Nov. 16, 1948. J. P. SAPP 2,454,214

CLOSURE

Filed June 21, 1945

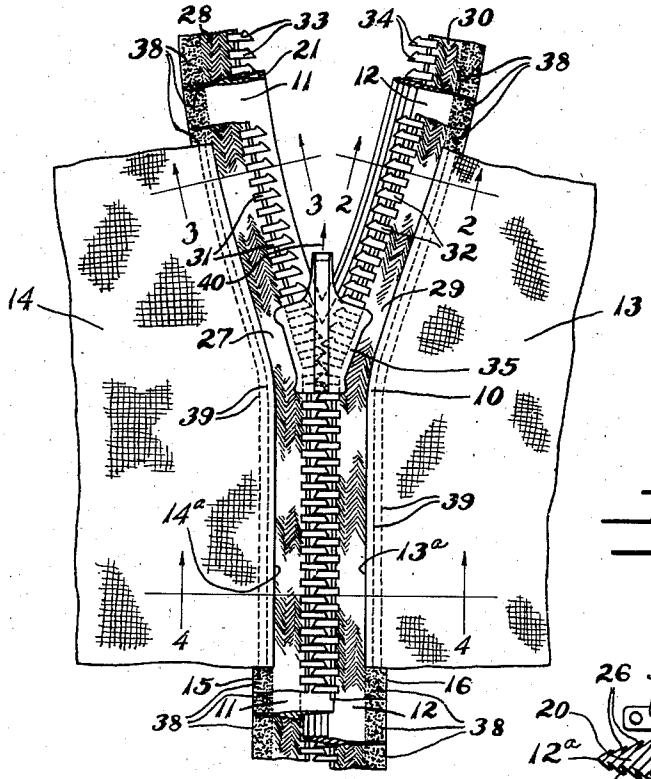


Fig-1

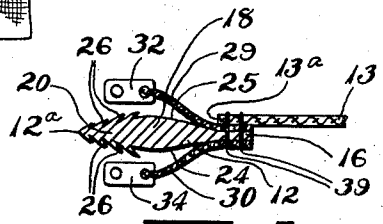


Fig-2

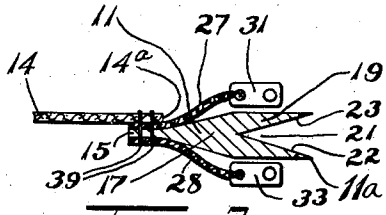


Fig-3

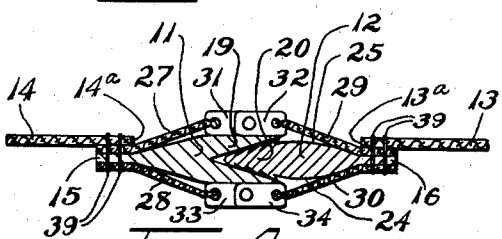


Fig-4

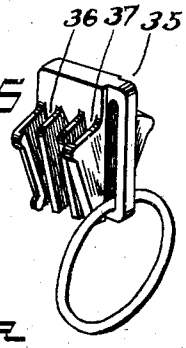


Fig-5

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2,454,214

CLOSURE

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Application June 21, 1945, Serial No. 600,677

11 Claims. (Cl. 24—205.1)

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The invention relates to closures and especially to slide fastener closures for sealing adjacent margins of the wall of an article to be joined.

Objects of the invention are to provide for closing effectively adjacent margins in a manner to resist especially leakage of air, water or gases therethrough; to provide for resisting leakage by lip-action between interlocking sealing means; to provide for one or more sealing zones at the interlocking sealing means; to provide for holding and supporting such sealing means in the engaged condition; to provide for sealing action while permitting flexure of the closure and relative movement of parts of the interlocking sealing means to provide simplicity of construction and convenience of manufacture; and to provide for ease and effectiveness of operation.

These and other objects and advantages of the invention will be apparent from the following description.

In the accompanying drawings which form a part of this specification and in which like numerals are employed to designate like parts throughout the same;

Fig. 1 is a plan view from above of a slide fastener closure in assembled relation with adjacent margins of the wall of an article, and constructed in accordance with and embodying the invention, parts being broken away and in section.

Fig. 2 is a sectional view on an enlarged scale taken along line 2—2 of Fig. 1.

Fig. 3 is a sectional view on an enlarged scale taken along line 3—3 of Fig. 1.

Fig. 4 is a sectional view on an enlarged scale taken along line 4—4 of Fig. 1, and

Fig. 5 is a perspective view of a runner for the slide fastener closure.

