United States Patent [19]

Italiano

[11] **3,751,770**

[45] **Aug. 14, 1973**

[54] **CLOSURES**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 26,980, April 9, 1970, abandoned.

[52] **U.S. Cl.** ..... **24/204,** 24/201 A, 24/224 R

[51] **Int. Cl.** **A44b 19/04**

[58] **Field of Search** ..... 24/226, 201 CF, 204, 24/245 B, 205.13 D, 201 A, 224 R; 206/56 DF

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[57] **ABSTRACT**

The disclosed closure for garments and the like includes a headed male member and a companion slotted female member, both blanked out of tough, pliant plastic sheets. The male member of sheet plastic is assembled to the female member that is also of sheet plastic by inserting a male head portion of the blanked outlet into an opening in the female member having an outline that includes a transverse enlargement, then shifting the neck of the male member into a slot in the blanked opening of the female member. That opening has a guiding pair of divergent edges, leading first to a slot construction that is spaced from an end abutment of the slot. The constriction inhibits the accidental separation of the closure members, but the related portions of the closure members promote assembly and disassembly in a way to overpower the constriction when manipulated deliberately.

Strips of the closures can be curved by bending the sheet material out of its plane and each strip is narrow or has narrow connections so that the strips can be flexed in their own planes.

5 Claims, 14 Drawing Figures

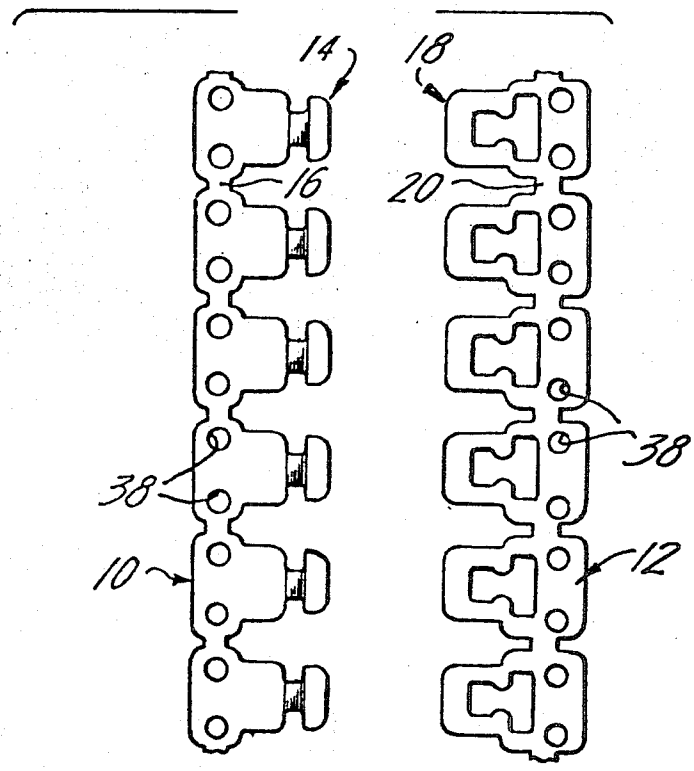


FIG. 1

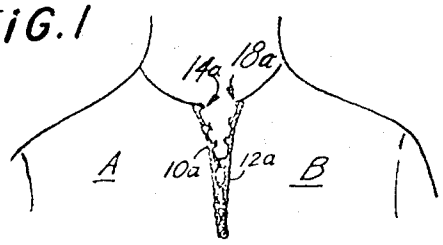


FIG. 8

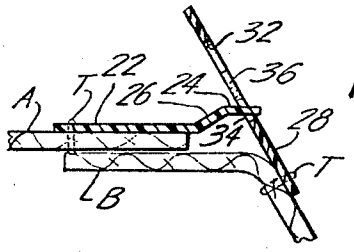


FIG. 3

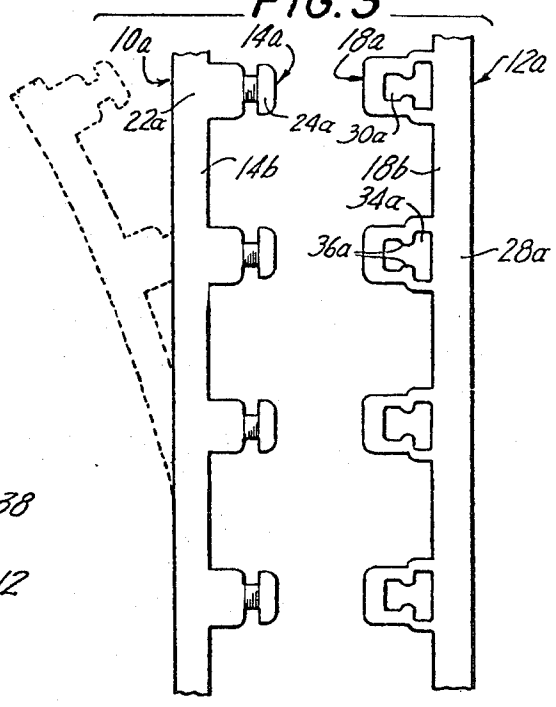


