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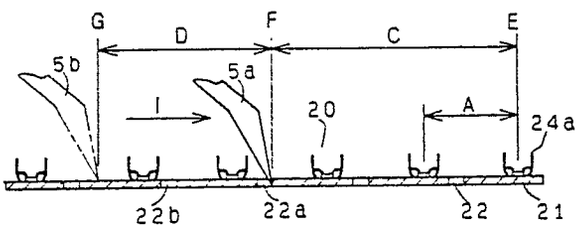
(54) A crimp terminal.

(57) A series of side by side aligned crimp terminals in a strip form having a controlled spacing between adjacent carrying apertures are disclosed.

According to the present invention any of the two strip terminals with different terminal spacing A and B is applied for crimping operationg with insulated conductors, where A < B < 2A and where spacing A between two adjacent crimp terminals are equal to that of the two adjacent apertures for carrying the strip, and the aperture is located on the terminal carrier in a position which is biased to an extent of distance A′ from longitudinal axis of the preceding crimp terminal, and anyone of the apertures is located in a position C which is apart distance C from crimping position E, where C ≤ 2A + A′, and the length C is matched with the distance from crimping position E in a crimping apparatus to a stationary position F of a feed blade of the same apparatus which carries the strip terminal in order by making an engagement at the carrying apertures.

Fig. 1



EP 0 358 218 A2

A CRIMP TERMINAL

This Application claims the benefit of the priority of Japanese Utility Model Application No.118.209/1988, filed on 8th September, 1988.

The present invention relates to an improved crimp terminal in a strip form which is particularly suitable in use in wiring harnesses of motor vehicles.

The terminals are aligned with unique relationship so that terminal strips with different spacings are applicable to a single crimping apparatus.

DESCRIPTION OF THE PRIOR ART

Apparatus and method for crimping terminals are shown in U.S. Patent 3.969.806 (USP '806) given to McCaughey.

According to the reference there is provided a movable head, a pair of matable anvil and crimping anvil, and a feed blade which can be moved rewardly along a terminal strip carrier portion.

In the upstroke of the head, a carriage block moves into an engagement with a stop screw, and the feed blade is engaged with an aperture in the terminal strip carrier portion to move a terminal to a crimping position.

An operator initially sets the stop determing the position of the feed blade at the extreme of its forward movement toward the crimping means and then the blade is at the standardized distance from the anvil of the crimping means.

The feed blade travels to a distance greater than the spacing between terminals of any strip to be applied and less than twice the spacing ($2 \times Sm$) between terminals of the strip with the smallest spacing (Sm) between terminals to be used and thus the stop screw and guide element become readily adjustable to obtain accurate feed of the terminal strip.

BACKGROUND OF THE INVENTION

Structural features of crimp terminals in a strip form (10),(10′) are illustrated in Fig.5 and Fig.6. As shown in the figures there are various kinds of crimp terminals with different spacings on the same side of terminal carriers (11).

Round holes (2) are called "pilot holes " and they are located on crossing points of longitudinal axis of each terminal and (longitudinal) center line of corresponding terminal carrier. There are found square "carrying apertures" (12) along the center line and are usually located in the middle of two adjacent pilot holes.

Spacing of the pilot holes (2) and that of square "carrying holes " (12) are standardized respectively.

A commonly used crimping apparatus for making an electrical contact between an insulated conductor and electrical terminal by crimping is illustrated in Fig.7.

In the conventional crimping practice a strip of terminals (3) is fed automatically on the surface of an anvil (4b) by means of a feed blade (5) from left to right and conductor holding portion (14) of the crimp terminal (13) faces a crimp die (4a).

The free end portion of the feed blade (5) is engaged with squae carrying aperture (12) in the terminal carrier (11). Another end portion of the feed blade is linked to a movable arm (6) and is pulled rearwardly preventing forward movement by a spring (7) during the engagement of free end portion of the feed blade (5) with pilot hole (2) or carrying aperture (12).

As mentioned before, spacings between adjacent pilot holes or adjacent carrying apertures are variable depending on the types of the crimp terminals and it becomes, therefore, necessary for an operator to set carefully the moving distance of the free end portion of the feed blade (5) by adjusting both blade length adjuster (9) and a drive cam pitch controller (8) which determines stroke D and frequency of moving arm (6).

