the printed circuit board or other panel involved. It is of a longitudinally stepped configuration, being comprised of a plurality of transversally spaced weld tab bodies 11 which are integrally united in a unitary set of, say, three parts by transverse connector pieces 12; and the tabs 11 of these sets are also integrally articulated in a longitudinally end-to-end relationship by longitudinal connector parts 13.

The transverse connector parts 12 are located at convergent insertion tip extremities 14 of the tab bodies 11, intersecting the longitudinal connectors of 13 at a point spaced somewhat in the longitudinal sense from the rounded ends 15 of the set of tabs 11 immediately preceeding. This sequence of spacing is carried out in multiple throughout the length of a very long supply strip 10 prestamped to afford the desired tab outline, and the strip may be coiled on a supply reel above the applicator, from which the successive tab sets are intermittently drawn downward by feed means of the applicator to be described.

As also illustrated in FIGS. 3 and 4, the individual tab parts 11 are provided with forward insertion noses 17 of generally U-shaped cross-section, which converge to their tips 14, forward of which the waste material of the strip 10 is blanked out in an area including the transverse and longitudinal connector parts 12, 13. In a typical instance in which the end-to-end length of the individual tabs 11 may be 0.172 inch, the corresponding dimension of the excised or died-out material will be 0.075 inch, as represented by the dimension *a* in FIG. 3. As best illustrated in FIG. 4, the strip 10 is stamped to provide stepped laterally extending arcuate seat formations 18 between successive tabs 11, for a needed function in successively feeding the strip.

FIGS. 1 and 2 of the drawing show the improved applicator of the invention, generally designated by the reference numeral 20, in its position at the commencement of a downward stroke in applying a tab component or components 11 to a typical printed circuit board or panel P, which is accurately positioned in relation to the applicator by reference to upright gauge pins 21 and a corner gauge 22 on a large rectangular locator plate 23. In addition to the gauge means referred to, plate 23 desirably has an opening 24 through which waste slugs as punched from the strip may fall. FIGS. 1 and 2 indicate that the circuit panel is provided with a series of through apertures or holes *h*, into which three weld tabs 11 are simultaneously lugged or staked by the apparatus 20, after the tabs have been individually separated from the supply strip 10.

To the extent that its basic components are revealed in FIGS. 1 and 2, the applicator 20 comprises an upright supporting plate or bracket 25 appropriately secured at its base on the locator plate 23, or otherwise supporting the applicator above the plate in any suitable manner. If desired, as in the interest of portability, these plates may be of aluminum. Bracket plate 25 has a lateral extension of substantial area which on one side fixedly supports a vertically elongated adapter plate 26 of substantial area and on one side thereof the plate 26 has mounted thereto a guide housing, generally designated 27, as through the agency of a series of bolts 28 and locator dowels 29. Housing 27 includes a depending back-up foot extension 30 which is disposed forwardly of a reciprocatory upright rectangular and vertically elongated operator bar 32.

This bar carries at its lower end the staking punch sub-assembly of the applicator 20, which is generally designated 33. Bar 32 is guided stably within and by the upright guide housing 27 and is backed by lower extension 30 of the housing.

A tab and cut-off die sub-assembly or unit, generally designated 35 in FIG. 1, is the second major component of the applicator 20, coacting with the staking punch sub assembly or unit 33 in the feeding, cutting-off and staking of the weld tabs 11. The units 33 and 35 have a pivotal connection to one another as will be described; and a major portion of this two-part operating assembly is concealed by a removably side cover plate 36, which is secured to the operator bar 32 of assembly 33 by a series of bolts 37.

In their operation, the units 33 and 35 have an initial relative pivotal movement for clamping the lower end of the strip 11 therebetween, followed by a bodily movement together. The prime mover for these motions is an upright air cylinder 38, which has a pivotal support at 39 from a mounting block 40. This block is bolted to the side of the mounting plate 26 which supports the operator bar guide housing 27. The depending, air-operated plunger 39 of cylinder 38 is pivotally connected by an end clevis 43 thereon to the end of a longer toggle arm 44 of two pivotally articulated arms, as at a pin connection 45; and the opposite end of arm 44 is pivotally connected by a pin 46 to the operator bar 32, at a point just below the housing 27.

