May 13, 1952 C. C. COHN 2,596,888

ZIPPER AND METHOD OF PRODUCING THE SAME

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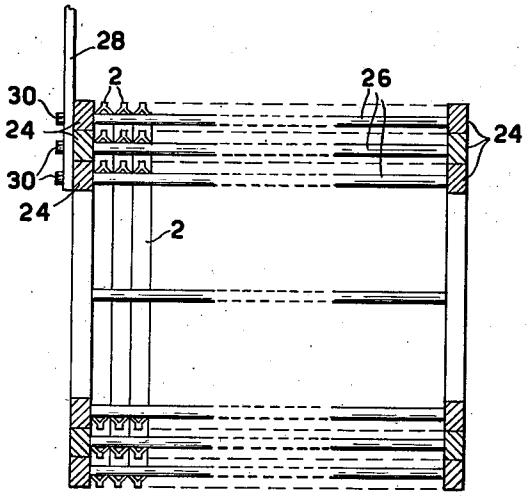



FIG. 1.

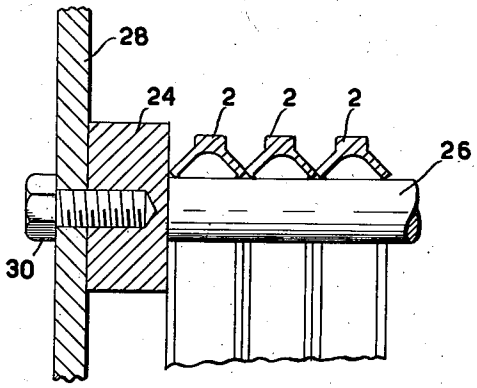



FIG. 2.

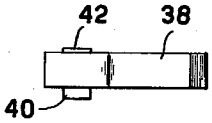



FIG. 5.

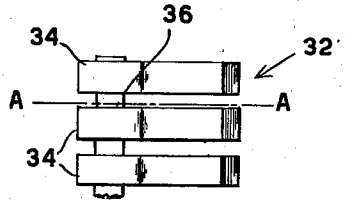



FIG. 4.




FIG. 3.




FIG. 6.

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## ZIPPER AND METHOD OF PRODUCING THE SAME

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2 Claims. (Cl. 29—148)

1

This invention relates to the production of zippers having their surfaces treated or coated to secure desirable appearance. The invention particularly relates to the surface coloring of aluminum zippers.

For many uses, particularly in clothing, the natural color of the metal from which zipper elements are formed is objectionable and, consequently, it has been generally customary to provide covering flaps for zippers to hide the elements from view. These flaps, however, are not always desirable and in many instances a better appearance of the product would result if the zipper elements, through exposed to view, were colored either to match the adjacent fabric or to contrast with it to provide ornamentation. Various methods of coloring or attempting to color elements have been used. For example, the exposed portions of zipper elements have been painted. When a garment having painted zippers is sold the appearance may be quite attractive; however, in use the paint very readily becomes dislodged and the irregular exposure of bare metal detracts greatly from the appearance of the garment. It has been recognized that a quite superior colored surface from the standpoint of resistance to wear could be produced if zipper elements were made of aluminum or its alloys and the exposed surfaces were oxide coated and then dyed. In particular, if this oxide coating was formed by anodizing the colored oxide coating, being extremely hard, would be quite resistant to wear. It may be here remarked that the wear on colored zippers does not occur, on the surfaces exposed to view, due to the sliding action of the opening and closing slide, but rather due to other contacts with the exposed zipper surfaces.

While the desirability of providing colored aluminum zippers of the type just mentioned has been recognized, serious difficulties are involved in securing these results in an inexpensive and commercially feasible fashion. It has, for example, been proposed that for anodizing aluminum zipper elements they might be clamped on tapes having woven or otherwise included therein electrically conductive wires engageable by the zipper elements. This, however, is impractical because for satisfactory anodizing quite heavy electrical currents are required to be passed through the zipper elements, and wires which would conduct these heavy currents to them would be required to be so heavy as to render the zippers objectionably stiff. For the electroplating of zippers, wherein the currents required are much smaller, this expedient has

2

been adopted, but even then is not fully satisfactory since it involves the use of special relatively expensive tapes and also the necessity for exercising considerable care in insuring proper electrical contacts during the plating process. Plating, of course, will produce only a limited range of metallic coatings and cannot be used for securing non-metallic coloring.

The production of oxide coatings on aluminum zipper elements while secured to a tape by chemical (non-electrolytic) action has also been impractical since the baths required, and heretofore known, have been of a type to discolor the material of the tape.

It has also been proposed to secure electrical conductivity to the zipper elements after they are secured to a conventional non-conducting tape by providing external contacts with the elements through the use of conductive screens or by the insurance of continuous contacts through a series of elements by zig-zagging the tapes and elements carried thereby to cause the adjacent elements to be brought into tight engagement with each other, the elements when the tape is stretched out being normally isolated from each other.