The purpose of the present invention is to afford crimp terminals in a strip form which enamble an operator with ordinary skill to achieve accurate positioning of the terminals toward the crimp die (4a) in the conventional crimping apparatus (1). More specifically the crimp terminals in a strip form (hereafter called as terminal strip) have perforations on their common terminal carrier (11) and the spacing between adjacent perforations is designed in a way that movement of the terminal strip (3) is matched with carrying stroke of the feed blade (5).

BRIEF DESCRIPTION OF THE DRAWINGS

Fig.1 shows a schematic front view of the crimp terminals in a strip form with spacing A of the present invention.

Fig.2 shows a plan view of the crimp terminals with spacing A in a strip form of the present invention.

Fig.3 shows a schematic front view of the crimp terminals in a strip form with spacing B of

the present invention.

Fig.4 shows a plan view of the crimp terminals with spacing B in a strip form of the present invention.

Fig.5 and Fig.6 show plan views of conventional crimp terminals with different spacings.

Fig.7 illustrates terminal carrier portions of conventional crimping apparatus.

NUMERALS

1.crimping apparatus
2.pilot hole
3.strip terminal
4a.crimp die
4b.anvil
5.feed blade
6.moving arm
7.spring
8.cam-pitch controller
9.blade length adjuster
10,20,30:strip terminal
11.21,31:terminal carrier
12,22,32:carrying aperture
13,23,33:crimp terminal
14,24,34:holding portion
15,25,35:longitudinal axis of crimp terminal

NOTATIONS

A,B:terminal spacing
C:distance between E and F
D:stroke of the feed blade
E:crimping position
F:stationary point of feed blade
G:start point of feed blade
H:mating position
I:moving direction of strip terminal
J:swing direction of arm

DESCRIPTION OF THE PREFERRED EMBODIMENT

In an crimping apparatus (1) shown in Fig.7 a strip terminal (10) is supplied by an automatic feeding mechanism consisting of a moving arm (6), a feed blade (5).

A piece of insulation wire is crimped at the holding portion (14) of the crimp terminal (13) when a crimp die (4a) descends until it meet with the upper surface of an anvil (4b). The moving arm (6) waves in a crockwise direction as indicated by line J. A spring (7) pulls the feed blade rearwardly and the top free end of the feed blade (5) will become engaged with adjacent perforations placed in the terminal carrier (11).

The crimp die (4a) moves upwardly and the moving arm (6) carries the strip terminal in a way that another terminal reaches accurately to the new crimping position. It has been a usual practice for the operator to make precise adjustment of terminal position using a cam-pitch controller (8) and a blade length adjuster (9).

According to the crimp terminal of the present invention, stroke D of the feed blade (5) is kept unchanged even if the sizes, numbers and spacings of the carrying apertures (22)(32) vary from terminal strip (20) to that of (30).

It has been realized ,therefore, that one single crimping apparatus may crimp electrical terminals with different spacing without making adjustment of stroke of the feed blade.

Specific means and design concept to accomplish the object of the present invention have now been disclosed in details.

(1) Spacing between adjacent terminals:

When Spacing A and Spacing B represents distance between adjacent terminals, in two strip terminals of (20) and (30) their relationship are expressed as follows:

$A < B$ [1]

$A < B < 2A$ [2]

The carrying apertures (22), (32) shall be located, on their terminal carrier portions (21)and (31) respectively, at point F which is commonly apart as distance C measured from position E where crimping operation is carried out.

The carrying apertures (22), (32) shall be positioned on their carrier portions (21), (31) respectively, at the same distance C measured from crimping position. (refer to Fig.1 and Fig.2)

(2) Moving stroke D of the feed blade:

The moving stroke of the feed blade D is determined within a range of the following equation:

$B \leq D < 2A$ [3]

When once determined, the same moving stroke D is maintained regardless of difference of terminal spacings. (refer to Fig.1 and Fig.3)

Crimping practice using crimp terminals in a strip form of the present invention is described in details by referring to the drawings.

Strip terminal (20) has a plurality of crimp terminals (23) [(23a), (23b) and others] aligned side by side with spacing A and with a terminal carrier (21) having carring apertures (22) [(22a), (22b) and others] positioned in a distance A which is taken from the longitudinal axis (25) of the crimp terminals (23) (Fig.2). The longitudinal axis (25) of the crimp terminal (23a) is in a matching position E

with that of crimp die (1) (Fig.7).