A second and shorter toggle arm 48 has a forked end straddling a recessed intermediate portion of the longer toggle arm 44, where it has a pivot pin connection at 49 to that arm; and the opposite end of shorter toggle arm 48 is pivotally connected at 49′ to an upper ear 50 integral with the body of the feed and cut-off unit 35, to be described. The toggle unit constituted by the longer and shorter arms 44 and 48 is generally designated 51.

Reference should now be had to FIG. 5, which better shows the feed and cut-off unit 35 and the staking punch unit 33 as operatively associated with one another and certain other components. FIG. 5 shows (as do also FIGS. 6-10) the units in question as revealed upon removal of the side cover plate 36 appearing in FIG. 1. Its replacement on the operator bar 32 of unit 33 is facilitated by locator dowels 52 on bar 32, which take into correspondently spaced inner holes on cover plate 36; the bolts 37 securing the latter are threaded into tapped holes 53 in a side of bar 32.

As depicted in FIG. 5, the feed and cut-off unit 35 conprises a relatively massive block-like body 55 of roughly triangular outline presenting integrally connected side or face portions 55′ and 55″ spaced from one another by a downwardly inclined, elongated strip guide slot 57 milled in the body 55. The portion 55″ has the upper ear 50, to the side of which the shorter toggle arm 48 is pivotally connected at 49′. A third face portion 55‴ of guide and cut-off die body 55 is coplanar with portions 55′ and 55″.

As appears in FIG. 5, the slot 57 slidably receives the flexible weld tab strip 10 at an elongated slot mouth 58; and the face part 55″ of the feed and cut-off body 55 is provided intermediate its upright length with a side recess opening to slot 57, in which recess a strip back latch finger 59 is pivotally mounted at 60. It depends from that point for restraining engagement with an arcuate stepped connector portion 18 of the strip 10, (FIGS. 3 and 4) between apertures in the latter, thus latching the strip against upward movement in the guide slot 57.

The body 55 of the feed and cut-off unit 35 is milled between its face portions 55″ and 55‴ to provide a vertically elongated way 62 in which an elongated feed bar 63 for periodically advancing the strip 10 is slidably received, and the body 55 is provided to the right (FIG. 5) of the way 62 with an enlarged ear or boss 64. It is at this boss that the body 55 is pivotally connected by a transverse pin 65 in a recess of the operator bar 32 of the staking punch assembly 33, the bar being provided with a side adapter piece (not shown) presenting the pivot pin 65.

The strip feed bar 63 is provided at its lower end with a recess in which a depending strip feed finger 67 is pivotally mounted at 68; structural features of this finger are shown in FIG. 13, just as structural features of the back latch finger 59 are depicted in FIG. 12, both being later described.

The upper end of the strip feed bar **63**, as guided in the way **62**, has a fixed connection to the lower end of a mildly angled upright feed control link **69**; and, reference being had to FIG. **2** in conjunction with FIG. **5**, the upper end of link **69** is provided with a laterally projecting pin **70**. This pin extends through a somewhat elongated stop slot **71** in a projecting flange of an angle bracket **72** bolted to the side of the mounting plate **26**. The upper and lower ends of the bracket slot **71** thus serve as stops limiting a slight vertical lost motion of feed control link **69**, hence of the strip feed bar **63**, after a limited relative upward or downward slide in the way **62** of the feed and cut-off body **55**.

As a component in the control of the relative motion of feed bar **63**, a wave spring **75** is disposed in a recess **76** of body portion **55''** to bear laterally to the left (FIG. **5**) against a side of bar **63**, exerting a degree of drag friction on the latter. The nature and effect of this relative lost motion, in reference to the staking punch sub-assembly **33** and the feed and cut-off subassembly **35**, are hereinafter described.

For the same general purpose, and as best illustrated in FIG. **5**, the unitary upward and downward motions of the two subassemblies or units **33**, **35** under air cylinder actuation of the operator bar **32**, are frictionally opposed by a cylindrical drag plug **78**. This member is slidably received in an opening **79** drilled in a block **80** which is bolt-secured to the upright mounting plate **26**, the plug **78** bearing to the right against the edge of operator bar **32** of the staking punch unit **33**. It is urged in this direction by a suitably rated coil compression spring **81** which backs against a cover plate **82** for the bore of block **80**.

