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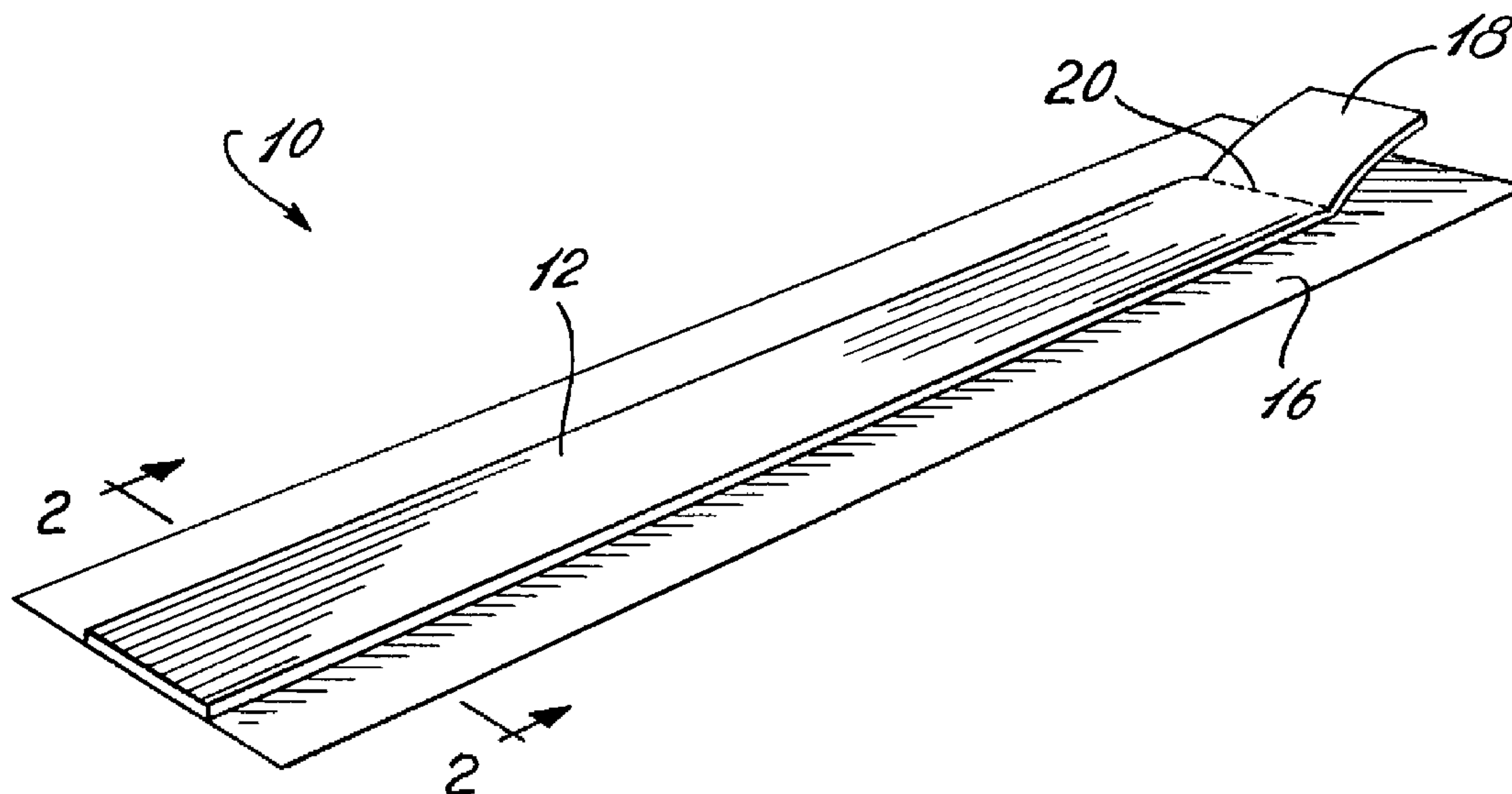
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(54) **BANDE ADHESIVE POUR SUTURE, A RETICULATION PAR
L'HUMIDITE**

(54) **MOISTURE-CURABLE ADHESIVE SUTURE STRIP**



(57) A moisture-curable adhesive suture strip for closing a wound on a patient comprises an elongated, flexible air-permeable backing strip having first and second surfaces facing away from one another and a length and width sufficient to secure facing edges of the wound in close juxtaposition with one another, and a moisture-curable adhesive substance coated on the first surface of the backing strip to adhere the strip to the patient with the facing edges of the wound in close juxtaposition, the adhesive substance comprising n-butyl 2-cyanoacrylate or octyl 2-cyanoacrylate. A first protective member is removably attached to the backing strip and covers the adhesive substance on the first surface thereof. After removal of the protective member to expose the adhesive substance and application of the backing strip with the exposed adhesive substance onto the patient to secure the facing edges of the wound in close juxtaposition, the adhesive substance upon curing together with the backing strip maintain the facing edges of the wound in close juxtaposition without the cured adhesive substance adversely affecting the flexibility of the backing strip.

