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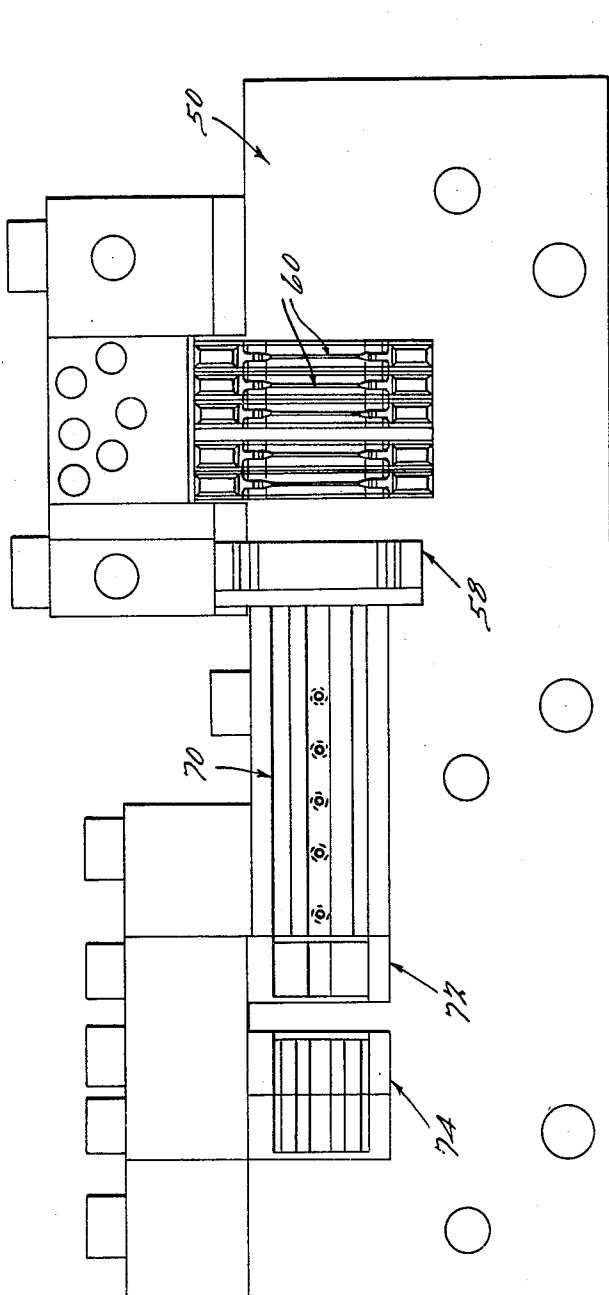
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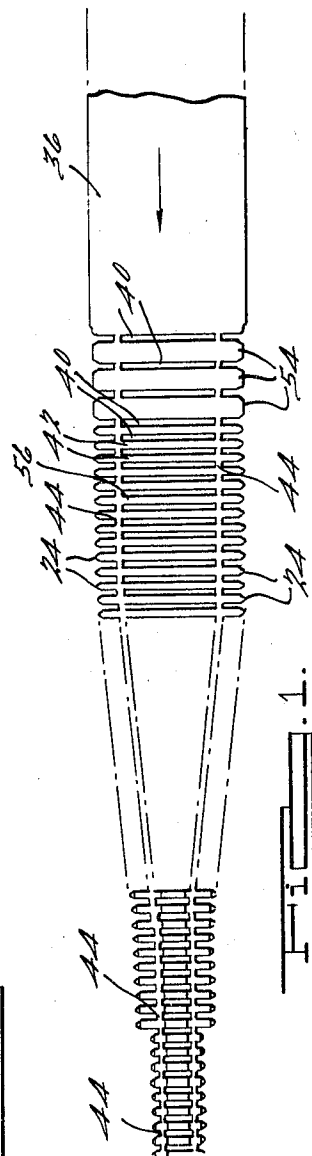
METHOD OF MAKING STRIP STAKE-ON TERMINALS AND ARTICLE

