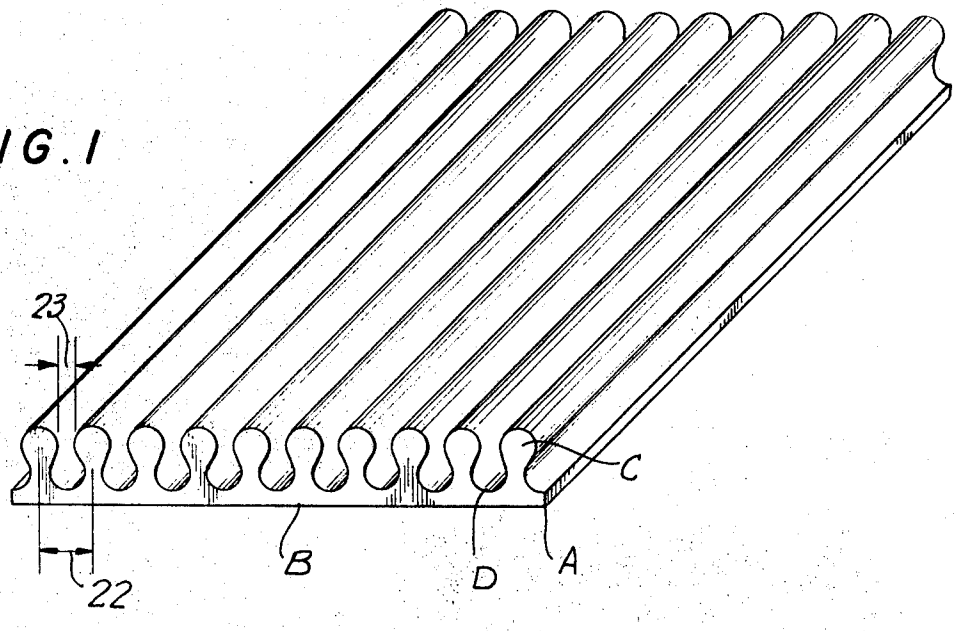
Jan. 26, 1971 W. H. ENGLE 3,557,413

NONMECHANICAL CLOSURE

Filed Sept. 23, 1968 2 Sheets-Sheet 1

FIG. 1



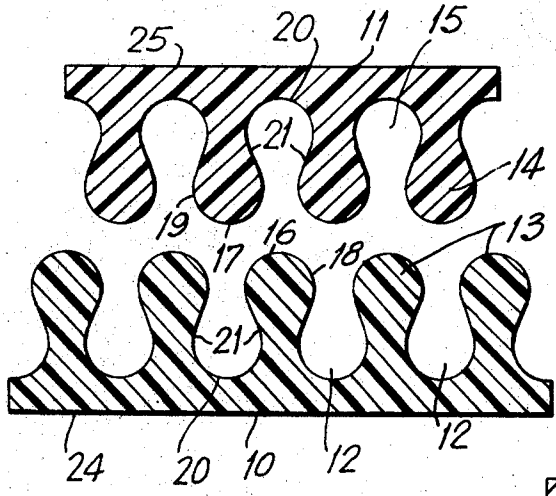




FIG. 2

FIG. 3

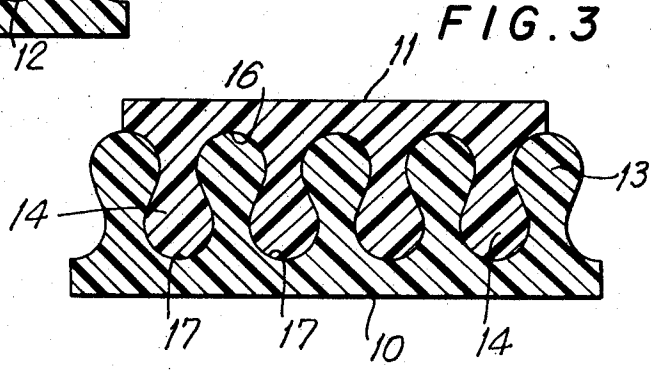
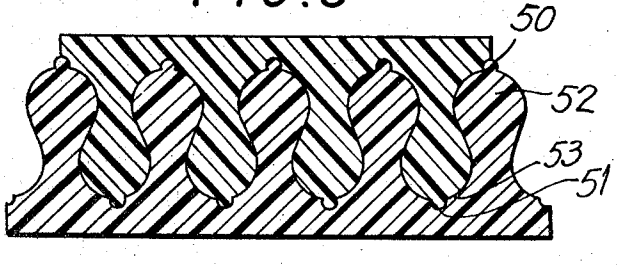



