

United States Patent

Perina et al.

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- [54] **CLOSURE ASSEMBLY WITH SLIDABLE CLOSURE MEMBER**

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24/205.13 D, 205.1, 205; 52/127, 582

3,431,605 3/1969 Hasslinger.....24/201 C
3,475,810 11/1969 Mates24/DIG. 18

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[57] ABSTRACT

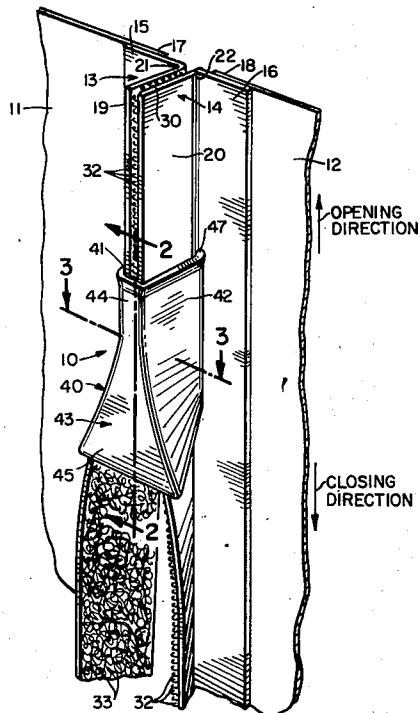
A closure assembly for releasably joining and separating sheet members which are provided with hook type hooking elements and loop type hooking elements is described. The assembly includes two flexible panels, each panel having a semi-rigid angle strip secured thereto and each angle strip having a tape member with projecting hooking elements secured to one of its legs. A slidible closure member slides along the legs of the angle strips for joining and separating the tape members.

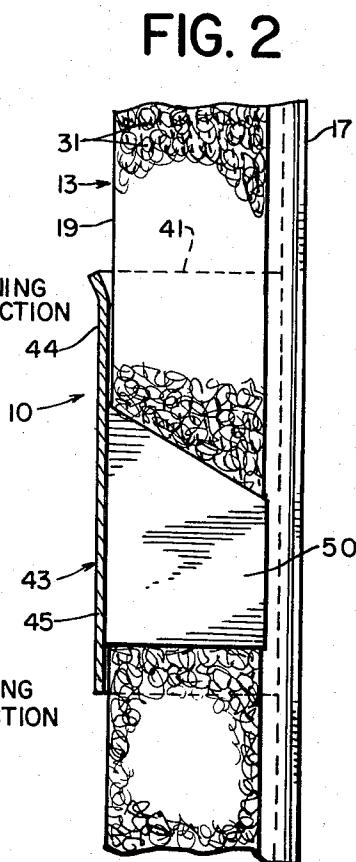
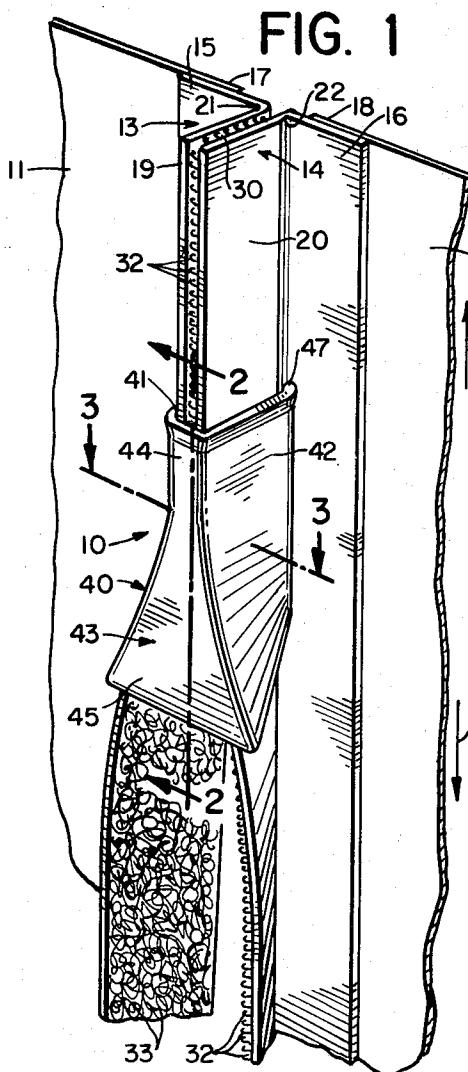
[56] References Cited

UNITED STATES PATENTS

2,810,944 10/1957 Sander 24/207 C

6 Claims, 3 Drawing Figures



**FIG. 3**

This cross-sectional view focuses on the top flap and the internal structure. The top flap is labeled 11, 15, 17, 21, 46, 50, 47, 18, and 12. Below the flap, the internal structure includes 22, 16, 31, 19, 41, 40, 44, 10, 30, 32, 20, and 42. Arrows indicate the opening direction (upwards) and closing direction (downwards).

