July 14, 1970 F. A. CLARK 3,520,035

FASTENING DEVICE

Filed May 2, 1968

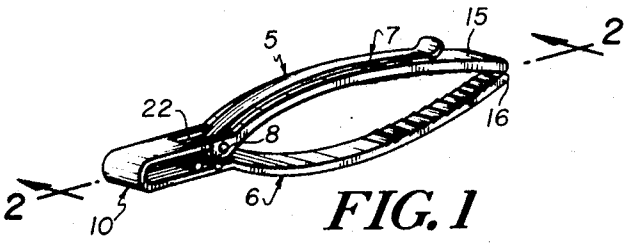


FIG. 1

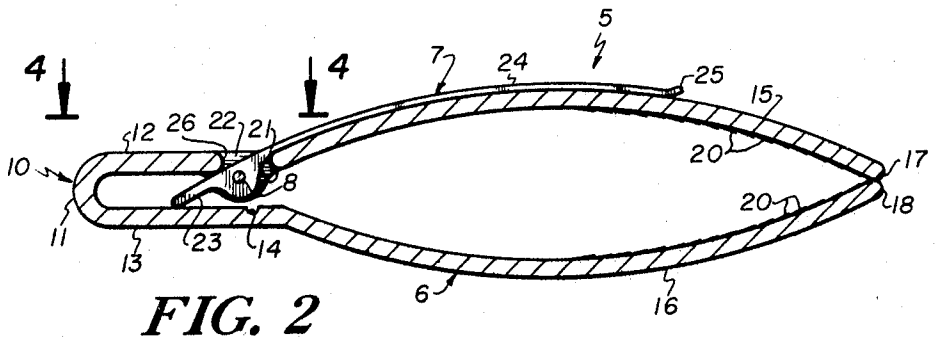


FIG. 2

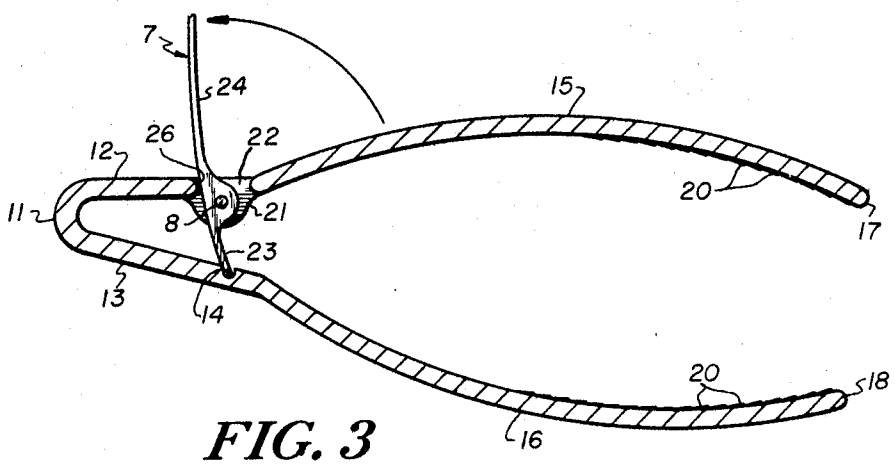


FIG. 3

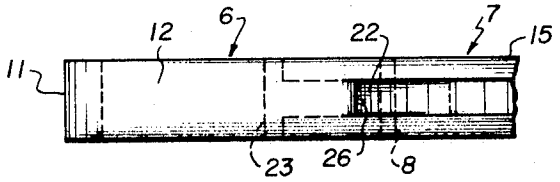


FIG. 4

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FASTENING DEVICE

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ABSTRACT OF THE DISCLOSURE

A fastening device, especially useful in lieu of safety pins or the like, to releasably hold together parts of a diaper. The device includes a clamp unit consisting of a U-shaped member, having a web and a pair of parallel arms, and a pair of arcuate jaw members, each of which is an extension of a corresponding arm. One of the arms is provided with a through opening and the other with a recess in its inner surface opposite the opening. A lever extends through the opening and is pivotally connected to said one of the arms about an axis across the opening. The part of the lever to one side of the axis projects into the space between the arms and toward the web, while the part of the lever to the other side of the axis is exterior the clamp unit and normally overlies a jaw member. The distance between the axis and the free end of said one part of the lever is greater than the distance between the axis and the recess when the device is in normal closed condition. Pivotal movement of the lever in one direction about the axis causes relative outward flexing of the arms and registration of the free end of said one part of the lever with the recess.