The front edges (right side edges) of the carrying aperture (22a) and (22b) are located in a positions which are shown in Fig.1 and Fig.2, where the distance from crimping position E to the front edge F (right side edge) of the carrying aperture (22a) is C and the carrying aperture (22b), where the feed blade is to be mated in order to carry the terminal (23b) to the crimp position E, is located in a position which is also apart length C from the longitudinal axis (25) of terminal (23a).

Movement of the strip terminal (20) under crimping operation is described by referring to Fig.1 and Fig.3. The feed blade (5a) remains in the stationary position F until crimping of an insulated conductor to holding position (24a) of crimp terminal (23a) is completed at position E.

After crimping has been completed the feed blade (5) is pulled back by the spring (7) along the terminal carrier (21) toward position G which is apart distance D from the stationary position F.

Then the strip terminal (20) is then moved in the direction I and mates with another carrying aperture (22b) and continues to move until the feed blade (5) comes again to the stationary position F. In the above described example shown in Fig.1 and Fig.2 stroke D of the feed blade (5) is larger than spacing A between the adjacent carrying apertures (22a), (22b).

Another strip terminal (31) having similar configuration, but with different locational relationship is illustrated in Fig.3 and Fig.4, where spacing between adjacent crimp terminals (33) is B which is larger than A in the preceeding example and is less than 2A. In this example the distance between the front edge (right side edge of carrying aperture (32) and longitudinal axis of adjasent preceeding crimp terminal (33) is B', carrying aperture (32a) is biased distance C from the crimp position E, and stroke D of the feed blade (5) is equal to the spacing between adjacent carrying apertures (32a), (32b).

As shown in Fig.3 the feed blade has mated with next aperture when it returns to position G by means of spring (7) and then movement toward I direction is started at once.

In the first example the strip terminal (20) shown in Fig.2 has standardized spacing A between adjacent crimp terminal such as (23a) (23b) and carrying aperture (22) located on terminal carrier (21) in the position with biased distance A' from the longitudinal axis of crimp terminal (23).

The second example describes strip terminal (30) shown in Fig.4 where spacing between (33a)-(33b) is B and carrying aperture (32) is in a position with biased distance B' from the longitudinal axis of crimp terminal (33).

Even when structure of the two strip terminals are different in terms of (a) spacing of crimp terminals and (b) position of carrying apertures, they are both applicable to the common crimping appratus (1) without adjusting the stroke D of the feed blade (5) if both the distance between longitudinal axes (25), (35) of terminals (20), (30) and carrying apertures (22), (23) on corresponding terminal carriers (21), (31) are equal to C is the where C is the distance between crimping position E and the stationary position F of the feed blade (5) of the crimping apparatus (1) to be used.

Claims

1. A crimp terminal in a strip form having a plurality of crimp terminals which are aligned side by side sharing a common terminal carrier connected to them at their neck portions near holding portions for insulated electrical conductors, and having apertures for carrying the strip terminal toward a crimping position in order characterized in: spacing A between two adjacent crimp terminals are equal to that of the two adjacent apertures for carrying the strip, and the aperture is located on the terminal carrier in a position which is biased to an extent of distance A' from longitudinal axis of the preceding crimp terminal, and anyone of the apertures is located in a position C which is apart distance C from crimping position E, where $C \leq 2A + A'$, and the length C is matched with the distance from crimping position E in a crimping apparatus to a stationary position F of a feed blade of the same apparatus which carries the strip terminal in order by making an engagement at the carrying apertures.

2. A crimp terminal in a strip form in Claim 1 wherein spacing B of adjacent crimp terminals is not more than 2A, but larger than A.

