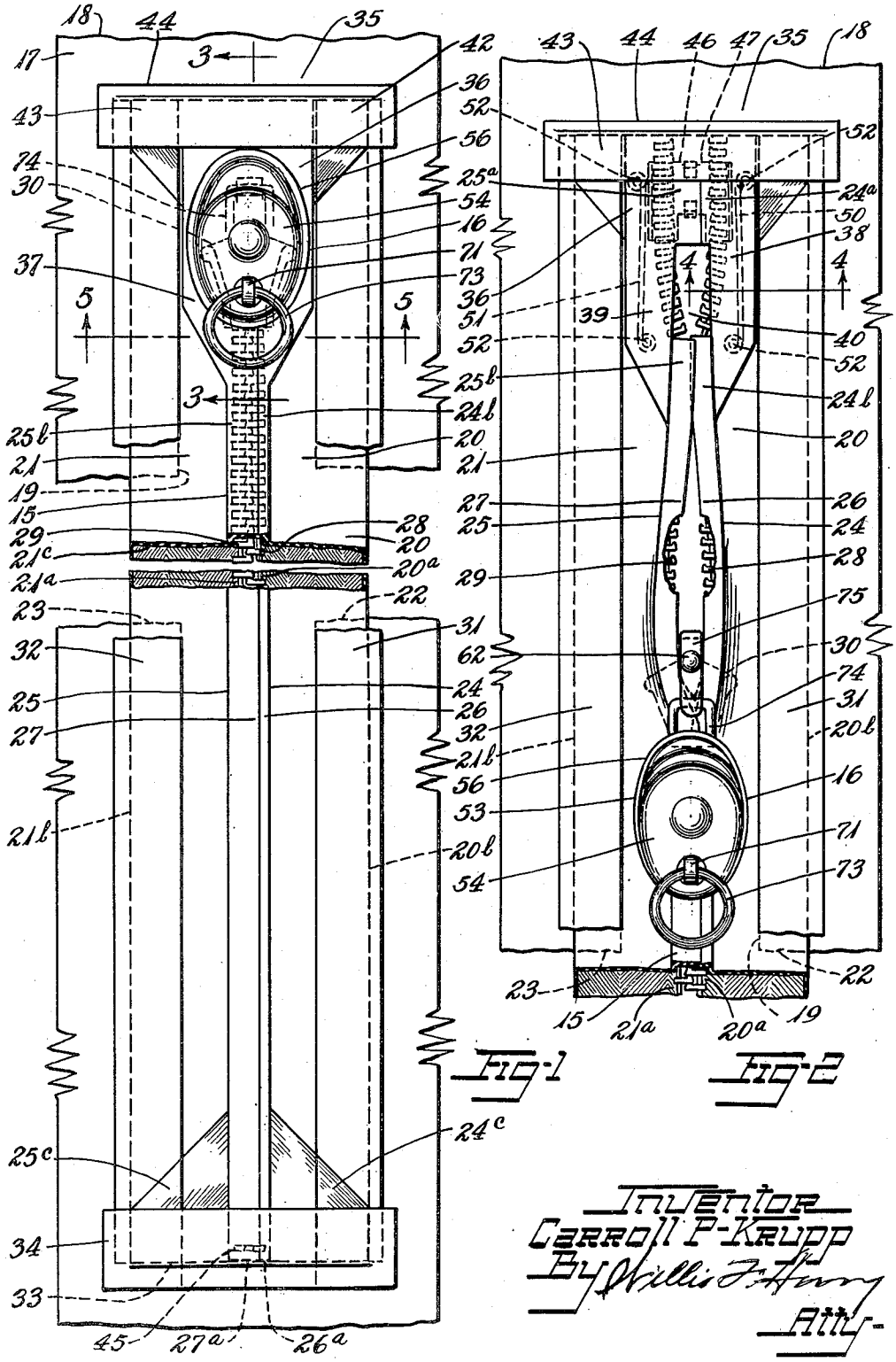
Jan. 10, 1950 C. P. KRUPP 2,494,249

SEALING CLOSURE

Filed Sept. 1, 1944 2 Sheets-Sheet 1



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Jan. 10, 1950 C. P. KRUPP 2,494,249

