Sept. 21, 1965 E. SCHUMM 3,206,814

QUICK-RELEASE CLOSURE

Filed Jan. 21, 1964 2 Sheets-Sheet 1

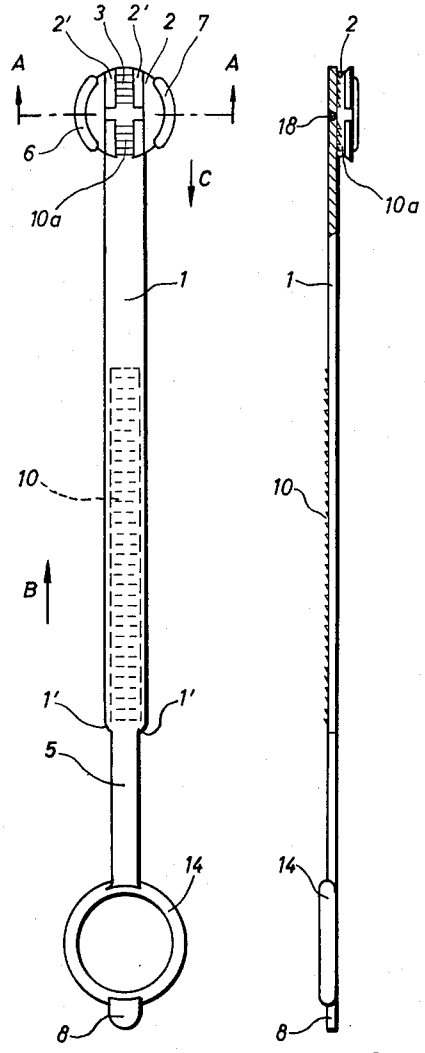

Fig. 1

Fig. 2

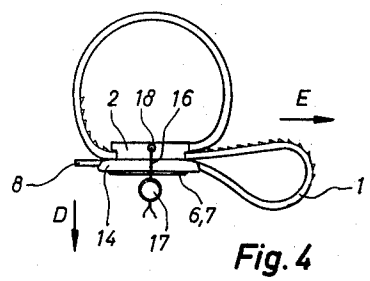

Fig. 4

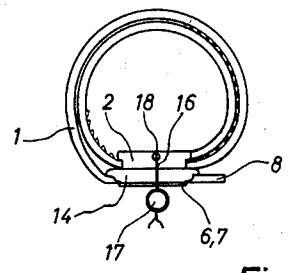

Fig. 5

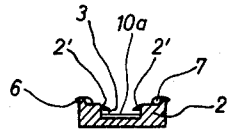

Fig. 3

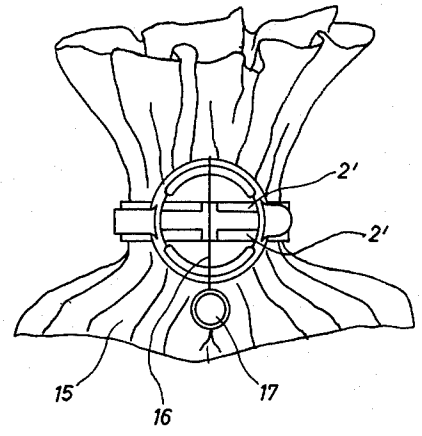

Fig. 6

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QUICK-RELEASE CLOSURE

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2 Sheets-Sheet 2

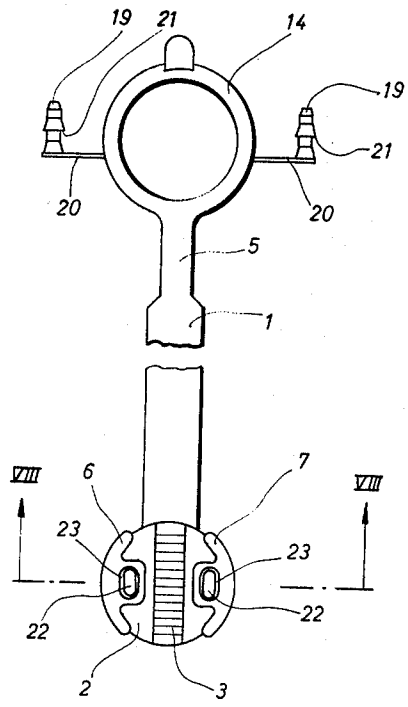

Fig. 7

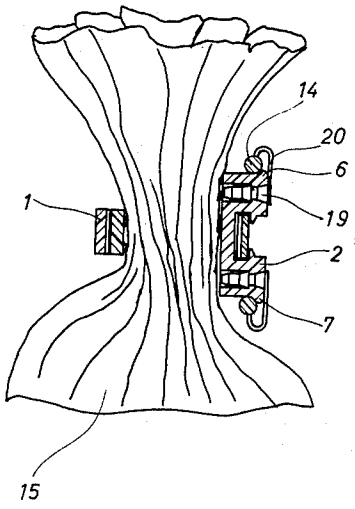

Fig. 9

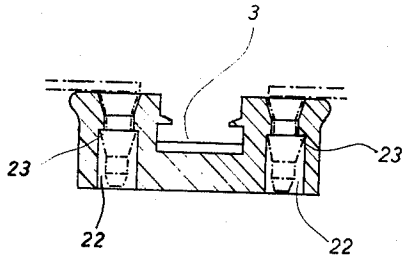

Fig. 8

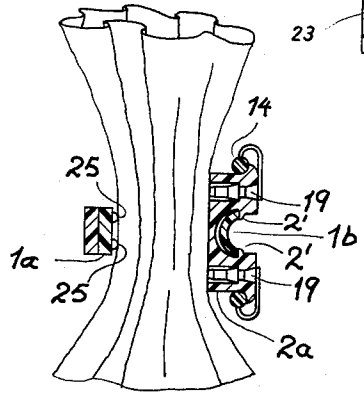

Fig. 10

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3,206,814

QUICK-RELEASE CLOSURE

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Claims priority, application Germany, Jan. 23, 1963, Sch 32,643
14 Claims. (Cl. 24—20)

My present invention relates to a quick-release sling-type closure of the type described and claimed in my copending application Serial. No. 245,821 filed Dec. 19, 1962 of which the present application is a continuation-in-part.

In my above-identified copending application I disclose an improved elongated flexible closure member adapted to be wound about a package (e.g. to encircle the neck of a sack or the wrapping of a carton) and having engaging means in the form of a head at one end adapted to effect a rapid opening of the device upon a tug on the band.

This closure has its head provided with a longitudinally extending channel adapted to receive the band and provided with a floor or other wall portion, juxtaposable with a toothed surface of the band, which is provided with another longitudinal array of teeth interengageable with the teeth of the band. Thus the floor of the channel can be provided with a first longitudinal array of teeth engageable with a second longitudinal array of teeth formed in the surface of the band juxtaposed with the floor of the channel in a closed condition of the closure. When the band is drawn through the channel, this second array of teeth engages with the teeth of the first array to lock the closure members; the longitudinally extending channel is partly defined by a pair of lateral members yieldably overlying the channel on opposite sides thereof to form a gap communicating with this channel through which a narrow portion of the band can be inserted, the teeth being provided upon the relatively wide portion of