Fig. 1

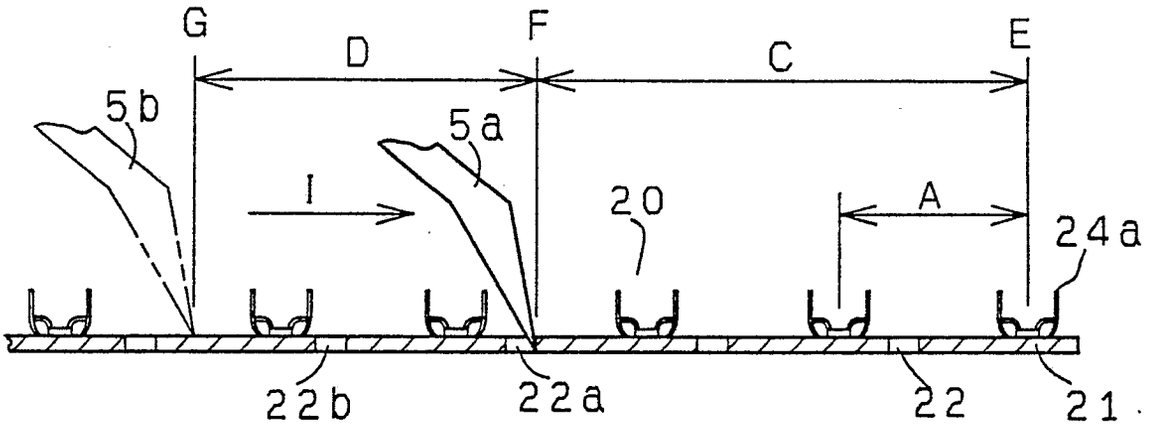


Fig. 2

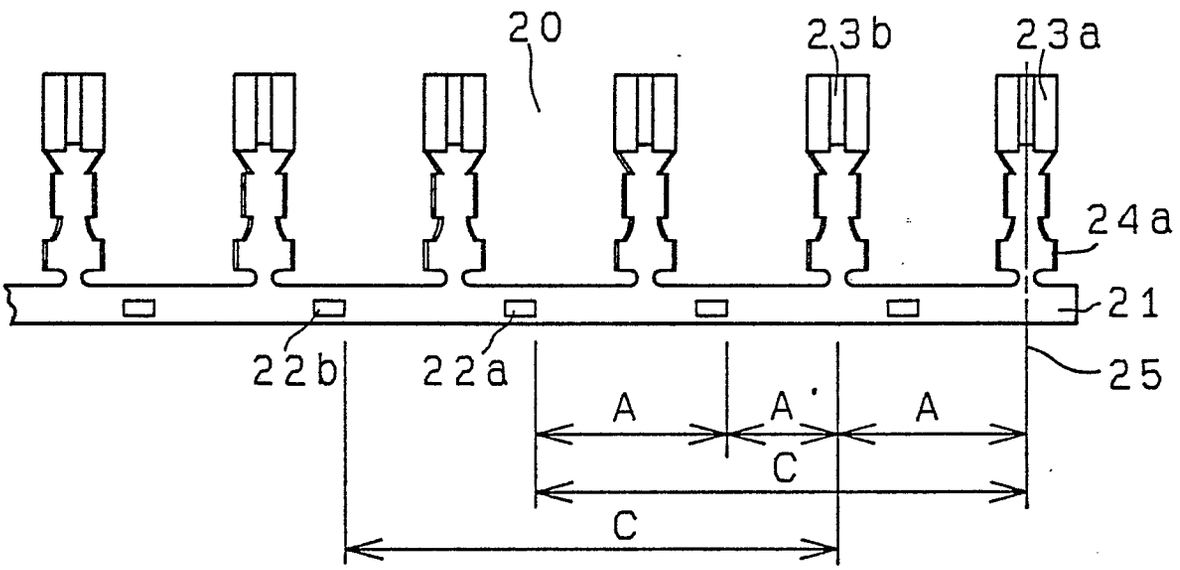


Fig. 3

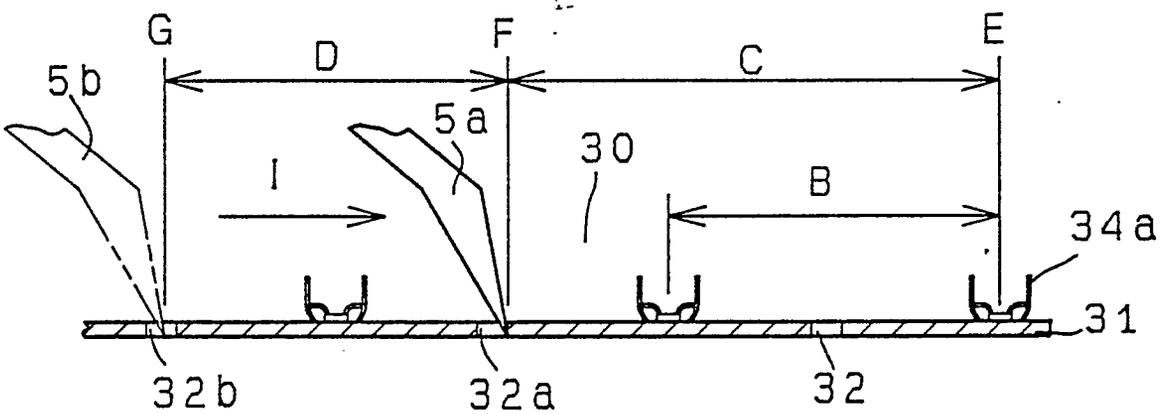