FIG. 2

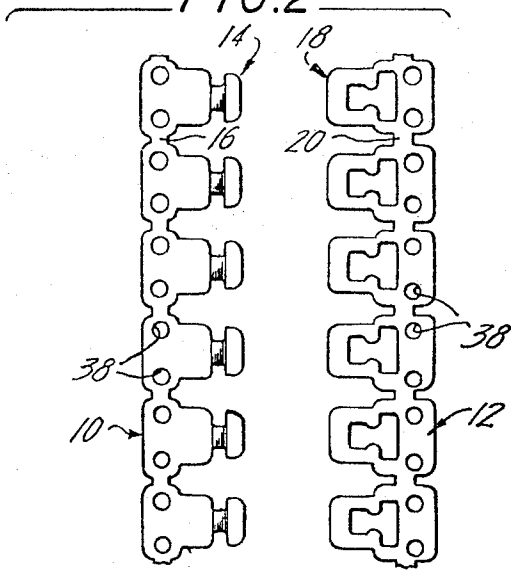


FIG. 5

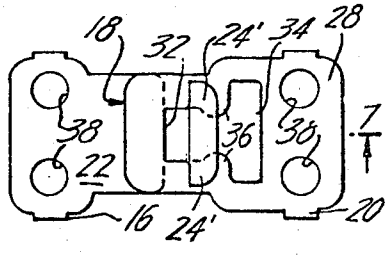


FIG. 4

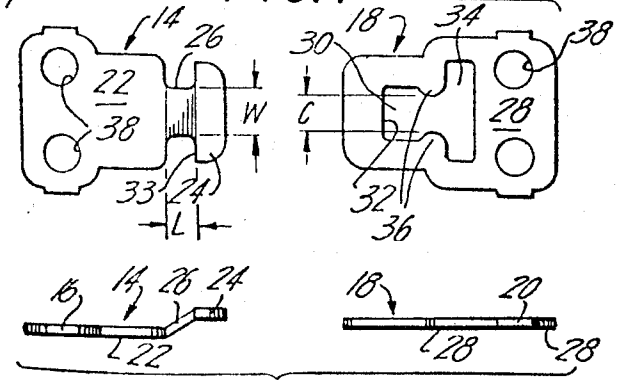


FIG. 6

FIG. 7

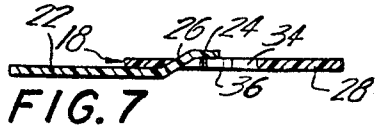


FIG. 9

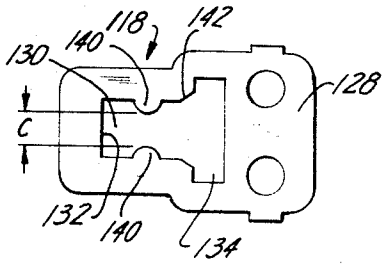


FIG. 12

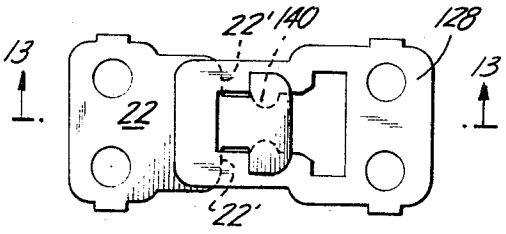
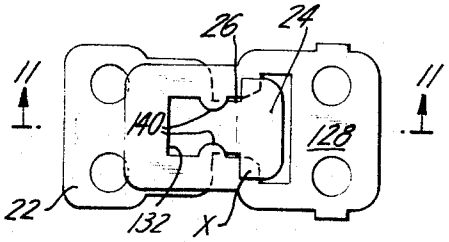


FIG. 10



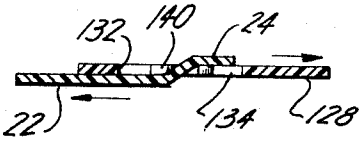
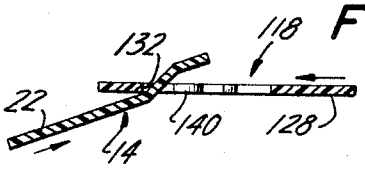


FIG. 11

FIG. 13



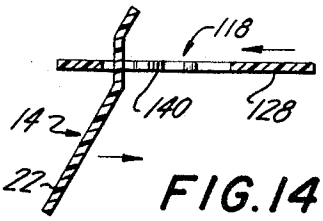


FIG. 14

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CLOSURES

This application is a continuation-in-part of my application Ser. No. 26,980 filed Apr. 9, 1970, to become abandoned upon filing of this application.

This invention relates to closures of the type commonly used to secure two parts together separably. The two parts may be parts of a garment such as the neckline slit of a lady's dress or the placket at the waist-line of a lady's skirt, but the closures of the present invention have innumerable other uses. For such applications, bent-wire hooks have heretofore been commonly used with companion eyes or loops of bent wire or thread, as individual pairs and in rows of paired male-female closure members.

An object of the present invention resides in the provision of a novel form of closure useful in place of hook-and-loop closures, having certain advantages. It is common to sew a series of hooks to a binding tape, and a series of wire loops to another binding tape, to be sewn later to a garment. The binding tapes preserve the spacing of the hooks in relation to the loops. The fact that two sewing operations are needed represents an important element of expense. Further, such strips of hook-and-loop closures must be made and stocked in various colors, to be useful in applications where they may be visible.

The illustrative embodiments of the invention are closures made as integral strips of pellucid tough plastic, where there are male and female members that can be interengaged separably. Since the integral strips comprise pairs of closure parts, there is no need of assembly operations as in the case of wire hooks and binding tape. Where pellucid material is used, there is no problem of color matching to the article on which it is used. The form of the closure is such that the parts can be made of plastic in the form of sheet material, obviating the expense of molding operations usually used for shaping articles of plastics. The closure can lie flat or essentially flat, but it can flex both in the planes of the closure strips and transverse to those planes. The suppleness facilitates fastening of the closure and it accommodates deformation of the garment or other article to which it is attached. The spacing and alignment of the successive male and companion female closure members are maintained by interconnection of the closure members as integral parts of the plastic strips, when the closure parts are being assembled. This construction is much more economical than wire hooks and loops sewn to cloth tapes. Each pair of male-female closure members does not merely fit together but it interlocks so that it does not become disengaged except by deliberate directed effort.

The nature of the invention, including the foregoing and other objects, features and advantages will be more fully appreciated from the following detailed description of two embodiments thereof, which are shown in the accompanying drawings.