this band. Under these circumstances, a pull on the band in a direction transverse to its major dimension, i.e. perpendicularly to the channel, will cause deflection of the members overlying the channel and permit the band to be withdrawn from the channel through the gap. The dual array of teeth permits the use of teeth whose individual heights are substantially less than that required when a single array of teeth was provided. With the dual arrays, the band must be raised away from the floor of the channel by a distance equal to at least twice the height of the teeth for any slippage of the closure to occur. As described in my copending application mentioned above, therefore, the height of the channel is so chosen as to be equal to the thickness of the band, but is preferably not substantially greater than this thickness so that any tendency for self-disengagement of the band from the teeth of the floor of the channel is limited by the overlying members. It should be understood that the head is preferably formed integrally with the band and that both are provided from a resilient material such as a synthetic resin (e.g. polyethylene) or another elastomeric material such as natural or synthetic rubber. Moreover, the teeth of the two arrays are of saw-tooth configuration and are directed oppositely to one another, thereby insuring positive engagement against retraction of the band through the channel in one longitudinal direction while permitting the drawing of the band through the channel with substantially free passage in the other longitudinal direction. The channel generally has a width approximating that of the toothed or wide portion of the band with the teeth of the channel floor extending substantially the full width of the channel. The band, however, has its teeth extending transversely over a central portion of

the band and of a length less than the width of the band. The narrow portion of the band, which can have a width equal to or less than the width of the array of teeth on the band, according to one feature of the construction described in my copending application, preferably terminates at the wide portion of the band in a ramp by means of which the laterally extending members of the channel are cammed upwardly onto the surface of the band opposite that upon which the teeth are provided.

It is the primary object of the present invention to extend the principles set forth in my copending application to improved sling-type quick-release closures.

