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2,931,747

FABRIC FASTENER

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Fig. 1

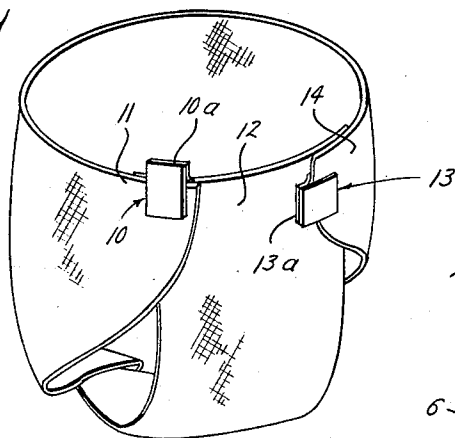


Fig. 2

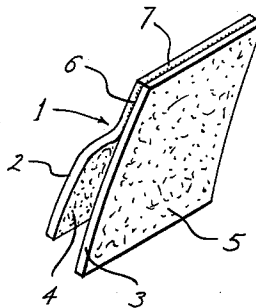


Fig. 3

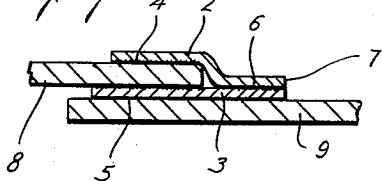


Fig. 5

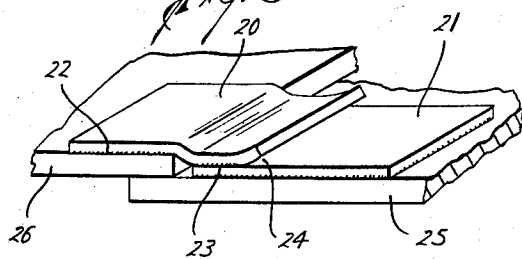


Fig. 4

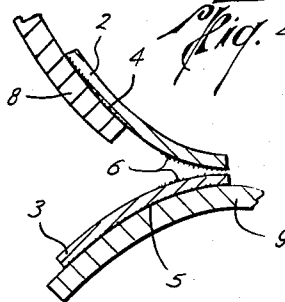
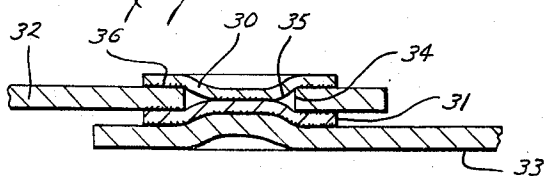


Fig. 6



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2,931,747

FABRIC FASTENER

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1 Claim. (Cl. 154—43)

My invention relates to a new and improved adhesive fastener for securing fabrics together temporarily. It is particularly useful in an installation where a joint of temporary duration is required on a fabric which subsequently is to be subjected to an operation which requires immersion in water, such as washing. An example of such an installation is in securing a diaper about a baby.

The conventional means for joining fabric together is the time consuming process of pinning with either straight or safety pins. Attempts to adapt adhesive strips or the like temporarily to secure fabrics together have met with little success due to strong bond between the fabric and the tape which resists separation of the elements to the extent that the fabric is damaged when separation is desired. When it is desired to separate the fabrics so joined an overload must be applied to the joint. With conventional adhesive fasteners the overload, unable to break the fastener, is reacted into the surrounding fabric, tearing it or straining it to a degree perhaps not discernible in one application but sufficient to tear it in repeated applications. Attempts to reduce the strength of the fastener to alleviate stress on the fabric by reducing the amount of adhesive area or reducing the adhesive strength obviously results in a sacrifice in holding power.

Moreover, in the specific application wherein I anticipate maximum utility, the application of diapers, mothers have been forced to choose between the elusive and fabric-weakening safety pin or, in some diapers, snap fasteners which, being affixed to the diaper, provide only limited size adjustment.

Therefore, it is an object of my invention to provide an adhesive fastener particularly designed for use with fabrics which produces a temporary joint of maximum strength under working loads but which is easily severable without any damaging stresses being transmitted to the fabric to which it is applied.

It is a further object of my invention to provide an adhesive fastener for producing a strength joint between fabric sheets which does not require stripping by force from the fabric to which it is attached after it is no longer needed, but is removable by immersion in water.

It is a further object of my invention to provide an adhesive fastener for fabrics which may be removed from the fabric and disposed of by immersion in water.

It is a further object of my invention to provide an adhesive fabric fastener which is particularly adaptable to fitting a diaper under desired tension about a baby.

In carrying out my invention I provide an adhesive fastener comprising two strips of a flexible sheet material, each of which is coated on one side only with an adhesive. One of the strips is placed on top of the other strip and a portion of its adhesive coating activated to secure the strips together. The remaining portion of its adhesive area is available for attachment to one element of the fabric joint. The adhesive coating of the underlying strip is available for attachment to the other element of the fabric joint. Forces tending to separate

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the joint are resisted in maximum strength under shear by all three bonded areas but a peeling action applied to the bond area between the fastener strips separates them readily. In addition to this novel fastener structure, I also propose that not only the adhesive but the strips themselves be formed of a water soluble material so that the severed fastener elements can be removed from the fabric and disposed of during laundering. Certain synthetic materials have been developed which possess the characteristics necessary for use in my fastener. A material which I have found to be particularly suitable is a synthetic sheet material known as polyvinyl alcohol film.