BACKGROUND OF THE INVENTION

This invention relates in general to a device for uniting parts of an article or a plurality of articles and, more particularly, to a fastening device having improved features of design and construction. The invention pertains, in one of its specific aspects to a spring type fastening device which may be advantageously used in place of safety pins or the like for holding together parts of a diaper.

As is well known, safety pins are commonly employed to join parts of diapers or other articles worn by infants. Such pins are highly objectionable for the reason that they have sharply pointed tip elements that are potentially dangerous. While numerous attempts have been made over the years to overcome the objections to safety pins, none has heretofore been successful.

The fastening device of this invention is intended to, and does in fact, successfully and advantageously overcome the inherent objections to safety pins as will be evident from the ensuing detailed description and the accompanying drawing.

SUMMARY OF THE INVENTION

A preferred fastening device according to this invention comprises a resilient clamp unit including a U-shaped member, having a web and a pair of spaced parallel arms, and a pair of jaw members which are extensions of corresponding arms. An opening is provided at the juncture of one of the arms and its jaw member. A lever extends through the opening and is pivotally connected to the clamp unit by a pin having an axis which extends across the opening. The part of the lever to one side of the pin axis projects into the space between the arms and toward the web. The part of the lever to the other side of the pin axis is positioned exterior the clamp unit. The arms are adapted to be flexed outwardly relative to each other in response to pivotal movement of the lever in one direction about the pin axis. A recess is provided in the inner surface of the other arm. The parts are so constructed and arranged that the free end of said one part of the lever registers with the recess upon predetermined pivotal movement of the lever in said one direction whereby to releasably maintain the clamp unit in open condition. Upon pivotal movement of the lever in a reverse direction, the lever is released from the recess allowing the parts to return to normally closed condition.

It is the primary object of this invention to provide a fastening device having improved features of design and construction.

Another object of this invention is to provide a novel spring type fastening device that is adapted to effectively and releasably hold together parts of an article or a plurality of articles by a simple clamping action.

Another object of this invention is to provide a fastening device that is devoid of sharp points or other potentially dangerous elements in use.

A further object of this invention is to provide a fastening device that is adapted to be readily and conveniently operated by one hand, thereby leaving a person's other hand free.

A still further object of this invention is to provide a device of the character indicated that is simple, compact and attractive in design; that is sturdy and durable in construction; that is reasonable in manufacturing costs; and that is capable of performing its intended fuctions in a satisfactory and dependable manner.

The enumerated objects and additional objects, together with the advantages of the invention, will be readily apparent to persons trained in the art from the following detailed description and the accompanying drawing which respectively describe and illustrate a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing, wherein like reference numerals identify corresponding parts in the several views:

FIG. 1 is an isometric view of a fastening device according to this invention and illustrates the relative position of the parts when the device is in normal closed condition;

FIG. 2 is a view in enlargement taken along line 2—2 of FIG. 1;

FIG. 3 corresponds to FIG. 2 and illustrates the relative position of the parts when the device is in fully open condition, a portion of the actuating lever shown in FIGS. 1 and 2 being omitted; and

FIG. 4 is an enlarged, fragmentary, top plan view taken along line 4—4 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Reference is first had to FIG. 1 which illustrates a preferred and recommended form of fastening device **5** that is constructed in accordance with this invention. Device **5** is composed of three parts, namely a clamp unit **6**, an actuating lever **7** and a pivot pin **8**. These parts are preferably made of a suitable, non-corrosive, acid-resistant metal.

Clamp unit **6**, which is best shown in FIGS. 2 and 3, is of one-piece construction and is resilient. This unit comprises a generally U-shaped member **10** which consists of a web **11**, an upper arm **12** and a lower arm **13** having a transverse recess **14**. Integral with and extending beyond each arm **12** and **13** is a corresponding elongated arcuate jaw member **15** and **16**. The jaw members are oppositely disposed and relatively inverted, member **15** being convex and member **16** being concave. The free ends of the jaw members are rounded, as indicated at **17** and **18**, respectively, and are in engagement when the device is in its normal closed condition (FIG. 2).

Each jaw member is serrated or otherwise roughened along its inner surface, as indicated at **20**, to provide frictional gripping or holding engagement with an article during use.