A further object of the present invention is to provide means, in a closure of the character described, for preventing the undesirable opening of the closure upon inadvertent application of stress to the band.

Still another object of this invention is to provide means, in a closure of the character described, for preventing unauthorized opening of the closure and indicating that the closure has been opened.

These objects and others which will become apparent hereinafter are attained, in accordance with the present invention, by providing a sling-type closure having a head formed with a channel adapted to receive the band, and locking means including an element extending transversely to said band across said channel and detachably engaging the head of the closure for preventing inadvertent passage of the band through the gap communicating with the channel.

According to a more specific feature of this invention, the aforementioned element of the locking means is annular and adapted to encircle the head which can have a generally cylindrical periphery, in which case the annular member can be constituted as a ring whose inner diameter is equal to the outer diameter of the cylindrical surface. To prevent or limit temporarily the removal of the annular member from the head, the latter is provided with at least one pair of lateral projections adjacent the outer surface and resiliently engaging the ring which is held between these projections and the band when the latter passes through the channel.

Still another feature of the present invention resides in the mounting of the annular member directly upon the band. The member can thus be integral with the band and disposed at the end thereof remote from the end provided with the head and thus serves as a grip for facilitating the opening and closing of the closure. When the locking means includes an annular member or ring, the head has both of its channel extremities blocked by the member as previously indicated. It is clear, therefore that as long as the head remains inserted in the recess or opening provided by the annular member, the band cannot be removed from the channel and inadvertent opening of the closure is prevented. The closure construction with a ring at the free end of the band not only is particularly convenient because the ring serves as a grip but also is suitable owing to the saving in material provided thereby. In order to facilitate removal of the locking member from the head, the ring can be provided with a tongue diametrically opposite the band. The projections along the surface of the band preferably are arcuate and conform to the cylindrical curvature of this surface.

According to still another feature of the present invention, the closure is provided with at least one frangible locking element interposed between the head and the ring and adapted to rupture upon disengagement of the ring from the head so as to indicate that the closure has been opened. This arrangement constitutes a security measure preventing undetected unauthorized tampering with the closure. The locking element preferably extends radially of the ring and can be constituted as

a flexible member (e.g. a wire whose ends terminate in a conventional metal seal) or as a pair of radial wands whose free extremities are provided with formations matingly engageable with complementary formations of the head in such manner that the elements must be ruptured prior to detachment of the ring from the head.

The above and other objects, features and advantages of the present invention will become more readily apparent from the following description, reference being made to the accompanying drawing in which:

FIG. 1 is a plan view of the open closure device;

FIG. 2 is a side-elevational view of the device, partly in section along the median plane through its head;

FIG. 3 is a cross-sectional view taken along the line III—III of FIG. 1;

FIGS. 4 and 5 are side-elevational views of the closure device illustrating two configurations thereof;

FIG. 6 is a front-elevational view of the device as applied to the neck of a sack;

FIG. 7 is a view similar to FIG. 1 of another closure according to the present invention;

FIG. 8 is a cross-sectional view of the head thereof taken along the line VIII—VIII of FIG. 7;

FIG. 9 is a view of the closure in cross-section as the device is applied to the neck of a sack; and

FIG. 10 is a cross-sectional view of the head of still another device according to the present invention.

In FIGS. 1–6, I show a band **1** having a head **2** at one end thereof and a ring **14** at the other end. The ring and head are formed integrally with the band and the entire closure is composed of a resiliently deformable synthetic resin (e.g. polyethylene). Between the ring and the wide portion of band **1** there is provided a relatively narrow portion **5** which terminates in a pair of diverging flanks **1'** forming a ramp for guiding the wide portion of the band into the channel **3** of the head. The upwardly open channel **3** is of T-shaped configuration in transverse section and extends longitudinally in the direction of the elongated band. Laterally extending members **2'** overlie and form a gap **2''** communicating therewith, this gap being of a width equal to or greater than the width of the narrow portion **5** of the band but less than the width of the wide portion thereof. The ramplike flanks **1'** serve to cam these members upwardly and guide the band into the channel.

Upon the board surface of the band opposite that at which the floor of channel **3** is provided, the band is formed with a longitudinal array of teeth **10** with relatively small spacing whose width is less than that of the band along the wide portion thereof. On the floor of the channel, there is provided another array **10***a* of teeth having a spacing identical to that of the array **10**. As will be evident from FIG. 2, the arrays of teeth are oriented in opposite directions and are of saw-tooth configuration so that the steep flanks of the teeth of array **10** face in the direction of arrow B while the teeth of the array **10***a* have their steep flanks facing in the direction of arrow C. Along the cylindrical periphery of the head **2** and the sides thereof spaced from the channel **3**, the head is provided with a pair of arcuate projections **6**, **7** adapted yieldably to retain the ring **14** on the head, this ring being provided with the tongue **8** diametrically opposite the band to facilitate its removal.