Filed Aug. 21, 1961

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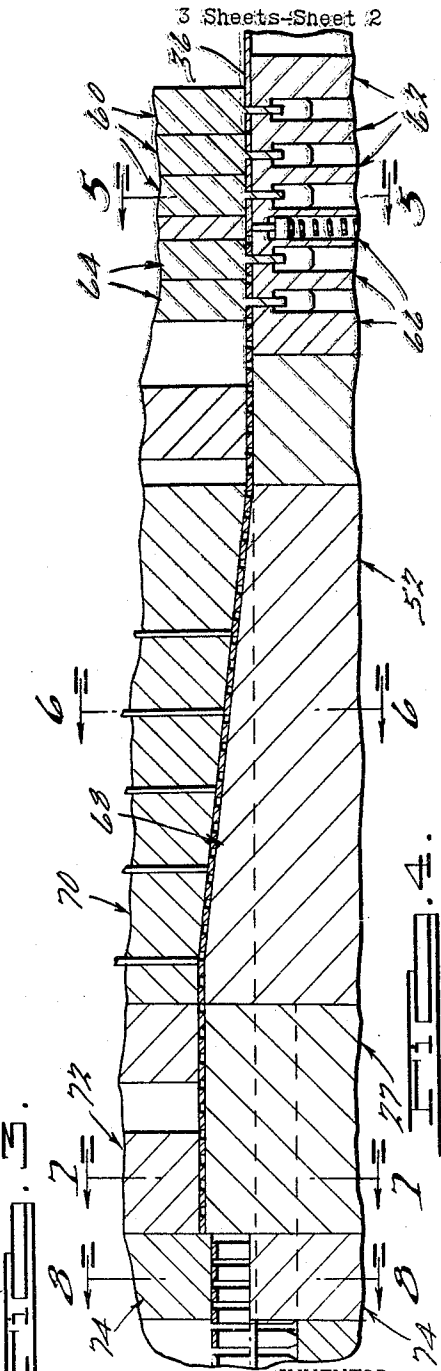
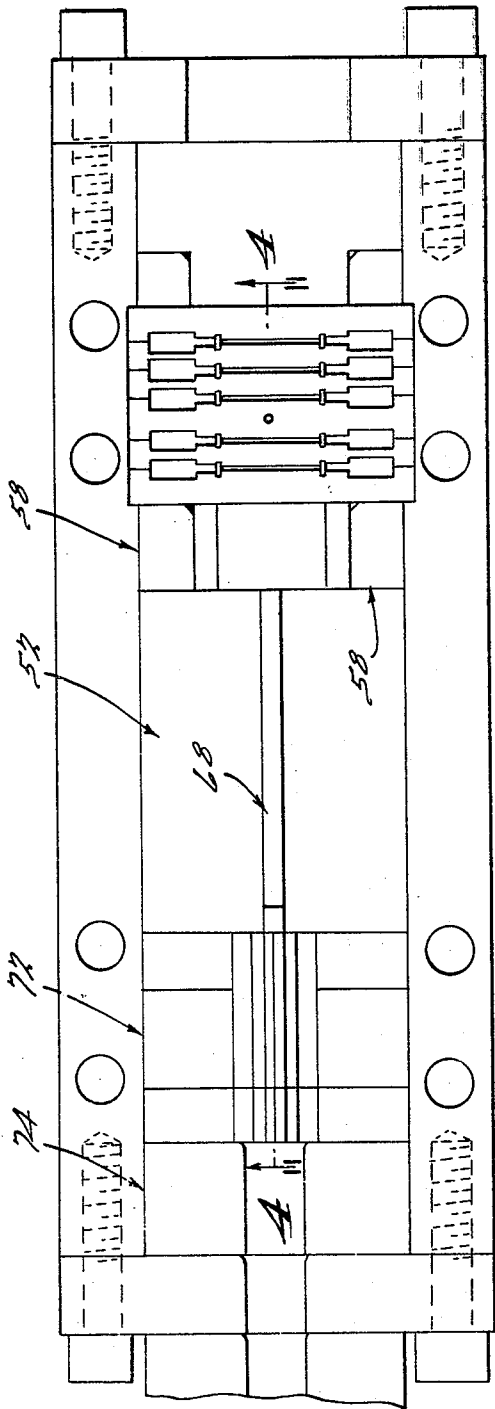