In the drawings:

FIG. 1 is a view of an application of the closures of the present invention;

FIGS. 2 and 3 are enlarged plan views of portions of paired closure strips, representing two different embodiments of the invention;

FIG. 4 is a fragmentary plan view of the closures of both FIGS. 2 and 3 but drawn to larger scale;

FIG. 5 is a fragmentary plan view like FIG. 4, showing the closures in their fully assembled position;

FIGS. 6 and 7 are cross-sections of the closures shown in FIGS. 4 and 5, viewed at the cross-section planes 6—6 and 7—7 respectively of FIGS. 4 and 5;

FIG. 8 is a cross-section as viewed from the plane 7—7 of FIG. 5, showing a closure of FIGS. 1–7 being applied to a garment

FIG. 9 is a plan view of a slightly modified form of the female closure member;

FIG. 10 is a plan view of the female closure member of FIG. 9 being assembled to a male closure member of the form shown in FIG. 4;

FIG. 11 is a cross-sectional view of the closure members of FIG. 10 as viewed at the section line 11—11;

FIG. 12 is a plan view of the closure members of FIGS. 10 and 11 in the initial phase of disassembly;

FIG. 13 is a cross-sectional view of FIG. 12 at the section line 13—13; and

FIG. 14 is a cross-sectional view of the parts of FIG. 12 in a modified configuration in readiness for disassembly.

Referring now to the drawings, FIG. 2 shows portions of first and second strips 10 and 12 of a closure, in side-by-side alignment. These strips are of a tough, pliable synthetic plastic material, especially polyethylene terephthalate, or Mylar. They are readily made by slitting sheets of the plastic to form strips, and feeding the strips into rotary or progressive stamping dies. Individual male closure members 14 are of uniform length along strip 10, connected at narrow junctions 16. Individual female closure members 18 are connected together at junctions 20 to form strip 12, and are of the same length as members 14. These two strips are fed to a cut-off station forming part of a machine for attaching individual pairs of closure members 14 and 18 to separate parts of a garment or other article. The machine may insert fasteners T (FIG. 8) through holes 38 and into the article, or a sewing machine can be used in the attaching operation.

As shown best in FIG. 4, each male closure member 14 includes a body 22 and a head 24 joined by a neck 26. The length L of neck 26 is somewhat greater than the thickness of strip 12, but length L is only a small portion of closure member 22. Each female closure member 18 also has a body 28, and laterally of body 28 (with reference to strip 12) there is a portion having a cut-out or opening. This opening includes what may be called a slot portion 30 having an abutment edge 32 remote from body 28 and an enlargement 34 that extends along strip 12 to the opposite sides of slot 30. The width of slot 30 varies. Adjacent abutment edge 32, slot portion 30 has a width about equal to the width W of neck 26. Adjacent enlargement 34 of the opening, the side edges of the slot portion have slight bumps 36 that define a constriction C adjacent enlargement 34 that is distinctly narrower than neck 26.

When closure members 14 and 18 are in their assembled configuration as shown in FIG. 5, head 24 is seen to have abutment portions 24' that overlie the parts of female closure member 18 at opposite sides of slot portion 30, and neck 24 extends through slot portion 30 adjacent to abutment edge 32. This engagement holds the closure together, preventing bodies 22 and 28 from pulling apart. Bodies 22 and 28 have punched apertures 38 for thread T or other means for affixing the closure pairs to the parts of an article that are to be secured together, such as parts A and B of a garment (FIG. 1). There is little tendency of the cut edges that

form apertures **38** to cut the fastening thread since any such cut edge is deformed plastically to a limited extent whenever localized pressure develops, and accordingly such edge is dull.

In the assembled configuration of the closure members as shown in FIG. **7**, head **24** lies on or close to the top face of member **18**, and body **22** lies at or close to the bottom face of member **18**. Head **24** and body **22** are ideally in parallel planes, and neck **26** has opposite bends to provide for the off-set condition of the head and the neck. These bends are desirable although not essential. They are intended to make the assembled closure essentially flat. The bends are readily formed cold, using suitably applied forming pressure. In time the formed configuration may be lost, and the male closure members may become nearly flat. The closure will nevertheless continue to serve effectively. It will lie reasonable flat in use, particularly because it is of pliant material, adapted to be deformed temporarily.

