Feb. 26, 1963

H. G. ALLEN

3,078,533

STAPLE

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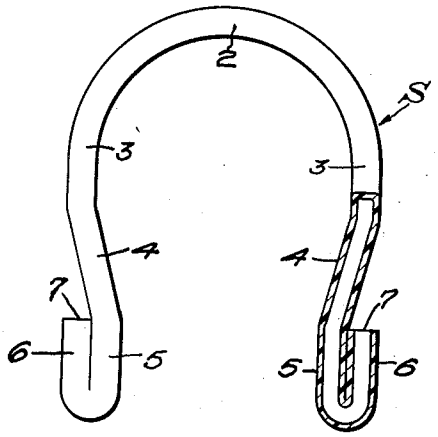


FIG. 1

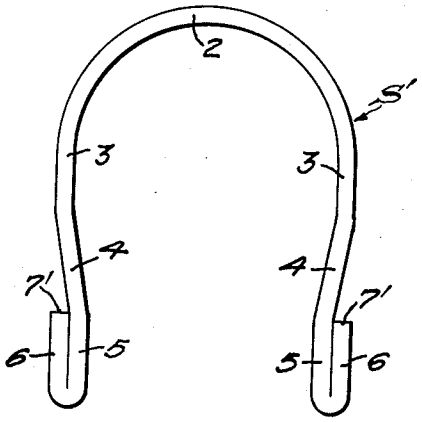


FIG. 2

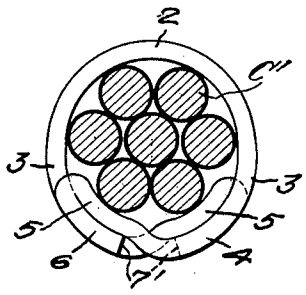


FIG. 4

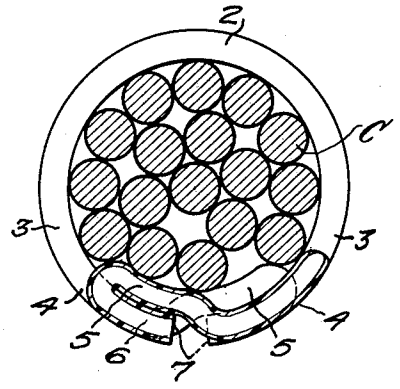


FIG. 3

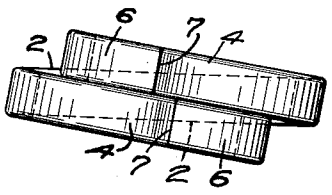


FIG. 5

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This invention relates to fastening devices and consists in a novel and improved type of staple adapted to be formed into a circular band or ring surrounding a plurality of electrical conductors to bind them together in a so-called harness; or for other uses such as gathering together the necks of bags and similar kinds of containers.

A particular object of the invention is to provide a staple of the type indicated having a smooth contour throughout all portions of its surface without the exposure of sharp edges or burrs at the raw ends of the severed length of wire or other material from which it is formed, liable to cause injury to the objects around which the staple is applied.

Another object is to provide a staple of the type indicated which may be formed in a machine to extend helically around a collection of insulated wires or other objects with the ends of its legs overlapping to effect a secure clinch so as to prevent expansion of the band and release of the objects enclosed thereby.

Another object is to provide a staple of the type indicated in which the metal portions thereof are coated or sheathed by a covering of polyethylene or suitable material to provide a dielectric shield for preventing contact of the metal parts of the staple with the electrical conductors bound together in a group at points therealong.

Another object is to provide a staple of the type indicated having its overall crown and terminal leg portions of uniform lateral dimensions to insure unrestricted sliding and accurate guiding of the staple in the throat or raceway of the machine in which the staple is formed into a band or ring for binding the parts together.

Another object is to provide a staple of the type indicated having the terminal portions of its legs bent around and folded upwardly alongside the lower vertical portions of the legs to prevent contact of the sharp edges on the raw ends of the wire or other material with the insulation on the multiple conductors to which it may be applied as a binder.

Another object is to provide a staple constructed from wire or other suitable strip material and coated on all parts with a covering of thermoplastic material such as nylon or the like to prevent the metal of the staple from chafing, rupturing or otherwise damaging the insulation on the conductors which it surrounds.

Further objects of the invention are set forth in the following specification which describes a preferred form of construction of the improved staple and one alternative form thereof, by way of example, as illustrated by the accompanying drawing. In the drawing:

FIG. 1 is an enlarged side view of the present improved staple shown with an insulating covering or coating thereon partly in section along a portion of one of its legs;

FIG. 2 is a similar view of the present improved staple shown as constructed from flat strip material without any insulating covering thereon;

FIG. 3 is a view of the coated staple illustrated in FIG. 1 shown as formed into a circular band enclosing a plurality of insulated electrical wires with its terminal portions in overlapping engagement to provide a clinch for securely holding it in place;

FIG. 4 shows the uncoated wire staple of FIG. 2 formed into a ring and applied as a binder for a lesser number of conductor elements; and

FIG. 5 is a side elevation of the formed staple shown

in FIG. 3 illustrating the arrangement of the reversely bent ends of its legs in overlapping clinched relationship.

