

Nov. 2, 1948.

A. M. BROWN

2,452,899

SLIDE FASTENER

Filed May 20, 1942

2 Sheets-Sheet 1

Fig. 1.

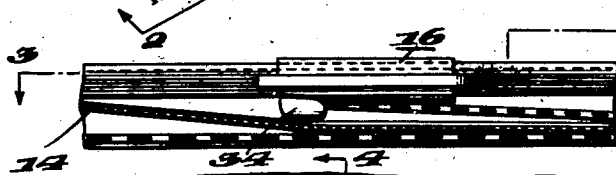
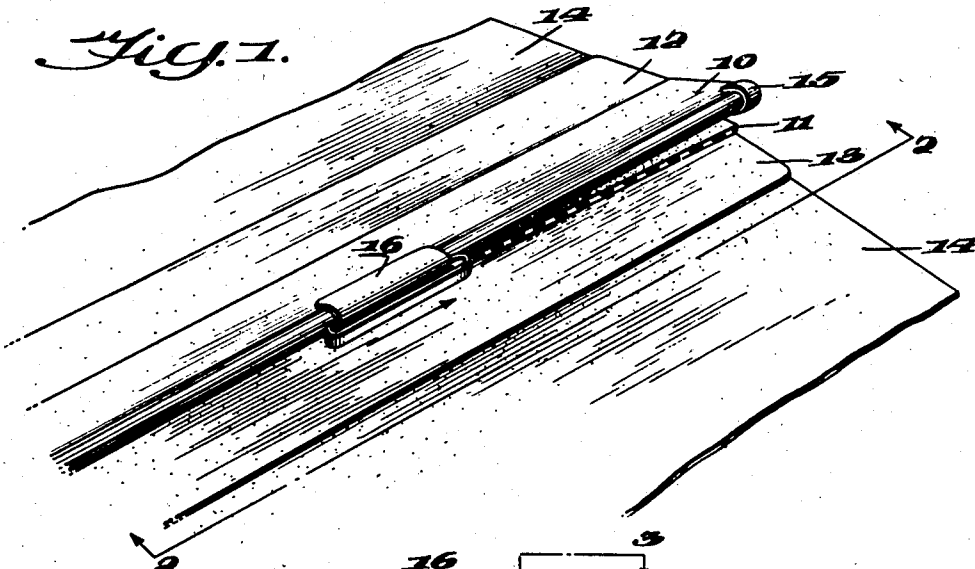


Fig. 2.

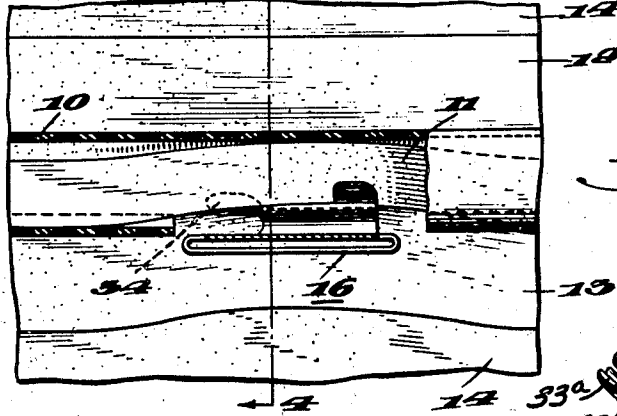


Fig. 3.

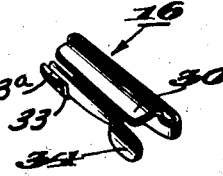
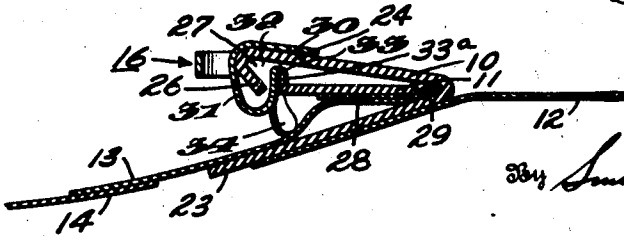


Fig. 4.

Fig. 5.



Inventor

ALEXANDER M. BROWN,

334 Smith, Michael & Gardiner,

Attorneys.

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A. M. BROWN
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2 Sheets-Sheet 2

Fig. 6.

