Nov. 9, 1943. H. A. HAMM 2,334,000

COLOR TREATMENT OF SLIDE FASTENERS

Filed Dec. 13, 1939 2 Sheets-Sheet 1

Fig. 1.

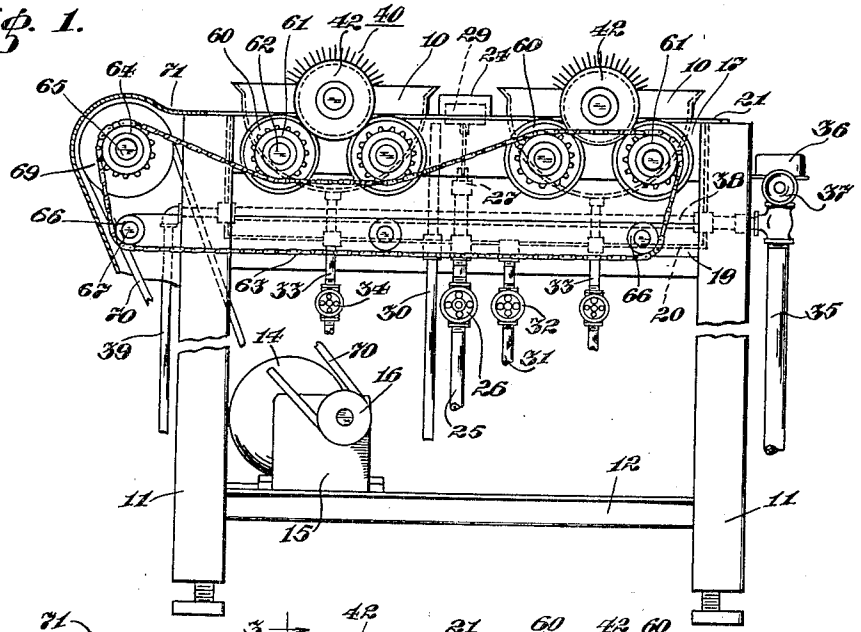
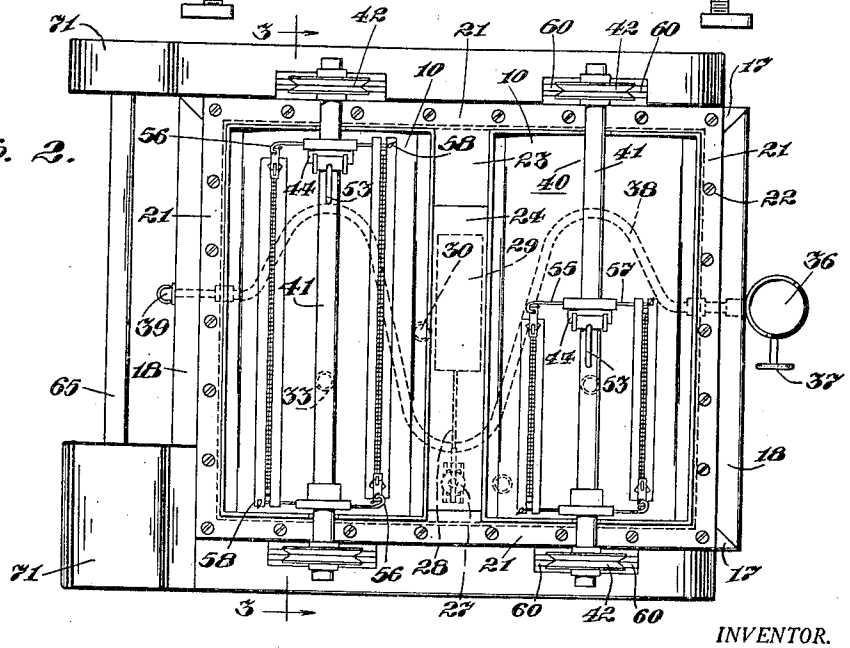


Fig. 2.



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Filed Dec. 13, 1939 2 Sheets-Sheet 2

Fig. 3.