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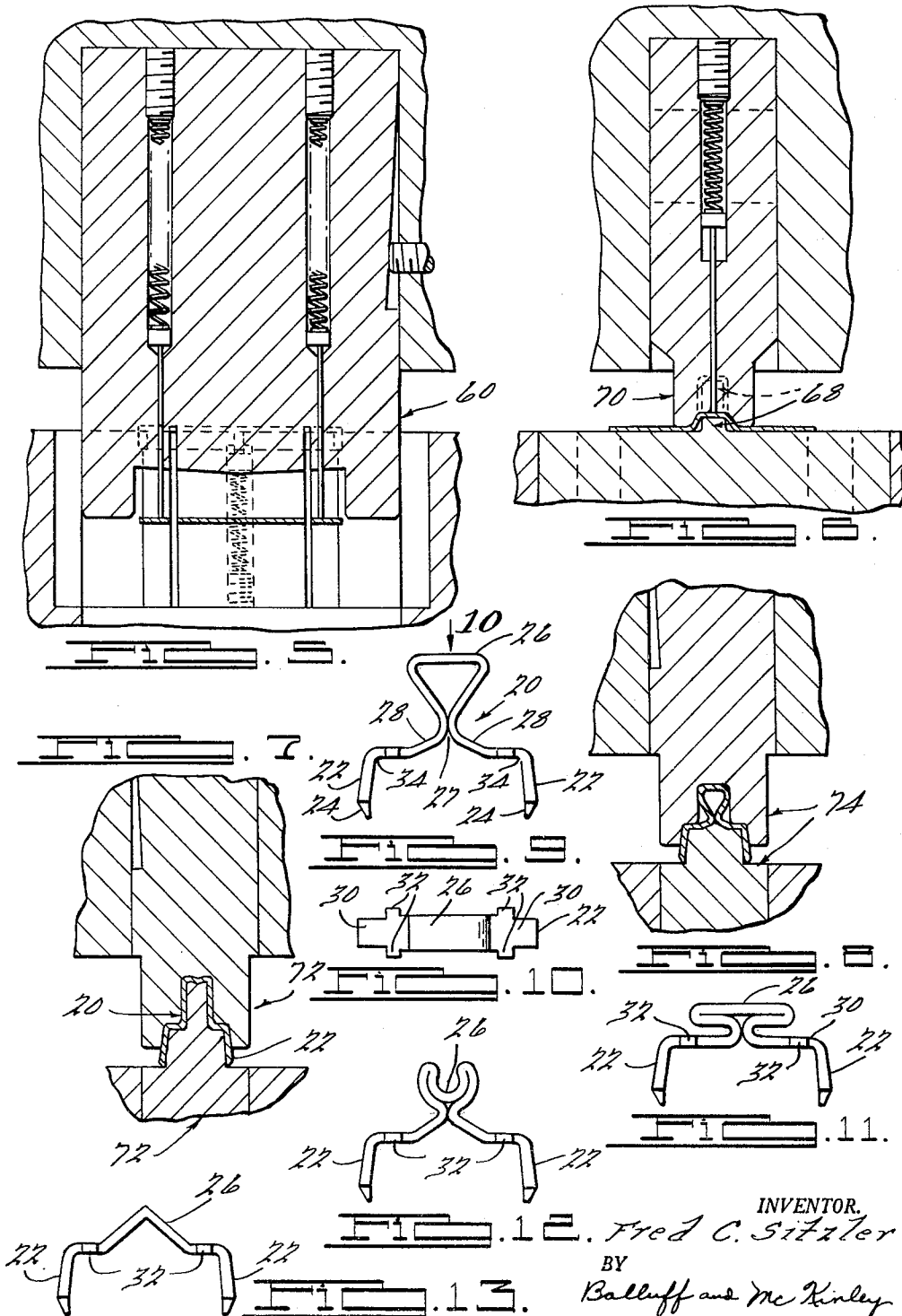
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METHOD OF MAKING STRIP STAKE-ON TERMINALS AND ARTICLE