The staking punch unit **33**, as shown in FIG. **11**, considered in conjunction with FIG. **5**, has a downwardly forked lower end **84** defined by longer and shorter leg portions **85**, **86**, respectively, separated by a guide slot **87**. This slot slidably receives a back-up plunger **88**, which is continuously spring urged downward by a coil compression spring **89** at its upper end, downward motion of plunger **88** being limited by a laterally offset toe **90** on one side of the bottom of the longer fork leg **85**. The leg **85** carries on its opposite side a projecting appropriately hardened male cut-off punch element **91** and somewhat above the punch **91** the same side of leg portion **85** is provided with a laterally projecting strip restraining block **92**.

Punch **91** coacts with a female cut-off die block **93** of the same composition, which block is fixedly bolt secured in a bottom side recess **94** of the body portion **55'** of feed and cut-off body **55**. The die **93** provides a die aperture at **95** (FIG. **11**) of the same shape as, but naturally of a trifle larger dimension than, the punch **91**, so that when block **93** is finally brought into engagement under sufficient force with the lower end of the strip **10**, as clamped between the lower ends of the feed and cut-off unit **35** and staking punch unit **33**, the strip will be severed in the area of width *a* (FIG. **3**). The punched out waste slugs (FIG. **11**) are forced through a lateral throat **96** of die block **93**, thence through an enlarged disposal opening **97** in feed and cut-off body **55**, from which they drop through the hole **24** in the circuit board locator plate **23**.

FIG. **12** shows the back latch finger **59** for the feed and cut-off body portion **55''** as comprising a somewhat elongated part **99** apertured adjacent its top for its pivotal mount at **60** on said portion. The finger **59** is of generally rectangular cross-section, flat on the side opposite the side viewed. The viewed surface has a recess at **100** in a bottom edge portion thereof; which recess extends a substantial part but not all of the way across the thickness of body **99**; it thus leaves an end restrainer portion **101** to enter into the space between successive longitudinal strip connectors **13**, and above transverse connector **12** (FIG. **3**), and thus hold strip **10** against upward motion in the feed slot **57**. A further inclined recess at **102** of somewhat shallower depth defines a reduced thickness upper end of part **99**, at which a pivot opening **103** for back latch finger **59** is formed.

FIG. **13** shows the feed finger **67** on the lower end of feed bar **63** as comprising an elongated piece **104** of generally rectangular cross-section, flat on one side surface, with an opening **105** in a reduced thickness upper end thereof for the pivotal mount thereof at **68** (FIG. **5**) in a side recess adjacent the lower end of feed bar **63**. Feed finger piece **104** is characterized by an integral projection **106** at one side thereof which is defined by parallel inclined upper and lower surfaces **107**, **108** respectively, the latter at the top of a reduced thickness tail portion **109**. That portion has a notched lower end **110** adapted to straddle across the tab strip connector portion **18** of a non-severed set of weld tabs **11**. Hence as the feed and cut-off unit **35** retracts upwardly, after being spread from unit **33**, the feed finger **67** in effect imparts a downward movement to strip **10** in relation to the feed and cut-off body **55**. Thus the strip is positioned relative to the latter for an ensuing weld tab clamping, cut-off and staking cycle of operation.

The downward stroke of the staking punch and cut-off subassemblies **33**, **35** is limited by bottoming of the assemblies on panel P during staking. A stop finger **111** bolted atop the actuator bar **32** is engageable with the housing **27**, thus preventing the assemblies from striking the plate **23** if there is no panel on the plate.

In the operation of the applicator **20**, with a printed circuit board positioned therebeneath on the locator plate **23**, the air-cylinder **38** will be alternately pressurized at opposite axial ends thereof through suitable fittings and line connections (not shown); and the reverse pressurization of the cylinder is through the agency of simple fluid pressure and control valve circuitry (also not shown). The reversing cycle may be controlled manually by an operator as to the timing of the up and down strokes of air cylinder plunger **39**, or the control may be effected automatically through more complicated means, as desired or thought appropriate for a controlled speed of production.

FIG. **5** shows the various sub-assembly means of applicator **10** in a fully elevated position (as do FIGS. **1** and **2**) at the commencement of a down stroke to clamp, sever, and stake the lower end of the tab supply strip **10**, the strip having been properly positioned previously in the manner described above.