FIG. 8




INVENTOR.
WILLIAM H. ENGLE

BY

ATTORNEY

Jan. 26, 1971 W. H. ENGLE 3,557,413

NONMECHANICAL CLOSURE

Filed Sept. 23, 1968 2 Sheets-Sheet 2

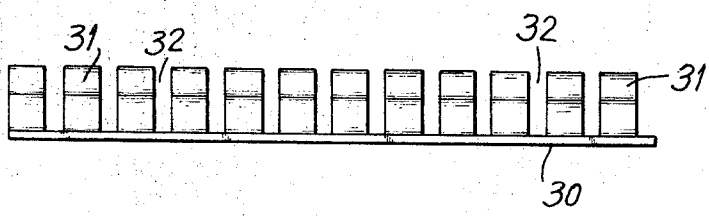



FIG. 4

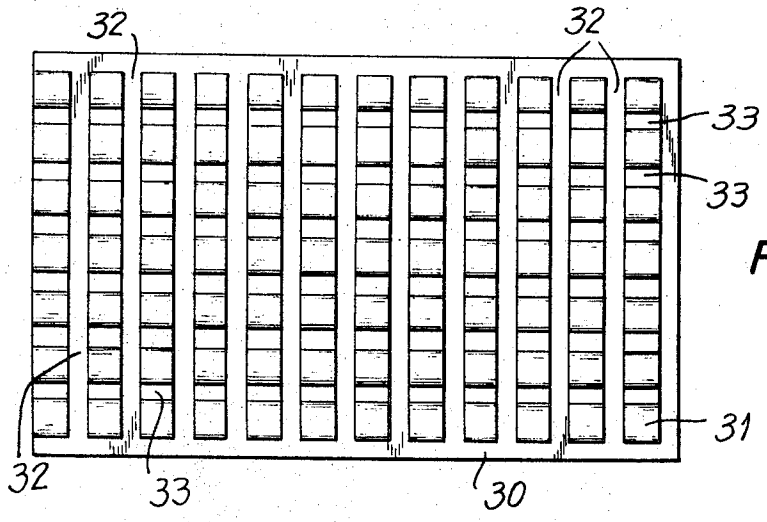



FIG. 5

FIG. 6

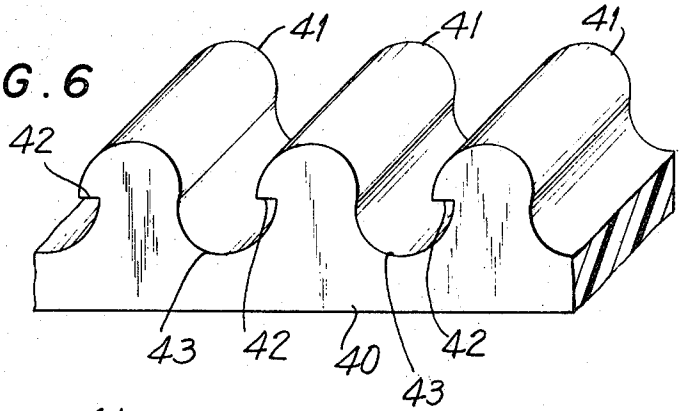
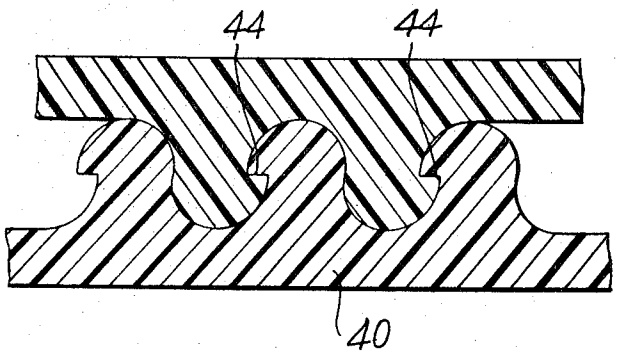



FIG. 7




INVENTOR.
WILLIAM H. ENGLE

BY

ATTORNEY

United States Patent Office 3,557,413
Patented Jan. 26, 1971



3,557,413

# NONMECHANICAL CLOSURE

William H. Engle, 10 Hillvale Road,
Syosset, N.Y. 11791

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Int. Cl. A44b 17/00, 19/14
U.S. Cl. 24—201 4 Claims

## ABSTRACT OF THE DISCLOSURE

The present disclosure describes a non-mechanical closure consisting of conforming ridged and grooved resealable locking members. The locking members each have a plurality of parallel locking nipples which may be formed of extruded low density plastic. The locking nipples may be continuous, though they may be interrupted. They are attached by stitching or adhesion to various types of fabrics, garments and other objects which are to be fastened together by detachable means.