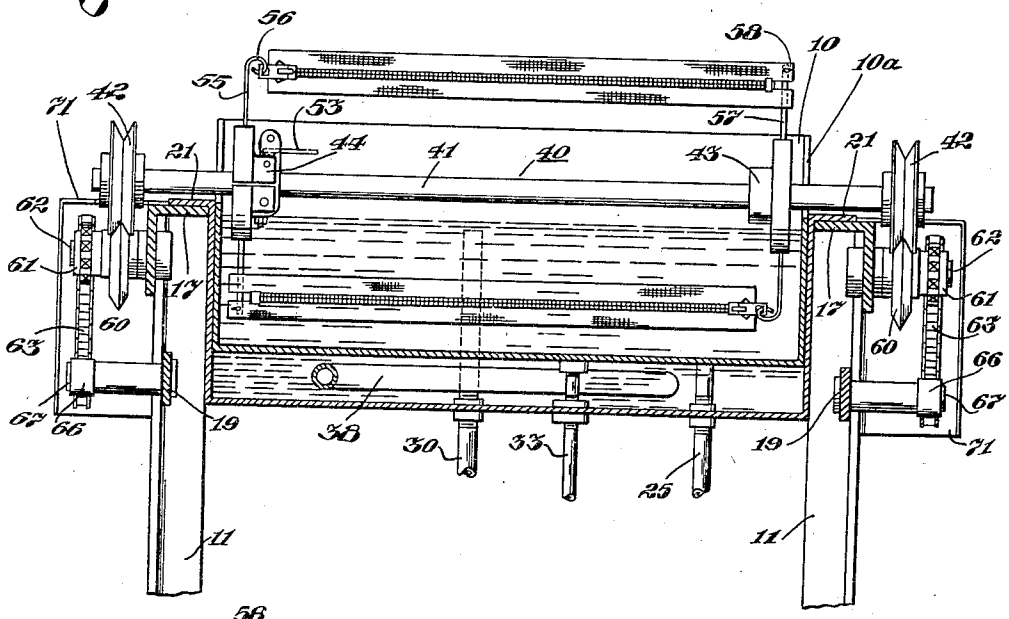


Fig. 4.

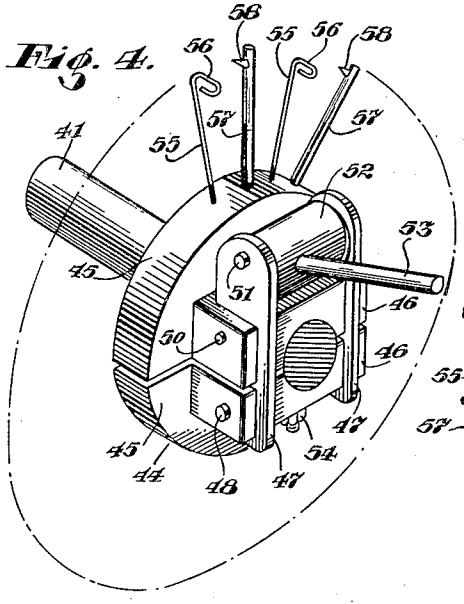
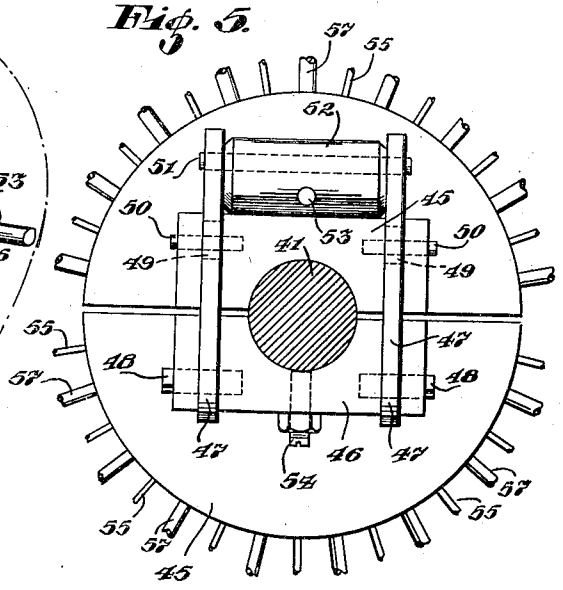


Fig. 5.



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2,334,000

COLOR TREATMENT OF SLIDE FASTENERS

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Application December 13, 1939, Serial No. 309,011

1 Claim. (Cl. 8—15)

This invention relates to slide fasteners and, in particular, to the color treatment thereof.