SEALING CLOSURE

Filed Sept. 1, 1944 2 Sheets-Sheet 2

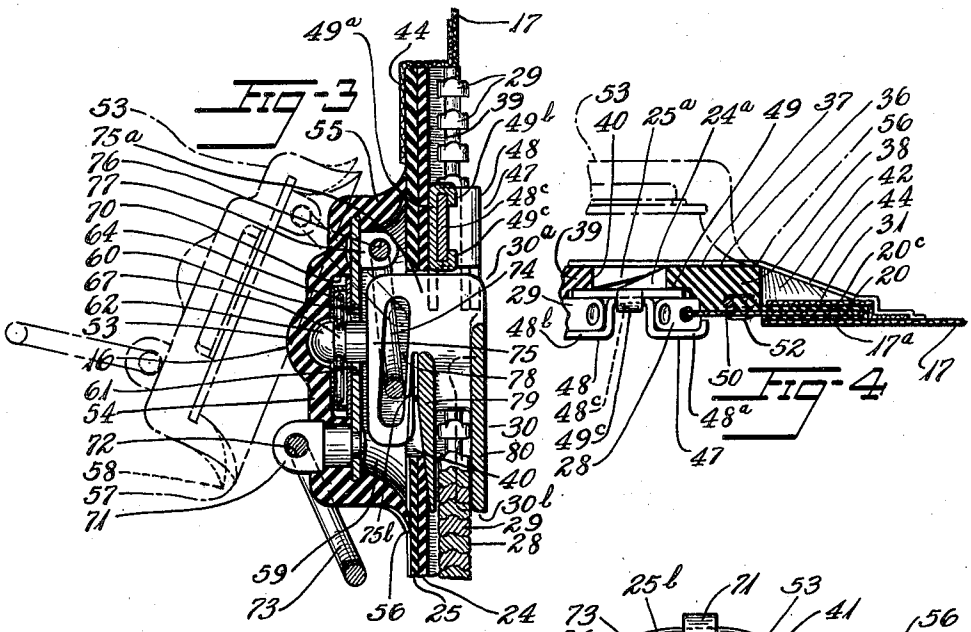


Fig-3

Fig-4

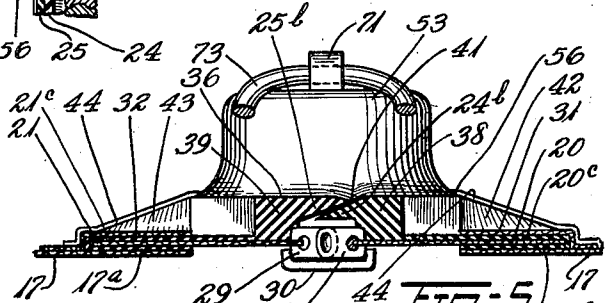


Fig-5

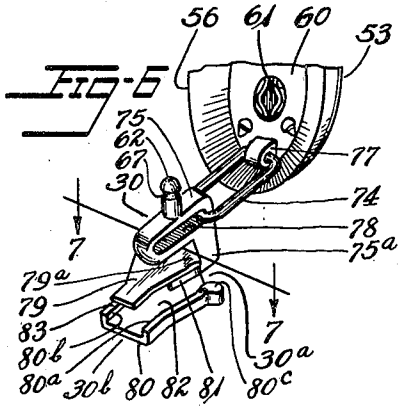


Fig-6

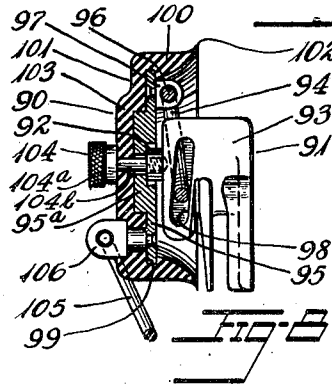


Fig-8

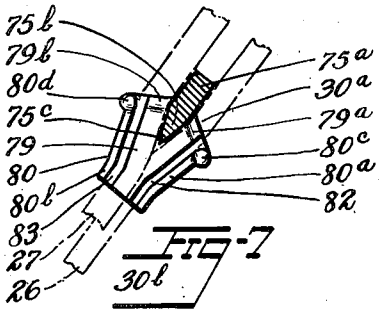


Fig-7

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Patented Jan. 10, 1950 2,494,249

UNITED STATES PATENT OFFICE

2,494,249

SEALING CLOSURE

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Application September 1, 1944, Serial No. 552,304

19 Claims. (Cl. 24—205.1)

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The invention relates to sealing closures and especially to sealing closures for the ends of slide fastener structures.

Objects of the invention are to provide for sealing effectively an aperture in the wall of a hollow article; to provide lip-action sealing between an enclosure structure and a sealing surface at one side of the wall; to provide for sealing at the region of the margin of the aperture despite irregularities in the sealing surface; to provide for preventing accidental breakage of the seal and accidental loss of the enclosure structure; to provide such a structure adapted for sealing relation with a wall of flexible material which wall may be under a pressure differential; and to provide simplicity of construction, convenience of manufacture, and ease and effectiveness of operation.

Other objects of the invention are to provide for sealing effectively an end of a slide fastener structure; to provide for enclosing a runner or slider of the slide fastener at a face of the latter while sealing said end; to provide an enclosure structure separably and interlockingly associated with the runner; to provide for sealing the end of the slide fastener by lip-action of the enclosure structure; to provide ease of engagement and disengagement of the enclosure with the runner; to provide for preventing accidental disengagement of the runner and the fastener elements of the slide fastener while facilitating operation of the latter, and to provide for operation of the runner with little or no wear on the sealing elements of the slide fastener structure.

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 showing a sealing closure including an enclosure structure attached to separable margins of an article to be fastened and sealed, the closure being in a closed condition and constructed in accordance with an embodying the invention, parts being broken away,

Fig. 2 is a view like Fig. 1 but showing the sealing closure in a partially opened condition at one end thereof,

Fig. 3 is a side view on an enlarged scale of the sealing closure at said end taken along line 3—3 of Fig. 1, parts being broken away and in section, and broken lines showing the enclosure in a released position relative to a runner of and prior to opening the sealing closure,

Fig. 4 is a side view on an enlarged scale taken along line 4—4 of Fig. 2, parts being broken away and in section,

Fig. 5 is a sectional view on an enlarged scale

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taken along line 5—5 of Fig. 1, showing conformance of a marginal sealing lip of the enclosure to an irregularity in the sealing surface of said end of the sealing closure, parts being broken away,

Fig. 6 is a perspective view from above of the runner,

Fig. 7 is a sectional view taken along line 7—7 of Fig. 6, broken lines showing the disposition of sealing lips of the sealing closure relative to the runner, and

Fig. 8 is a view showing a modified construction of the enclosure structure and the runner of the sealing closure.

The invention is suitable for sealing apertures in the flexible walls of articles such, for example, as garment bags, sleeping bags, wading boots, tents, gun coverings, protective clothing and suits and other like articles for preventing the admission of insects and dust, water and other objectionable substances; and in some of its aspects, the invention is applicable to sealing apertures in bodies of relatively rigid material such as metal, glass, Bakelite, hard rubber and other related materials. Also, the invention is especially suitable for application to containers for flowable materials like foodstuffs, water, oil and fuel, and inflatable containers and clothing, such containers having wall portions 17 of flexible, impervious material such, for example, as textile fabric of cotton, silk, linen, glass and rayon filaments coated or impregnated with resilient rubber or other rubber-like material 17a.

In the illustrative form of the invention shown in the drawings, a sealing closure including a slide fastener structure 15 and an enclosure structure or housing 16 at one end of the sealing closure, is associated with the impervious, flexible wall 17 of suitable material coated with suitable rubber 17a of a container 18 for foodstuffs, for example, in a manner to provide for sealing an elongated aperture 19 in such wall whereby the entrance of objectionable water or moisture is prevented effectively even though such container be submerged, wholly or partly, in water. The slide fastener structure 15 which is desirably like the fastener structure shown and described more fully in my copending application for Sealing closure, Serial No. 509,427 filed November 8, 1943, and includes features also of my Patent 2,385,816, may be attached along its stringers 20 and 21 of suitable impervious textile fabric coated with suitable rubber 20c and 21c at a face thereof to the wall 17 as by an adhesive such, for example, as rubber cement, or by sewing or both, the stringers being mounted on adjacent separable margins 22 and 23 of the aperture 19 at the exterior face of the wall 17. For closing the opening between the adjacent margins of the stringers 20 and 21, sealing elements 24 and 25 including laterally projecting tapered portions 26 and 27 of resilient rubber-

like material are mounted directly upon the opposite ends of and bridge spaced-apart cooperating fastener elements 28 and 29 in series at the adjacent margins 20a and 21a of such stringers, which sealing and fastener elements are preferably coextensive with such margins of the stringers. The fastener elements are engaged and disengaged by means of a runner or slider 30 operable from the exterior face of the slide fastener structure 15, thereby facilitating joining the stringers 20 and 21 and flexing the tapered portions 26 and 27 of the sealing elements in contacting and overlapping relation to one another along their extent for sealing the opening by lip-action.