## DESCRIPTION OF THE INVENTION

The present invention relates to a non-mechanical closing and holding device, which is preferably formed of extruded plastic materials.

It is among the objects of the present invention to provide a non-mechanical detachable fastening device without using opening or closing zipper members, which may be readily attached to fabrics, garments, cardboard flaps, or the like for detachable fastening purposes.

Another object of the present invention is to provide a detachable closure which may be readily re-sealed and opened and which can be produced economically at low cost and may be attached at a minimum of expense and without difficulty to sheet materials such as fabrics or paper.

A further object is to provide a fastening device which can be readily used in connection with packaging, particularly cardboard packaging, which will adequately secure the flaps and closures together, with elimination of the usual tapes and metal strips.

Still further objects and advantages will appear in the more detailed description set forth below, it being understood, however, that this more detailed description is given by way of illustration and explanation only and not by way of limitation, since various changes therein may be made by those skilled in the art without departing from the scope and spirit of the present invention.

In accomplishing the above objects it has been found most satisfactory, according to the present invention, to provide extruded plastic strips having upwardly projecting therefrom a series of parallel closely spaced ridged members which will extend the length of the fastening device and which are separated by parallel grooves. The ridged members and the grooves should have the same cross-section with enlargements at the top and bottom thereof, so that the ridges and grooves may be readily locked together.

At the same time the base material is desirably of a low density plastic which will permit the ridges and grooves on opposite members to be locked together and when forced together to resist transverse separation, although permitting sliding of the elements in respect to each other. The density of the plastic and the pliability thereof will affect the strength of the attachment.

In the cross-sectional shape of the ridges the device thereof may be enlarged, while the groove between the ridges will have the same shape, with the bottoms thereof similarly enlarged. The bottoms of the grooves may have small recesses extending longitudinally therethrough, which are matched by small projections on the top of the



ridge elements. The ridge elements, as well as the grooves, may also be shouldered or have the re-entrant tooth elements to enhance the attachment.

In general, the male and female elements are of similar or same cross-section, and, when pressed together, will lock together with the projections of one element completely filling the recesses or grooves in the other element.

The cross-sectional shapes may be considerably varied to give the locking effect and the strength of the attachment will be controlled not only by the size of the nipple but also in accordance with the density of the material. The preferred material is a low density plastic, such as polyvinyl chloride, but it is also possible to utilize polyethylene or low density polystyrene. The device may be particularly used for fastening garments, shoes or belts, for bag closures, for sealing bags and cartons, and for a wide variety of purposes where fastenings are utilized in the clothing and packaging field.

## BRIEF DESCRIPTION OF DRAWINGS

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts as hereinafter more specifically described, and illustrated in the accompanying drawings, wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which fall within the scope of the claims hereunto appended.

In the drawings wherein like reference characters denote corresponding parts throughout the several views:

FIG. 1 is a top perspective plan view of a section of the fastening element of the present invention.

FIG. 2 is a transverse sectional view indicating how the male and female elements may be attached together.

FIG. 3 is a transverse sectional view, similar to FIG. 2, showing the elements attached together.

FIG. 4 is a side elevational view showing the fastening elements of FIGS. 1 to 3, transversely interrupted.

FIG. 5 is a top plan view of the interrupted structure of FIG. 4.

FIG. 6 is a side perspective view of another form of interlocking ridge.

FIG. 7 is a transverse sectional view showing the functioning of the interlocking ridges of FIG. 6.

FIG. 8 is a transverse sectional view of an alternative embodiment.

Referring to FIG. 1, the extrusion A of polyvinyl chloride, polyethylene or low density polystyrene has a base structure B and a plurality of parallel, upwardly projecting ridges C and recesses D. The extrusion of FIG. 1 may be cut into two portions, the base or female portion **10** and a male or locking portion **11**. It will be noted that the cross-sections of the recesses or grooves **12** are the same as cross-sections of the upwardly projecting portions **13** in the base portion **10**, and this is also true of the projecting portions **14** and the recesses **15** of the male structure, as shown in FIG. 2.