In accordance with the present invention the desired results are secured in a quite different fashion. Speaking specifically of anodizing followed by dyeing, the invention involves the provision of extruded or otherwise shaped aluminum or aluminum alloy wires of suitable cross-section which are anodized, or anodized and colored, and are then chopped or segmented to provide individual zipper elements. The anodized coatings formed on the wires adhere very strongly to the metal and are sufficiently elastic or extensible so as not to be broken or chipped away. While the segmenting of the formed wire exposes uncoated surfaces these surfaces, in accordance with the invention, are not perceptible in the finished closed zipper and, consequently, a quite uniform coating or coloring is presented to view.

While the invention is particularly applicable to the anodizing and dyeing of the anodized coating of aluminum or aluminum alloys it is not necessarily so limited but is applicable to the production of zippers of aluminum or its alloys which are painted or plated and is also adapted to zippers formed of other metals which are plated or painted. It will, therefore, be understood that while for simplicity the following decription is presented with primary reference to aluminum zippers which are oxide coated either chemically or by anodizing, and are thereafter

dyed, the principles involved are more broadly applicable.

The general object of the invention relating to the production of zippers in an improved fashion will be evident from the foregoing. Other objects relate to the improved product of the invention and to various details of manipulations and will become apparent from the following description read in conjunction with the accompanying drawings in which:

Figure 1 is a vertical axial section through an assembly of frames supporting formed wires for the production of zippers and particularly adapted to carry these in an anodizing procedure;

Figure 2 is an enlarged section illustrating a portion of one of the racks of Figure 1 with wires carried thereon;

Figure 3 is a perspective diagram illustrating the fashion in which zipper elements are produced from a formed wire and secured on a tape;

Figure 4 is a fragmentary elevation of a modified form of wire from which zipper elements may be produced;

Figure 5 is an elevation of a single zipper element cut from the wire illustrated in Figure 4; and

Figure 6 is a plan view of said element.

Preferably used as a part of the present invention is the type of machine for making zippers disclosed in the patents to Sundback 1,467,015, dated September 4, 1923, and 2,141,200, dated December 27, 1938, and in the patent to Lamb 1,817,990, dated August 11, 1931. Figure 3 of the present application is essentially the same as Figure 13 of Sundback Patent 2,141,200 and illustrates the formation of zipper elements from a formed wire **2** which is fed by means of feed rollers **4** and **6** to a chopping element **8** which forms therefrom zipper element blanks **10** which are finished by means of a die **12** and associated elements **14** and **16** to provide a final shaping of this blank to form a depression in one side thereof and a cooperating projection from the other side thereof. The zipper elements are then transferred to a tape **18** provided with beads **19** at its edge over which the zipper elements are clamped through the cooperation of a pair of pressing levers **22**, the final zipper element on the tape being as illustrated at **20**. The mechanism so far described forms per se no part of the present invention and has been referred to and illustrated merely for a clearer understanding of the invention. Reference may be made to the patents mentioned above for a further understanding of details of this mechanism. It may also be noted that this mechanism is merely illustrative of a type of mechanism which may be used since the invention may be carried out using other similar devices for cutting zipper elements from a formed wire and clamping them on supporting tapes.

Referring specifically to the use of aluminum or aluminum alloys for the formed wire **2** and the formation of an oxide coating thereon by anodizing, reference may be made to Figures 1 and 2 which illustrate the initial treatment of the formed wire **2**. Racks **24** are provided consisting of annular end rings **24** joined by axially extending rods **26**, these being formed of aluminum or aluminum alloy. As illustrated in Figure 1 a series of these racks may be provided of different diameters such that they may be nested in groups to permit the treatment of long lengths of the formed wires **2**. These racks may be quite long depending upon the dimensions of the anodizing tanks in which they are used. Each of the racks may have three or more rods **26** about which the wires **2** are helically wound as illustrated. The winding is desirably carried out to secure both a maximum amount of wire on the racks and also the best electrical contacts by winding the wires in such fashion that their leg portions are in contact, with the edges which become the ultimate points of the zippers engaging the rods **26**. A tight winding in this fashion will result in excellent and sufficient electrical conductivity throughout the entire assembly and will also result in the exposure to the electrolytic bath of all of those portions of the wires later in the final zipper become exposed to view. A group of the racks may be assembled by one or more conducting bars **28** through which bolts **30** are threaded into the end rings of the racks.

Assembly having been achieved as illustrated in Figure 1 two of these assemblies may be located in spaced relationship with each other in a conventional anodizing tank and alternating current passed between them through the electrolyte in which they are submerged to effect anodizing. Alternatively, of course, direct current anodizing may be used in which case the assembly is made the anode.