Strip members 31 and 32 of suitable impervious textile fabric may be disposed along the edges of and extend to the ends of opposite margins 20b and 21b of the stringers in superimposed and overlapping relation with the latter and the wall 17. Such members may be attached to the stringers and wall as by a suitable adhesive such as rubber cement for further assuring sealing along such edges of the stringers.

The elongated aperture 19 in the container 18 at one end at 33 of the slide fastener structure 15 may be sealed by securing together as by rubber cement the opposing faces of overlapping end portions 26a and 27a of the laterally projecting tapered portions 26 and 27 of the sealing elements 24 and 25 and by a strip member 34 of suitable rubber material extending continuously across the ends of the fabric stringers 20 and 21, the ends of the strip members 31 and 32, and the ends of the sealing elements 24 and 25 at portions 26a and 27a including tapered bracing projections 24c and 25c in superimposed and overlapping relation therewith and with the wall 17. The strip member 34 is secured thereto by a suitable adhesive.

For sealing effectively the aperture 19 at the opposite end at 35 of the slide fastener structure 15, the invention provides an end closure construction which includes the enclosure structure 16 detachably associated with the runner 30 and capable of sealingly engaging by lip-action with a sealing surface 36 of a platform 37 positioned at the exterior face of the fastener structure at the region of the end at 35. In order to accommodate the enclosure structure 16 and to provide the desired sealing surface 36, preferably substantially flat and smooth, the platform 37, which is relatively less flexible as compared to the flexibility of the slide fastener structure per se, is desirably of resilient rubber or other rubber-like material and includes outwardly flared portions 38 and 39 integrally united with, as by molding, and in continuation with end portions 24a, 24b and 25a, 25b of the sealing elements 24 and 25 at the end at 35. The flared portions 38 and 39 extend longitudinally of the fastener structure along the end portions 24a, 24b, and 25a, 25b desirably to the ends of the stringers 20 and 21 at 35 and may project laterally from the sealing elements at least part way toward or wholly to the opposite margins 20b and 21b of such stringers whereby the platform 37 may be of sufficient extent for accommodating the enclosure structure 16.

For ease of operation with little or no binding action of the tapered portions of the sealing elements on the runner and for effectiveness of closure, the tapered portions 26 and 27 of such sealing elements are constructed and arranged in a part of their length intermediate the ends of the platform 37 to provide an elongated opening at 40 for receiving the runner 30. The opposing

areas of the overlapping tapered portions 26 and 27 at end portions 24a and 25a of the sealing elements extending from one end of the opening 40 to the extreme end at 35 of the slide fastener 15 are attached together as by a suitable adhesive for sealing purposes, and such attached parts of the end portions 24a and 25a are positioned in a manner such that a substantially flat surface is provided across the same in continuation of the flat surfaces of the flared portions 38 and 39 as shown especially in Fig. 4. The tapered portions 26 and 27 of the end portions 24b and 25b of the sealing elements extending from the other end of the opening 40 in the direction of the opposite end at 33 of the slide fastener and coextensive with the flared portions 38 and 39 are operatively free for opening and closing the aperture 19 in cooperation with the adjacent parts of the sealing closure. For the closed condition of the end closure arrangement, the tapered portions 26 and 27 of the end portions 24b and 25b are flexed such as to provide a substantially flat surface in continuation with the surfaces of the flared portions 38 and 39 as shown especially in Fig. 5, although an irregularity in the sealing surface 36 may be present at 41 where the marginal edge of the tapered portion 27 in flexure is held in contact with the other tapered portion 26 in sealing relation therewith.

For the platform arrangement shown, lateral projections 42 and 43, tapered in section, extending from the flared portions to the opposite margins of the stringers may be provided for bracing the latter portions to prevent undue transverse flexure of the same and for providing the desired transverse contour at the end at 35 to facilitate sealing such end by disposing smoothly thereon a strip element 44 of suitable rubber material extending across the end in superimposed and overlapping relation with the slide fastener 15, the strip elements 31 and 32, the platform 37 and the wall 17 of the container. The strip element 44 is attached thereto by a suitable adhesive.

Stop means 45 and 46 for preventing engaging and disengaging movement of the runner 30 beyond the end fastener elements at the respective ends at 33 and 35 of the slide fastener structure 15 are provided in association with such end fastener elements. Stop means 46 includes, desirably, a bridge structure 47 of rigid non-corrosive material such, for example, as brass strip material spanning the space between the adjacent margins 20a and 21a of the stringers, and mounted on the fastener elements adjacent the end of the opening 40 beneath the attached parts of the end portions 24a and 25a of the sealing elements in a manner such that the runner 30 will be positioned within the opening 40, when the sealing closure is in the closed condition, as shown especially in Figs. 1, 3 and 4. The bridge structure 47 is constructed and arranged to provide further bracing of the platform against undue bending of the latter transversely and to a limited extent longitudinally thereof to promote maintenance of the seal between the enclosure structure and the platform.

To these ends the bridge structure 47 includes a lower member 48 having spaced-apart channel portions 48a and 48b adapted to embrace the lower faces and ends of several of the fastener elements along each adjacent margin of the stringers, which channel portions are interconnected by a narrow web portion 48c positioned level with the upper faces of the fastener elements as shown especially in Fig. 4. The bridge

structure also includes an upper flat plate member 49 including a web 49a positioned on the upper faces of the fastener elements, the web 49a having dependent side portions 49b and 49c bent to embrace and secured to the web portion 48c as by soldering, if desired, for fastening together the upper and lower members 48 and 49 in engagement with the fastener elements thereby rigidly positioning in transverse spaced-apart relation the latter elements relative to one another and also functioning to support and stiffen the platform 37, especially at the region of the bridge structure, against objectionable flexure.