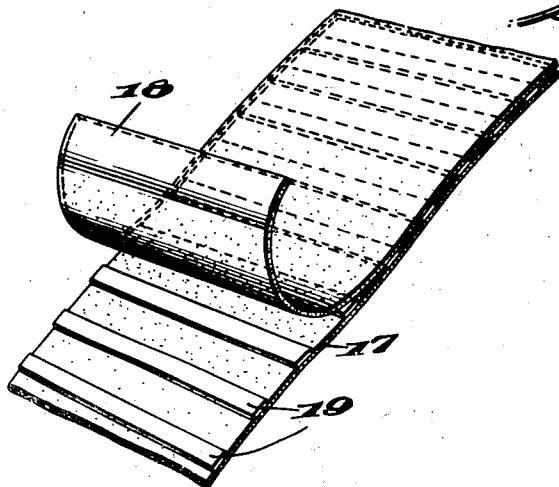


Fig. 7.

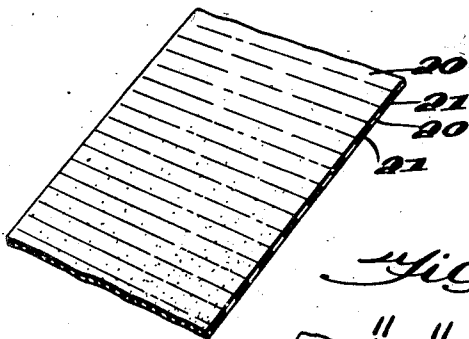


Fig. 8.

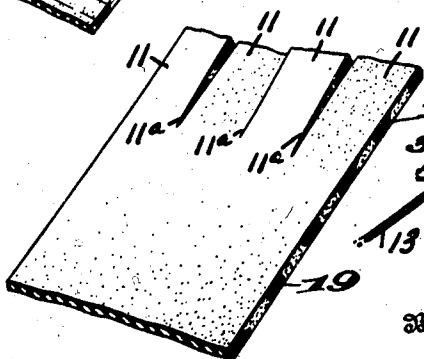


Fig. 9.

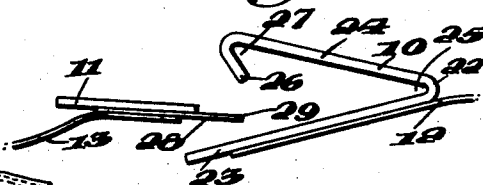


Fig. 10.

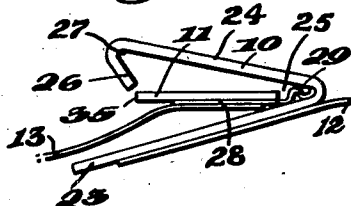


Fig. 11.

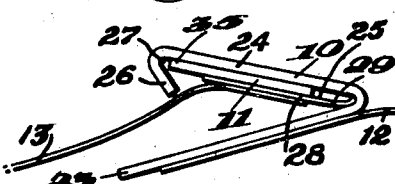


Fig. 12.

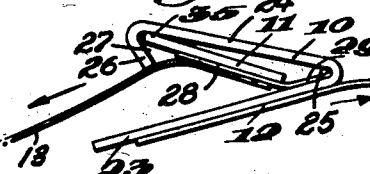
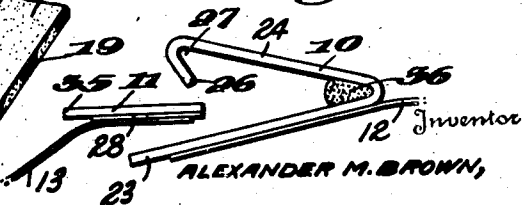


Fig. 13.



Inventor
ALEXANDER M. BROWN,
324, Smith, Michael & Searles,
Attorneys.

UNITED STATES PATENT OFFICE

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SLIDE FASTENER

Alexander M. Brown, Ocean Grove, N. J., assignor
of forty per cent to Madison Dallis Pickens,
New York, N. Y.

Application May 20, 1942, Serial No. 443,788

13 Claims. (Cl. 24-205.1)

1

This invention relates to fasteners, in particular to slide fasteners and to the provision of new and improved material from which such fastener may be formed.