It is an object of this invention to provide a new and improved method for color treatment of slide fasteners, and particularly enameled slide fasteners wherein the enameled slide fastener components may be colored or re-colored simultaneously with dyeing of the textile or other stringer tapes thereof, either in matching colors or in differing, contrasting colors or wherein either the components or stringer tapes may be independently dyed or colored.

It is a further object of this invention to provide new and improved apparatus for carrying out the above processes conveniently, economically and expeditiously.

It is an object of this invention to provide in such apparatus removable slide fastener supporting means adapted resiliently to support slide fasteners under desired tension, and removable as a unit for insertion in ovens or other drying means for drying slide fasteners supported thereon during dyeing.

It is a further object of this invention to provide such slide fastener supporting means which is readily and conveniently adjustable for supporting fasteners of different lengths and which is provided with slide fastener supporting members which are readily and conveniently attachable and detachable with respect to slide fasteners to be dyed and dried thereon.

It is a further object of this invention to provide such slide fastener coloring apparatus which is equipped with means for securing the ultimate flexibility of control during dyeing operations.

These and other objects and advantages of the invention will appear from the following description taken in conjunction with the accompanying drawings which form a part thereof, and will be pointed out in the appended claim.

In the drawings:

Fig. 1 is a fragmentary side elevation of slide fastener color treating apparatus embodying the principles of this invention, with parts of the structure broken away in the interest of clearness;

Fig. 2 is a plan view of the structure shown in Fig. 1 with certain parts omitted in the interest of clearness;

Fig. 3 is a section taken substantially on the line 3—3 of Fig. 2 and with portions of the fastener supporting apparatus omitted in the interest of clearness;

Fig. 4 is an enlarged fragmentary detail, in perspective, of structure shown in Figs. 1, 2 and 3; and

Fig. 5 is a fragmentary end view of the structure shown in Fig. 4.

Slide fasteners comprise complementary textile tapes provided with components formed either of metal or non-metallic plastic material. The components include the interengaging or interlocking fastener members which are secured to the tape edges in spaced rows, the top and bottom stops secured to the tape edges at the respective ends of the rows of fastener members, and the slider which is longitudinally slidable with respect to the rows of fastener members, between the top and bottom stops, for engaging and disengaging the fastener members to close and to open the slide fastener.

Where the fastener components are non-metallic plastic material, it is customary, in order to obtain a fastener of given color, to dye the textile stringer tapes prior to the attachment of the non-metallic plastic components which are fashioned from plastic material of the desired color. I have discovered, however, that it is possible, by utilizing the principles of this invention, concurrently to dye the components and tapes of plastic fasteners of light color or shade to darker colors or shades subsequent to their manufacture.

Where the fastener components are of metal, the desired color therein may be secured by application of enamel of the desired color to the forward surfaces of the components. Formerly, the stringer tapes were dyed to the desired color prior to the attachment of the metallic components and the enamel coating of desired color was applied thereafter. This practice was subject to certain objections, because of the necessity for carrying in stock colored tapes in a large number of colors and the necessity also for carrying in stock a single enamel for each color and shade desired in the finished fastener. I have discovered, however, that, by utilizing the principles of this invention, the necessity for carrying such varied colors in tapes and enamels is obviated by forming fasteners with white tapes and white enameled forward surfaces, or other colors in light shades, and thereafter dyeing them, concurrently, to the same or contrasting desired colors by the use of a dye bath containing a dye component producing the desired color in the tape and also a component producing the desired color in the enamel on the forward surfaces. I have discovered that the depth of color both in the tape and in the enamel may be varied within an appreciable range by variation of time and

temperature in the dyeing operation. I have likewise discovered that it is possible to re-dye an enameled fastener of a given color to secure a darker shade of that color or to secure a variation in the color or color depth.

It is also possible, according to the principles of this invention, to dye colored enameled fasteners of dark shades to black or other extremely dark colors by first bleaching the enamel on the metal components by the use of heat and thereafter re-dyeing both the enameled surfaces and the textile stringer tapes by immersion in a heated bath containing dye components operative both upon the enamel and the textile stringers.