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3 Sheets-Sheet 3



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METHOD OF MAKING STRIP STAKE-ON TERMINALS AND ARTICLE

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14 Claims. (Cl. 59-77)

This invention relates to the making of strip terminals and has particular reference to a new and improved method of making stake-on terminals in a continuous strip form.

Electric terminals of this type are very extensively used, particularly for application to coilforms. This invention contemplates a simple and efficient method of making such terminals in strip form which not only reduces the cost of manufacture of such terminals but also facilitates the handling and the application of such terminals to the work.

A principal object of the invention therefore is to provide a new and improved method of making a staple type of terminal in a continuous strip form.

Other and further objects of the invention will be apparent from the following description and claims and may be understood by reference to the accompanying drawings, of which there are three sheets, which by way of illustration show a preferred embodiment of the invention and what I now consider to be the best mode of applying the principles thereof. Other embodiments of the invention may be used without departing from the scope of the present invention as set forth in the appended claims.

In the drawings:

FIG. 1 is an enlarged plan view of a strip of material illustrating the various steps in the formation of a continuous strip of terminals;

FIG. 2 is a bottom plan view of an upper die for use in a reciprocating press for forming the strip of terminals;

FIG. 3 is a plan view of the bottom die which is operable with the upper die of FIG. 2 to form the strip of terminals;

FIG. 4 is an enlarged fragmentary sectional view of the upper and lower dies in their closed position and taken generally along the line 4-4 of FIG. 3;

FIGS. 5, 6, 7 and 8 are fragmentary sectional views taken along the lines 5-5, 6-6, 7-7, and 8-8, respectively, of FIG. 4;

FIG. 9 is an enlarged elevational view of a terminal;

FIG. 10 is a plan view of the same; and

FIGS. 11, 12 and 13 are elevational views of modified forms of terminals.

A preferred form of terminal produced in accordance with my method is illustrated in FIGS. 9 and 10 and comprises a U-shaped staple type of metal terminal 20 which includes spaced attaching prongs 22 the ends 24 of which are swaged so as to facilitate the penetration of the prongs into a coilform or other body to which the terminal is attached. The prongs 22 are interconnected by an integral portion which is formed to provide a closed triangularly shaped wire tie or loop 26 which lies generally in the same plane as the prongs 22 but is offset from the space between such prongs. The prongs 22 flare outwardly somewhat and may be slightly "bowlegged" so as to facilitate the curling of the ends of the prongs toward each other when applied to a coilform.

Below the closed loop 26 the portions 28 diverging laterally from the closed end of the loop 26 may be formed angularly relative to each other as illustrated in FIG. 9 so as to form two sides of a generally triangular space 27 below the loop 26 and thus provide a socket or opening between the portions 28 of the terminal and the body to

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which it is attached whereby a wire may be conveniently attached to one or both portions 28 of the terminal 20.

The terminal may be formed of any suitable metal, such for example as electroplated brass having a nominal stock thickness of .015 inch. The portions 28 extend laterally beyond the sides of the loop 26 so as to provide exposed shoulders 30 laterally of the wire tie 26 to which pressure is applied for driving the prongs into the body to which the terminal 20 is to be attached. Projecting laterally from the shoulders 30 are tabs 32 which form an integral part of the strip out of which the terminal is made and which before severing serve to integrally connect adjacent staples disposed parallel to each other in the strip. The radius of the corners 34 preferably should be no greater than three-fourths of the stock thickness. The tips of the swaged ends 24 of the prongs 22 may be from a knife edge to about three-fourths of the thickness of the material.

A strip 36 of brass out of which the terminals are formed is shown in plan view in FIG. 1 and in side elevation in FIG. 4, which illustrate the various forming operations that are successively performed on the strip so as to produce the terminals 20.

My method of making terminals of the type indicated in strip form consists in general of moving the strip 36 of sheet metal in the direction of its length; forming spaced transverse parallel slots 40 in the strip so as to form a series of spaced parallel blanks 42 interconnected by integral portions 44 of the strip spaced inwardly from the lateral edges thereof; swaging the ends 24 of the blanks; forming the metal of the blank between the integral portions 44 into general U-form as shown in FIGS. 6 and 7; bending the metal of each blank disposed outwardly of the integral portions 44 to form the attaching prongs 22; and then partially collapsing the U-shaped form as shown in FIG. 8 so as to form the closed loop or wire tie 26 and the portions 28 diverging therefrom and leave the outer ends 30 of such diverging portions exposed. The product of the method is a strip of terminals as shown in FIG. 9 wherein the terminals are disposed parallel to each other in the strip and interconnected by the integral portions 44 which, when severed, leave the tabs 32.

Preferably the connecting portions 44 are severed during the application of the terminals so that the terminals will be in strip form for handling. For example, I contemplate that as formed the strip of terminals may be coiled on a reel which provides a convenient technique for holding the terminals and feeding the same to the terminal applicator. However, if individual terminals or a strip of terminals of a given number is desired, at the end of the forming operations the strip may be severed so as to separate the terminals from each other or to provide strips of terminals of a given number.

The spacing between the terminals in the strip depends upon a number of variable factors and hence the spacing may vary widely, even to the point where little or no spacing is provided, depending upon the size of the terminals and the method and apparatus used in applying the same.