In the illustrative embodiment of the invention shown in the drawings, the construction of a closure 10 includes sealing elements 11, 12 of resilient rubber or other rubber-like material extending along adjacent margins 13, 14 of the wall of an article to be joined, which article or articles may be, for example, life saving suits, aviator's garments, gas bags for balloons, tents, wading boots, footwear, and other similar containers and receptacles. The sealing elements 11, 12 are desirably secured to the margins 13, 14 at a position adjacent the edges 13a, 14a of such margins and extend laterally from such edges toward one another.

Each sealing element includes an attaching portion 15, 16, which may be relatively thin and substantially flat, and a bracing portion 17, 18 extending laterally from the attaching portion and

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having desirably diverging side walls with respect to the relatively thin flat attaching portion 15, 16. Each sealing element also terminates at its free end in an interlocking portion 19, 20 adapted to cooperate with the other interlocking portion of the other element for sealing and closing the margins 13 and 14.

For this purpose, the sealing element 11 is provided along its extent with a recess 21 in the face at the free end 11a of the interlocking portion 19, as shown especially in Fig. 3, which recess is desirably elongated-in-cross-section and may be defined by inwardly converging walls 22, 23. The recess 21 is of dimensions in cross-section adapted to receive therein at least a part of the other interlocking portion 20 of the sealing element 12 and desirably to receive such interlocking portion 20 in its entirety for facilitating the desired interlocking and overlapping relation of the respective interlocking portions 19 and 20. The bracing portion 17 of the element 11 being of greater mass of material than the interlocking portion 19 having the recess 21 facilitates positioning and holding the interlocking portion 19 in the desired manner for cooperating with the other interlocking portion 20 during the engaging operation of the closure and for maintaining the sealed condition of the sealing elements 11 and 12 during engagement of the latter elements.

To the end of fitting within the recess 21 of the interlocking portion 19 in a "floating" manner, the interlocking portion 20 of the other element 12 has opposed side faces 24, 25 converging in the direction toward the free end 12a of the sealing element 12 and is desirably of cross-sectional dimensions less than the corresponding dimensions of the recess 21. Such interlocking portion 20 is provided with a plurality of integral spaced-apart ribs 26, 26 of suitable resilient rubber material projecting outwardly from each of the opposed converging faces 24, 25 and terminating in edges for contact with the adjacent converging walls 22, 23 of the recess 21 by flexure of the ribs 26, 26, and such ribs sealing against the converging walls 22, 23 by lip-action of the edges. Each of the respective ribs 26 is desirably tapered in cross-section and in addition to projecting outwardly from an opposed face 24, 25 is desirably inclined in the direction away from the free end 12a of the sealing element 12, as shown especially in Fig. 2. Also, the ribs 26 at each such face are desirably of progressively decreasing extent or graduated in the direction toward the free or tapered end 12a, whereby each rib of rela-

tively smallest dimensions in cross-section is nearest such free end 12a of the tapered interlocking portion 20. Such ribs may be inclined with respect to the opposite converging faces 24, 25 in the direction away from the free end 12a of the sealing element 12 for further assuring sealing of the closure despite pressures existing at either or both sides of the closure 10 since the effect of such pressures acting on the ribs 26 is to tend to press the latter more tightly into contact with the walls 22, 23 of the recess 21 and thereby supplement the pressing action of such ribs against such walls 22, 23 by virtue of their flexed condition and the resilience of the rubber material thereof.

For such arrangement of graduated ribs 26, the included angle between the converging faces 24, 25 is desirably less than the included angle between the inwardly converging side walls 22, 23 of the interlocking portion 19 of the other sealing element 11. While the end 12a of the sealing element may, if desired, contact the inner end wall of the recess 21 at the junction of the converging walls 22, 23; in the preferred construction, the free end 12a of the sealing element 12 is desirably in separated condition with respect to such inner end wall of the recess 21, as shown especially in Fig. 4. Thus, the interlocking portion 20 is held in a suspended and separated condition with respect to the walls of the recess 21 by the arrangement and support afforded thereto by the ribs 26, thereby promoting effective lip-sealing action despite flexure and/or twisting of the closure 10.

This construction and arrangement accommodates the free positioning of the respective interlocking portions 19 and 20 of the sealing elements 11 and 12 in a "floating" manner in overlapping relation for facilitating flexure of the closure and facilitating the desired flexure and lip-sealing action of the ribs 26 with the walls 22, 23 of the recess 21. This construction also makes possible the provision of a plurality of laterally spaced-apart sealing zones extending along and between each of the opposing faces 24, 25 and converging walls 22, 23 for the engaged condition of the sealing elements. Additionally, by virtue of such construction and arrangement, relative flexing movement of the sealing elements is accommodated with respect to one another at the interlocking portions 19, 20 while maintaining effectively lip-sealing action.