It has been proposed previously in the instant art to form U-shaped staples into circular bands or rings for binding together various objects and articles; for example, to close the gathered necks of bags and other types of containers (U.S. Patent No. 1,963,306). It has also been proposed to use a U-shaped staple as a clip or binder for fastening strips of paper together and further for joining the crossing strands of nets and wire fencing or the like. Previously in the art, there has also been disclosed a U-shaped staple formed as a clip or holder for application to a folded newspaper to prevent it from opening or being damaged when thrown by the carrier in delivering it to a subscriber.

The staple of the present invention, however, has a broader industrial use in being adaptable for binding a plurality of electrical conductors together in a so-called harness after the withdrawal of one or more lengths of the individual wires to serve as leads to the terminals of various electrical appliances, instruments, and the like. In most instances several lead wires are drawn out from the harness at spaced locations therealong and a binder ring is applied at each point to enclose and combine the remaining wires of lesser number in the harness.

As illustrated in the drawing, the present improved staple S is generally of horseshoe-shape comprising an arched semicircular crown portion 2 with integral legs 3, 3 projecting vertically downward from the ends of the crown in straight parallel lengths 3, 3 and then inclined or bowed inwardly toward each other in further straight portions 4, 4. Beyond the inclined portions 4, 4 the legs are continued downwardly in parallel vertical portions 5,5 which are finally curved outwardly and folded upward to provide reversely-extending shorter terminal lengths 6, 6 displaced laterally in parallel relation to the vertical portions 5, 5. In other words, the terminal portions 6, 6 of the legs are turned upwardly in close association with the downwardly-extending vertical portions 5, 5, thus providing overlying lengths at the ends of the legs for disposing the sharp raw ends 7 of the wire or other material in the staple outwardly and remote from the inner contour of the legs so as to prevent their contact with the insulation on the conductors C such as shown in FIG. 3 of the present drawing.

This peculiar and novel form of the staple provides the essential features of the present invention as follows: First, the width of the staple at the ends of its legs is equal to its width at the sides of the crown 2 so that its lateral dimensions are uniform for insuring that the staple will slide freely in the throat of the machine in which it is applied to the work; secondly, the reversely-bent terminal portions 6, 6 of the lower lengths of the legs 5, 5 of the staple locate the raw ends of the wire or metal strip from which it is constructed remote from its portions that contact with the objects to which it is applied. In this way, any sharp edges or burrs that may exist on the raw ends of the severed length of wire are prevented from contact with and injury to the insulation on the conductors which the band encloses as a binder.

That is to say, when the staple is driven and formed around a plurality of insulated wires or electrical conductors C, C' such as shown in FIGS. 3 and 4, only its smooth rounded contours will make contact therewith so that any chance of abrading or rupturing the insulation is prevented to insure against shorting the electrical circuits in the conductors. Such precautionary measures are present even with the type of staple shown in FIG. 2 of the drawing, that is a staple of the present shape made from smooth surfaced wire or strip material without a coating or sheathing of insulating material because the raw ends of the metal at the ends of the legs of the

staple are prevented from contact with the insulation on the conductors. As a double precaution, however, the full extent of the metal wire or strip material forming the staple may be coated or otherwise sheathed with insulating material as shown in FIGS. 1 and 3 whereby to avoid any electrical contact should the insulation on the conductors themselves be ruptured at any point.

FIG. 4 of the drawing shows the plain or bare wire staple S' formed as a binder for a lesser number of conductors C' than shown in FIG. 3 and it will be observed therefrom that in any case the raw ends of the wire beyond the bends in the terminal portions 7', 7' of the legs of the staple are prevented from any contact with the conductors.

While the present improvement is concerned particularly with a staple adapted to be formed into a circular band or binder ring for use on electrical harnesses, it is to be understood that the present invention may have additional uses for binding together other objects or articles, for example, strands of cord and rope. As still another application, the present staple may be formed and used as a binder for the gathered necks of bags and like containers constructed of thin plastic or other fragile material where it provides the same advantages of preventing contact therewith liable to tear or rupture the material of the container.

The present improved type of staple may be formed and applied to any character of grouped articles or other objects in a machine having a raceway terminating in helical grooves which guide the legs of the staple to bend them around into overlying spiral relationship as shown in FIG. 5 of the drawing. Such a type of machine is shown in my application for patent Serial No. 766,911 filed October 13, 1958, now Patent 2,969,545.

While the present improved staple is herein shown and described in a preferred form of construction, with one

modification thereof, it is to be understood that further alterations may be made in its shape and structure without departing from the spirit or scope of the invention as defined in the accompanying claim. Therefore, without limiting myself in this respect, I claim:

A staple constructed from a single length of strip material and shaped with a circular crown portion continued in legs extending from the ends of said crown in the same plane therewith, said legs being inclined inwardly toward each other in straight lengths and then extending in opposite parallel lengths beyond their inclined portions, the terminal portions of said parallel lengths being bent rearwardly to extend in relatively short lengths lying parallel and in substantially abutting relation to said last-named straight lengths continued from the inclined lengths of said legs, said staple being accurately dimensioned across its width at the crown and terminals of its legs to exactly fit between the lateral walls of the guiding slot in a staple driving machine without canting therein, the distance between the outer sides of the rearwardly bent terminal portions of its legs being exactly equal to the distance across the width of said circular crown portion along the major chord of its arc.

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