Additional bracing of the platform 37 against such flexure, especially longitudinally thereof along the enclosure structure 16, may be provided by spaced-apart stiffening elements 50 and 51 of relatively rigid material such, for example, as steel wire disposed along the platform 37 substantially parallel with the fastener elements 28 and 29, and the ends of the wire elements may have closed loops to facilitate positioning the stiffening elements desirably adjacent the stringers by studs 52 extending through the stringers and the looped ends. The stiffening wires 50 and 51 are also embedded in the body of resilient rubber material comprising the platform in the manner shown especially in Figs. 1, 2 and 4, thereby imparting stiffness to the rubber material of the platform adjacent the enclosure structure.

The enclosure structure 16 includes a housing 53 of resilient rubber or other rubber-like material, preferably molded and vulcanized in the desired shape, which housing is desirably generally elliptical in form but may be circular, rectangular or other suitable forms for accommodating the runner 30 and for conforming substantially to the form of the platform 37. The housing 53 includes a cap portion 54 and a continuous marginal side wall 55 depending from the cap portion 54, the side wall 55 being tapered in section and terminating in an edge 56 for sealing by lip-action with the sealing surface 36, which construction also permits flexure and conformance of the tapered side wall at the edge 56 to irregularities as at 41 in such sealing surface by virtue of the flexibility of the resilient rubber material thereof. In the "as molded" condition of the housing, the tapered side wall 55 is in the position indicated by the numeral 57, as shown especially in broken lines in Fig. 3; and in the sealing condition with the platform, such tapered side wall 55 is flexed to the position indicated by the numeral 58.

Retaining means for holding the housing 53 in separable sealing relation with the platform 37 and for separably associating the housing with the runner 30 is, desirably, enclosed within the space 59 defined by such housing. The retaining means may include a mounting plate 60 of relatively rigid sheet material such, for example, as sheet brass of generally elliptical form having a central aperture at 61 for receiving therethrough a projecting pin 62 attached to the runner. The outer marginal portion of the plate 60 is seated in an annular recess in the inner face of the side wall 55 adjacent the cap portion 54 and may be held therein as by a suitable adhesive.

A snap fastener assembly 64 for detachably engaging the wall of the groove 67 in the pin 62 may be mounted upon the upper face of the mounting plate 60 and suitably secured to the latter as by a plurality of spaced-apart lugs extending through apertures in the plate 60 and bent into engagement with the lower face of such plate, as shown especially in Figs. 3 and 6. The

snap fastener assembly 64 is also positioned within a suitably shaped recess at 70 in the cap portion 54 adapted to receive such assembly and the end of the projecting pin 62. The housing 53, the mounting plate 60 and the snap fastener assembly 64 are constructed and arranged to cooperate with the projecting pin 62 of the runner such that, when the fastener assembly 64 is engaged with the pin, the tapered sidewall 55 is flexed resiliently outward relative to such side wall and is held resiliently in sealing relation with the surface 36 of the platform 37 by lip-action of the edge 56.

For conveniently engaging and disengaging the snap fastener assembly 64 and the pin 62 by manipulation from the exterior of the housing 53, a fitting 71 of suitable metal material is secured at one end as by riveting to the front portion of the mounting plate 60 at the longitudinal centerline thereof, and extends through a suitable opening in the cap portion 54 in sealing relation with the wall of such opening and may be attached to the latter wall as by rubber cement. The fitting 71 has a transverse bore 72 in its other end portion at the exterior of the housing for receiving in a pivotal manner a pull tab 73 such, for example, as a metal ring to provide for exerting force on the fitting in the direction normal to the slide fastener structure for engaging and disengaging the enclosure structure and the runner, or, if desired, substantially parallel with the same along the wall of the container for moving the runner 30 back and forth along the fastener elements 28 and 29 to engage and disengage the latter.

To further facilitate such movement of the runner along the slide fastener 15 and to provide relative swinging movement between the enclosure structure 16 and the runner 30 while preventing accidental loss of the latter structure, a movable link 74 of suitable rigid material such as brass having the desired strength characteristics interconnects the enclosure structure and the runner and embraces part of a projecting portion 75 or second post of the latter when such runner and enclosure structure are engaged for sealing the opening 40 at the platform 37. The link 74 at one end thereof extends through a transverse bore 76 in a supporting member 77 of suitable rigid material, which member 77 is secured at one end as by riveting to the back portion of the mounting plate 60 at the longitudinal centerline thereof. The link 74 at its other end extends through a suitable slit 78 in the projecting portion 75, which portion and link are adapted to be housed within the enclosure structure 16 beneath the plate 60. The link 74 pivots freely in the bore 76 and the slot 78, and slides freely along such slot for permitting the relative swinging movement between the enclosure structure 16 and the runner 30 for conveniently opening and closing the slide fastener structure 16 and for sealing the latter at its platform end at 35.

In contrast to prior runner or slider constructions which have loosely engaged the fastener elements for obtaining relative ease of operation of the slide fastener, the runner 30 provides advantageously for close control of such fastener elements while providing the desired ease and reliability of operation. The runner 30 also permits the free passage thereover of the laterally projecting tapered portions 26 and 27 of the sealing elements 24 and 25 with little or no wear on

the edges of such tapered portions despite the projecting portion 75 of the runner extending therebetween. The runner 30 is made of rigid material such, for example, as brass, aluminum alloy or plastic material and may be made an integral unit as by die-casting or molding or other suitable processes. The runner includes a top plate element 79 having desirably a gradually curved upper face terminating in upwardly flared portions 79*a* and 79*b* at the entrance end at 30*a* of the runner and positionable adjacent the tapered portions 26 and 27 of the sealing elements 24 and 25 and a flat lower face, and includes a bottom plate or track element 80 having side flanges 80*a* and 80*b*, which elements 79 and 80 are held in spaced-apart parallel relation and interconnected by a center or spreader post 81, tapered in section, at the entrance end 30*a* of the runner.

