AUTOMATIC BUTTON FASTENING DEVICE

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Filed: Feb. 1, 1971

Appl. No.: 111,690

Related U.S. Application Data

U.S. Cl. ................................................. 24/90 PR
Int. Cl. .................................................. A44b 1/18
Field of Search...24/73 P, 90 PR, 90 W, 102 SL,
24/108, 73 D, 216, 217, 150 A, 150 C, 155
D, 155 R, 208 A

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Primary Examiner—Donald A. Griffin
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ABSTRACT
An automatic button fastening device comprised of a locking stud and a receptacle portion. The locking stud is adapted to be passed through the article to be fastened and then inserted into the receptacle portion which may be in the form of a button body. Involuntary removal from the receptacle portion is prevented by the retaining shoulders holding the locking stud in place. The locking stud can be released by the lateral movement of the locking stud accompanied by the radial displacement of the receptacle portion which is accompanied by the lateral shifting of the retainer shoulder.

6 Claims, 8 Drawing Figures
AUTOMATIC BUTTON FASTENING DEVICE

BACKGROUND OF THE INVENTION

This application is a continuation-in-part of co-pending application Ser. No. 732,271, filed Dec. 9, 1968 and now abandoned.

The present invention relates to an automatic button fastening device. The buttons provided with this device may be employed in several industrial fields. In fact, they may replace not only the conventional buttons sewn on articles of clothing of any kind, such as ready-made clothes, shirts, shoes, handbags, and so forth, but also buttons and like fastening members used in many other fields, e.g., for fastening covering panels inside a motor vehicle, wall panels to upstanding support frames, and so forth.

One clear instance of the drawbacks of the conventional buttons is given by the industry of ready-made clothes, wherein there is a continuous demand for increasing output, without requiring further equipment and/or labor and without affecting quality and features of the products.

In the industry of ready-made clothes it has been observed that one operation involving many drawbacks and time consumption is that of sewing buttons onto articles of clothing. The articles of clothier, already made up and ironed, have to be taken up from the rack, conveyed to a special machinery, usually a sewing machine requiring a skilled operator, who must exactly locate the article under the sewing head for applying buttons, so that, at the end of the various handling operations, required for sewing all the buttons on one article, said articles has to be wholly, or at least partially, again ironed, and then brought back and again hung onto the rack. This sequence of movements and operations results in a considerable increase in the time for the manufacture of an article, with the consequent waste of personnel and increase in production costs.

SUMMARY OF THE INVENTION

A primary object of the present invention is therefore to provide an automatic button fastening device for affixing a button to articles of clothing to bypass the above mentioned sewing operation, the corresponding machinery and all the technical, practical and economical disadvantages involved.

Another object of the present invention is to provide an automatic button fastening device for any fastening use by means of a simple snap pressure operation, adapted also for fixing two elements spaced between one another.

Buttons provided with the automatic fastening device according to the present invention may be applied by hand at an extremely high rate by even non skilled workers. Further, the button may be applied to articles of clothing without moving the manufactured articles from their storage position on the racks. Moreover, thanks to this device, the manufacturer may also deliver the articles of clothing without buttons, which may be applied and chosen at the moment of selling the article according to the clients' desires. In this latter case the manufacturer is also saving its time and labor for applying the buttons.

The instant automatic fastening device guarantees a high stability and long life to the buttons as well as an easy and quick removability, so that its employ is of great advantage to the user, particularly, the buttons may be easily removed before washing, dry-cleaning, ironing, and like operations which may be performed periodically on the articles of clothing.

The device of the present invention also removes the possibility of losing the buttons during use of the article and does not damage the fabric surrounding the application point.

With the removal of the conventional method of sewing the buttons, it is now possible to make the buttons from any number of different materials and of any desired shape and size, without altering the above said novel features. The buttons may be of any desired outer aesthetic form as considerations of how the buttons are to be bound to the article or the application method to be used, no longer apply.

The automatic button fastening device according to the present invention is comprised of a male snap connector or a locking stud, and a receptacle portion into which said stud is inserted and held. The head of said locking stud includes a perforating needle, which is adapted to be past through the article to be fastened and then into the receptacle portion, where it is held in place by a retaining shoulder. The locking stud can be released by the lateral movement of the locking stud accompanied by the radial displacement of the receptacle portion which is accompanied by the lateral shifting of the retaining shoulder.

This female receptacle may also be a detached part which is being pressure inserted into a corresponding recess or projecting seat on the rear side of the button, so that button manufacturers may still employ the same machinery and equipment as for making conventional buttons.