The portion **21** of clamp unit **6**, in the region of the juncture of arm **12** and jaw member **15**, is of greater thickness than the remainder of this unit and is provided with a rectangular through opening **22**.

Actuating lever **7** extends through opening **22** and projects into the space between arms **12** and **13** and toward web **11**. As is indicated in the several views, lever **7** is pivotally connected to clamp unit **6** by a pin **8** which extends through aligned openings (not shown) in clamp unit portion **21** and in the lever. The lever consists of two parts, namely a first part **23** which is to one side of the axis of pin **8** and a second part **24** which is to the opposite side of the axis of pin **8**. Lever part **23** is positioned wholly within the confines of U-shaped element **10**. The major portion of lever part **24** is positioned exterior the clamp unit and has a configuration conforming to that of part of jaw member **15** whereby it overlies and bears against the jaw member when the fastening device is in closed condition (FIGS. 1 and 2). The free end of lever part **24** is rounded and is slightly upturned, as indicated at **25**, to facilitate actuation.

It will be noted from an examination of FIG. 2 that the distance between the axis of pin **8** and the free end of lever part **23** is greater than the distance between the pin axis and the inner surface of the arm **13** of the clamp unit.

The parts are so constructed and arranged as to assume the relative position shown in FIG. 2 when the fastening device is in fully closed condition due to the resilience of clamp unit **6**. The fastening device may be readily actuated from closed condition (FIG. 2) to fully open condition (FIG. 3) by moving lever **7** in a counter-clockwise direction about the axis of pin **8**, as indicated by the arrow in FIG. 3. In the course of such movement, lever part **23** rides along the inner surface of arm **13** and causes relative outward flexing movement of arms **12** and **13** and corresponding relative outward movement of jaw members **15** and **16**. Upon predetermined counter-clockwise movement of lever **7**, the free end of part **23** registers with recess **14** and part **24** of the lever bears against an abutment **26** which is formed by a portion of arm **12** that defines opening **22**. When the parts are in this relative position, the device is releasably maintained in fully opened condition by the lever.

The fastening device is readily converted from open condition (FIG. 3) to closed condition (FIG. 2) by simply swinging lever **7** in a clockwise direction about the axis of pin **8**. This disengages the lever from recess **14** and allows the parts to return to the relative position shown in FIGS. 1 and 2 due to the resiliency of the clamp unit.

It will be appreciated that parts of a diaper or other article may be readily introduced between jaw members **15** and **16**, when the device is in fully or partly open condition, and be firmly gripped by the jaw members, when lever **7** is released and allowed to move toward closed condition.

If desired, the exposed parts of the illustrated form of the invention may be coated with a suitable protective material, such as an appropriate synthetic plastic composition, that is resistant to moisture, acids and cleansing compounds.

Based on the foregoing, it is believed that the construction, objects and advantages of my present invention will be readily comprehended by persons skilled in the art, without further description.

I claim:

1. A fastening device comprising:

(a) a clamp unit made of a resilient material and including:

(1) a generally U-shaped member consisting of:

(a) a web; and

(b) a pair of spaced generally parallel arms; and

(2) a pair of jaw members, each of which is an extension of a corresponding arm,

said jaw members being oppositely convex in a lengthwise direction,

the clamp unit defining an opening in the region of the juncture of one of the arms and the corresponding jaw member; and

(b) a lever extending through said opening and being pivotally connected to the clamp unit about an axis which extends across said opening, the part of the lever to one side of said axis projecting into the space between the arms and toward the web, the part of the lever to the opposite side of said axis being positioned exterior the clamp unit, having a configuration conforming to that of the outer surface of a jaw member and overlying said jaw member when the device is in normal closed condition, the arms being adapted to be flexed outwardly relative to each other in response to pivotal movement of the lever in one direction about said axis.

2. A fastening device according to claim **1** wherein:

(a) the exposed surface of the parts are non-corrosive and acid-resistant;

(b) the distance between said axis and the free end of said one part of the lever is greater than the distance between said axis and the inner surface of the other arm;

(c) the other arm is formed with a recess to receive the free end of said one part of the lever in response to predetermined pivotal movement of the lever about said axis in said one direction; and

(d) the inner surfaces of the jaw members are roughened to effect frictional holding engagement with an article that is adapted to be positioned therebetween.

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