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CLOSURE ASSEMBLY WITH SLIDABLE CLOSURE MEMBER

BACKGROUND OF THE DISCLOSURE

1. Field of the Invention

This invention relates to a closure assembly, and more particularly to a closure assembly for releasably joining and separating a pair of sheet members.

2. Description of Prior Art

Separable fasteners such as the hook and loop fasteners described in U.S. Pat. Nos. 2,717,437 and 3,009,235 are widely used for the purpose of attaching one object to another. In general, fasteners of this type include separable members each member having a pile-like surface containing hooking elements. Upon being pressed together in face-to-face relationship, the hooking elements of the separable members releasably interengage one another to hold the members together. In the above-mentioned U.S. Patents, each separable member comprises a sheet of woven synthetic material having raised loop threads wherein the loops of one member are cut at their outer extremities to form hook-type hooking elements while the loop threads of the other member remain uncut to form loop-type hooking elements. It is also contemplated that a given member may comprise both hooks and loops. When these two members are pressed together in face-to-face relationship, there is substantial engagement of the hook-type hooking elements with the loop-type hooking elements. A considerable effort must be applied to separate the members unless they are peeled apart in which case the members are separated quite easily.

The number of applications in which separable fasteners of the type described above can be advantageously utilized is legion. However, some difficulty has been experienced in joining and separating long lengths of separable fasteners where the members to be joined are not supported firmly or where the seam is in a relatively inaccessible area. This is mainly due to the problem of aligning long lengths of separable fastening tape members and then applying a compressive force normal to the interfacial plane of engagement of the members in order to join the fastening elements.

Although separable closure assemblies having sliding closure members for joining two relatively long sheets together are known, these known assemblies have numerous disadvantages. Several of these assemblies have overlapping joints which generally leads to a considerable amount of drag when opening and closing the fastener. In order to prevent the drag, an undesirable rigid joint is usually required. Furthermore, the overlapping joint permits re-engagement of the separable fastening elements as the joint is being opened unless the elements are covered by additional material. This makes the overlap joint more complicated and increases the cost.

It is, therefore, the principal object of the present invention to overcome the disadvantages stated hereinabove. With the present invention it is now possible to provide a closure assembly for releasably joining two tent flaps, boat sails, roof covers on life rafts, large tarpaulins and many other structures where similar problems exist.

SUMMARY OF THE INVENTION

The closure assembly of the present invention for releasably joining first and second sheet members comprises a first angle strip member and a second angle strip member each strip member having flexible leg members and a groove at the intersection of the two leg members. The first angle strip member is secured to the first sheet member along one of its leg members and the second angle strip member is secured to the second sheet member along one of its leg members. A first tape member having a surface defined by a plurality of flexible upstanding hooking elements is secured to the second leg of the first angle strip member and a second tape member having a surface defined by a plurality of flexible upstanding complimentary hooking elements is secured to the second leg of the second angle strip member. A slidable closure member includes guide means extending from the closure member into the grooves in the angle strip members for sliding therein. The guide means force the tape members into face-to-face engagement causing a large number of hooking elements on the first tape member to engage a large number of complimentary hooking elements on the second tape member when the slidable closure member is traversed in a closing direction. The assembly includes means for disengaging the hooking elements from the complimentary hooking elements.

The slidable closure member in accordance with the present invention is preferably in the shape of a three-sided channel and includes a top funnel shaped planar surface having an upper substantially rectangular shaped portion and a lower triangular shaped portion having outwardly tapered sides. A first guide means extends from one of the funnel shaped edge portions of the planar surface for guiding the first tape member and a second guide means extends from the opposite funnel shaped edge portion of the planar surface for guiding the second tape member.