The extent of head **24** along strip **10** is made slightly less than the extent of opening enlargement **34** along strip **12**. In this way, each male closure member can be inserted transversely into assembly with a laterally aligned female closure member. As represented in FIG. **8**, a companion pair of closure members can be angled relative to each other to facilitate this direct transverse insertion stroke. After head **24** has passed through the opening in closure member **18**, neck **26** is forced to pass the constriction formed by bumps **36**. This is accomplished merely by pulling the companion closure members while the abutment portions **24'** slide against the surfaces of closure member **18** at opposite sides of slot **30**. Once a neck **26** has reached abutment edge **32**, the closure is prevented by bumps **36** from becoming disassembled merely when tension is relaxed between the closure members. This feature is important in the assembly of a series of companion closure members. Thus, a series of male and female closure members can be stitched to a garment in rows at spaced-apart points with male and female closure members aligned with each other in pairs. A companion pair of closure members at one end of the rows can be assembled. Starting here, the companion pairs of closure members can be assembled progressively, one after another, until all of them have been assembled. The constrictions formed by bumps **36** are of special value in this procedure. Once any given pair of closure members has been fully assembled (FIG. **5**) the constriction of its member **18** minimizes the risk of the assembled pair of closure members becoming disengaged during the manipulation involved in assembling the next pair of members. The slot constrictions are opened readily with deliberately applied force when the closure is to be opened, merely by pushing body portions **22** and **28** of the male and female closure members toward each other. This shifts neck **26** into opening enlargement **34**, and head **24** can then be withdrawn freely.

Opening enlargement **34** is here made wide enough (transverse to strip **12**) to allow head **24** to be lifted through it, without tilting, by an assembly operation perpendicular to the planes of head **24** and closure member **18**. With such a construction, either mode of assembly can be used. Opening enlargement **34** can be much narrower as measured transverse to strip **12** so as to require tilting for assembly and for disconnection of the closure pair.

A modification is shown in FIG. **3**. In the modification, the closures are not only formed as strips **10*a*** and **12*a***, but they are used very effectively as strips. The closure pairs **14*a*** and **18*a*** are of modular size, interconnected by integral narrow bands **14*b*** and **18*b*** of equal modular length. They are readily sewn to garment parts A and B by stitching along separators **14*b*** and **18*b*** and along body portions **22** and **28**.

The modular form of interconnected closure members is useful for insuring alignment of the pairs of closure members. While the polyethylene tetraphthalate as the preferred material is pliable, it is highly stable dimensionally. It is not appreciably elastic in the longitudinal direction, and while enforced deformations may be imposed on the strips in use, such deformations fade when the force is relieved. Because the material of strips **10*a*** and **12*a*** is tough and pliant, the strips can be curved out of the plane of the drawing to conform to the shapes to be secured together. Narrow bands **14*b*** and **18*b*** also accommodate flexure of the strips in their own plane, as indicated by the broken-line position of strip **14*a***, as well as twisting and other types of deformation of the strips. This capacity for deformation is of value where the closure is secured to parts A and B of a garment. There is a natural tendency of the parts of the garment to assume such curved shapes as pairs of male and female members of the strips are engaged with each other in sequence progressively, from bottom to top in the illustration. After deformation, the plastic material should have the property of becoming restored very nearly to its original shape. Modular separators **14*b*** and **18*b*** serve to maintain the mutual alignment of the pairs of closure members of the two strips. When two, three or more separate pairs of male and female closure members are stitched or otherwise secured as aligned pairs in respective rows, there would be some uncertainty as to whether the closure members of one row will line up with companion closure members of the other row before the closure pairs are assembled. A garment bearing such separate pairs of closure members should itself be relatively inelastic along the rows of fasteners. In that case, after the two series of male and female closure members are initially mounted on the garment in proper lateral alignment with each other, in pairs, they should remain aligned in pairs. Where the closures and separators form integral strips (FIG. **3**) there is assurance that rows of male and female closure members will retain their initially established alignment.