I have found that it is possible to practice my method by employing upper and lower dies 50 and 52 on a reciprocating press, the lower die 52 being fixed and the upper die 50 being reciprocable with the ram of the press. The dies 50 and 52 in fact comprise a series of dies which are adapted to perform the several operations illustrated. The material 36 is fed step by step between the dies when the press is open, preferably so that a plurality of terminals 20 will be formed on each stroke of the press. As illustrated, the strip is fed between the dies 50 and 52 so as to form two terminals at one time.

In accordance with the method as illustrated, the strip

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36 is transversely slotted by the dies 60 and 62 to form double sized blanks 54 which are subsequently slotted by the dies 64 and 66 to form the individual blanks. While the strip is flat the ends of the blanks are struck by swaging dies 58 to swage the ends 24 of the blanks. Thereafter the strip 36 is fed upwardly between a ramp 68 and a cooperating forming die 70 so as to gradually form the metal of each blank between the integral portions 44 thereof into generally U-shaped form as shown in FIGS. 6 and 7. Thereafter the metal disposed outwardly of the integral portions of each blank is bent downwardly by the dies 72 as shown in FIG. 7 to form the prongs 22.

At the next station the U-shaped portion of the terminal is partially collapsed by the dies 74 as shown in FIG. 8 so as to bend the sides of such U-shaped portion together to form a wire tie in the form of a triangle and the diverging portions 28.

Other forms of staple type terminals such as shown, for example, in FIGS. 11-13 may be formed in accordance with the technique herein disclosed. The terminals of FIGS. 11, 12 and 13 differ from that of FIG. 9 in that the wire tie or loop portion thereof is different and hence would require specifically different tooling from that illustrated.

It is to be noted that the prongs 22 are "toed in" as a result of a bend 34 just above the swaged ends 24. Such bend is spaced from the end of the prongs from about .020 inch to a maximum of about two-thirds of the total length of the prongs. The angle of such bend may be from about 178° as shown to about 135°. This bend helps the prongs to pierce the material to which the staple is attached and also facilitates staking or bending over of the ends of the prongs.

While I have illustrated and described a preferred embodiment of my invention, it is understood that this is capable of modification, and I therefore do not wish to be limited to the precise details set forth but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. That method of making a series of generally U-shaped staples in a continuous strip with the staples disposed parallel to each other in the strip and wherein each staple includes spaced attaching prongs interconnected by a portion formed to provide a wire tie offset from the space between said prongs, said method comprising moving a strip of sheet metal in the direction of its length, forming spaced transverse parallel slots in said strip so as to form a series of spaced parallel blanks interconnected by integral portions of said strip spaced inwardly from the lateral edges thereof, forming the metal of each blank between said integral portions into generally U-shaped form, bending the metal of each blank disposed outwardly of said integral portions to form prongs which extend generally in the same direction, bending the sides of said U-shaped form together so as to form a wire tie and portions diverging laterally therefrom and from the ends of which diverging portions said prongs project and so as to leave the outer ends of said diverging portions exposed and thereby form a series of staples in strip form wherein said integral portions interconnect said staples.

2. That method of making a series of generally U-shaped staples in a continuous strip with the staples disposed parallel to each other in the strip and wherein each staple includes spaced generally parallel attaching prongs interconnected by a portion formed to provide a loop offset from the space between said prongs, said method comprising moving a strip of sheet metal in the direction of its length, forming spaced transverse parallel slots in said strip so as to form a series of spaced parallel flat blanks interconnected by integral portions of said strip spaced inwardly from the lateral edges thereof, gradually forming the metal of each blank between said

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integral portions into generally U-shaped form, bending the metal of each blank disposed outwardly of said integral portions to form parallel prongs, bending the sides of said U-shaped form together so as to form a loop in the form of a triangle and portions diverging laterally therefrom and from the ends of which diverging portions said prongs project, while leaving the outer ends of said portions exposed to form shoulders.

3. That method according to claim 2 characterized in that said strip is moved step by step between relatively reciprocable cooperable dies and said forming operations are effected by said dies.

4. That method according to claim 2 which includes forming said laterally diverging portions angularly relative to each other as two sides of a triangle at the base of said first-mentioned triangle.

5. That method of making a series of generally U-shaped staples from a continuous strip wherein each staple includes spaced staking legs interconnected by a portion formed to provide a loop offset from the space between said legs, said method comprising forming spaced transverse parallel slots in a flat strip of sheet metal so as to form a series of spaced parallel blanks interconnected by integral portions of said strip spaced inwardly from the lateral edges thereof, forming the metal of each blank between said integral portions into generally U-shaped form, bending the metal of each blank disposed outwardly of said integral portions to form staking legs, and moving the sides of said U-shaped form together to form a loop and portions laterally diverging therefrom and from the ends of which diverging portions said staking legs project, and leaving the outer ends of said diverging portions exposed to form shoulders.