As will be apparent from FIGS. 4–6, the closure can be slung around the neck of a sack **15** or around some other package with the channel opening outwardly, whereupon the narrow portion **5** of the band **1** is inserted opposite to the direction of arrow D through the gap between the members **2'** into the channel and the band drawn thereto in the direction of arrow E (FIG. 4), the flanks **1'** then guiding the wide portion of the band into the channel below the members **2'**. The teeth of the array **10** thus slide over the teeth of array **10***a* until the closure is tight and the neck of the sack **15** is sealed. Reverse movement of the band in the channel is prevented by the interengagement of the teeth.

When the band is of sufficient length to extend twice around the sack, the closure may be locked by winding the free extremities around the portion of the band encircling the neck of the sack (FIG. 5) and forcing the ring **14** past the projections **6**, **7** onto the head **2**. With larger sacks the band is bent back upon itself (FIG. 4) with the ring then being forced over the projections onto the head **2**. When it is desired to release the closure, tongue **8** can be grasped and the ring **14** drawn in the direction of arrow D of the head **2**. The ring can then serve as a grip for the withdrawal of the band **1** from the channel **3** through the gap between members **2'** in the direction of arrow D to open the closure.

In order to prevent undetected and unauthorized opening of the device, a locking element **16**, which is here shown to be a wire extending radially of the ring **14** and having its ends terminating in a metallic lead seal **17**, is passed through bores **18** provided in the head below the channel **3** and extending tightly around the ring **14**, thereby interconnecting the ring and the head so that the ring can be removed only after rupture of element **16**.

In the construction of FIGS. 7–9, the closure device is similar to that of FIGS. 1–6 except that the locking elements are integral with the ring **14**. In this case, the locking elements are a pair of flexible wands **20** extending at substantially diametrically opposite locations generally radially from the ring **14** and provided with pins **19** of wedgelike configuration at their free extremities. These pins **19** have annular shoulders **21** which are engageable with the complementary shoulders **23** of a pair of recesses **22** provided in the head **21**. The pins **19** are so dimensioned that they are received wholly within the recesses **22** and thus cannot be pulled out from the extremity of the head past the shoulder **23** without rupture of the wands **20** or separation of these wands from the pins at their junctions. Although the recesses **22** are shown to be throughgoing bores, it is possible to construct them as blind recesses to prevent pushing of the pins out of the recesses from the rear. The cross-section of shoulder **23** is made less than that of shoulder **21** so that, upon engagement of the shoulders, the pins cannot be removed from the recesses. Moreover, this lock is further secured by providing the mouth of the recesses wtih a funnel-shaped configuration into which the wedge-shaped root portion of the pins **19** fits tightly so that there is no relative movement of the pins in the recesses when locking has taken place. The closure of FIGS. 7–9 is applied to the sack **15** in a manner similar to that described with reference to FIGS. 1–6. After the ring **14** is fitted over the head **2**, however, the pins **19** are inserted (FIGS. 8 and 9) into the respective recesses **22** so that removal of the ring **14** from the head can take place only upon rupture of the wands **20**.

The closure of FIG. 10 is generally similar to those previously described although it is specifically designed for heavy-duty packaging, e.g. for burlap sacks. Thus the tooth portion **1***b* of the band **1***a* is shown to have a convex configuration while the floor of the channel is trough-shaped with the teeth extending to the sides of the flooring.

Moreover, the tooth side of the band is provided with a sack-engaging portion between the toothed array and the head formed with protuberances **25** adapted to insure positive engagement of the closure with the sack. I have found that this construction, using the pins **19** of FIG. 7, is particularly suitable for heavy-duty closures.

The invention described and illustrated is believed to admit of many modifications within the ability of persons skilled in the art, all such modifications being considered within the spirit and scope of the appended claims.

What is claimed is:

1. A closure comprising:
an elongated flexible band having a surface provided with a longitudinal array of teeth;
a head at one end of said band provided with a longitudinally extending channel adapted to receive said band and with a pair of laterally extending members yieldably overlying said channel and forming between them a gap communicating therewith, said channel having a wall portion juxtaposable with said surface in a closed condition of the closure and formed with a longitudinal array of teeth interengageable with the teeth of said surface, said band being withdrawable from said channel through said gap; and
locking means for releasably preventing withdrawal of said band from said channel through said gap, said locking means including a member detachably engageable with said head and extending transversely of said band across said channel.