ABSTRACT

A moisture-curable adhesive suture strip for closing a wound on a patient comprises an elongated, flexible air-permeable backing strip having first and second surfaces facing away from one another and a length and width sufficient to secure facing edges of the wound in close juxtaposition with one another, and a moisture-curable adhesive substance coated on the first surface of the backing strip to adhere the strip to the patient with the facing edges of the wound in close juxtaposition, the adhesive substance comprising n-butyl 2-cyanoacrylate or octyl 2-cyanoacrylate. A first protective member is removably attached to the backing strip and covers the adhesive substance on the first surface thereof. After removal of the protective member to expose the adhesive substance and application of the backing strip with the exposed adhesive substance onto the patient to secure the facing edges of the wound in close juxtaposition, the adhesive substance upon curing together with the backing strip maintain the facing edges of the wound in close juxtaposition without the cured adhesive substance adversely affecting the flexibility of the backing strip.

"MOISTURE-CURABLE ADHESIVE SUTURE STRIP"

The present invention pertains to improvements in the field of wound suturing. More particularly, the invention relates to a moisture-curable adhesive suture strip for closing a wound on a patient.

When closing a wound, it is necessary to join and keep together the facing edges of the wound. If the separated skin sections are sewn, unesthetical scars may remain, and if they are stapled, such scars generally remain.

Cyanoacrylate-based adhesives have been suggested as an alternative to sutures. When a cyanoacrylate adhesive is employed, the separated skin sections are joined and the adhesive is applied on top of the joined sections under sterile conditions. The cyanoacrylate adhesive bonds to the skin and polymerizes so as to keep together the joined sections. Although cyanoacrylate adhesives successfully bind the skin, the use of such adhesives as suture replacements can be accompanied by occasional adhesion failure resulting in wound reopening which requires closure by sutures. Fear of wound reopening is one of the reasons physicians have been reluctant to use any adhesive including cyanoacrylate based adhesives instead of sutures.

U.S. Patent No. 5,254,132 proposes a method of treating suturable wounds by first suturing or stapling the wound and then joining the skin between sutures or staples with a cyanoacrylate adhesive. According to this method, the wound is sutured or stapled so that the sutures or staples are separated from each other by no more than about 1.2 centimeter and no less than about 0.6 centimeter. Butyl 2-cyanoacrylate is then applied to the opposing and still separated skin sections between the sutures or staples in an amount sufficient so that upon

polymerization the skin sections are joined; the application is conducted so that contact of the cyanoacrylate adhesive with the sutures or staples is avoided. The adjacent separated skin sections are thereafter contacted under conditions that permit the adhesive to polymerize so as to join the separated skin sections. Such a method is not only time-consuming and requires particular skill to practice, but also delays healing of the wound if cyanoacrylate adhesive penetrates in between the skin sections.

Surgical adhesive plasters for closing wounds are also known. These plasters generally do not have much tensile strength so that their use is limited to shallow wounds requiring little tension to close. Another major disadvantage resides in their permeability to water, causing the plaster to become unstuck upon contact with water or moisture and thereby preventing the wounded area from being washed.

It is therefore an object of the present invention to overcome the above drawbacks and to provide a moisture-curable and pressure-sensitive suture strip for closing wounds.

In accordance with the invention, there is provided a moisture-curable adhesive suture strip for closing a wound on a patient, comprising:

an elongated, flexible air-permeable backing strip having first and second surfaces facing away from one another and a length and width sufficient to secure facing edges of the wound in close juxtaposition with one another;

a moisture-curable adhesive substance coated on the first surface of the backing strip to adhere the strip to the patient with the facing edges of the wound being in close juxtaposition, the adhesive

substance comprising n-butyl 2-cyanoacrylate or octyl 2-cyanoacrylate; and

5 a first protective member removably attached to the backing strip and covering the adhesive substance on the first surface thereof.

After removal of the protective member to expose the adhesive substance and application of the backing strip with the exposed adhesive substance onto the patient to secure the facing edges of the wound in
10 close juxtaposition, the adhesive substance upon curing together with the backing strip maintain the facing edges of the wound in close juxtaposition, without the cured adhesive substance adversely affecting the flexibility of the backing strip.