Initial pressurization of cylinder **38** at its upper end has no effect to move the feed and cut-off unit **35** and the staking punch unit **33** bodily downward. This is due to the fact that the spring-urged drag plug **78** engages the operator bar **32** of unit **33** with sufficient frictional force to prevent such initial downward movement of bar **32**.

Instead, as indicated in FIG. **6**, the longer arm or link **44** of the toggle unit **51** is swung counter-clockwise (FIG. **6**), under force applied by clevis **43**, about the arm's end pivot at **46**. This in turn exerts end thrust on the shorter toggle arm **48** in the direction of the arrow, with the result that the massive body **55** of strip feed and cut-off unit **35** is swung counter-clockwise about its pivot at **65** to the staking punch unit **33**. Consequently, the lower end of the tab supply strip **10** is initially clamped between the lower ends of the units **33**, **35**, but not yet with sufficient force to cause the cut-off of the lowermost tab section **11** by the coacting punch and die elements **91**, **93**. A typical lowering of the air cylinder plunger **39** amounting to, say, 0.560 inch will be involved to relatively straighten the toggle unit **51** and drop it pivotally from the position of FIG. **5** to the position of FIG. **6**.

FIG. **5** shows the pin **70** on the top of the mildly angled feed link **69** (in effect an upward extension of the slideable strip feed bar **63** of unit **35**) as being located in a solid line position at the top of the slot **71** in the fixed stop angle **72**. See also FIG. **2**. It is held temporarily as thus positioned by the friction of the wave spring **75** which bears against the feed bar **63**. However, upon completion of the counter-clockwise clamping swing of unit **35** about its pivot **65**, a continued downward drive of units **33**, **35** is sufficient to overcome the frictional spring drag on bar **63**, so that the link **69** is drawn downwardly a slight amount, thus to bring the link's coupling pin **70** to the bottom of the fixed stop slot **71**, as shown in dotted line of FIG. **5**. It remains there during ensuing actions, to be described, until there is a full elevation of the units **33** and **35** returning the same to starting position.

With the strip **10** clamped as shown in FIG. **6**, continued downward motion of air cylinder plunger **39** overcomes the frictional resistance of the drag plug **78** (FIG. **5**), so that force is simultaneously exerted through toggle unit **51**, and its arm connections at **46**, **49** and **49'** to the respective feed-cut-off and staking punch units **35,33**, to shift the two downwardly as a unit sufficiently to stake the lower-most section **11** of tab supply strip **10** into holes *h* in the printed circuit board P. This amounts typically to a component of downward air cylinder plunger travel approximately **0.600** inch, so that the total travel of plunger **39** in a tab-applying phase amounts to about 1.160 inch. However, FIG. **7** shows that the toggle linkage **51** has not yet quite reached its maximally straightened condition.

That condition is reached when continued force applied to toggle arm **48**, **51** suffices to drive the latter clockwise (FIG. **8**) about the medial toggle pivot at **49**, the toggle arm **48** engaging a downwardly facing surface **44** at the end of the other arm **44'**; at this time the female cut-off die **93** telescopes the male punch **91** (FIG. **11**) to excise the waste slug *s* from strip **10** and sever the bottom-most tab section **11** from the remainder of the strip.

The next action of the applicator **20**, as shown in FIG. **9**, responds to an upward movement of the air cylinder plunger **39**, it being noted that in this view the feed link coupling pin **70** is still, as appears in FIG. **9A**, at the bottom of the lost motion stop slot **71** of angle piece **72**. As the direction of air cylinder force is reversed, (FIG. **9**), the toggle unit **51** is broken, toggle arm **44** swinging clockwise about its pivot **46** and arm **48** pivoting in the direction of the arrow to swing the feed and cut-off body **55** clockwise about its pivot at **65** to the actuator bar **32** of staking punch sub-assembly unit **33**. Thus, the two units are separated at the zone of the cut-off and staking phases described above. The drag force of friction plug **79** (FIG. **5**) has sufficed to prevent upward travel of the actuator rod **32** at this time.