BRIEF DESCRIPTION OF THE DRAWINGS

Other features, objects and advantages of the invention, being the result of long and accurate study of the problem, will be more readily understood from the following detailed description of some preferred embodiments, given by way of non limiting example only, and illustrated in the accompanying drawings in which:

FIG. 1 is an elevational view, partly sectioned and with the parts detached of a button provided with the automatic fastening device of the present invention, applied on an article of clothing;

FIG. 2 is a similar elevational view, partly sectioned, but with the parts in engagement in the fastening position;

FIG. 3 is an elevational and partly sectional view of the automatic fastening device of the invention, to be pressure inserted into a recess made in a conventional button, with the locking stud ready for insertion into the detached female receptacle;

FIG. 4 is a view similar to FIG. 3, of the same device, inserted into a button;

FIG. 5 is a similar view, showing the detail of the way by which the locking stud needle is disengaged from the female receptacle;

FIG. 6 is a view similar to FIG. 4, of a variant of the automatic fastening device, to be pressure applied on a seat made outside the rear surface of a conventional button, the locking stud being shown in an inserted position;
FIG. 7 is a similar view of a button provided with the automatic fastening device of the invention, showing the possibility of pressure insertion of an ornamental disc on the outer front side of the button; and FIG. 8 is a similar elevational view, partly sectioned, of a button with automatic fastening device according to the invention, but employed for fastening a covering panel to a bearing frame.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The automatic button fastening device of the present invention is composed of a male locking stud and a female receptacle portion. The locking stud, with its perforating head, is adapted to be passed through a piece of clothing and then attached to the receptacle portion of the button body. In normal use, the button cannot be removed from the article of clothing. When the buttons need to be removed for operations such as dry cleaning, the button can be removed from the locking stud by means of a lateral movement.

The shape of the cavity within the button body and the configuration of the head of the locking stud provide the aforesaid advantages to the present invention. The perforating head, having a base of greater diameter than that of the retaining shoulder opening, is effectively trapped or held within the receptacle portion. For separation of the two pieces, the locking stud is moved laterally, whereby, the apex of the conically shaped head, abuts one of the sides of the cavity to form a fulcrum point. As the perforating head pivots about the fulcrum point, further lateral movement causes the base of the head to contact the side of the cavity, opposite to that of the fulcrum point, and the cavity is radially dilated. Once the cavity is radially dilated, a portion of the base of the locking stud enters into the insertion slot or entry way, thereby permitting the withdrawal of the perforating head.

With respect to the drawings, described in detail, hereinafter an attempt has been made to designate with the same number those parts which are essentially the same in each of the various embodiments.

With reference now to the figures of the drawings, and first to FIGS. 1 and 2, a first embodiment of device according to the present invention is shown, consisting of a locking stud 1, including a base 2, a shaft or perforating needle 3 projecting upwardly from said base and a head 5 having a conical shape and having a base 5a larger than the subjacent shaft 3. This locking stud 1 is made of a rigid material and forms the male snap connector portion of the automatic fastening device. The female receptacle portion of the fastening device is made of elastic material and has a cavity 6 in the rear side 7 of a button 8, said cavity hole or recess 6 being formed in a conical shape to receive and envelope the head 5 and base 5a of the stud. The cavity is in communication with the outside through an insertion slot or neck 9 and has a frusto-conically shaped passage 9b outwardly flared to allow the head 5 to be guided into the conical cavity 6 and also allows the shaft 3 to be tilted during detachment. Said cavity hole or recess 6 has a radial slot or retaining shoulder 9a to elastically retain the head 5 of the locking stud 1 when said stud is in position. The portion of the conical cavity 6 above the retaining shoulder 9a, of such a size and shape as aforesaid, permits the head of the locking stud, when moved laterally with respect to the longitudinal axis of the cavity, to lever the point of the head 5 against the side of the cavity 6 to permit the lateral sides to radially expand the throat of the retaining shoulder 10. The consequent widening of the throat 10 permits the locking stud 1 to, thereafter, be easily disengaged from the receptacle portion. Such disengagement will be explained in detail, hereinafter, with respect to FIG. 5. All of the embodiments of the invention herein are arranged to engage and disengage in a similar manner.

In view of the novel fastening device of the present invention, the outer or front face of the button 8 may have any desired shape, e.g., it may have projections 11 and recesses 12 or any other design relief, engraving or it may of course be also smooth.

