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McKenna

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[54] METHOD OF PROTECTIVELY CAPPING AND BONDING THREAD PORTIONS SECURING A BUTTON TO A GARMENT

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[52] **U.S. Cl.** **156/93,** 2/265, 24/90, 112/265, 161/48, 161/52

[51] **Int. Cl.** **B32b 7/08,** B32b 3/06, D05b 3/12

[58] **Field of Search** ..... 161/48, 50, 51–52; 156/91, 93; 2/265; 112/265, 262; 24/56, 90 R, 90.2, 113, 90 HA, 90 TA, 113 MP, 90 C

[56] **References Cited**

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1,388,833	8/1921	Harlem	161/50 X
2,189,067	2/1940	Hlavaty	24/90 HA
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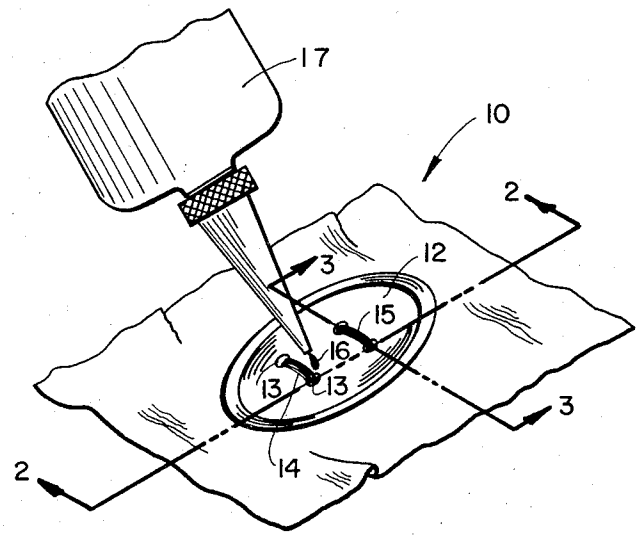
Primary Examiner—Philip Dier

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[57] **ABSTRACT**

Threads extend through apertures of a button and into a fabric to secure the button onto the fabric. A protective abrasion-resistant cap is formed over the thread portions which cross the face of the button by applying a selected bonding agent to the thread portions. Some of the bonding agent penetrates into the threads and bonds the threads together. The remainder of the bonding agent hardens around the thread portions forming a protective cap. The bonding agent is selected such that it will penetrate the threads only to desired degree leaving some of the bonding agent to form the protective cap and limiting the region of thread penetration such that the flexibility of the button mounting is preserved.