Fasteners constructed according to this invention comprise a pair of runways which are interlockingly engageable and disengageable, for closing and opening a closure, preferably by means of a slide member or slider which is slidably supported for movement lengthwise of the runways for progressively engaging and disengaging the runways to close and open the fastener and the closure embodying the aforesaid fastener.

It is an object of the present invention to provide a fastener which provides a joint that is substantially gas-tight and water-tight while at the same time presenting a pleasing and attractive appearance.

A further object of the invention is to provide a slide fastener which is of considerable strength, being limited only by the strength of the reinforcing material employed, and which is so arranged that lateral pull cannot disengage the interlocking runways, but serves only to increase the interlocking effect between the cooperating runways.

Still another object is to provide the continuous strip members which form the interlocking runways with an internal strengthening or reinforcing material so that the continuous strips are extremely flexible in one direction but are quite rigid in the opposite direction, so that the strip may be bent about transverse axes but resists bending about longitudinal axes.

The material employed may be formed in large sheets with the reinforcing elements extending across the sheets in spaced relation but relatively close together. The sheets may be cut transversely of the reinforcing elements so that the reinforcing elements are exposed at the edge of the strips, after which the strips may be bent to desired configuration. By this construction the reinforcing elements are presented at the edge of the strips so that they form relatively friction-free tracks on which the slide member engages, thereby permitting easy operation of the slide.

The material employed, furthermore, is impervious in character and is relatively thin, with the reinforcing elements so embodied that the strips are of even thickness so that the surfaces presented are relatively smooth.

Other objects and advantages will appear as the description proceeds, reference being had to the accompanying drawings which illustrate preferred forms of my invention.

Referring in detail to the several drawings:

2

Figure 1 is a perspective view of the slide fastener embodying the present invention.

Fig. 2 is a fragmentary sectional view taken on the line 2-2 of Fig. 1.

Fig. 3 is a horizontal sectional view taken on the line 3-3 of Fig. 2.

Fig. 4 is a transverse sectional view taken on the line 4-4 of Fig. 3.

Fig. 5 is a perspective view of the slide employed to effect interlocking of the runways.

Fig. 6 is a fragmentary view showing one manner of preparing the material forming the runways.

Fig. 7 shows another type of material that may be employed for forming the runways.

Fig. 8 illustrates the manner of preparing and cutting the sheets out of which the runways are formed.

Figs. 9, 10, 11 and 12 are diagrammatic transverse sectional views showing progressive steps that are performed in interlocking the runways, and

Fig. 13 is a transverse sectional view of a modified form of my invention.

Referring in detail to the drawings, one runway is indicated at 10 and its companion interlocking runway is indicated at 11.

The runway 10 is suitably attached to a continuous strip of material 12, the material being rubber, fabric or other suitable substance which is preferably water-proof in character.

The runway 11 is attached to a similar continuous strip 13 with the strips 12 and 13 attached to fabric or other material indicated at 14 in connection with which the fastener is to be employed.

As seen in Fig. 1, the interlocking runways form a joint that is completely closed so that there is no opportunity for entrance of water, gas or the like, and to this extent the fastener distinguishes from prior patents in which a series of interlocking tongues, scoops or interdigitating fastener members engage each other, because the interstices between said tongues or fastener members present openings, permitting entry of water and the like.

In order to limit the movement of the slide or slider employed there is provided at one end of the runway 10, a stop 15, although it is understood that this is not essential.

The runways 10 and 11 are engaged by a suitable slide or slider 16 for the purpose of bringing the runways into interlocked relation, and the construction of the slide will be more fully described hereinafter.

The material employed in manufacturing the

runways 10 and 11 is shown in Figs. 6 and 7. Fig. 6 discloses sheets 17 and 18 of uncured rubber stock or other material. Interposed between the sheets are transversely extending reinforcing elements 19 which may be of thin metal, plastic or other suitable material, which is relatively rigid. The reinforcing elements 19 are spaced as illustrated, and lie in substantially parallel relation to each other.

After the reinforcing elements have been properly positioned between the sheets 17 and 18, the whole structure is prepared and cured by means of processes which are old and well known in the rubber art.

As the result of the process just described a sheet is provided which is impervious to gas and water, is relatively thin, and is substantially smooth on both faces. This material is extremely flexible when bent along lines extending transversely of the sheet or parallel to the reinforcing elements, but is relatively rigid and resists bending force along lines extending transversely of the reinforcing elements.