2. A closure comprising:
an elongated flexible band having a surface provided with a longitudinal array of teeth;
a head at one end of said band provided with a longitudinally extending channel adapted to receive said band and with a pair of laterally extending members yieldably overlying said channel and forming between them a gap communicating therewith, said channel having a wall portion juxtaposable with said surface in a closed condition of the closure and formed with a longitudinal array of teeth interengageable with the teeth of said surface, said band being withdrawable from said channel through said gap; and
locking means for releasably preventing withdrawal of said band from said channel through said gap, said locking means including a member integral with said band remote from said end thereof detachably engageable with said head and extending transversely of said band across said channel.

3. A closure comprising:
an elongated flexible band having a surface provided with a longitudinal array of teeth;
a head at one end of said band provided with a longitudinally extending channel adapted to receive said band and with a pair of laterally extending members yieldably overlying said channel and forming between them a gap communicating therewith, said channel having a wall portion juxtaposable with said surface in a closed condition of the closure and formed with a longitudinal array of teeth interengageable with the teeth of said surface, said band being withdrawable from said channel through said gap; and
locking means for releasably preventing withdrawal of said band from said channel through said gap, said locking means including an annular member detachably engageable with said head and surrounding the latter while extending transversely of said band across said channel at opposite extremities thereof.

4. A closure comprising:
an elongated flexible band having a surface provided with a longitudinal array of teeth;
a head at one end of said band provided with a longitudinally extending channel adapted to receive said band and with a pair of laterally extending members yieldably overlying said channel and forming between them a gap communicating therewith, said channel having a wall portion juxtaposed with said surface in a closed condition of the closure and formed with a longitudinal array of teeth interengageable with the teeth of said surface, said band being withdrawable from said channel through said gap; and
locking means for releaseably preventing withdrawal of said band from said channel through said gap, said locking means including an annular member integral with said band remote from said end thereof detachably engageable with said head and surrounding the the latter while extending transversely of said band across said channel at opposite extremities thereof.

5. A quick-release sling-type closure comprising:
an elongated flexible band having a surface provided with a longitudinal array of teeth;
a head integral with said band at one end thereof provided with a longitudinally extending channel adapted to receive said band and with a pair of laterally extending members yieldably overlaying said channel and forming between them a gap communicating therewith, said channel having a wall portion juxtaposable with said surface in a closed condition of the closure and formed with a longitudinal array of teeth interengageable with the teeth of said surface, the teeth of said arrays being oppositely directed whereby said band can be drawn through said channel in one longitudinal direction but is prevented from displacement in the opposite longitudinal direction, said band being withdrawable from said channel through said gap transversely to said direction past said members; and
locking means for releasably preventing withdrawal of said band from said channel through said gap, said locking means including an annular member integral with said band remote from said end thereof detachably engageable with said head and surrounding the latter while extending transversely of said band across said channel at opposite extremities thereof.

6. A closure as defined in claim **5** wherein said head has a generally cylindrical outer surface and said annular member is a substantially circular ring integral with said band having an inner diameter substantially equal to the diameter of said cylindrical outer surface of said head.

7. A closure as defined in claim **6** wherein said ring is disposed at the opposite end of said band.

8. A closure as defined in claim **7** wherein said ring is formed with a tongue extending therefrom at a location substantially diametrically opposite said band for facilitating removal of said ring from said head.

9. A closure as defined in claim **6** wherein said head is formed with at least two lateral projections adjacent said cylindrical outer surface for yieldably retaining said ring on said head and temporarily locking said ring between said projections and said band upon said band extending through said channel.

10. A closure as defined in claim **6**, further comprising at least one frangible locking element interposed between said head and said ring and rupturable upon disengagement of said ring from said head.

11. A closure as defined in claim **10** wherein said locking element extends radially of said ring.

12. A closure as defined in claim **11** wherein at least two such elements are provided and each of said elements comprises a flexible wand extending radially from said ring and having a free extremity provided with a first formation, said head having second formations matingly engageable with said first formations, respectively, while limiting detachment of the interengaged first and second formations.

13. A closure as defined in claim **12** wherein said first formations are pins provided with peripheral shoulders and said second formations are recesses formed in said head and provided with respective shoulders engageable with the shoulders of said pins.

14. A closure as defined in claim **11** wherein said element is a wire extending through said head.

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DONLEY J. STOCKING, *Primary Examiner.*