Fig. 4

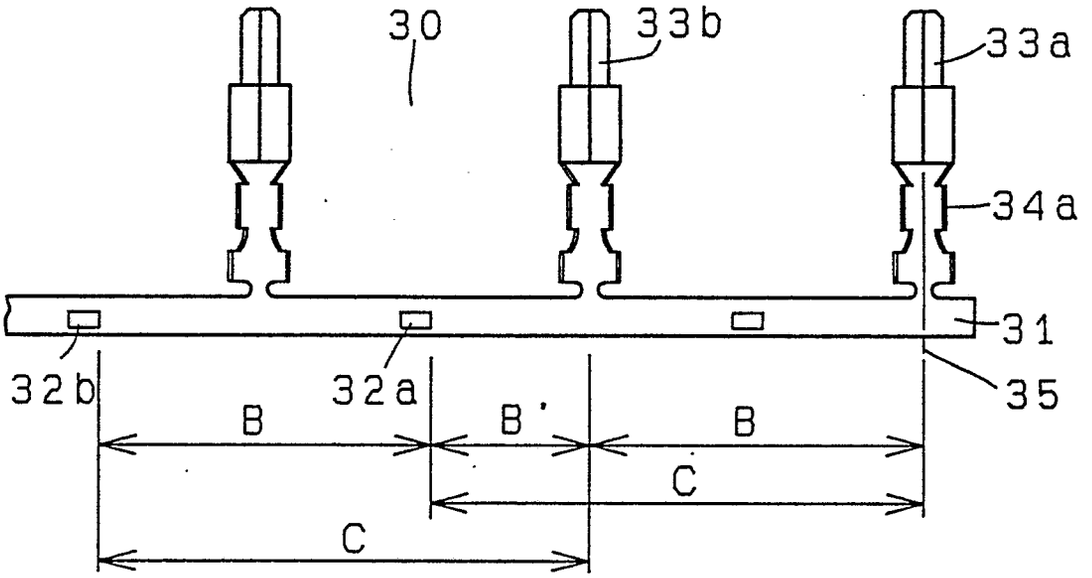


Fig. 5

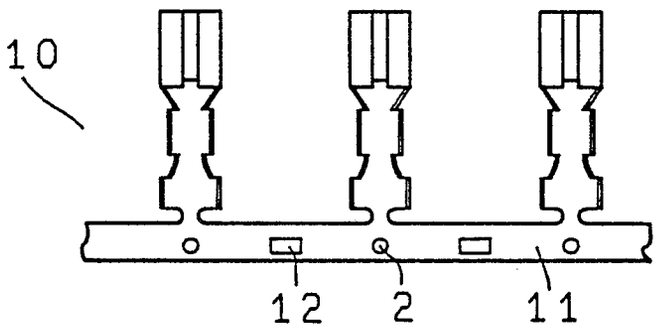


Fig. 6

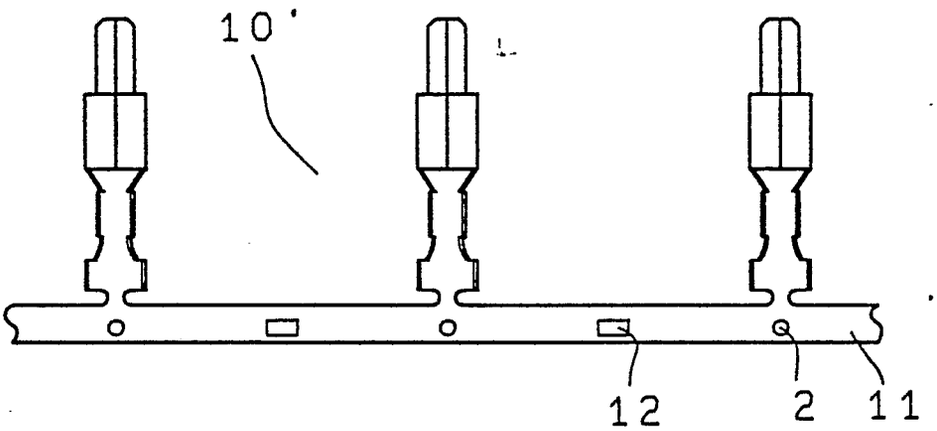


Fig. 7