In Fig. 7 another form of material is illustrated, although the results of employing a sheet of this type are the same as in connection with sheets manufactured after the fashion illustrated in Fig. 6.

In Fig. 7 strips 20 of flexible material such as rubber or the like, alternate with strips 21 which are of metal, plastic or other suitable rigid material. The strips are arranged in parallel relation, after which they are pressed, vulcanized or otherwise caused to adhere to each other to form a continuous sheet of material which is flexible in one direction and relatively rigid in the other, as described in connection with Fig. 6. In this form of the invention it will be seen that the sheet is of uniform thickness, so that upper and lower smooth surfaces are presented which do not hinder the operation of the slide or slider 16 thereover.

The material as illustrated in Figs. 6 and 7 may be made into sheets of any suitable dimensions, after which it may be cut into narrow strips of the desired width with the reinforcing elements 19 extending transversely of each strip, although it is to be understood that the reinforcing elements do not necessarily have to be precisely at right angles to the length of the strip.

After the strips of material heretofore described have been cut to suitable width, the strip 10, which is formed of such material, is bent upon itself as at 22 to form diverging legs 23 and 24 presenting a channel or channel portion 25 therebetween. The leg 24 is provided with a return bend 26 which forms a second channel or channel portion 27, an open mouthed channel being defined by the legs or portions 23, 24 and 26 which includes the channel or channel portions 25 and 27 as parts thereof.

The leg 23 of the channel forming strip 10 is shown attached to the continuous strip 12, but the strip could, of course, be attached to other parts of the runway 10, depending upon the manner in which the fastener is to be used. The strip 12 is preferably bonded to the channel forming strip or runway 10 by vulcanization or by the use of suitable adhesive, cement, or the like.

The strip 11 forming the opposed runway is relatively flat and is of a width less than the distance between the channels 25 and 27. Strips 11 may be formed by cutting sheets of the material, transversely of the reinforcements 19, as shown, in Fig. 8, into strips 11 of desired width

along parallel lines, the slots for so cutting the material being designated 11a in Fig. 8.

As illustrated in Fig. 9, a thin, flexible strip of rubber or similar material 28 is secured to the underface of the strip 11 and projects beyond one edge of the strip 11 as at 29 to such extent that the combined width of the runway formed by the strip 11 and the attached strip 28 is at least slightly greater than the distance between the channels 25 and 27 (see Fig. 12).

The continuous strip 13 is shown in Fig. 9 as attached to the strip 28 with the strip 28 secured to the lower face of the runway 11, but various rearrangements and modifications are comprehended which will be apparent to those skilled in the fastener art.

In order to interlock the runways 10 and 11, a slide or slider 16 is employed. This slide or slider is provided with an overhanging lip 30 having an arcuate portion 31 which extends around the upper edge of the runway 10 (Fig. 4) to present a slot 32 through which the upper leg 24 of the runway 10 extends. The bent or arcuate portion 31 extends upwardly as indicated at 33, so that it will be seen that the return bend 26 cannot become disengaged from the slide 16.

The slide 16 is also provided with a depending runway engaging finger 34 which contacts the rear edge of the runway 11 for the purpose of progressively bringing the runway 11 into interlocking relation with the runway 10 during sliding movement of the slider 16 in one (i. e. closing) direction.

The slide or slider 16 is also provided with a downwardly depending finger 33a (Figs. 4 and 5) which engages the strip 11 during sliding movement of the slider 16 and by means of which the aforesaid strip or runway 11 is progressively brought or forced out of engagement with the flange portion 26 of the runway 10 during sliding movement of the slider 16 in the other (i. e. opening) direction.

In Figs. 10 and 11 the successive operation performed by the slide or slider 16 are clearly disclosed. In order to force the runway 11 into the runway 10, since the runway 11 and overhanging edge 29 are of a greater width than the distance between the channels 25 and 27, it is obvious that the runway 11 must be reduced in width in order that the heel 35 may clear the edge of the return bend 26.

As shown in Fig. 10, the heel 35 of the runway or strip 11, by reason of its engagement with the depending runway engaging finger 34, has been brought or forced inwardly of the channel portion 25, the flexible lip 29 having been compressed to such an extent that the heel 35 of the runway 11 may pass the return bend or flange 26.