Where the fastener components are formed of an aluminum alloy, it is possible, by electrolytic processes, anodically to treat the metallic surfaces and render them susceptible to dyeing. By the principles of this invention, I may secure the desired color in such fasteners by subjecting the fastener to immersion in a dye bath containing dye components adapted to produce the desired color or colors in the textile stringer tapes and anodized surfaces respectively.

Likewise, as will be readily understood, the principles of this invention are applicable to the dyeing or color treatment of such fasteners which are previously subjected to anodic surface treatment.

A preferred form of structure illustrative of the principles of this invention is shown in Figs. 1, 2 and 3.

In the structure shown in Figs. 1, 2 and 3, the dye vats 10 are of substantially semi-cylindrical form and are rigidly secured to a stationary frame having extensibly adjustble legs 11 and a motor supporting table 12, upon which is supported suitable drive motor means 14. Associated with this drive motor means is a variable speed transmission 15 with output pulley 16. The upper ends of the legs 11 are secured together by longitudinal rails 17 of angle form and also by similar transverse rails 18, as shown in Fig. 2. Also secured between each pair of legs 11 below and in parallelism with the longitudinal angle rails 17 are the longitudinal idler sprocket supporting rails 19.

Disposed within the angle rails 17 and 18 is a substantially rectangular tank 20 having a substantially horizontal marginal flange 21 which is secured to the horizontal upper surfaces of the rails 17 and 18 by bolts 22 or other suitable means. A transverse plate member 23 is provided at the intermediate portion of the tank 20 and has the ends thereof secured to the longitudinal flanges 21 joined thereby in suitable manner. The plate member 24 is provided with an intermediate upraised portion 24 forming a float housing for accommodating the float member 29 hereinafter more clearly described.

The dye vat members 10 are closely fitted into the apertures provided at the opposite sides of the plate member 23 in such manner that the lower surfaces of the vat members 10 and the inner surfaces of the tank 20 form a water jacket, as is clearly shown in Figs. 1 and 3.

In order to supply water into the jacket formed between the walls of the vats 10 and the tank 20, the water supply pipe 25, having a manual valve 26, leads upwardly into the space intermediate the vats 10 and terminates in a float controlled valve 27 having a float arm 28 with a float member 29 secured to the end thereof and disposed within the above-described float housing formed by the upraised portion 24 of the plate member 23. This float valve 27 maintains a uniform supply of water in the water jacket, because the valve 27 opens automatically upon depression of the float 29, as will be readily understood.

Associated with this water supply pipe 25 is an overflow pipe 30 extending downwardly from the upper portion of the water jacket space and spaced closely adjacent the operative zone of the float 29. As will be readily understood, the supply pipe 25 and overflow pipe 30 maintain a constant volume of water within the water jacket. In order that the water jacket space may be drained, when desired, the water drain pipe 31 provided with a manual valve 32 leads downwardly from the lower wall of the tank 20. If it is desired to drain the water jacket space, it is merely necessary to close the valve 26 and open the valve 32 in order to effect this drainage.

In order that the vats 10 may be drained, a vat drain pipe 33 is provided for each vat 10 and communicates from the bottom wall thereof through the water jacket space to the exterior. Each vat drain pipe 33 is provided with a manual valve 34 which may be opened, when desired, to effect drainage of the vat 10 controlled thereby. The dye vats 10 are filled from the top and the valves 34 are normally closed. When a dyeing operation is finished and it is desired to empty a dye vat 10, it is merely necessary to open the appropriate manual valve 34 in order that the vat may be drained.

In order that the water in the water jacket space may be heated for heating the dye in vats 10, a steam supply pipe 35 having a thermostatic control valve 36 with manual control 37, connects with a heating coil 38 which is of undulated or serpentine form, which extends from end to end of the water jacket space, and which leads from the steam supply pipe 35 to the steam return pipe 39 leading from the opposite end of the water jacket space, as shown in Figs. 1 and 2.

From the above description, it will be readily understood that dye solution may be placed in one or more of the vats 10 and thereafter brought to and maintained at predetermined temperature for desired periods of time by proper adjustment of the thermostatic valve 36 which, by controlling the steam supply to the heating coil 38, controls the temperature of the water in the water jacket. In the dye bath which is thus heated and maintained at predetermined temperature, the fasteners are intermittently immersed and traversed at desired speeds by mechanisms hereinafter described, the fastener members being supported under desired tension upon removably supported rotors generally designated 40 as shown in Figs. 2 and 3.