The respective plate and track elements 79 and 80 and the spreader post 81 define track passages for the fastener elements having substantially parallel sides through the runner. Such passages include at the end 30*b* opposite the entrance end 30*a* of the runner a channel longitudinal of the rows of fastener elements 28 and 29 and two connecting channels extending angularly from the longitudinal channel to the entrance end. The angular connecting channels are of sufficient width normal to and between the spreader post 81 and the inner faces of the side flanges 80*a* and 80*b* to accommodate the fastener elements with minimum transverse movement of the latter during longitudinal movement therethrough in order to prevent twisting and jamming of the fastener elements in such angular passages.

The inner transverse edges of the ends of the plate and track elements at 30*a* and 30*b* are rounded, as shown especially in Fig. 3, which facilitates smooth engaging action by the runner with the fastener elements 28 and 29 at such ends and aids in preventing jamming of the latter elements 28 and 29 at these points. Rounded end portions 80*c* and 80*d* of the side flanges at the entrance end 30*a* of the runner are flared upwardly and outwardly which construction narrows the width of slots 82 and 83 between the side margins of the top plate element 79 and the side flanges of the bottom track element 80 for further facilitating the desired smooth engaging action and preventing jamming by the fastener elements at such end 30*a*, and also preventing side egress of the fastener elements immediately at such rounded end portions of the side flanges. The width of the respective slots 82 and 83 along the sides of the runner is less than the depth of the fastener elements to prevent egress of such elements along such sides.

The projecting portion 75 of the runner extends along the longitudinal centerline of the latter in superimposed and spaced-apart relation with the top plate element 79 substantially from end to end thereof to accommodate the sealing elements 24 and 25 therebetween and includes a downward extension 75*a* integrally united with the plate and track elements 79 and 80 and the center post 81 at the entrance end 20*a* of the runner. The projecting portion 75 or second post including the extension 75*a* is relatively narrow in width as compared to the width of the top plate element to permit substantially free movement of such portion 75 between the edges of the tapered portions 26 and 27 of the sealing elements 24 and 25 with little or no rubbing on such edges during manipulation of the slide fastener structure 15, as shown especially in Fig. 7.

The projecting portion 75 also includes a web 75*b* joined with and extending a relatively short distance along the top plate 79 at the region of the angular passages of the runner at the end 30*a*. The web 75*b* tapers in section to a rounded edge 75*c* and is disposed such that the edge 75*c* is offset relative to the longitudinal centerline of the runner in a manner to promote, in cooperation with the curved upper face and flared end portions of the top plate, the desired opening and spreading apart action of the sealing elements 24 and 25 with minimum rubbing contact with the edges of the tapered portions 26 and 27 of the latter elements.

To open the sealing closure from the closed condition shown in Fig. 1, the pull tab 73 is moved to a position permitting the exertion of outward lifting force on the fitting 71 substantially normal to the slide fastener structure 15 and platform 37, which lifting force is transmitted through the fitting 71 to the enclosure structure 16 at the front portion of the mounting plate 60. Under the influence of such lifting force the mounting plate 60 and snap fastener structure 64 then swing in a pivotal manner away from the platform 37 rotating about the axis of the junction between the link 74 and the supporting member 77 at the back portion of the mounting plate 60 and overlying the bridge structure 47, which pivotal swinging action disengages the snap fastener 64 from the pin 62 and also breaks the seal between the enclosure structure 16 and the platform 37. The bridge structure 47 and platform 37 function as bracing means to prevent substantial inward movement relative to the platform by the link 74 and supporting member 77 despite the inward force exerted thereon due to the lifting of the front portion of the mounting plate 60 causing a pivoting action to a limited extent about the pin 62, whereby the supporting member 77 maintains a relatively fixed position during the disengaging action.

When the enclosure structure 16 is fully disengaged from the pin 62, a force or pull substantially parallel to the side fastener 15 in the direction of the end at 33 thereof applied through the pull tab 73 and fitting 71 causes the enclosure structure to swing outwardly from the platform to a position in advance of the runner 30 toward the end at 33 by virtue of the coincidental pivoting of the link 74 in the bore 76 of the supporting member 77 and in the slot 78 of the projecting portion 75 of the runner, the link 74 stopping its sliding movement at the front end of the projecting portion 75. Continuation of such pull on the enclosure structure 16 in the direction of the end at 33 moves the runner from the opening 40 in the platform 37 along the slide fastener 15 toward such end disengaging the fastener elements 28 and 29 successively during the sliding movement of the runner. By virtue of the coaction of the fastener elements, the center post and the walls of the angular connecting channels of the runner, such sliding movement spreads apart transversely the flared portions 38 and 39 of the platform 37 and the adjacent margins of the stringers 20 and 21 and disposes the sealing members 24 and 25 in substantially the position shown especially in Fig. 2, thus breaking the lip seal between such members 24 and 25 at the platform 37 and along the disengaged part of the slide fastener structure 15 intermediate the opening 40 and the runner 30.

During the movement of the runner 30 in such direction, the top plate element 79 passes in contacting relation with and beneath the sealing members 24 and 25 permitting the free passage of the tapered portions 26 and 27 of the members over the gradually curved upper face of such plate element 79. The spreading action of the runner on the stringers and sealing members moves the edge of the tapered portion 27 of one of such members across the opposing area of the tapered portion 26 of the other member to a position separated from and in angular relation with the edge of the latter tapered portion 26 at the region of the projecting portion 75 including the web 75*a*, as shown especially in Figs. 2 and 7. During such spreading action, the curved upper face and the flared portions 79*a* and 79*b* of the top plate 79 flex the tapered portions 26 and 27 outwardly relative to the runner and fastener elements and cooperate with the projecting portion 75 and web 75*a* in a manner such that the tapered portions 26 and 27 of the sealing members pass freely over such face and freely along the projecting portion 75 with little or no wear of the edges of the tapered portions. This construction and arrangement thus promotes reliability of fluid sealing and ease of operation of the slide fastener structure 15 even after extensive use and service.