The anodizing may be carried out in conventional fashion and the anodizing procedure need not be described in detail. The electrolyte may, for example, comprise conventional solutions of sulphuric acid, oxalic acid, or mixtures of sulphuric acid and chromic acid, phosphoric acid, malonic acid, hydrofluosilicic acid, manganic acid, various sulfonic and sulphamic acids, potassium bisulfate or the like, which will produce coats of a porous type capable of absorbing dyes. As an example of the anodic treatment just indicated there may be cited anodic treatment in a conventional sulphuric acid electrolyte comprising, for example, a 10% sulphuric acid solution, the anodic treatment being carried out for twenty minutes at 15 volts A. C. at temperatures ranging from 70° F. to 90° F. With other electrolytes different conditions of times, temperatures, current densities, voltages, concentrations, etc. are usable as will be evident by reference to prior patents and publications in this art.

Instead of producing an aluminum oxide coating by anodizing a coating may be produced by chemical treatment utilizing one of the treatments known to produce a porous coating which will be capable of absorbing dye. Such coatings may be produced by treatments with mixtures of soda ash and sodium chromate, alone or in the presence of glycocoll or potassium permanganate, or by treatment of aluminum or aluminum alloy by a mixture of sodium oxalate and sodium aluminate or by an alkaline solution of an alkali ferricyanide. Since these treatments and their conditions of operation are known in the art it will not be necessary to give details thereof. Various other chemical treatments for producing oxide coatings are known but some of these produce coatings which are too impervious to accept substantial amounts of dye.

In the case of chemical treatment to produce aluminum oxide coatings it is, of course, not necessary to provide for the conduction of electric current to the wire to be coated. Accordingly, while there may be used a racking arrangement as indicated in Figures 1 and 2 and heretofore described, the chemical oxide coating may be

effected with the wire otherwise supported, or even with it running continuously through a bath at a sufficiently low rate to insure proper oxidation.

In any event the result of this first step of the procedure is the production of a formed wire of aluminum or aluminum alloy which carries an oxide coating capable of absorbing a dye.

Dyeing of the wire coating may then be carried out in any conventional fashion to secure the desired color on the wire. As is well known a wide variety of dyes may be used and in the example of the practice of the invention now being given it is immaterial whether or not the dyes used will or will not dye cotton.

Following the dyeing the dye is preferably sealed, after rinsing, the sealing insuring both permanence of the dyeing and also resistance of the coating to the absorption of other dye if exposure to another dye should be provided later. The sealing may be carried out in any of the usual fashions known to the art. For example, merely by treatment with hot water or by treatment with nickel acetate, sodium aluminate, alkali silicates or the like.

The coated and colored wire is now in condition for the production of a zipper and may be handled as illustrated in Figure 3 and described above, the zipper elements being sheared therefrom and clamped upon a tape previously dyed in the desired color. A finished zipper will thus be secured.

In the shearing operation in accordance with Figure 3 the sheared faces of the zipper elements will, of course, be uncoated. However, the coatings on the side surfaces will not be disturbed, at any rate to such a degree as will destroy the continuity of appearance of the color. Specifically, the coating is sufficiently pliable and elastic as not to be damaged by the pressure applied by levers **22**. The result is that when the zipper is closed in the garment there will be presented to view only the colored surfaces of the zipper elements with, at most, a quite unnoticeable exposure of uncoated metal surfaces of the projections from the zipper elements which produce their interlocking.

Before discussing variations in procedure there may be referred to the improved type of wire illustrated in Figures 4, 5 and 6. In this case the wire illustrated generally at **32** which is originally substantially in the extruded form previously indicated is partly segmented to provide zipper element blanks **34** joined by junction portions **36** which have cross sectional areas corresponding substantially to the cross sectional areas and positions of the projections which will ultimately provide for interlocking of the zipper elements. The wire **32** thus provided may be coated, dyed and sealed in the fashion described above; in this case, however, there being exposed for coating all of the exposed areas of the wire including substantial transverse areas of the zipper element blank as well as the exposed areas of the junction portion **36**. When this wire is fed as illustrated in Figure 3 with the feeding means properly toothed to index the position of the wire, transverse severance by the knife element **8** may be caused to take place along the plane indicated at A—A in Figure 4, i. e., as illustrated, close to but slightly above the upper surface of the zipper element blanks. A severed zipper element is illustrated in Figure 5, this element **38** having projecting therefrom a lower projection **40** and a slightly protruding upper projection **42**. As will be evident from the treatment referred to the only uncoated portions of this zipper element are the transverse ends of the two projections. This element when treated in the mechanism illustrated in Figure 3 will have the slight projection **42** pressed downwardly to form a recess while the projection **40** may be slightly deformed to produce the interlocking projection of the zipper element. In this later treatment some disturbance of the coating on this projection may take place but to a considerable extent the coating will remain so that in the finished closed zipper there will be a minimum of uncoated metal exposed to view. The transverse faces of the zipper element have their coatings undisturbed so that any exposure of metal at these surfaces is avoided.