Each rotor 40 comprises a shaft 41 disposed in the slots 10a in the end walls of a vat 10 having drive pulleys 42 fixed to opposite ends thereof and having secured thereon, between drive pulleys 42, a fixed spider 43 and an axially adjustable spider assembly 44. The fixed spider 43 is of annular form and is provided with a plurality of yieldable, radial fastener supports, 55, 57 hereinafter described, which are alternately of different form.

The spider assembly 44 comprises a pair of semi-annular hub members 45 having substantially rectangular bosses 46 extending axially therefrom, inwardly of the shaft 41. The bosses 46 are provided with complementary pairs of axially extending slots adapted to receive a pair of parallel plate members 47. At one end each plate member 47 is provided with a circular aperture,

through which extends a hinge pin 48 supported in complementary bores provided in the lower boss member 46. Intermediate their ends, the plate members 47 are provided with elongated apertures 49 through each of which extends slidably a pin 50 similar to the pins 48 and supported in like manner in bores provided in the upper boss 46. The bosses 46, which are integral with the hubs 45, are thus movably connected together by the plates 47. At their upper ends, each plate member 47 is provided with a circular aperture for receiving the cross pin 51 which extends between the plate members 47, as shown in Fig. 5. Pivotally supported on this cross pin 51 between the plate members 47 is the eccentric cylindrical cam member 52 which is provided with a manually engageable handle member 53.

By manual adjustment of the cam member 52, the bosses 46 and integral hubs 45 may be releasably clamped together against the shaft 41, as will be readily understood. Likewise, by manual engagement of the handle 53, the cam member 52 may be rotatably adjusted to release the bosses 46 and hubs 45 from the shaft 41 and permit axial adjustment of the spider assembly 44 upon the shaft 41 for varying the distance between the spider assembly 44 and the fixed spider 43. In order to inhibit relative rotation between the spider assembly 44 and the shaft 41, an adjustable stud 54 extends from the lower side of the lower block 46 to the shaft bearing aperture. This stud may be adjusted to increase friction and prevent accidental slippage between the shaft 41 and the spider assembly 44, and the end of the stud 54 may, of course, be provided with a sharpened or roughened surface, if desired. The hub members 45 of the spider assembly 44 are provided with yieldable radial fastener supports 56, 57 similar to the corresponding members on the fixed spider 43 and similarly arranged thereon.

As shown in Figs. 4 and 5, each alternate fastener support 55 is formed of resilient material, preferably of wire-like form and provided at its outer end with a hook member 56, particularly adapted to extend through the aperture in the slider pull of a slide fastener, as shown in Figs. 2 and 3. The other fastener supports 57, each of which is disposed between a pair of fastener supports 55, is thicker and relatively more rigid than are the fastener supports 55 and, instead of being provided at their outer ends with a loop or hook, such as 56, are provided with relatively sharp-pointed pin members 58 adapted to penetrate the textile fastener tape end portion adjacent the bottom stop of the slide fastener, as also shown in Figs. 2 and 3.

Rotation is imparted to the rotors 40 in the following manner. Each drive pulley 42 which is of the V-type is supported on and between two crown pulleys or friction wheels 60. Each pulley 60 has rigidly secured thereto a sprocket 61. The crown pulleys, which function as friction wheels, and their attached sprockets 61 are each supported upon similar pintle members 62 secured to the longitudinal angle rails 17, as shown in Figs. 1 and 3. Drive connection between the respective crown pulleys 60 and their attached sprockets 61 is secured by means of chains 63 drivingly engaging the teeth of the sprockets 60 and taking power from main sprockets 64 which are rigidly secured to the ends of the drive shaft 65. The drive shaft 65 is rotatably supported in suitable bearings provided at one end of the frame, the details of which bearings are not shown. Each chain 63 passes also over a plurality of idler pulleys or sprockets 66 each rotatably supported by one of the similar pintle members 67 secured to the above-described longitudinal idler sprocket supporting rails 19, as shown in Figs. 1 and 3. The drive shaft 65 has the drive pulley 69 fixed thereto, which is operatively connected by the belt 70 with the output pulley 16 of the varia-speed transmission 15 which is driven by the drive motor means 14 on the motor supporting table 12 of the stationary frame.