To return the sealing closure from the open condition shown in Fig. 2 to the closed condition shown in Fig. 1, a pull or force in the direction of the end at 35 and substantially parallel to the slide fastener is exerted through the pull tab 73 and fitting 71 which pivots swingingly the enclosure structure 16 about the axis of the bore 76 of the supporting member 77 on the link 74, while the link 74 pivots in and slides along the slot 78 to the opposite end of the projecting portion 75 of the runner. As the runner and enclosure structure are manipulated along the rows of fastener elements 28 and 29, the latter move through the angular connecting and longitudinal passages of the runner without jamming at the entrance end 30*a* thereof. Also, the tapered portions 26 and 27 of the sealing members 24 and 25 pass freely along the projecting portion 75 and web 75*a* and pass freely over the curved upper face of the top plate 79 flexing back into overlapping and sealing relation with one another at the end at 30*b* of such runner, as shown especially in Fig. 7.

When the runner 30 passes along the end portions 24*b* and 25*b* of the sealing members contiguous with the flared portions 38 and 39 of the platform 37 to register the projecting portion 75 of the runner with the opening at 40, such end and flared portions are initially spread apart and the stiffening wires 50 and 51 are bent by the entrance end 30*a* of the runner but resume the closed and sealed condition upon engagement of the fastener elements 28 and 29 by virtue of the hereinabove given action of the tapered portions 26 and 27 of the sealing members coacting with the runner and by virtue of the resiliency of the rubber material of such members and platform and the restorative spring action of the stiffening wires 50 and 51. In this manner the desired substantially flat sealing surface 36 is again provided at the region of the end portions 24*b* and 25*b*.

To completely seal the sealing closure at the end at 35, the enclosure structure 16 is next swung pivotally toward the end at 33 until the central aperture at 61 of the mounting plate 60 is registered with the pin 62 on the projecting portion 75 positioned in the opening at 40, the link 74 sliding along the slot 78 toward the end at 30*b* of the runner. The snap fastener assembly 64 is then engaged with the pin 62 by exerting inward force relative to the platform 37 on the fitting 71 and seating the spring elements 65 and 66 in the groove 67 through pivoting the mounting plate 60 about the axis of the bore 76 of the supporting member 77 overlying the bracing bridge structure 47. Coincidental with the inward movements and separable attachment of the enclosure structure 16 to the runner, the tapered side wall 55 of the housing 53 flexes into contact with the platform 37 and seals against the sealing surface 36 by lip action of the edge 56. By virtue of the resiliency of the rubber-like material, the side wall 55 at the edge 56 conforms to the sealing surface despite irregularities therein as at 41 and conforms to any minor extent of flexure of the platform 37, transversely or longitudinally, which may occur in use.

The modified construction shown in Fig. 8 is similar in many aspects to the construction of the enclosure structure 16 and the runner 30 and is useful especially for applications of the sealing closure where a screwthreaded or other positive-action fastener means is desired for separably attaching the enclosure structure 90 to the runner 91. The runner 91 is like the runner 30 except that instead of the pin 62 of the latter, an interiorly threaded boss 92 integral with and projecting upwardly from the projecting portion 93 of the runner 91 is provided for securing the enclosure 90 thereto.

The enclosure structure 90 is pivotally connected to the runner 91 by the link 94 extending through the slot 98 of the runner and engaging the supporting member 97 at the bore 96 therein, such link and supporting member being substantially like the link 74 and the member 77. The supporting member 97 is attached as by riveting to the mounting plate 95 at the back portion thereof, the mounting plate 95 being of suitable shape and of suitable metal material and being seated in an annular recess 99 in the side wall 100 of the housing 101 molded of suitable rubber-like material to the desired generally elliptical form. The side wall 100 is tapered in section and terminates in an edge 102 for lip-sealing action with the platform 37. The mounting plate 95 includes an integral central portion 95*a* seated in a recess in and contacting the cap portion 103 of the housing 101 and such plate 95, if desired, may be secured to the housing as by a suitable adhesive. A bore for admitting a screw fastener 104 extends through the cap portion 103 and the mounting plate 95 and terminates in a counterbore at the lower face of the plate 95 for receiving the boss 92 of the runner 91.

The screw fastener 104 includes a knurled head portion 104*a* and a shank portion 104*b* threaded at the end opposite the knurled head for engaging the threaded boss 92. The knurled head 104*a* has a substantially flat lower surface for seating in sealing relation against the cap portion 103 of the housing upon engagement of the enclosure structure 90 with the runner 91.

For manipulating the enclosure structure 90 and the slide fastener, the pull tab 105 and the fitting 106 substantially the same as the tab 73 and fitting 71 are suitably secured to the front portion of the mounting plate 95. The fitting 106

extends through the wall of the housing 101 in sealing relation therewith.

To detach the enclosure structure 90 from the runner 91 for opening the sealing closure at the platform end thereof, the screw fastener 104 is disengaged from the boss 92 by turning the knurled head 104*a* and exerting outward lifting force relative to the platform 37 on the enclosure structure 90 by means of the pull tab 105 and fitting 106. The enclosure structure is then tilted and swung in a pivotal manner to the forward position as described hereinabove for the enclosure structure 16 to permit operating the runner along the sealing slide fastener to open the latter.

The opening 40 at the platform end of the sealing closure is closed by manipulating the runner and then positioning the enclosure structure 90 by the pivotal action of the link 94 such that the bore and counterbore in the mounting plate 95 register with the boss 92. The screw fastener 104 is engaged with the boss 92 drawing the enclosure structure 90 inwardly toward the platform 37 and flexing the tapered side wall 100 for sealing contact at the edge 102 with such platform. In the fully engaged condition, the knurled head 104*a* of the screw fastener 104 presses inwardly on the rubber material of the cap portion 103 compressing such material against the mounting plate 95 and against the shank portion 104*b* of the screw fastener 104, also seating the mounting plate against the boss 92, whereby fluid sealing at the region of the bore in the enclosure structure 90 is accomplished.

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

I claim:

1. A sealing closure for an aperture in a wall having an exposed sealing surface, said closure comprising an enclosure structure positionable in overlying relation with said aperture at said surface for closing the aperture and including a marginal portion of resilient rubber-like material tapering to an edge for sealing against said surface by lip-action of said edge, and retaining means for holding said structure at said surface in separable sealing relation therewith, said means including an element pivotally mounted on said structure and anchored with respect to said surface for permitting swinging movement of said structure relative to said surface for opening the aperture.