11 Claims, 4 Drawing Figures



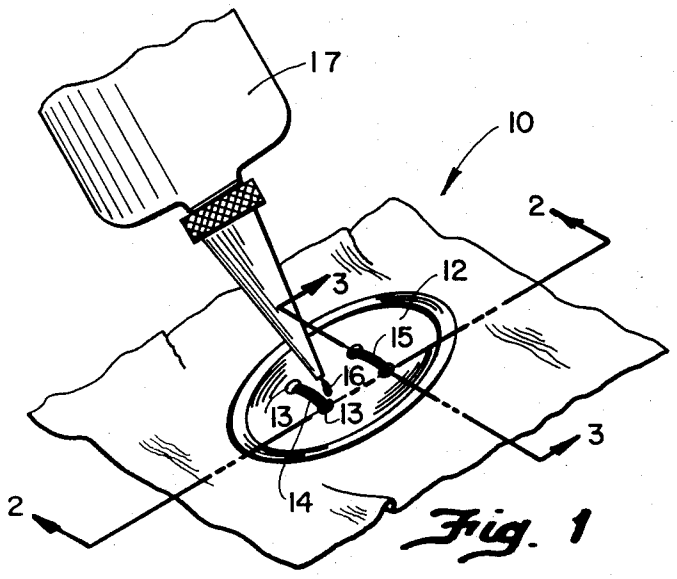


Fig. 1

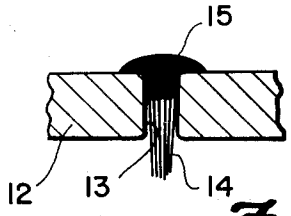


Fig. 4

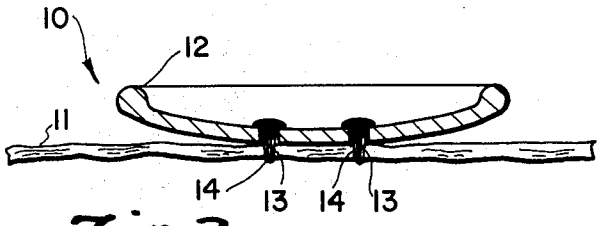


Fig. 2

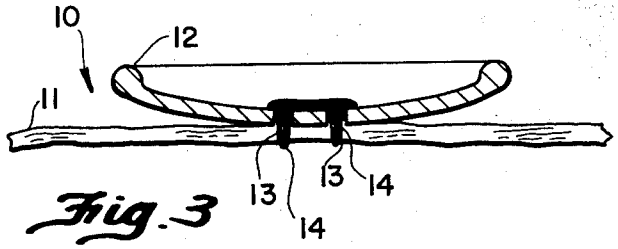


Fig. 3

METHOD OF PROTECTIVELY CAPPING AND BONDING THREAD PORTIONS SECURING A BUTTON TO A GARMENT

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a method for prolonging the service life of threads securing a button to a garment, and to garments having buttons secured thereon by threads protected in such a way as to prolong their service life.

2. Prior Art

A number of proposals have been made to overcome the problem of buttons falling off garments due to thread breakage. Proposals involving the use of relatively expensive abrasion resistant threads and thread subsitutes have gained some acceptance, but frequently provide a more rigid button mounting than is desirable.

U.S. Pat. No. 2,189,067 proposes the use of cement to facilitate holding buttons in place on a garment. This proposal involves coating the thread immediately prior to sewing with a liquid cement. A button is then sewed on with the coated thread before the cement dries. This procedure is described in the referenced patent as providing a resulting product wherein the threads are cemented together, the threads are cemented to the fabric, the layers of fabric are cemented together (where more than one layer is used), the threads are cemented to the button, and the button is cemented to the fabric. In short, all the elements are cemented together such that a relatively rigid button mounting is provided.

The proposal of the referenced patent has enjoyed little, if any, commercial acceptance by the garment industry. One reason for its lack of acceptance is the substantial number of problems attendant its use with present-day sewing machinery. Another reason is that the resulting product has undesirable features.

For such a proposal to be incorporated in a manufacturing process, a cement application system must be added to the sewing machines, and the sewing machines redesigned to accomodate and overcome the problems of cement build-up on the sewing machine components. Most present-day sewing machines, it will be appreciated, are delicate precision apparatuses and are not designed to feed wet cement-coated threads.

Still another difficulty arises in adapting the proposal of the referenced patent to manufacturing use. Most present-day sewing machines operate at relatively high speeds, e.g. 1500–1700 needle strokes per minute. This high speed operation would likely shake much of the cement off the thread an onto the sewing machine. Accordingly, production speed is slowed both in effort to keep the required quantity of cement on the thread and to keep the equipment free of buildups of drying cement.

Moreover, such a proposal, even if successfully adopted by the garment industry, would result in a product having undesirable qualities. When the cement hardens around the thread portions extending between the button and the garment, these thread portions lose their flexibility and the button mounting is rendered stiff. If the button becomes adhered to the fabric as suggested in the referenced patent, the button will not readily accommodate thick fabrics and the size of button hole required to accommodate the button will be increased.

Problems are likewise encountered in adapting the proposal of the referenced patent to home use. While the patent sets out that the proposed method can be used by hand, the procedure of coating a thread with cement and then sewing the thread with the cement in a "wet" condition is messy, to say the least, and results in a product having the same undesirable features described above. Moreover, the only way that threads on buttons which are already secured in place can be reinforced is to cut the button off and replace the threads with new cement-wetted threads.

SUMMARY OF THE INVENTION

The present invention overcomes the foregoing drawbacks of the prior art and provides a novel and improved system for prolonging the service life of threads used to secure a button on to a garment. No removal of mounted buttons is required. Button mountings on garments both new and old can be readily protected.

In accordance with the present invention, buttons are sewn in place with threads in the usual fashion. The secured button is then positioned generally horizontally so as to face upwardly, and a small quantity of bonding material is applied to the threads in regions where they cross the face of the button. The bonding material, as will be explained, is selected such that it will penetrate the threads only to a desired degree leaving some of the bonding agent to form the protective cap and limiting the region of thread penetration such that the flexibility of the button mounting is preserved.

One significant feature of the system of the present invention is that it permits a complete separation of the sewing and bonding operations. In commercial applications, this means that the threads can be protectively bonded without changes being made in sewing machinery or sewing room layout. In terms of home use, the present invention provides a mess-free system that can easily be used by the housewife for bonding button threads together on garments new and old.