6. That method of making a series of generally U-shaped staples wherein each staple includes spaced attaching prongs interconnected by a portion formed to provide a loop offset from the space between said prongs, said method comprising moving a strip of sheet metal in the direction of its length, transversely slitting said strip so as to form a series of parallel blanks interconnected by integral portions of said strip spaced inwardly from the lateral edges thereof, forming the metal of each blank between said integral portions into generally U-shaped form, bending the metal of each blank disposed outwardly of said integral portions to form attaching prongs, bending the sides of said U-shaped form together so as to form a loop and portions diverging laterally therefrom and from the ends of which diverging portions said prongs project, while leaving the outer ends of said diverging portions exposed.

7. That method according to claim 6 characterized in that said strip is moved step by step between relatively reciprocable cooperable dies and said forming operations are effected by said dies.

8. That method of making a series of generally U-shaped staples in a continuous strip form with the staples disposed parallel to each other in the strip and wherein each staple includes spaced attaching prongs interconnected by a portion formed to provide a loop offset from the space between said prongs, said method comprising moving a flat strip of sheet metal step by step in the direction of its length, transversely slitting said strip so as to form a series of parallel blanks interconnected by integral portions of said strip spaced inwardly from the lateral edges thereof, gradually forming the metal of each blank between said integral portions into generally U-shaped form, bending the metal of each blank disposed outwardly of said integral portions about a radius no greater than three-fourths of the thickness of the strip metal to form diverging prongs which extend generally in the same direction, swaging the ends of said prongs, bending the sides of said U-shaped form together so as to form a loop and portions diverging therefrom laterally of said loop and from the ends of which diverging portions said prongs project while leaving the outer ends of

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said diverging portions exposed and thereby form a series of staples in strip form wherein said integral portions interconnecting said staples are disposed in zones lying laterally outwardly of the lateral sides of said loop.

9. That method of making a series of generally U-shaped staples in a continuous strip form and wherein each staple includes spaced attaching prongs interconnected by a portion formed to provide a loop, said method comprising moving a strip of sheet metal in the direction of its length, transversely slitting said strip so as to form a series of blanks interconnected by integral portions of said strip, forming the metal of each blank at the center thereof into generally U-shaped form, bending the metal of each blank disposed outwardly of said U-shaped form to form prongs, bending said U-shaped form into a loop and portions diverging therefrom laterally of said loop and from the ends of which diverging portions said prongs project, and leaving the outer ends of said diverging portions exposed thereby to form a series of staples in strip form wherein said integral portions interconnect said staples.

10. That method according to claim 9 characterized in that said strip is initially slitted so as to form blanks of a size at least twice the size of a single blank.

11. That method of making a series of generally U-shaped staples in a continuous strip form and wherein each staple includes spaced attaching prongs interconnected by a portion formed to provide a loop, said method comprising moving a strip of sheet metal in the direction of its length, transversely slitting said strip so as to form a series of blanks interconnected by integral portions of said strip, forming the metal of each blank at the center thereof into a loop, bending the metal at the ends of each blank to form prongs which extends generally in the same direction while leaving portions of the blank between said loop and said prongs exposed

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to form shoulders whereby pressure may be applied to said prongs for driving the same into a body.

12. That method according to claim 11 characterized in that said loop is formed by moving the center of said strip up a ramp so as to form the center of said blank into a U form and then applying pressure to the closed end of said U form to partially collapse the sides thereof.

13. That method of making a series of generally U-shaped staples in a continuous strip form with the staples disposed parallel to each other in the strip and wherein each staple includes spaced generally parallel attaching prongs interconnected by a portion formed to provide a wire tie offset from the space between said prongs, said method comprising moving a flat strip of sheet metal step by step in the direction of its length, at one step forming spaced transverse slits in said strip so as to form a series of interconnected parallel blanks, gradually forming the metal of each blank at the center thereof into generally U-shaped form, bending the outer ends of each blank to form prongs, bending the sides of said U-shaped form together to form a wire tie and pressure applying shoulders laterally thereof, thereby to form a series of staples in strip form wherein said integral portions interconnect said staples.

14. That method according to claim 13 wherein said prongs are bent so as to toe the ends thereof inwardly toward each other.

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