The means for separating the hooking elements from the complimentary hooking elements comprises a blade which extends from the lower portion of the planar surface found on the closure member toward the sheet members. The blade causes a shearing force, thus separating the hooking elements from the complimentary hooking elements when the closure member is traversed in an opening direction.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the complete closure assembly;

FIG. 2 is a sectional view of the closure assembly taken substantially along line 2-2 of FIG. 1; and

FIG. 3 is a sectional view of the closure assembly taken substantially along line 3-3 of FIG. 1.

DESCRIPTION OF PREFERRED EMBODIMENT

Referring initially to FIG. 1 of the drawing, the closure assembly 10 comprises first and second sheet members 11, 12 which are to be secured together. The sheet members 11, 12 may be flaps of a tent, boat sails, roof covers, tarpaulins or similar structures. As best shown in FIGS. 1 and 3 angle strip members 13, 14 are secured along one of their legs 15, 16 to the marginal edges 17, 18 of the sheet members 11, 12 respectively.

The angle strip members 13, 14 may be secured to the sheet members 11, 12 by using an adhesive or by any other suitable means.

Each of the angle strip members 13, 14 comprises legs, 15, 19 and 16, 20 respectively, each pair of legs defining a recessed guide in the form of a groove 21, 22 located along the points where the two legs of each angle strip member intersect. The angle strip members 13, 14 are semi-rigid in the sense that the legs of the angle strip members are resilient enough to bend to an applied stress and then return to their original configuration when the stress is relieved. In their normal position the angle between the legs 15, 19 and 16, 20 is less than 90° as shown in FIG. 1. However, the angle strip members must be of sufficient resiliency to permit the legs to open to an angle of approximately 90° upon an applied stress and then return to less than 90° when the stress is relieved. For example, angle strip members formed of plastic or vinyl would be eminently suitable for this purpose. It is important that the angle between the legs of each of the angle strip members be less than 90° when the assembly is in an open position, and the angle strip members be of flexible material permitting the legs to open to approximately 90° when the assembly is in a closed position and return to less than 90° when the assembly is opened for reasons to be explained hereafter.

Fastening tape members 30, 31 are secured to angle strip members 13, 14 along one surface of legs 19, 20 respectively as shown in FIGS. 1 and 3. The fastening tape members 30, 31 may be secured to the legs 19, 20 by stitching, using an adhesive or by any other suitable means.

Fastening tape 30 has a surface defined by a plurality of upstanding hooking elements 32 which are raised loop threads of synthetic material such as super polyamide. The hooking elements 32 may be cut at their outer extremities to form hooks as shown in the present embodiment or they may be closed loops. Fastening tape 31 has a surface defined by a plurality of complimentary hooking elements 33 which also are raised loop threads of synthetic material such as super polyamide. The complimentary hooking elements 33 may be closed loops as shown in the present embodiment or the loops may be cut at their outer extremities to form hooks. While hook-type hooking elements 32 have been provided on fastening tape 30 and loop-type hooking elements 33 have been provided on fastening tape 31, it is intended that they may be interchanged and thus hook-type hooking elements may be provided on tape 31 and loop-type hooking elements on tape 30. In fact, it is contemplated that a given tape surface could comprise both hook-type and loop-type hooking elements. When fastening tape members 30 and 31 are brought firmly into face-to-face engagement a large number of hooking elements 32 of tape 30 engage a large number of complimentary hooking elements 33 of tape 31. The elements 32, 33 so engaged, resist separation, but may be separated readily by a peeling force applied substantially normal to the interfacial plane of engagement.

A slidable closure member 40 of a basic "taped opening" or "funnel" design includes guide means 41, 42 extending from the closure member 40 which retain legs 19, 20 of angle strip members 13, 14 and slides

back and forth along the angle strip members. One preferred construction for the closure member, as shown, includes a top funnel shaped surface 43 having an upper substantially rectangular shaped portion 44 and a lower triangular shaped portion 45 having outwardly tapered sides. A first guide means 41 extends from one edge portion of the funnel shaped surface 43 into groove 21 located on angle strip member 13. A second guide means 42 extends from the opposite edge portion of the funnel shaped surface 43 into groove 22 located on angle strip member 14. The end portions of each of the guide means 41, 42 include slide portions, 46, 47 which basically conform to the shape of grooves 21, 22 so that the closure member can easily slide along the legs 19, 20 of angle strip members 13, 14, and also to prevent the guide means 41, 42 from easily being pulled out of the grooves.