The discovery that the service life of button threads can be substantially prolonged simply by protectively capping and bonding the thread portions crossing the face of the button is of substantial significance. The bonding together of the threads along a continuous length from the region where the threads emerge together from one button aperture to the region where they enter another spaced button aperture provides a rigid U-shaped thread mass which will not move across the button face and will not, accordingly, subject the threads to abrasive wear as they traverse the rough edges of a button aperture. The formation of a protective cap over the threads crossing the button face protects the threads from abrasive wear as the threads are brought into contact with foreign objects.

The bonding agent is preferably selected so it will penetrate the threads only to a controlled, limited degree and will harden to form a protective cap over the threads. If the bonding agent penetrates the threads to a greater extent than is desired no effective abrasive resistant protective cap may be formed over the threads, and, depending on the type of bonding agent used, the thread portions extending between the button and the fabric may be rendered rigid, destroying the flexibility of the button mounting. The flexibility of the button mounting may also be inhibited where the bonding

agent travels down the thread in sufficient quantity as to accumulate between the button and the fabric, thereby adhering the button to the fabric. Accordingly, the bonding agent must be carefully selected or mixed to control its penetrability on a particular thread.

One particular bonding agent mixture which has been found to work well with a wide variety of thread materials is a mixture comprising, by weight, 1000 parts "AIRCOFLEX 400," 2 parts "AEROSOL OT," and 2 parts "NOPCO JMY," giving a resin having a viscosity within the range of 700 to 2100 Centipoises on a Brookfield Viscometer. AIRCOFLEX 400 is a water soluble, non-toxic vinyl-ethylene co-polymer sold by Airco Chemical and Plastics, 150 East 42nd Street, New York, New York 10017. AERSOL OT, is a surfactant and consists of an odorless ester of a sulfonated dicarboxylic acid produced by American Cyanamid Company, Wayne, New Jersey. NOPCO JMY is an antifoamer sold by the NOPCO Chemical Division of Diamond Shamrock Company, Newark, New Jersey 07101. This resin mixture, once hardened, is particularly desirable in that is has a transparent color that does not detract from the appearance of the garment, and it is sufficiently flexible such that if some of the resin penetrates the threads in regions between the button and the fabric, there will be very little effect on the flexibility of the button mounting.

The above described resin has a surface setting time of approximately 15–20 minutes and a curing time of approximately 15–20 hours, and accordingly is not readily usable in commercial applications where garments are frequently stacked one on top of the other within seconds of completing a production operation. For such commercial applications, thermosetting resins having a surface setting time of 3–5 seconds are desirable. Such thermo-setting resins should, as they harden, effect at least a partial penetration of the threads to bond the threads together, and should also form a cap over the threads to protect them from abrasion.

Among the resins which can be used include acrylics, epoxies, nylons, phenolics, polyesters, polyethylenes, polypropylenes, urethanes, acrylonitrile-butadiene-styrenes, alhyds, polcarbonates, polyvinyl, and the like. Any of a number of common surfactants and antifoaming agents can be used with the resins to improve their wicking action into the threads and to prevent the formation of bubbles.

Accordingly, it is a general object to provide a novel and improved system for prolonging the service life of threads holding a button on a garment.

Other objects and features will become apparent and a better understanding of the invention will be obtained from the following description and claims when considered in conjunction with the accompaying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a button secured to a garment by threads and illustrating the process of protectively capping the threads with a bonding agent;

FIG. 2 is an enlarged cross-sectional view as seen from the plane indicated by line 2—2 in FIG. 1;

FIG. 3 is a cross-sectional view on the same scale as FIG. 2, as seen from the plane indicated by the line 3—3 in FIG. 1; and,

FIG. 4 is an enlarged portion of the view of FIG. 2 showing more clearly the penetrating and capping action of the bonding agent.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, a garment portion is indicated generally at 10. The garment 10 includes a fabric 11 and a button 12. A plurality of spaced apertures 13 are formed through the face of the button 12. Threads 14 extend through the apertures 13 and into the fabric 11 to secure the button 12 in place.

A protective abrasion-resistant cap 15 is formed over the portions of the threads 14 which cross the face of the button. The protective cap 15 is formed by applying a selected bonding agent 16 to the thread portions crossing the button face. The bonding agent at least partially penetrates the thread portions to bond the threads together, and hardens to form a protective cap over the thread portions. For home use, an applicator in the form of a plastic squeeze bottle 17 can be used to dispense the bonding agent. In commercial applications, heated dispensing systems are preferably used to dispense a bonding agent of thermo-setting type which has a very rapid surface hardening time.