For a better understanding of my invention, reference should be had to the drawings, wherein

Fig. 1 represents a specific installation of my fastener, securing a diaper to a baby;

Fig. 2 is a perspective view of my fastener prior to application;

Fig. 3 is a section view of a typical installation of my fastener, illustrating the manner in which the joint is formed;

Fig. 4 shows a joint formed with my fastener as it is severed;

Fig. 5 is a view in perspective of a second form of my fastener as applied to complete a joint; and

Fig. 6 is a section view of a third embodiment of my fastener.

Referring still to the drawings and particularly to Fig. 2, I have shown my fabric fastener 1 comprising two strips of a thin flexible material 2 and 3. Each strip 2 and 3 has a coating 4 and 5 of an adhesive material on one side thereof. The strip 2 is placed on strip 3 and aligned coextensively therewith, the adhesive side of strip 2 lying against the unglued side of strip 3. The strips are joined by adhering strip 2 to strip 3 over the area 6 adjacent to one pair of aligned side edges 7. Beyond the area 6 over which strip 1 is adhered to strip 2 its adhesive coating 4 is exposed. Of course, the entire gummed surface of strip 3 is exposed and may be used for attachment.

In Fig. 3, the fastener of Fig. 2 is pictured in use. One loose end 8 of the fabric which is to be joined is located so that it overlaps the other loose end 9 thereof.

The fastener is placed in position so that the exposed adhesive coating 4 of strip 2 is secured to the overlying end 8 of the fabric and the adhesive coating 5 of the other strip 3 is secured to the surface of the underlying fabric 9. With the adhesive faces 4 and 5 of strips 2 and 3 being attached to the fabric ends 8 and 9, respectively, the fabric joint is completed by the adhesive area 6 along the side edges common to both strips.

My fastener is designed to produce maximum holding strength under working loads. For example, in the diaper application illustrated in Fig. 1, substantially all working loads are due to waist expansion, i.e., in a circumferential direction tending to separate the diaper ends. The force exerted by a baby's mid-section during breathing and by stomach expansion at feeding can be considerable and the need for a strong joint at the diaper ends is great. In the case of adhesive fasteners it is necessary to resist such forces in shear wherein the entire adhesively bonded area works to resist the load. Referring to Fig. 1, a fastener 10 may be placed at the top edge of the diaper side waistband 11 to secure the side waistband to the front 12 of the diaper. In the case of fastener 10 the load is longitudinal with respect thereto. However, if desired, a fastener 13 may be placed at the end of the waistband side 14, in which case the load is transverse to the common side edge 13a. In either case, the flexibility of the fabric and the fastener permits an alignment of the fabric and the fastener substantially in the plane

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of the load. Consequently, all of the force is resisted in shear by the bonded areas between the fastener elements and the fabric and in the common adhesive area between the elements. Since the full resistance of the adhesive areas is developed, maximum holding strength is achieved.

When it is desired to sever the joint as in removing the diaper, the common bonded area 6 between the strips provides a novel means of release that does not require stripping the fastener from the fabric and thus avoids damage to the fabric. To break the joint one need merely to grasp the fastener strips 2 and 3 (in Fig. 3) or the surrounding fabric ends 8 and 9, separately and pull in a direction to peel the common adhesive bond apart. Again, each fastener element will align itself with the fabric so that the loads between each fabric end and its fastener element are in shear. Consequently, such peeling develops the full strength of the adhesive areas 4 and 5 but the peeling of the fastener element is resisted merely by a line of adhesive at the juncture of the two strips which moves progressively across the common load area 6 during the peeling operation. This resistance is easily overcome and separation is facilitated.

Referring now to Fig. 4, the fastener joint is shown being severed, the separation occurring at the adhesively joined ends of the strips. It illustrates the tendency of my joint to fail under such peeling action through the fastener itself rather than to damage the fabric.

The manner in which the joint fails is of particular significance in my invention. Neither the strip 2 attached to the overlying fabric 8 nor the strip 3 attached to the underlying fabric 9 has pulled away from or damaged the fabric. The force necessary to separate this joint will be the same every time a fastener of this type is used because its strength is not dependent upon the effective bond area between the strips and the fabrics to be joined. Regardless of how securely, or how hastily and inefficiently the strips are joined to the fabric, failure will occur as shown in Fig. 4 if a minimum, noninjurious amount of bond strength is developed and peeling loads are applied to the joint. Under such loads, the common adhesive area 6 constitutes an appreciably weaker area and failure at this point will occur before damaging loads can be developed in the joined fabric.