It has already been said that the assembled closure members lie essentially flat. They add only a bit to the total thickness of the garment parts which are secured together. They are virtually unnoticeable to the wearer insofar as localized pressure is concerned. They are inherently inconspicuous when made of pellucid — i.e., transparent or translucent — material. This feature makes it possible to use a common supply of closure material for garments or other articles of various colors. Unlike zippers, the present closures continue to serve effectively even in case of a localized failure of a companion pair of closure members somewhere along an interconnected series of paired closure members.

The closure strips, and the closure members in those strips, can be made in various sizes and styles. The drawing is a reasonably accurate scale drawing of a successful example. However, the following example of ac-

tual dimensions of a successful closure of the form illustrated may prove useful:

The modular length of closures **14, 18, 14***a* and **18***a* along strips **10, 10***a*, **12** and **12***a* is 0.320 inch.

The size of each of the male closure member **14** and of the female closure member **18,** and that of closure members **14***a* and **18***a*, across the respective strips, is 0.375 inch.

Strips **10, 12, 10***a* and **12***a* are of Mylar 0.014 inch thick. (This is but one-fifth of the corresponding dimension of a wire hook.)

Measured along the respective strips, opening enlargement **34** is 0.190 inch and head **24** is 0.186 inch.

Slot portion **30** is 0.70 inch wide, with a constriction C 0.050 inch wide. Neck **26** is 0.060 long (measured from body **22** to head **24**) and 0.066 wide.

A female closure member **118** is shown in FIG. **9,** as a slight modification of closure member **18** in FIGS. **4–8,** the two being the same in all respects with the exceptions noted below. Body portion **128** is adjacent to enlargement **134** of the opening that merges (T-shaped) into slot portion **130** of the opening. Abutment edge **132** is remote from body portion **128.** The slot **130** is preferably slightly wider than neck **26,** but that width is reduced by bumps **140** to define a constriction C. Neck **26** is received in slot **130** between abutment edge **132** and bumps **140** when the closure members are fully assembled, and bumps **140** are spaced from slot enlargement **134.** Where slot **130** meets enlargement **134,** the edges of slot **130** have diverging portions **142.**

After head **24** has been projected through enlargement **134** (as shown in FIG. **8,** for example) the closure members are moved in the direction of the arrows of FIG. **11,** so that an initial relationship develops as shown in FIGS. **10** and **11.** Diverging portions **142** promote easy entry of neck **26** into slot **130.** This is of great importance in the use of these closure members because they are usually too tiny to be observed when being assembled and they may be at a position that cannot be seen by the user, as at the rear of a garment being worn.

When the partly assembled condition of FIG. **10** has been reached, the lateral abutment parts of head **124** overlie areas X of closure member **118.** When body portions **22** and **128** are pulled away from each other, as represented by the arrows in FIG. **11,** the lateral portions of head **24** slide along the top of member **118** and prevent the head from being pulled through the opening in member **118.** Because of that constraint the pulling effort forces neck **26** to pass bumps **140,** both the bumps and the neck yielding to accommodate each other in this operation. The size of the bumps is limited in relation to all other related factors of the closures to achieve this effect, e.g., the yielding quality of the plastic, the neck width and thickness, etc.

The above-described features related to the separation between enlargement **134** and the portion of slot **130** that forms the minimum-width constriction is not necessary for the described effects to be achieved. The separation can be reduced, the extreme condition being that shown in FIGS. **4** and **5.** Bumps **36** provide diverging portions of the slot edges that open into enlargement **34.** When the neck **26** moves from enlargement **34** toward abutment **32,** the neck moves far enough before meeting resistance from the constriction so that the lateral parts **24'** (FIG. **5**) of head **24** overlie areas of member **28** like areas X in FIG. **10.** Thereafter simple pulling of members **14** and **18** is sufficient to produce the full-assembled relation in FIG. **5.** Head **24** is guided along the top surface of member **18,** and this prevents the head from pulling through the opening when enough pull is applied to overcome the effects of constriction C.