In accordance with what has been disclosed above a continuous formed wire, either unsegmented as illustrated in Figures 1, 2, 3, or partially segmented as illustrated in Figure 4, has been oxide coated and dyed to provide pre-dyed zipper elements for securing to a supporting tape. Numerous variations of this procedure, however, will now be evident, for example, the attachment of the zipper elements to a tape prior to dyeing, i. e., the oxide coated wire may be used to form oxide coated zipper elements which are then attached to a dyed or undyed tape. Assuming that the tape is undyed there may be effected dyeing of the zipper elements and the tape in one operation by the use of dyes which will simultaneously color the oxide coatings and dye the cotton tapes. As examples of such dyes there may be mentioned chlorantine fast blue GLM, chlorantine fast yellow B, chloramine sky blue A, Congo red, and diamine orange BA.

Alternatively, if the zipper elements are secured to a tape which has been previously dyed and which is not to be dyed by the dye applied to the secured zipper elements there may be used dyes which will color the oxide coating but which will not dye cotton tape. Among such dyes there may be cited cloth fast blue GN, croceine scarlet MOO, comacid fast red B, chrome fast blue GR, chromate brown A, and chromaven green G. Numerous other dyes in both classes mentioned above will be apparent to those skilled in the art.

Still another alternative would involve the treatment of a dyed tape in one of the many well known fashions to prevent absorptions of dyes which would normally dye the tape, whereupon the tape with the zipper elements secured thereto could be immersed in a bath of dye which will dye the zipper elements without dyeing the tape even though the dye is of a type which would dye untreated tape.

Still another alternative is to secure dyed and sealed zipper elements to an undyed tape with later dyeing of the tape, the zipper elements then failing to absorb the last dye due to the fact that they are sealed. Still other variations of the procedure will be apparent to those skilled in the art to result in the dyeing of the tape and the zipper elements in the same or contrasting colors.

The invention further makes possible the provision of zippers in which the elements are metallically plated. To attain this end the procedure may be carried out to plate the wire in any conventional fashion while supported for electrical connection on a frame such as that illustrated in Figure 1. The formed wires under these conditions, which may be of the type illustrated in Figure 1 or of the type illustrated

in Figure 4, may be formed of aluminum or its alloys or of some other suitable metal. Here again the result is to produce a product in which the visible coating is undisturbed in the procedure of securing the zipper elements to the tape. In the case of plating, which may be generally carried out more rapidly than the production of oxide coatings, the wires may be run continuously through the bath to effect progressive plating. The same may be done in the formation of oxide coating anodically but this is generally not commercially practical because of the long period of immersion required involving quite slow progress of the wires through the bath, and hence either baths of very considerable volume must be used or very small production rate of the coated wire is attained.

It will also be clear from the foregoing that the coloring of the wire prior to the formation of the zipper elements therefrom may be effected by painting or lacquering. In the case of the use of aluminum or its alloys it is desirable to provide an oxide coating as a paint base to secure good adherence of the paint or lacquer. Accordingly, anodizing or oxide coating may be carried out as heretofore described but there may, in this instance, be used a wider variety of coating procedures since it will not be necessary that the coating should be porous; for example, chromic acid anodizing may in this case be used as well as a wide variety of chemical oxidizing procedures unsuitable when dyeing is to be effected.

In all of the foregoing the essence of the invention is the production on a wire, prior to formation of zipper elements therefrom, of a coating in either a preliminary or finished condition. While the invention is thus of very broad applicability, it will be evident that it is particularly applicable to the anodizing and dyeing of aluminum or aluminum alloy zippers.

What I claim and desire to protect by Letters Patent is:



1. The method of producing coated metallic zippers comprising providing a wire having portions of a cross-section approximating that of a final zipper element connected by portions of less cross-sectional area, electrolytically coating said wire, severing zipper element blanks from said wire by cuts through the last mentioned portions thereof, forming said blanks into zipper elements each of which has a projection from one face thereof and a socket in the other face thereof, and securing said elements on a carrier, said portions of the wire of less cross-sectional area corresponding in position and cross-sectional area to the areas of the elements at which said projections and sockets are formed.

2. A wire having an electrolytically coated surface and adapted to be transversely severed to provide zipper elements each of which has a projection from one face thereof and a socket in the other face thereof, said wire having portions providing spaced legs and of a cross-section approximating that of the final zipper element connected by portions of less cross-sectional area, the wire being slotted to separate the legs of adjacent first mentioned portions, said portions of the wire of less cross-sectional area corresponding in position and cross-sectional area to the areas of the elements at which said projections and sockets are to be formed.

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