2. In a slide fastener closure including cooperative fastener elements at adjacent margins of stringers to be joined, sealing members positionable in overlapping sealing relation to one another and extending along said margins over said fastener elements at a face of said closure, and a runner including a projecting portion at said face for thus positioning said sealing members and for engaging and disengaging said fastener elements, said projecting portion extending between said sealing members, an end closure comprising a sealing surface at said face at an end of the slide fastener closure, an enclosure structure positionable at said surface and adapted to receive said projecting portion of said runner, said enclosure structure including a marginal portion of elastic material tapering to an edge for sealing against said sealing surface by lip-action of said edge, and attaching means carried by said enclosure structure for separably attaching the latter to said projecting portion of the runner.

3. In a slide fastener closure including cooperative fastener elements at adjacent margins of stringers to be joined, sealing members positionable in overlapping sealing relation to one another and extending along said margins over said fastener elements at a face of said closure, and a runner including a projecting portion at said face for thus positioning said sealing members and for engaging and disengaging said fastener elements, said projecting portion extending between said sealing members, an end closure comprising a sealing surface at said face at an end of the slide fastener closure, an enclosure structure positionable at said surface and adapted to receive said projecting portion of said runner, said enclosure structure including a marginal portion of elastic material tapering to an edge for sealing against said sealing surface by lip-action of said edge, and attaching means carried by said enclosure structure for separably attaching the latter to said projecting portion of the runner, said attaching means including means pivotally associated with said runner and said enclosure structure for interlocking the runner and said structure while permitting swinging movement of said structure relative to said sealing surface.

4. In a slide fastener closure including cooperative fastener elements at adjacent margins of stringers to be joined, sealing members of resilient rubber-like material positionable in overlapping sealing relation to one another and extending along said margins at said fastener elements at a face of said closure, and a runner including a projecting portion at said face for thus positioning said sealing members and for engaging and disengaging said fastener elements, said projecting portion extending between said sealing members, an end closure at said face and comprising platform elements of resilient rubber-like material extending along and united with said sealing members at an end of the slide fastener closure providing in cooperation with said sealing members a sealing surface at said face of said slide fastener closure, stiffening elements embedded in the material of said platform elements, an enclosure structure of resilient rubber-like material positionable at said sealing surface and adapted to receive said projecting portion of said runner, said structure including a marginal portion of the resilient material tapering to an edge for sealing against said surface by lip-action of said edge, snap fastener means carried by said enclosure structure for separably attaching the latter to said projecting portion of the runner and for positioning said edge against said sealing surface, link means pivotally associated with said projecting portion of the runner and said enclosure structure for interlocking the runner and said structure while permitting swinging movement of said structure relative to said sealing surface, and means carried by said enclosure structure coacting with said link means for so moving said structure and for manipulating said runner from the exterior of said enclosure structure.

5. A runner for a sealing slide fastener in which a series of fastener elements are engageable and disengageable by action of the runner and sealing members are adapted to be brought into sealing relation upon closing the fastener, said runner comprising a lower plate, an upper plate, a spreader post spacing said plates apart and providing therewith a track for said fastener elements, said lower plate having upstanding side flanges diverging in a fore and aft direction and said upper plate being narrower than said lower

plate with margins sufficiently close to said flanges to prevent lateral escape of said fastener elements, and a runner-manipulating projection extending from said upper plate with side clearance above said upper plate for passage between said sealing members.

6. A runner as defined in claim 5 in which said runner-manipulating projection comprises a portion elongated in the fore and aft direction and having a slot for reception of an operating member, said portion being connected to said upper plate by a web tapering to a relatively thin edge for providing said clearance above the upper plate.

7. A sealing closure for an aperture in a wall having an exposed sealing surface, said closure comprising an enclosure structure positionable in overlying relation with said aperture at said surface, said structure including an elastic marginal portion tapering to a thin edge for sealing against said surface by lip-action flexure of said edge against said surface, and retaining means for detachably holding said structure against said surface, said means including an element pivotally mounted on said structure and anchored with respect to said surface for permitting swinging movement of said structure relative to said surface for opening the aperture.

8. A sealing closure for adjacent margins, said closure comprising sealing elements extending along said margins at a face of the closure and terminating in a junction at an end of the closure, said junction having a sealing surface at said face and an opening therein at the joinder of said elements with the junction, a member positionable in said opening in engagement with said margins in the closed condition of the closure, a housing positionable in overlying relation to said opening and said member at said surface for closing said opening, and means for separably holding said housing against said surface, said housing including an elastic marginal portion for sealing against said surface.

9. A sealing closure for adjacent margins, said closure comprising slide fastener means including a runner for engaging and disengaging said margins, sealing elements extending along said margins at a face of the closure, a platform on said margins joined with said elements at an end of the closure, said platform having a sealing surface at said face and an opening therein at the region of joinder with said elements for receiving said runner in the closed condition of the closure, a housing positionable in overlying relation to said runner and said opening at said surface for closing said opening, said housing including an elastic marginal portion tapering to a thin edge for sealing against said surface by lip-action flexure of said edge against said surface, and means carried by said housing for separably engaging said runner and holding said housing at said surface.

10. A sealing closure for adjacent margins, said closure comprising slide fastener means including a runner for engaging and disengaging said margins, sealing elements including lateral portions of resilient material extending along said margins at a face of the closure for disposition in overlapping sealing relation of said lateral portions in the closed condition of the closure, at least one of said lateral portions tapering to an edge for contacting the other portion in sealing relation therewith by lip-action of said edge, a platform on said margins joined with said sealing elements at an end of the closure, said platform having a sealing surface at said face merging with said sealing elements and having an opening therein at the region of merger with said sealing elements for receiving said runner in the closed condition, a housing positionable in overlying relation to said runner and said opening at said surface for closing said opening, and means carried by said housing for separably engaging said runner and holding said housing at said surface, said housing including a reslient marginal portion tapering to a sharp edge for sealing against said surface by lip-action flexure of said sharp edge against said surface.

11. In a slide fastener closure including cooperative fastener elements at adjacent margins to be joined, sealing elements having elastic lateral portions positionable in overlapping sealing relation to one another and extending along said margins over said fastener elements at a face of the closure, one of which portions tapers to an edge for contacting the other portion in sealing relation therewith by lip-action of said edge, and a runner including a projecting portion at said face for thus positioning said sealing elements and for engaging and disengaging said fastener elements, said projecting portion extending between said sealing elements, an end closure comprising a sealing surface at said face at an end of the slide fastener closure, a housing positionable at said surface and adapted to receive said projecting portion of said runner, said housing including a marginal portion of resilient rubber-like material tapering to an edge for sealing against said sealing surface by lip-action of the latter said edge, and attaching means carried by said housing for separably attaching the latter to said projecting portion of said runner.