The closure 10 further includes a pair of margins or stringers 27, 28 and 29, 30 of flexible material such, for example, as woven fabric of cotton, linen, nylon, rayon, glass fibers, and other suitable fibrous or plastic material positioned at opposite sides of each sealing element 11, 12. The pairs of stringers are secured to the opposite sides of the attaching portions 15, 16, preferably by a suitable adhesive such, for example, as rubber cement 38 or by sewing 39 or by both, the attachment being relatively remote from the adjacent edges of the margins or stringers and the remainder of the stringers being free and unattached to the sealing element at the region of the respective bracing and interlocking portions for facilitating ease of operation of the closure. If desired, for protective and/or appearance purposes together with convenience of manufacture and assembly of the closure, the fabric stringers may be coated or impregnated with a treating material such, for example, as suitable rubber-like material.

Cooperating fastener elements 31, 32, 33, 34 of a known type slide fastener construction are attached at the free edges of the respective stringers 27, 28, 29 and 30 and extend in series along the stringers, as shown especially in Fig. 1. A suitable runner 35 including twin operating structures 36, 37 of known construction is in guided engagement with the sealing elements 11 and 12 and engage the respective fastener elements on each of the stringers by movement along the closure 10 for engaging and disengaging such sealing elements and fastener elements to place the closure 10 in the open or the closed condition.

The unattached condition of the stringers 27, 28, 29, 30 relative to the sealing elements 11 and 12 except at the attaching portions 15, 16 thereof facilitates ease of engaging and disengaging the sealing elements 11, 12 while providing support of the latter for the engaged condition of the closure. Also, the construction is such that the fastener elements 31, 32, 33, 34, for the closed condition, are positioned along the longitudinal center line of the closure substantially in contact with the sides of the sealing elements, especially at the region of the interlocking portions 19, 20 for baking such portions, thereby cooperating with the stringers for holding and supporting the sealing elements in the desired engaged relation to one another and for assuring effective sealing action despite flexure of the closure.

The assembled closure 10 comprising the several component elements given hereinabove may be attached to the adjacent marigns 13, 14 of the article, which may be of fabric construction, as by suitable adhesive, or sewing, or both at the attaching portions 15, 16 of the sealing elements 11, 12 and desirably at a region relatively remote from the adjacent edges of the stringers 28 to 30. The assembled closure 10 may be positioned at either side of the wall of the article, if desired.

In the operation of the closure 10 assembled to the wall of the article and in the open condition, the runner 35 is moved in the direction indicated by an arrow 40 for placing the closure 10 in the closed condition. Manipulating the runner in such direction engages the respective fastener elements 31, 32 and 33, 34 attached to the respective pairs of stringers 27, 28 and 29, 30; and during such engaging action, the stringers and the sealing elements 11, 12 are drawn together and positioned in the manner shown especially in Fig. 4, the runner 35 engagingly guiding the sealing elements so that the interlocking portions 19, 20 are disposed in the desired overlapping and sealing relation. The interlocking portion 20 freely enters the recess 21 of the interlocking portion 19 by lateral movement toward the sealing element 11, during which movement the respective ribs 26, 26 are resiliently flexed about their bases at the side faces 24, 25 and resiliently press at their edges against the converging walls 22, 23 of the recess 21 thereby effecting lip-sealing action and providing a plurality of laterally spaced-apart sealing zones at such interlocking portions for assuring effective sealing and closing of the closure 10. Also, during such engaging action of the runner, the stringers 27, 28, 29 and 30 are drawn substantially into contact along the diverging walls of the bracing portions 17, 18 of the sealing elements 11, 12 for supporting the sealing elements during such engagement. The engaged fastener elements extend along the sealing elements in back-

ing relation to the interlocking portions further assuring maintaining the sealing elements in the desired engaged position and additionally assuring maintenance of the seal even though the closure 10 to be flexed and/or twisted a substantial extent along the length thereof.

For opening the closure, the runner 35 is manipulated in the opposite direction which disengages and separates the fastener elements forcing them apart and freeing the stringers from their substantially contiguous condition with the bracing portions of the sealing elements. Also, the sealing elements are forced apart, separating the interlocking portions and breaking the seal at such regions of separation. During the spreading apart action of the sealing elements, the ribs 26, 26 quickly resume their original inclined position with respect to the side faces 24, 25 of the interlocking portion 20, as shown especially in Fig. 2, by virtue of the resiliency of the rubber material thereof. This facilitates the resumption of the sealed condition of the closure, quickly and conveniently, even though the runner be manipulated relatively rapidly along the closure for reengaging the fastener elements and repositioning the stringers, as shown especially in Fig. 4.