On application of the article of clothing, the locking stud 1 is urged against the fabric 7 at its inner side, so that the conically shaped head of the locking stud perforates the fabric and projects outwardly; button 8 is then snap inserted onto locking stud by causing the conically shaped head of said locking stud to enter the cavity 6 by elastically dilating the throat 10. Thereafter, the head 5 is elastically retained in position by the retaining shoulder 9a. The frusto-conical flaring 9b of passage 9 assists with the dilation and insertion of the head 5 into the cavity 6.

It is clear that button 8 cannot be detached from the perforating needle 3 by a normal rotation, traction, pull or jerk, as the base 5a of the head 5 cannot pass through the neck 10 and is normally held in position by retaining shoulder 9a. In order to detach button 8, it is necessary to willingly displace the perforating needle to the right or to the left of the passageway 9, so that the apex or point of the head 5 leans against the side of the cavity 6 to form a fulcrum. The head 5, therefore, pivots about the fulcrum and contacts the cavity side opposite to that of the fulcrum side. Continued displacement of the locking stud causes the head 5 to radially expand the cavity 6 so that the lateral retaining shoulder 9a is moved laterally. When the retaining shoulder has been displaced laterally, the throat 10 of passageway 9 has been expanded so that head 5 can thereafter be disengaged from the receptacle portion of the button.

As is clear from the above description, the receptacle portion of the button must be of a material that can easily be displaced yet is highly elastic so that it will retain its original shape and configuration after repeated expansions. It has been found that nylon is the preferred material for all embodiments of the invention disclosed herein.

With reference now to FIGS. 3—5, the second embodiment of the invention is shown, in which the automatic fastening device has the female receptacle detached from the button body. Said piece 15 is adapted to be pressure inserted, preferably by a machine, into a recess 14 located in the rear portion of the button 11.

Said detached piece 15, like the first embodiment of the invention, has a radial slot or retaining shoulder 9a in the inner cavity 6, into which, head or point 5 of the locking stud is inserted. The insertion slot, or passageway 9, has a frusto-conical shape 9b and is arranged in relation to the cavity so as to form a
passageway from the outer surface of the receptacle portion into the inner cavity.

In order to make easier pressure insertion of piece 15 into the recess 14 of the button body 11, said piece 15 has slots 16, being preferably in a cross-like arrangement, so as to give increased elasticity to the receptacle portion for ease of assembly. These slots provide this effect as they weaken the upper portion of the receptacle to permit it to be radially contracted under pressure.

Disengagement of piece 15 from recess 14 is completely hindered by making body piece 15 and recess 14 of a frusto-conical shape with upwardly directed flaring, as shown in FIG. 4, or by providing a shoulder or undercut 15a, as is shown in FIG. 5.

In order to withdraw the locking stud from hole 6, the operation is simply to displace the locking stud either to the left or to the right so that the apex of the head 5 presses against the side of the cavity 6 and causes said cavity to radially expand so as to laterally displace the retaining shoulder 9a. This is most clearly shown in FIG. 5. As is shown in FIG. 5, the lateral shifting of the retaining shoulder permits a portion of the head 5 to enter the frusto-conically shaped entry way 9b so that it can thereafter be removed. The frusto-conically shaped entry way 9b facilitates the removal of the head and permits the locking stud to be moved laterally.

Only as an example, the outer shape of the button in the form of false sewing thread is shown with the reference numeral 17 in FIG. 4, for imitating the appearance of the conventional buttons.

In the event of manufacture of the button with a material having a good elasticity and which is easily displicable, detachment of the locking stud may take place by simple radial expansion or dilation of the cavity 6. In these cases where the material is not easily displicable, it is possible to provide a slot 13 in the receptacle portion extending approximately up to the half way point on the insertion slot. The slot 13 facilitates the removal of the locking stud by making the lower part of the receptacle portion weaker and thereby more easily displicable. The greatest need for a displicable section is in the lower portion of the receptacle which must be moved the greatest lateral distance in order for the locking stud to be removed.

As is shown most clearly in FIG. 4, a recess is formed below the head of the locking stud when it is in position in the receptacle portion. The recess or dead space is the result of the retaining shoulder 9a of the cavity 6 sloping downwardly toward the insertion slot. This recess facilitates the removal of the locking stud by permitting a greater pivoted movement of the head 5 of the locking stud.