However, when the clockwise unclamping swing of the cut-off die body **55** bottoms the same laterally to the right against the actuator bar **32**, the units **33** and **35** become coupled rigidly for upward movement, which then takes place until they are fully elevated to the original starting position of FIG. **5**. In this travel, the drag resistance of the wave spring **75** on feed bar **63** is overcome when the latter rises to bring the pin **70** of its coupling link **69** from a position at the bottom of stop slot **71** to the top stop position at the top of stop slot **71**. Thus, the feed bar **63** is held vertically motionless as the feed and cut-off body **55** continues to travel upwardly to the re-starting position. Accordingly, the strip feed finger **67** pivoted at the bottom of feed bar **63** continues to move the tab strip **10** to its lower or fed position. This in effect amounts to a lowering of the strip on the cut-off body **55** to the relative position which they occupy at start-off, as appears in FIG. **5**.

The applicator **20** is very simply devised indeed to perform unfailingly and reliably the compound actions described above. It may readily and inexpensively be made portable in nature to be set up on location as desired, as at a strip user's plant. Similarly, an improved weld tab supply strip of the nature shown in FIGS. **3** and **4** may be stamped to fit any applicator **20** and vice versa. In general, the nature of the feed strip bar **63**, its feed finger **57**, and the back latch finger **59** of feed and cut-off body **55** are such as to enable the handling of a considerable number of configurations of the tab supply strip.

What is claimed is:

1. An applicator for weld tab or like components to be staked into a printed circuit board or like panel, comprising a feeding, severing and staking assembly having a strip providing said components, said assembly including a strip feeding and component cut-off unit, and a staking unit, a pivotal connection between said units, and operating means for successively moving said units relative to one another about said connection and bodily together in linear movement for a strip severing, component cut-off and staking stroke, said operating means including a toggle linkage operatively connecting said units to one another and to a linearly travelling operator bar of said operating means for a pivotal strip clamping action of said units during a staking stroke of said operator bar.

2. The applicator of claim **1**, in which said operator bar carries one of said units in a linear travel, said operating means including a power member to reversibly actuate said bar for said travel and said units for a relative pivotal movement, said toggle linkage including a first arm pivotally connected between said operator bar and said power member, and a second arm pivotally connected between said first arm and the other unit of said assembly, and means controlling the operation of said power member and toggle linkage on said units to produce sequential actions of the latter to clamp a strip component therebetween and to cut and stake an end component of said strip in said panel.

3. The applicator of claim **2**, including means providing the pivotal action of said linkage prior to the linear travel of said operator bar.

4. The applicator of claim **3**, and further comprising drag means acting frictionally on said operator bar to delay its said linear travel pending an operation of said toggle linkage by said power member to pivotally operate said units relative to one another.

5. The applicator of claim **1**, and further comprising means operated in timed relation to the operation of said units to position said strip in a different relation to said units after a staking of an end strip component by the units.

6. The applicator of claim **1**, and further comprising means operated in timed relation to the operation of said linkage and operator bar to position said strip in a different relation to said units after a staking of an end strip component by the units.

7. The applicator of claim **2**, and further comprising means operated in timed relation to the operation of said linkage and operator bar by said power member to position said strip in a different relation to said units after a staking of an end strip component by the units.

8. The applicator of claim **3**, and further comprising means operated in timed relation to the operation of said linkage and operator bar by said power member to position said strip in a different relation to said units after a staking of an end strip component by the units.

9. The applicator of claim **4**, and further comprising means operated in timed relation to the operation of said linkage and operator bar by said power member to position said strip in a different relation to said units after a staking of an end strip component by the units.

10. Apparatus for staking weld tabs or like connector components to a printed circuit board or like panel, comprising means to manipulate a strip presenting a longitudinally articulated series of such components to position the latter to be clamped in proper relation to the length of said series and to said panel for a subsequent staking step, means to clamp the strip as thus positioned and to advance the clamped strip toward the plane of said panel, means operating in conjunction with said clamping and advancing means for severing from the strip the end-most component of said strip and staking that component to the panel, all of said aforementioned means being operated for said actions by a common reversing stroke power device in a stroke of the latter, such device being operatively connected to said clamping and advancing means to effect said actions progressively in the named order, the operative connection of said device to said clamping and advancing means occasioning the unclamping of the unsevered portion of said strip at the outset of a reverse retractal stroke of said device, said strip manipulating means being operable to advance said strip in said one stroke and including means acting on said strip during said reverse stroke to prevent retraction of the unsevered and unclamped strip portion in the same direction.

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