In order to protect the operators from contact with the chains 63, box-like chain guards 71 are provided which substantially enclose the drive mechanism at each side of the frame, as shown in Figs. 1, 2 and 3. Suitable apertures are provided in the chain guards 71 between crown pulleys 60 to permit the drive pulleys 42 of the shaft 41 to project downwardly into contact with the drive pulleys 60.

From the above description, it will readily appear that the friction drive arrangement for the rotors 40 permits of their ready removal with attached fasteners, as well as their ready attachment to the machine. Because of this feature, the rotor 40 and attached fasteners may be handled as a unit.

In order to perform a dyeing operation, one or more vats 10 is filled to suitable depth with dye solution, either of simple formula adapted to dye either the textile tapes or the fastener components alone, or of compound type having dye components operative concurrently upon both the textile stringer tapes and the fastener components. The water in the water jacket is then brought to the temperature necessary to secure the desired temperature in the dye solution in the vat or vats 10. The desired temperature is thereafter maintained by suitable adjustment of the thermostatic valve 36 which controls the supply of steam to the heating coil 38 in the water jacket.

Fasteners are then mounted upon the rotor which is to be used by first hooking one stringer tape end portion over a pin 58 and then hooking the fastener pull into the hook 56 of a member 55 at the opposite end of the rotor, as shown in Figs. 2 and 3. It is, of course, to be understood that prior rough adjustment of the axially adjustable spider assembly 44 may be made to accommodate fasteners of a given length. The fasteners which are resiliently supported upon the rotor 40 are then subjected to intermittent immersion and traverse through the heated dye solution or bath by placing the loaded rotor 40 in operative position and starting the motor means 14 to drive the rotor through the variable speed transmission 15, belt 70, pulleys 69, shafts 65, chain 63, sprocket 61 and pulleys or friction wheels 60 at the desired speed. This operation is continued for a predetermined time in order to secure the desired depth of color in the fastener stringer tapes, fastener components or both. Where the dyeing operations are carried out in a plurality of vats at the same time, it is not necessary to stop the motor means in order to remove a loaded rotor 40 upon completion of dyeing of the fasteners thereon, but the shaft 41 may be grasped and removed upwardly from operative position by one or more operators.

It will, of course, be understood that a plurality of pairs of spiders 43 and 44 may be mounted upon a single shaft 40 in order that fasteners of different length may be dyed simultaneously, or concurrently, in the same enclosing dye vat 10. It will likewise be understood that the angle of

incidence of the fastener, in entering the dye in a vat 10, may be varied by securing the lower stringer tape end to the prong 58 of a member 57 which is spaced radially from the member 55 to the hook 56 of which the pull of the slider is attached.

By maintaining the fastener stretched at predetermined tension during the dyeing and ensuing drying operations, the relationship between the adjacent interlocking fastener members of the fastener is maintained constant and the necessity for pressing is avoided. Likewise, abrasion or other damage of enameled surfaces of the fastener is totally avoided according to my invention by supporting the fastener in such manner that these surfaces are prevented from contacting such surfaces of other fasteners or any other surfaces whatsoever during the dyeing and drying operations.

After removal of the rotor having dyed fasteners supported thereon, the rotor and fasteners may be placed, as a unit, in suitable drying means such as an oven, and the fasteners dried under tension which obviates the necessity, thereafter, for pressing of the fastener tapes. This drying under tension also prevents shrinkage of the fastener stringer tapes.

From the above description, which is, of course, merely illustrative of the principles of my invention, it will be readily understood that I have provided apparatus and methods for dyeing and drying fully manufactured slide fasteners with the utmost convenience and economy and with the resulting advantages set forth in detail above.

It is, of course, to be understood that the above described structure is merely illustrative and in nowise limiting and that I desire to comprehend within my invention all modifications included within the scope of the appended claim.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

In a method of coloring assembled slide fasteners comprising textile stringer tapes and rows of closely and accurately spaced fastener elements having surface portions, at least, formed of non-metallic plastic material; supporting said stringer tapes with said attached elements under tension, subjecting said fasteners while under said tension to immersion and agitation in a dye bath containing dye components effective upon the textile and plastic materials respectively, thereafter removing said fasteners from said dye bath, and drying said fasteners while maintaining the fasteners stretched under tension to preserve the accuracy of spacing of said attached elements.

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