In general, the projecting portions **13** and **14** will have a curved top face **16** in the lower element **10** and **17** in the upper element **11**, the projecting side faces **18** in the lower section **10** and **19** in the upper section **11**.

The recesses **12** of the bottom section or element **10** and the top element **11** are similarly formed with curved bottoms **20** and with inwardly converging sides **21**, which also form the sides of the knoblike cross-sections of the ridges **13** and **14**. As a result, when these elements are pressed together, as shown in FIG. 3, they will engage and lock together with the resiliency of the polyplastic material, assuring a tight gripping action.

The low density plastic material, which forms the body of the fastening elements of FIGS. 2 and 3, may be varied in density and size so as to give varying gripping effects.

For example, a separation between the mid-section of the projecting elements, as indicated by the dimension **22**, may be $\frac{3}{64}$ of an inch, while the matching width of each projecting element may be $\frac{1}{16}$ of an inch.

The space between the projecting ridges C, as indicated by the dimension **23**, may be $\frac{1}{32}$ of an inch. The elements **10** and **11** of FIGS. 2 and 3 may be cut off in small sections, varying in dimension from 1 inch to 2 inches and may be attached at their bottom faces **24** and **25** by adhesive, heat or other means of attachment.

In the embodiment of FIGS. 4 and 5, the base structure **30** may be used for attachment purposes and the ridge members **31** may be cut as indicated at **32** by milling. These recesses or grooves **32** may be $\frac{1}{2}$, $\frac{1}{3}$ or $\frac{3}{4}$ of the locking nipples or projections **31**, which may be of the same cross-section as already illustrated in connection with FIGS. 1 to 3.

The structures of FIGS. 4 and 5 may be stitched to a base fabric or other sheet material by stitching along the recesses **32** and the projecting elements **31** may fit in the spaces **33** of an opposite element to give the locking effect.

In FIG. 6, the base material **40** is shown as having the projecting elements **41**, with the shoulders **42** above the bottom of the grove **43**. As shown in FIG. 4, these members will lock together at **44** to give a firm fastening.

FIG. 8 shows a modification of FIGS. 1 to 3 in which there are projections **50** with corresponding recesses **51** over the top of the ridges **52** and the bottom of the recesses **53**. This will aid in the locking effect when the members are engaged together, as shown in FIG. 8.

As many changes could be made in the above non-mechanical closure, and many widely different embodiments of this invention could be made without departure form the scope of the claims, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

Having now particularly described and ascertained the nature of the invention, and in what manner the same is to be performed, what is claimed is:

**1.** An extruded flexible plastic non-mechanical closing and holding device for detachably fastening together sheet materials which comprises providing inter-engaging ridged and grooved elements of the same cross-section formed of a pliable elastic material, selected from the group consisting of low density polyvinyl chloride, polyethylene and polystyrene, said elements having base portions and elongated projecting ridges of enlarged outer circular cross-section and reduced converging neck portions connecting the outer cross-section to the base portions and the elongated spaces between said projecting ridges having the same shaped relatively wide recessed spaces between neck portions and narrow spaces between the enlarged outer cross-sections, said elongated ridges being of sinuous cross-section with the outer portions being enlarged and the base portions being narrowed so as to form a series of closely spaced knobs in cross-section transverse to the longitudinal direction of the ridges and mounted integrally on a thin base sheet, the ridge portions being cut transversely at spaced intervals so as to provide intermediate channels, said cutting being down to said base sheet.



**2.** The device of claim **1**, in which the cross-sections of the elements are identical in shape and, when reversed upon one another and inter-engaged, will firmly lock together.

**3.** The device of claim **1**, in which the ridges have sidewardly projecting shoulder elements and the ridges will have conforming recessed portions to conform with said shouldered ridge portions forming transverse channels, said cuts slightly smaller than the residual portions of the interrupted ridge portions.

**4.** The device of claim **1**, the ridges and grooves being preferably separated by about $\frac{3}{64}$ of an inch at their mid-sections and having an average width of about $\frac{1}{16}$ of an inch.


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BERNARD A. GELAK, Primary Examiner

U.S. Cl. X.R.

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