15 Applicant has found quite unexpectedly that by using a flexible and air-permeable backing strip and coating one surface of such a strip with a n-butyl 2-cyanoacrylate or octyl 2-cyanoacrylate adhesive, one obtains a suture strip which can be easily and rapidly
20 applied onto the patient to secure the facing edges of the wound in close juxtaposition with one another, without the adhesive entering into the wound and delaying healing thereof. The adhesive upon curing together with the backing strip maintain the facing edges of the wound
25 in close juxtaposition, thereby preventing adhesion failure and reopening of the wound. Since the flexibility of the strip is not adversely affected by the cured cyanoacrylate adhesive, the suture strip remains flexible and can thus follow movements of the skin. The curing
30 time of n-butyl 2-cyanoacrylate is about 30 seconds, whereas that of octyl 2-cyanoacrylate is about 60 seconds. The strip is of course air-permeable to enable the skin to breathe.

Preferably, the backing strip comprises a nylon
35 web or a porous sheet of nylon resin. The protective

member, on the other hand, preferably comprises a sheet of high density polyethylene.

According to a preferred embodiment of the invention, a finger-grip tab is detachably connected to the backing strip at one end thereof along a tear line extending transversely of the strip. Such a tab enables one to pull the backing strip away from the protecting member and thereby remove the latter to expose the adhesive on the strip. After the strip has been applied onto the patient's skin, the tab is torn away. Preferably, the protective member is substantially coextensive with the backing strip along the length thereof and the tab, and extends beyond opposite side edges of the strip and tab.

According to another preferred embodiment, a second protective member having a pressure-sensitive adhesive substance coated on one side thereof is removably attached to the backing strip and covers the second surface, the strip being disposed between the first and second protective members. Examples of suitable pressure-sensitive adhesives which may be used include rubber or oil-based adhesives. The second protective member comprises preferably a film of low density polyethylene. Preferably, each of the first and second protective members extends beyond opposite end edges and opposite side edges of the backing strip to define respective first and second end portions and first and second lateral portions. The first end portions and the first and second lateral portions of the first and second protective members face one another and are releasably bonded together by the pressure-sensitive adhesive substance. The second end portion of the second protective member faces the second end portion of the first protective member and is partially free of adhesive

so as to define with the second end portion of the first protective member a pair of finger-grip tabs.

Further features and advantages of the present invention will become more readily apparent from the following description of preferred embodiments as
5 illustrated by way of examples in the accompanying drawings, in which:

Figure 1 is a perspective view of a moisture-curable adhesive suture strip according to a preferred
10 embodiment of the invention;

Figure 2 is a sectional view taken along line 2-2 of Fig. 1;

Figure 3 is a perspective view of moisture-curable adhesive suture strip according to another
15 preferred embodiment of the invention;

Figure 4 is a perspective view of a moisture-curable adhesive suture strip according to a further preferred embodiment of the invention;

Figure 5 is a sectional view taken along line
20 5-5 of Fig. 4; and

Figure 6 is a view illustrating how the lower protective member is peeled-off the suture strip of Fig. 4 to expose the adhesive coating on the backing strip.

Referring to Figs. 1 and 2, there is illustrated a moisture-curable adhesive suture strip which is generally designated by reference numeral 10 and used for closing a wound on a patient (not shown). The suture strip 10 comprises an elongated, flexible and air-permeable backing strip 12 having a wound facing surface
30 coated with n-butyl 2-cyanoacrylate or octyl 2-cyanoacrylate adhesive 14. The backing strip 12 has a length and width sufficient to secure facing edges of the wound in close juxtaposition to one another. A protective
35 member 16 is removably attached to the backing strip 12

and covers the adhesive 14. A finger-grip tab 18 is detachably connected to the backing strip 12 at one end thereof along a tear line 20 extending transversely of the strip 12. As shown, the protective member 16 is substantially coextensive with the backing strip 12 along the length thereof and the tab 18, and extends beyond opposite side edges of the strip 12 and tab 18.

In use, the protective member 16 is first peeled-off to expose the adhesive 14 while holding the tab 18 with one's fingers. The end portion of the strip 12 opposite the tab 18 is adhered to one of the separated skin sections, which is then pulled in a direction towards the other separated skin section to bring the facing edges of the wound in close juxtaposition with one another, and the other end portion of the strip 12 adjacent the tab 18 is adhered to the other skin section, thereby closing the wound and securing the facing edges thereof in close juxtaposition. The tab 18 is thereafter torn along the tear line 20.