As best shown in FIG. 2, the closure member 40 includes means for separating the hooking elements 32 from the complimentary hooking elements 33. In the preferred embodiment shown, the means consists of a blade 50 which extends from the lower portion of planar surface 43 toward the sheets members 11, 12.

As shown in FIG. 1, when the sliding closure member 40 is traversed in a "closing direction," the guides 41, 42 exert an inward force on legs 19, 20 of angle strip members 13, 14. Due to the inwardly tapered shape of guides 41, 42, legs 19, 20 are forced toward one another until tape members 30, 31 are brought into face-to-face relationship. The force exerted on the two tape members causes the engagement of a large number of hook-type hooking elements 32 with a large number of loop-type hooking elements 33, thus firmly joining tape member 30 to tape member 31. When in this closed position the angle between the leg members 15, 19 and 16, 20 respectively, is approximately 90°.

When the closure member 40 is traversed in the "opening direction," the blade 50 exerts an outwardly normal force (shearing force) along the interface between the joined tape members 30, 31 which tends to peel them apart thereby disengaging the hook-type hooking elements 32 from the loop-type hooking elements 33. Once the tape members are separated, legs 19 and 20 return to their normal position. Thus the angle between legs 15, 19 and 16, 20 is once more less than 90°. As the tape members separate and legs 19, 20 return to their normal position, the possibility of re-engaging the tape members, when this is not desired, is substantially eliminated.

Although not shown, the closure member 40 may include a handle portion such as a handle in the form of a ring secured to the top planar surface 43 of the closure member for allowing one to easily grasp the closure member and move the closure member in both an "opening" or "closing" direction.

The tape members 30, 31 with associated upstanding hook-type hooking elements 32 or loop-type hooking elements 33 may consist of the woven hook pile or loop pile material described in U.S. Pat. Nos. 2,717,437 and 3,009,235 or of the knitted loop pile or hook pile material described in commonly assigned copending U.S. Pat. application Ser. No. 659,669, filed Aug. 10, 1967. Alternatively, these hook and loop type hooking elements may consist of the molded plastic hook pile or loop pile material described in commonly assigned

copending U.S. Pat. application Ser. No. 824,597, filed May 14, 1969.

It will be seen from the foregoing description that a very simple yet effective means for securing sheet members together has been devised. The angle strip members which are secured to the sheet members and which have secured thereto the separable fastening tape members, provide a very simple and quick method for securing together sheet members when it is so desired, and for preventing the tape members from engaging one another when it is desired to have the sheet members apart.

We claim:

1. A closure assembly for releasably joining first and second sheet members comprising a first angle strip member and a second angle strip member, each strip member having flexible leg members and a groove defined at the intersection of the two leg members, the first angle strip member being secured to the first sheet member along one of its leg members and the second angle strip member being secured to the second sheet member along one of its leg members; a first tape member having a surface defined by a plurality of upstanding flexible hooking elements secured to the second leg of the first angle strip member; a second tape member having a surface defined by a plurality of upstanding flexible complimentary hooking elements secured to the second leg of the second angle strip member; a slidible closure member including guide means extending from the closure member into the grooves in the angle strip members for sliding therein, the guide means forcing the tape members into face-to-face engagement causing a large number of hooking elements on the first tape member to engage a large 35

number of complimentary hooking elements on the second tape member when the slidible closure member is traversed in a closing direction; and means for disengaging the hooking elements from the complimentary hooking elements.

2. A closure assembly according to claim 1 wherein the slidible closure member forms a three sided channel and includes a top funnel shaped planar surface having an upper substantially rectangular shaped portion and a lower triangular shaped portion having outwardly tapered sides, a first guide means extending from one of the funnel shaped edge portions of the planar surface for guiding the first tape member and a second guide means extending from the opposite funnel shaped edge portion of the planar surface for guiding the second tape member.

3. A closure assembly according to claim 2 wherein the means for separating the hooking elements from the complimentary hooking elements comprises a 20 blade extending from the lower portion of the planar surface toward the sheet members, the blade separating the hooking elements from the complimentary hooking elements when the closure member is traversed in an opening direction.

4. A closure assembly according to claim 1 wherein the angle between the leg members of each angle strip member is less than 90° when the assembly is in an opened position.

5. A closure assembly according to claim 1 wherein 30 the angle between the leg members of each angle strip member is about 90° when the assembly is in a closed position.

6. A closure assembly according to claim 1 wherein the sheet members are flexible panels.

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