FIGS. **12** and **13** illustrate one mode of disassembly. Body portions **22** and **128** are pushed toward each other as shown by the arrows in FIG. **13.** The shoulders **22'** of male closure member **14** are guided along the bottom of member **118,** providing leverage for overpowering the restraining effect of bumps **140.** Thus, the force that is deliberately applied to body portions **22** and **128** by the user's fingers is easily effective to release the closure from the detent effect of bumps **140,** whereas those bumps are effective to restrain the closure against disassembly in most cases, as the result of random applied forces.

Body portions **22** and **128** can be grasped by the user's fingers to dispose the closure members at an angle to each other as in FIG. **14,** and then bumps **140** can be overpowered by moving the parts in the direction of the arrows in this Figure. The closure member **14** is stiff enough to provide such action.

What has been said in relation to FIGS. **12, 13** and **14** applies fully to the above-described closure shown in FIGS. **4–8.**

The foregoing exemplary applications of the invention in its various aspects will be recognized as subject to other applications and to a variety of changes within the skill of the art and therefore the invention should be construed broadly in accordance with its full spirit and scope.

What is claimed is:

1. A closure for securing first and second elements together, said closure including first and second unitary members of tough, pliant synthetic plastic sheet material,

a. one of said members having a first body portion for securement to a first element, a head, and a neck connecting said body portion and said head, said head having abutment portions projecting to opposite sides of said neck, and

b. said second member having a second body portion for securement to a second element that is to be secured to the first element by the closure, said second member having an opening adjacent to said second body portion,

i. said opening including a slot portion having side edges and having an abutment edge,

ii. said opening also having an enlargement between said abutment edge and said second body portion, said enlargement extending beyond the side edges of said slot portion and being at least as large in the direction transverse to the side edges of the slot portion as said head when the latter is measured in the direction transverse to said neck,

iii. said slot portion having a constriction at least part of which is narrower than said neck of said first member, said constriction being spaced from said abutment edge so that when said neck is received between said constriction and said abutment edge in the fully assembled condition of said first and second members, said constric-

tion inhibits disassembly of the closure members, said narrower part of said constriction being spaced from said enlargement so that, when said head of the first member is inserted through the slot enlargement and the neck of the first member is then shifted against the narrower part of said constriction, said abutment portions of the head overlie areas of the second member to prevent the head from being pulled through said opening when said body portions are pulled for forcing said neck past said constriction.

2. A closure in accordance with claim 1, wherein said head and said body portion of said first member are displaced in parallel planes such that, when said closure members are in said fully assembled condition, said head lies against one surface of said second member and part of said first body portion lies against the opposite surface of said second member.

3. A closure in accordance with claim 1, further including additional first and second closure members as aforesaid to constitute a multiplicity of closure members interconnected in respective rows as integral parts of two essentially planar strips of sheet material and said multiplicity of first and second closure members being distributed along their respective strips for cooperation in pairs, said strips being sufficiently narrow and thin, at least at parts thereof, so as to be readily curved out of the planes of their respective strips and so as to be readily curved in their respective planes.

4. A closure in accordance with claim 1, wherein said constriction is limited in relation to the width of said neck, taking into account the stiffness of the plastic sheet material and its proportions and pliancy, to accommodate separation of a fully assembled pair of the male and female closures in response to manual engagement and forcible shift of the respective body portions thereof toward each other.

5. A closure in accordance with claim 1, wherein at least part of the edges of said slot portion of the opening between said constriction and said enlargement converge toward said constriction, for facilitating the shift of the neck of said first member from said enlargement to said constriction in assembling said first and second members.

* * * * *