Where the margins 13 and 14 of the wall of the articles define an opening which is closed at one or both ends, known sealing constructions may be employed for effecting sealing of the closure 10 at such end or ends. It is to be understood, also, that the invention is applicable to articles having double wall fabric constructions in which event the adjacent margins of such double walls may serve as and perform the functions of the respective stringers 27, 28, 29 and 30. The fastener elements may be secured at the adjacent edges of such double wall margins and the sealing elements are suitably secured at their attaching portions 15, 16 in the manner described hereinabove and at regions relatively remote from such edges of the double wall margins.

Variations may be made without departing from the scope of the invention as it is defined in the following claims.

I claim:

1. A closure for adjacent margins, said closure comprising fastener means for detachably joining said margins, and sealing elements including interlocking overlapping portions at said margins for closing the latter, one of said portions at a face thereof having a recess therein for receiving at least part of the other portion in sealing relation therewith, and one of said portions at the part thereof receivable in said recess having a sealing rib of elastic material terminating in a sharp edge for contacting a wall of said recess, said rib in the closed condition of the closure being positioned in said recess in angular flexed relation to said wall of said recess with said edge contacting said wall and with one of the side faces of said rib rearwardly of said edge inclined relative to said wall and with the other side face rearwardly of said edge spaced-apart relative to the adjacent wall portion of said recess so that sealing of the flexed rib against said wall of the recess is effected by lip-action flexure of said edge, and said portions being backed by said fastener means for holding and supporting said sealing elements in engaged relation to one another.

2. A closure for adjacent margins, said closure comprising fastener means for detachably joining said margins, and sealing elements including interlocking overlapping portions at said margins for closing the latter, one of said portions at a face thereof having a recess therein for receiving at least part of the other portion in sealing relation therewith, and one of said portions having a plurality of spaced-apart ribs of elastic material projecting from a face thereof and terminating in edges for contact with the other portion and sealing against the latter said other portion by lip-action of said edges providing a plurality of sealing zones, and said portions being backed by said fastener means for holding and supporting said sealing elements in engaged relation to one another.

3. A closure for adjacent margins, said closure comprising fastener means for detachably joining said margins, and sealing elements of elastic material including interlocking overlapping portions at said margins for closing the latter, one of said portions at a face thereof having a recess therein defined by inwardly converging opposite walls for receiving the other portion in sealing relation therewith, said other portion having opposed converging faces being adapted to fit in said recess and said other portion having a plurality of spaced-apart ribs of said material projecting from each of said opposed faces and terminating in edges for contact with said walls and sealing against said walls by lip-action of said edges providing a plurality of sealing zones, and said portions being backed by said fastener means for holding and supporting said sealing elements in engaged relation to one another.

4. A closure for adjacent margins, said closure comprising sealing elements of elastic material for said margins to close the same, said elements including bracing portions projecting laterally from adjacent edges of said margins toward one another and terminating in interlocking portions positionable in overlapping and contacting relation to one another, one of said interlocking portions at the free end face thereof having a recess therein for receiving the other interlocking portion in sealing relation therewith, said other interlocking portion comprising sealing means including a rib of said material projecting from a face thereof adjacent the free end of said other interlocking portion and terminating in an edge for contact with the inner wall of said recess by flexure of said rib and sealing against said wall by lip-action of said edge, and means for so positioning and holding said sealing elements in said overlapping and contacting relation.

5. A closure for adjacent margins as defined in claim 4 in which said recess is defined by inwardly converging side walls, said other interlocking portion is tapered-in-cross-section to fit in said recess, and said sealing means includes a plurality of spaced-apart ribs of said elastic material projecting from the side faces of said other interlocking portion and terminating in edges for contact with said converging side walls by flexure of said ribs and sealing against said side walls by lip-action of said edges providing a plurality of sealing zones, said ribs extending outwardly from said side faces a progressively decreasing extent in a direction toward the tapered end of said other interlocking portion.

6. A closure for adjacent margins, said closure comprising slide fastener means for detachably joining said margins, and sealing elements including interlocking overlapping portions of elastic material attachable to said margins for closing the same, one of said portions at a face thereof having a recess therein for receiving at least a part of the other portion in sealing relation therewith, and one of said portions at the part thereof

receivable in said recess having a sealing rib of elastic material terminating in a sharp edge for contacting a wall of said recess, said rib in the closed condition of the closure being positioned in said recess in angular flexed relation to said wall of said recess with said edge contacting said wall and with one of the side faces of said rib rearwardly of said edge inclined relative to said wall and with the other side face rearwardly of said edge spaced-apart relative to the adjacent wall portion of said recess so that sealing of the flexed rib against said wall of the recess is effected by lip-action flexure of said edge, said slide fastener means being in overlying and backing relation to said sealing elements for holding and supporting said sealing elements in engaged relation to one another.