The embodiment 10' illustrated in Fig. 3 is similar to that shown in Fig. 1, with the exception that a much wider protective member 16' is used to accommodate a plurality of backing strips coated with n-butyl 2-cyanoacrylate or octyl 2-cyanoacrylate adhesive.

Turning to Figs. 4 to 6, there is illustrated another moisture-curable adhesive suture strip which is generally designated by reference numeral 22 and comprises an elongated, flexible and air-permeable backing strip 24 having surfaces 26 and 28 facing away from one another with the surface 26 being coated with n-butyl 2-cyanoacrylate or octyl 2-cyanoacrylate adhesive 30. The backing strip 24 has a length and width sufficient to secure facing edges of the wound in close juxtaposition to one another. A protective member 32 is removably attached to the backing strip 24 and covers the

adhesive 30. A further protective member 34 having a pressure-sensitive adhesive 36 coated on one side thereof is removably attached to the backing strip 24 and covers the surface 28. As shown, the strip 24 is disposed
5 between the protective members 32 and 34.

The protective member 32 extends beyond the end edges and side edges of the backing strip 24 to define end portions 38,40 and lateral portions 42,44. Similarly, the protective member 34 extends beyond the end edges and
10 side edges of the backing strip 24 to define end portions 46,48 and lateral portions 50,52. The end portions 38,46 and lateral portions 42,50 and 44,52 face one another and are releasably bonded together by the adhesive 36. The end portion 48 is partially free of adhesive so as to
15 define with the end portion 40 a pair of finger-grip tabs, the tab defined by the end portion 48 being foldable along the fold line 54.

Figure 6 illustrates how the protective member 32 is peeled-off to expose the adhesive 30 on the backing
20 strip 24. The strip 24 with the exposed adhesive 30, carrying the protective member 34, is used in the same manner as the suture strip 10 shown in Figs. 1-3 to close a wound. After the facing edges of the wound have been secured in close juxtaposition to one another, the
25 protective member 34 is peeled-off.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A moisture-curable adhesive suture strip for closing a wound on a patient, comprising:

an elongated, flexible air-permeable backing strip having first and second surfaces facing away from one another and a length and width sufficient to secure facing edges of the wound in close juxtaposition with one another;

a moisture-curable adhesive substance coated on the first surface of said backing strip to adhere said strip to the patient with the facing edges of the wound in said close juxtaposition, said adhesive substance comprising n-butyl 2-cyanoacrylate or octyl 2-cyanoacrylate; and

a first protective member removably attached to said backing strip and covering the adhesive substance on the first surface thereof;

whereby after removal of said protective member to expose said adhesive substance and application of said backing strip with the exposed adhesive substance onto said patient to secure the facing edges of said wound in said close juxtaposition, said adhesive substance upon curing together with said backing strip maintain the facing edges of said wound in said close juxtaposition without the cured adhesive substance adversely affecting the flexibility of said backing strip.

2. A suture strip according to claim 1, wherein said backing strip comprises a nylon web.

3. A suture strip according to claim 1, wherein said backing strip comprises a porous sheet of nylon resin.

4. A suture strip according to claim 1, 2 or 3, wherein said adhesive substance comprises octyl 2-cyanoacrylate.
5. A suture strip according to claim 1, 2 or 3, wherein said adhesive substance comprises n-butyl 2-cyanoacrylate.
6. A suture strip according to anyone of claims 1 to 5, wherein said protective member comprises a sheet of high density polyethylene.
7. A suture strip according to anyone of claims 1 to 6, wherein a finger-grip tab is detachably connected to said backing strip at one end thereof along a tear line extending transversely of said strip.
8. A suture strip according to claim 7, wherein said protective member is substantially coextensive with said backing strip along the length thereof and said tab, and extends beyond opposite side edges of said strip and said tab.
9. A suture strip according to anyone of claims 1 to 6, wherein a second protective member having a pressure-sensitive adhesive substance coated on one side thereof is removably attached to said backing strip and covers said second surface, said strip being disposed between said first and second protective members.
10. A suture strip according to claim 9, wherein said second protective member comprises a film of low density polyethylene.

11. A suture strip according to claim 9, wherein each of said first and second protective members extends beyond opposite end edges and opposite side edges of said backing strip to define respective first and second end portions and first and second lateral portions, and wherein the first end portions and the first and second lateral portions of said first and second protective members face one another and are releasably bonded together by said pressure-sensitive adhesive substance, the second end portion of said second protective member facing the second end portion of said first protective member and being partially free of adhesive so as to define with the second end portion of said first protective member a pair of finger-grip tabs.