12. A sealing closure for adjacent margins, said closure comprising cooperative fastener elements at said margins, sealing elements including lateral portions of resilient material extending along said margins at a face of the closure for disposition in overlapping sealing relation of said lateral portions in the closed condition of the closure, one of which portions tapers to an edge for contacting the other portion in sealing relation therewith by lip-action of said edge, a runner comprising an upper plate including a projecting portion at the opening end of the runner and at said face of the closure for thus positioning said sealing elements and for engaging and disengaging said fastener elements, said upper plate having side margins and having faces which rise from said side margins toward the center and toward said opening end and merge with said projecting portion for guiding said sealing elements into said overlapping sealing relation, said projecting portion extending between said sealing elements, a platform on said adjacent margins of the closure joined with said sealing elements at an end of the closure, said platform having a sealing surface at said face of the closure merging with said sealing elements and having an opening therein at the region of merger with said sealing elements and having an opening therein at the region of merger with said sealing elements for receiving said runner including said projecting portion thereof in the closed condition, a housing positionable in overlying relation to said runner and said opening at said sealing surface for closing said opening and adapted to receive said projecting portion, and means carried by said housing for separably engaging said projecting portion and holding said housing against said sealing surface, said housing includ-

ing a resilient marginal portion tapering to a sharp edge for sealing against said sealing surface by lip-action flexure of said sharp edge against said surface.

13. A runner assembly for a sealing slide fastener in which a series of fastener elements are engageable and disengageable by action of the runner and sealing elements are adapted to be brought into sealing relation upon closing the fastener, said runner assembly comprising a runner structure including a lower plate, an upper plate, a spreader post spacing said plates apart and providing therewith a track for said fastener elements, and a second post extending above said upper plate for projecting between said sealing elements, and said runner assembly comprising a housing carried by said runner structure for disposition at a sealing surface of an end portion of the slide fastener and adapted to receive said second post of said runner structure, said housing having an elastic marginal portion tapering to an edge for sealing against said surface by lip-action flexure of said edge against said surface, and means carried by said housing for separably engaging said second post of said runner structure and holding said housing at said surface.

14. A runner assembly for a sealing slide fastener in which a series of fastener elements are engageable and disengageable by action of the runner and sealing elements are adapted to be brought into sealing relation upon closing the fastener, said runner assembly comprising a runner structure including a lower plate, an upper plate, a spreader post spacing said plates apart and providing therewith a track for said fastener elements, and a second post extending above said upper plate for projecting between said sealing elements and having side clearance above said upper plate for passage between said sealing elements, and said runner assembly comprising a housing carried by said runner structure for disposition at a sealing surface of an end portion of the slide fastener and adapted to receive said second post of said runner structure, said housing having a marginal portion of resilient rubber-like material tapering to an edge for sealing against said surface by lip-action flexure of said edge against said surface, and attaching means carried by said housing for separably engaging said second post of said runner structure and holding said housing at said surface, said attaching means including an element pivotally mounted on said housing and said second post for permitting swinging movement of said housing relative to said runner structure and the sealing surface.

15. A runner assembly for a sealing slide fastener in which a series of fastener elements are engageable and disengageable by action of the runner and sealing elements are adapted to be brought into sealing relation upon closing the fastener, said runner assembly comprising a lower plate, an upper plate, a spreader post spacing said plates apart and providing therewith a track for said fastener elements, a second post extending above said upper plate for projecting between said sealing elements, and handle means separably connected to said second post for manipulating said runner to open and close the fastener, said handle means including closure means for sealing against a sealing surface of an end portion of the slide fastener to close the same.

16. A runner for a sealing slide fastener in which a series of fastener elements are engageable and disengageable by action of the runner and sealing elements are adapted to be brought into overlapping sealing relation upon closing the fastener, said runner comprising a lower plate, an upper plate, and a spreader post at the opening end of the runner spacing said plates apart and providing therewith a track for said fastener elements, said lower plate having upstanding side flanges diverging in a fore and aft direction toward said opening end, and said upper plate being narrower than said lower plate with margins adjacent said flanges to prevent lateral escape of said fastener elements, said upper plate having faces for contacting said sealing elements which faces rise from said margins continuously to and merge at the center and rise continuously from the closing end to said opening end of the runner to facilitate guiding said sealing elements into said overlapping sealing relation.

17. A runner as defined in claim 16 in which said side flanges of said lower plate are flared upwardly and outwardly with respect to said upper plate at said opening end of the runner to narrow the space between said side flanges and said upper plate at said end for preventing jamming of said fastener elements and lateral escape thereof at said end of the runner.

18. A runner as defined in claim 17 in which said faces of said upper plate terminate at said opening end of the runner in end portions of such plate upwardly flared continuously across their extent with respect to said lower plate providing with the latter plate an enlarged mouth of said track at said end for receiving said fastener elements and preventing jamming of said fastener elements and lateral escape thereof at said end of the runner.

19. A runner for a sealing slide fastener in which a series of fastener elements are engageable and disengageable by action of the runner and sealing elements are adapted to be brought into overlapping sealing relation upon closing the fastener, said runner comprising a lower plate, an upper plate, and a spreader post at the opening end of the runner spacing said plates apart and providing therewith a track for said fastener elements, said lower plate having upstanding side flanges diverging in the fore and aft direction toward said opening end, and said upper plate having margins adjacent said side flanges and faces for contacting said sealing elements which faces rise from said margins continuously to and merge at the center and rise to said opening end of the runner to facilitate guiding said sealing elements into said overlapping sealing relation.

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

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Certificate of Correction

Patent No. 2,494,249 January 10, 1950

CARROLL P. KRUPP

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

Column 6, line 56, for "slit 78" read *slot 78*; column 7, line 68, for "20a" read *30a*; column 14, line 10, for "reslient" read *resilient*; lines 65 to 67 inclusive, strike out the words "and having an opening therein at the region of merger with said sealing elements";

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 8th day of August, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.