7. A closure for adjacent pairs of margins, said closure comprising slide fastener means for joining said margins including cooperating fastener elements for each pair of margins and a runner for engaging and disengaging said fastener elements, and sealing elements of elastic material for closing the margins and being attachable to and between said pairs of margins, said sealing elements extending laterally toward one another from their attachment to each pair of margins, said attachment being relatively remote from the adjacent edges of the margins providing free portions of each said pair of margins overlying each side of said sealing elements, and said sealing elements having interlocking overlapping portions at their free ends for contacting and sealing relation one to another, one of said interlocking portions having at its end face an elongated-in-cross-section recess therein for receiving the other interlocking portion and said other interlocking portion comprising sealing means including a rib of said material projecting outwardly at each side face thereof and terminating in an edge for contacting an adjacent inner side wall of said recess by flexure of said rib and sealing against said side wall by lip-action of said edge, said other interlocking portion being maintained in spaced relation to the first said interlocking portion by said ribs, and said runner being in guided engagement with said sealing elements and operative engagement with said fastener elements to draw said free portions of said pairs of margins and said sealing elements together whereby said margins are in backing relation at each side of the sealing elements for holding and supporting the latter in engaged relation to one another.

8. A closure as defined in claim 7 in which said sealing means of said other interlocking portion includes a plurality of spaced-apart ribs of said material projecting outwardly at each side face thereof and terminating in edges for contacting adjacent inner side walls of said elongated recess by flexure of said ribs and sealing against said side walls by lip-action of said edges.

9. A closure as defined in claim 7 in which said elongated-in-section recess of the first said interlocking portion is defined by inwardly converging walls, said other interlocking portion being tapered-in-cross-section to fit in said recess, and said sealing means includes a plurality of laterally spaced apart ribs of said elastic material projecting outwardly at each side face of the

tapered portion and terminating in edges for contacting said converging walls of said recess by flexure of said ribs and sealing against said converging walls by lip-action of said edges providing a plurality of laterally spaced-apart sealing zones.

10. A slide fastener closure for adjacent margins of the wall of an article to be closed, said closure comprising a pair of sealing elements of resilient rubber-like material extending along said margins and extending laterally toward each other from the adjacent edges of said margins, said sealing elements including interlocking portions at the free ends thereof constructed and arranged for contacting and telescopic engagement one to another to close said margins, one of said interlocking portions including lip-sealing means of said material integral therewith for contacting the other interlocking portion, a pair of stringers at each margin and upon opposite sides of each sealing element, said sealing elements and said pairs of stringers being secured to one another and to said margins adjacent said edges of the latter, cooperating fastener elements in series on each pair of stringers at the free edges thereof, and a runner including twin operating structures in guided engagement with said sealing elements and engageable with said fastener elements on each said stringers for engaging and disengaging said sealing elements and said fastener elements.

11. A closure for adjacent margins, said closure comprising fastener means for detachably joining said margins, and sealing elements including interlocking overlapping portions at said margins for closing the latter, one of said portions at a face thereof having a recess therein for receiving at least a part of the other portion in sealing relation therewith, and one of said portions at the part thereof receivable in said recess having a surface for disposition in adjacent spaced-apart relation to an inner wall of said recess in the closed condition of the closure and having a rib of elastic material projecting from said surface in position to enter said recess and projecting to an extent greater than that between said surface and said wall in said condition so as to be flexed in angular relation to said wall in said closed condition of the closure, said rib terminating in a sharp edge for contacting said wall and sealing against the same by lip-action of said edge under flexure of said rib, and said portions being backed by said fastener means for holding and supporting said sealing elements in engaged relation to one another.

JOHN P. SAPP.

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The following references are of record in the file of this patent:

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2,289,586	Marinsky et al.	July 14, 1942
2,358,653	Mock	Sept. 19, 1944

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Number	Country	Date
807,192	France	Oct. 12, 1936

Certificate of Correction

Patent No. 2,454,214. November 16, 1948.

JOHN P. SAPP

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 1, line 15, after the word "means" insert a semi-colon; column 3, line 8, after "closure 10" insert a semi-colon; line 67, for "element" read *elements*; column 4, line 27, for "baking" read *backing*; column 5, line 5, before "be" strike out *to*; line 28, for "articles" read *articte*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 22nd day of November, A. D. 1949.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.