The embodiment of FIG. 6 is very similar to that of FIGS. 3 through 5, excepting that the female receptacle for the locking stud is embodied as a detached piece 18 which is pressure applied onto a seat 19 that is provided on the outer rear surface of the button. The locking stud is the same as that previously described and is inserted into and held in cavity 20 by means of a horizontal shoulder 21 against which the base of the head 5 of the locking stud abuts.

In FIG. 7 a button is shown, having on its outer front face an ornamental disc 22 which may be of any shape and material, even of valuable nature, such as nacre, silver, gold and so forth, and is pressure applied in the corresponding seat 23. This embodiment particularly points out the way in which the automatic fastening device of the present invention has freed the button from the conventional shape.

With reference now to FIG. 8, an automatic button fastening device is shown, for fastening covering panels to a bearing frame, more particularly inside the passenger compartment of a motor vehicle.

In this embodiment of FIG. 8, the female receptacle 25 is snapped by means of fins 26, provided with suitable recesses 26a into a bore made in a support panel 24, e.g., a metal plate by the body of a motor vehicle. The female connector 25 has a central cavity 27 giving it the elasticity required for application under pressure. The rest of the automatic fastening device is the same as that of the previously described embodiments, and the locking stud in this case, instead of passing through a fabric or like articles, is passing through a bore 30 made in covering panel 28 (such as the leathery panels provided for internally covering the passenger compartment of a motor vehicle) as well as in its supporting frame 29. Quick and easy fastening of panels is obtained by means of the fastening device of this invention. Furthermore, said covering panels are always held under traction by this fastening device, so that they do not chatter during running of the vehicle.

Lastly, it could be also devised to apply the perforating needle to the button, instead of to the locking stud. In this embodiment the locking stud portion will thus act as the female receptacle. The user would be obliged in this case, however, to try to insert the perforating needle into the locking stud which will be located inside the article to be fastened.

With repeated practical tests, it has been observed that the fastening device of the present invention not only gives a very high amount of safety, stability and irremovability, but it may also be applied by non skilled personnel, in an amount of time which is much lower than that required for securing buttons with a sewing machine. Further the button of the present invention may even be applied by the user himself.

All the parts of the device described in the foregoing drawings and specification may be made of plastics, it is clear, however, that when said parts where made of metal, other systems for connecting perforating needle with locking stud may be used, such as threading, welding, groove and tongue joint and the like.

It will be understood that many variations, modifications and additions may be made to the embodiments of the instant device, however, without departing from its spirit and scope as defined in the appended claims.

What is claimed is:

1. An improved fastening device of which parts which can be readily attached to an article without stitching or other conventional fastening means, the first part of said fastening device being a female receptacle in the form of a button with an inner cavity and a passage that is arranged with relation to the cavity so as to form a passageway from the outer surface of the receptacle into the cavity; the second part, being a male locking stud with includes a base and a shaft projecting therefrom, with a head mounted upon said shaft on the end opposite to that of the base and which is
adapted to be removably insertable into, and elastically held within, the receptacle, said improvement comprising:

a. the receptacle being of an elastically deformable material;
b. a retaining shoulder, provided at the entrance to the cavity to prevent the involuntary removal of the locking stud when it is in position therein, the retaining shoulder having an opening with a diameter smaller than that of the diameter of the base of the locking stud head;
c. the head of the locking stud being of a conical shape having a base wider than that of the shaft to provide a shoulder on said shaft which will be held in place in the receptacle by the retaining shoulder;
d. the locking stud being formed from a rigid material; and
e. the portion of the cavity above said retaining shoulder being of such a size as to permit the head of the locking stud, when moved laterally with respect to the longitudinal axis of the cavity, to press against the cavity sides to thereby expand the cavity radially so as to permit the lateral dilation of the retaining shoulder whereby the locking stud can be voluntarily disengaged from the receptacle.

2. The improved fastening device of claim 1 wherein the passageway in the receptacle is of a frustoconical shape to facilitate the entry and removal of the locking stud head from the receptacle portion.

3. The improved fastening device of claim 2 wherein the receptacle includes at least one groove extending therethrough, which is aligned with the longitudinal axis of the cavity to facilitate the radial expansion of said cavity with the lateral motion of the locking stud.

4. The improved fastening device of claim 3 wherein the elastically deformable material from which the receptacle is made is nylon.

5. The improved fastening device of claim 4 wherein a recess is formed below the retaining shoulder by the walls of said cavity sloping downwardly from said retaining shoulder toward the passage of the receptacle.

6. The improved fastening device of claim 5 wherein the receptacle is adapted to be inserted into different button bodies.

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