It is a further feature of my invention that it is completely unnecessary to strip any adhesive fastener element from the fabric. With the relatively irregular surface of fabric the adhesion of a gummed tape is frequently so great that attempts to separate the two results in the rupture of threads. In the case of infants' diapers where my gummed fastener has particular utility, the repeated removal of gummed strips that would otherwise be necessary would appreciably shorten the life of the diaper. To avoid this I propose to use water soluble adhesives 4 and 5 on my fastener so that they will be separated from the diaper upon immersion in water. Since diapers obviously have to be laundered after having been worn, no extra operation is required.

Moreover, the subsequent disposal of the components after their removal is not a problem with my preferred embodiment. The material of which the fastener is formed is water soluble and the subsequent immersion of the diaper in water during the washing operation will dissolve the fastener. Sheet material of polyvinyl alcohol film is preferred for such use. It dissolves completely in the wash water and leaves no residual deposit on the diaper. After the diaper is clean and dry, it may be equipped with new fasteners. Fasteners may be applied repeatedly at the same location on the diaper without weakening the fabric.

My invention has particular utility in a commercial diaper service enterprise. Clean diapers with my fasteners partially affixed to the side edges 11 and 14, or to the front portion 12, may be supplied to the user. For example, a fastener may be attached to each of the

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side edges by securing the unattached portion of strip 2 thereto at the diaper service. Then, the joint will be completed after the diaper is placed around the baby by attaching the other strip of the fastener to an appropriate location on the front portion 12 of the diaper. When the diaper is removed from the baby, it may be returned to the diaper service with the loose fastener ends still attached. When the diaper is laundered the fastener components are disposed of simultaneously. Subsequently, the clean, dry diaper is re-supplied with fasteners and returned to mother for reuse.

A diaper so equipped has great utility because it frees the mother of the necessity for reaching for some object, such as a safety pin, while attempting to hold the diaper in place. Presupplying the diaper with integral fasteners eliminates the problems of locating and affixing a securing element. It reduces the diaper changing process to a more simple operation.

A second embodiment of my invention is shown in Fig. 5. There two gummed strips 20 and 21 are aligned longitudinally and overlapped end to end. The adhesive 22 on the overlapping strip 20 does not extend over the entire surface thereof. Thus, there is a common bond 23 between the two strips and an unattached portion 24 of the overlapped segment that is not attached to strip 21. With this form of fastener, the underlying adhesive strip 21 will be attached to one fabric end 25 and the overlying strip attached to the other fabric end 26 and the joint is completed by the overlapped segment with a common adhesive bond 23. In this modification, as in the embodiment of Figs. 1 to 4, the full strength of each adhesive area is developed under normal loads in shear. However, to sever the fabric joint, one need merely grasp the unattached portion 24 of the overlapped segment and peel it from the underlying segment 21. Again, the common adhesive area 23 constitutes the weakest link in the chain of attachment and failure at this point will occur before damaging loads can be developed in the fabric.

I prefer to supply my fastener to the user as a complete unit with the two ends already joined. By so doing I insure that the two ends, the critical section of the fastener, are securely joined so as to produce uniform strength. However, the strips could be supplied and applied to the fabric separately and joined at their ends as the final operation.

I have chosen to describe and illustrate my fastener joining two fabric ends which are initially placed one over the other. However, my fastener could be used to join fabric ends which are abutting rather than overlapping and the result would be the same. For all installations in which my fastener is applied to a flexible surface, it will react under load as described. This follows from the fact that a flexible surface is free to align itself to resist loads along its own length, that is, in the direction in which it is strongest.

A further embodiment of my invention is shown in Fig. 6 wherein the fastener elements 30 and 31 are applied separately to the fabric ends 32 and 33, respectively. The overlapping fabric end 32 is provided with an opening 34 therethrough so that a portion 35 of the adhesive coating 36 on the top fastener element 30 is exposed. Thus to complete the fabric joint, the adhesive coating portion 35 need merely be activated to secure the top fastener element 30 to the uncoated side of the bottom fastener element 31.

While the preferred embodiments of my invention have been shown and described, it is obvious many modifications thereof can be made by one skilled in the art without departing from the spirit of my invention. It is, therefore, desired to protect by Letters Patent all forms of the invention falling within the scope of the following claim.

I claim:

In combination with two members having parallel

surfaces thereof in overlapping relationship, a temporary fastener securing said surfaces together to resist a relative force therebetween exerted in shear along the planes thereof, said fastener comprising a pair of elements of sheet material, means adhesively and securely connecting one side of each of said elements over substantially the entire area thereof to one only of said overlapping surfaces, said pair of elements being arranged in face to face engagement separable adhesive means joining the adjacent sides of said pair of elements together over a portion only of the areas thereof leaving other portions of said adjacent sides unjoined, said separable adhesive means being of sufficient strength to withstand and support said relative force but being of lesser strength than said securely connecting means and thereby conditioned to permit separation of said elements and said overlapping surfaces by applying moderate tension to said separable adhesive means in a direction transverse to said adjacent sides.

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