The bonding agent is selected to have a controlled degree of penetrability on the specific thread being used, such that penetration of the bonding agent into the threads will be limited to substantially the region of application of the bonding agent. As is shown in FIGS. 2 and 3, and on a magnified scale in FIG. 4, the penetration of the bonding agent preferably does not penetrate to any substantial degree into the region of the threads which extend between the button and the fabric. This limiting of the area of penetration of the bonding agent is desirable to preserve the flexibility of the button mounting. If a substantial quantity of the bonding agent penetrates to a position between the button and the fabric, the button may be undesirably adhered to the fabric.

The protective cap 15 formed over the threads can take the form of a thin, relatively uniform thread coating, or as shown in FIGS. 2 and 4, can fully cover the region of the button apertures 13. Upon hardening, the protective caps 15 are resistant to abrasion from foreign objects and thereby serve to protect the thread portions from wear.

While a number of resinous bonding agents can be used, so long as their penetrability of the thread being used in controlled as specified above, one bonding agent which has been found to be suitable for use with a wide variety of thread materials is a mixture comprising by weight:

1000 parts AIRCOFLEX 400, a vinyl ethylene copolymer sold by AIRCO Chemicals and Plastics, 150 East 42nd Street, New York, New York 10017:

2 parts AEROSOL OT, a surfactant sold by American Cyanamid Company, Wayne, New Jersey; and

2 parts NOPCO JMY, an antifoaming agent sold by NOPCO Chemical Division, Diamond Shamrock Chemical Company, Newark, New Jersey 07101.

This mixture, when applied at room temperature, preferably has a viscosity within the range of 700–2100 Centipoises as measured on a Brookfield Viscometer. One feature of this particular mixture is that in its hardened state, it is transparent and does not detract from the appearance of the garment. Another feature is that in it hardened state this resin is sufficiently flexible such

that if a small quantity of the resin penetrates into the thread regions between the button and the fabric, the thread mounting will not be rendered inflexible.

Other bonding agents including thermo-setting resins materials and the like can also be used so long as their penetrability is controlled as described. Thermo-setting resins are particularly desirable in commercial applications where a surface hardening time of only a few seconds is needed in order for the thread capping operation to keep pace with other production steps.

Among the resin which can be used include acrylics, epoxies, nylons, phenolics, polyesters, polyethylenes, polypropylenes, urethanes, acrylonitrile-butadiene-stryrenes, alhyds, polcarbonates, polyvinyl, and the like. Any of a number of common surfactants and anti-foaming agents can be used with the resins to improve their wicking action into the threads and to prevent the formation of bubbles.

Accordingly it is a general object to provide a novel and improved system for prolonging the service life of threads holding a button on a garment.

Although the invention has been described in its preferred form with a certain degree of particularly, it is understood that the present disclosure of the preferred form has been made only by way of example and numerous changes may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

1. The method of prolonging the service life of threads securing a button to a fabric without destroying the flexibility of the mounting comprising the steps of applying a bonding agent having a controlled degree of penetrability to the thread portion extending across the face of the button between the spaced button apertures, and controlling the degree of penetration of the agent along the button threads so that said thread portion is impregnated and bonded into an integral mass while preventing wicking of the agent along thread portions below the button thereby forming a protective cap encompassing said thread portion, and thereafter curing said impregnated thread portion in situ.

2. The method of claim **1** characterized by the step of maintaining the face of the button in a substantially horizontal plane while applying the bonding agent and curing said impregnated thread portion.

3. The method of claim **1** wherein said bonding agent comprises a mixture of a resin, a surface active agent to facilitate the penetration of the mixture into the threads, and an anti-foaming agent to minimize the formation of bubbles in the protective cap.

4. The method of claim **3** wherein the mixture has a viscosity with the range of 700–2100 Centipoises as measured on a Brookfiled Viscometer.

5. The method of claim **4** wherein the resin comprises a vinyl-ethylene resin.

6. The method of claim **1** wherein the bonding agent comprises a thermosetting resin.

7. A method of prolonging the service life of threads securing a button to a fabric without destroying the flexibility of the mounting comprising the steps of applying a bonding agent consisting of a resin, surfactant, and an anti-foaming agent to the thread portion extending across the face of the button between the spaced button apertures, controlling the degree of wicking of said bonding agent along the button threads by regulating the amount of surfactant present in the bonding agent to permit impregnation of said thread portion while preventing impregnation of the button threads extending below the button thereby forming a protective cap encompassing said thread portion.

8. The method of claim **7** wherein the bonding agent comprises a vinyl-ethylene resin.

9. The method of claim **7** wherein the bonding agent comprises a thermosetting resin.

10. The method of claim **7** wherein the resin comprises vinyl-ethylene copolymer and the mixture has a viscosity within the range of 700–2100 Centipoises as measured on a Brookfield Viscometer.

11. The method of claim **1** wherein said bonding agent is heated during said curing step.

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