As the slider moves along, pressure of the finger 34 on the heel 35 of the runway 11 is relieved, after which the compressible lip 29 expands to normal position, thereby forcing the heel 35 of the runway 11 into the channel portion 27 and maintaining it therein, while the overhanging edge 29 occupies a position in the channel 25, as shown in Fig. 11.

In this manner the runways 10 and 11 are interlocked and since they are composed of material which is relatively rigid or which does not flex about lines extending longitudinally thereof (i. e. longitudinal axes), an extremely strong and durable fastener is provided.

As illustrated in Fig. 12, any force exerted in the direction of the arrows tends merely to force the heel or inner edge 35 of the strip or runway

11 into more intimate engagement with the channel or socket 27, the runway 11 fulcruming about the heel 35 until the forward or outer edge of the strip 11 engages the leg 23 of the runway 10 through the portion 29 of the strip 28. Therefore, any transverse stress or strain is taken entirely by the rigid runways, so that the joint between the runways is dependent for its strength entirely upon the strength of the material from which the runways are formed. This differs from prior art structures wherein the reinforcing elements of fasteners of the non-interdigitating type must be flexed during the closing or interlocking operation, the requirements for such flexibility preventing the use of such rigid reinforcing elements are herein described which withstand crosswise strain, as explained.

It is obvious that by operating the slide or slider 16 in the opposite (i. e. opening) direction the reverse operation will take place. This is to say, the depending fingers 34 of the slider 16 engaging the inner edge or heel 35 of the runway 11 moves the aforesaid runway 11 inwardly toward the channel 25 so that the compressible edge or overhanging portion 29 will be bent, collapsed or distorted until the heel 35 of the runway 11, moved downwardly by the finger 33a of the slider 16, can be disengaged from behind the return bend 26, after which the resilient edge portion 29 expands or returns to its undistorted form or position, forcing the runway 11 out of the runway 10.

In Fig. 13 a somewhat modified form is disclosed, but the operation is substantially the same. In this illustration the compressible resilient edge portion 29 is eliminated from the runway 11 and the resilient, compressible member is placed in the channel 25. This material is indicated at 36 and may consist of a continuous strip of rubber or other suitable resilient material extending the full length of the runway 10, which forms a yieldable seal member or gasket yieldingly urging or forcing the heel 35 of the runway 11 into channel 27 while also providing an effective water-tight and gas-tight seal.

By utilizing this construction it will be apparent that the transversely rigid runway 11 is forced into the resilient material 36 until the heel 35 clears the return bend 26 in the same manner as described in connection with the preceding figures, after which expansion of the resilient material 36 forces the heel 35 behind the return bend 26 and into interlocking engagement.

The member 10 may be properly termed a channel member since the space between the channels or channel portions 25 and 27 thereof is itself a groove or channel having a mouth of less width than its upper or inner portion, or an undercut groove. The bend or flange 26 and the leg 23 may be said to form with the intermediate leg 24 a pair of spaced shoulders. Likewise the heel or inner edge portion 35 of the strip or strip member 11 may be properly termed a shoulder spaced inwardly of the strip or runway 11.

The runway or strip 11 in the form shown in Figs. 4 and 9 to 12 inclusive may be considered a strip member of variable effective width, the width being reduced temporarily by the slide or slider 16, as described above and as shown in Fig. 10, to snap the strip or strip member 11 into the channel or groove (i. e. between the shoulders) of the channel member 10.

Since the gasket 36 (Fig. 13) is compressible, the channel member 10 of that form may be properly described as having a channel of variable

width, temporarily spread by the slider 16 which thrusts the laterally incompressible strip or strip member 11 (Fig. 13) thereagainst in snapping the strip or strip member 11 into the wider portion of the channel or groove in the channel member 10, or in other words beyond the constricted mouth of the channel or groove between the spaced shoulders of the member 10, or between the channels or channel portions 25 and 27 thereof.

From the foregoing it will be seen that the broad concept is the same in all of the operations described, that is to say, the effective width of one of the members must be varied so as to permit entry of one of the runways into the other. In the form shown in Fig. 9, the effective width of the runway 11 is reduced, whereas in the form disclosed in Fig. 13, the width of the effective runway 11 remains constant, whereas the effective width of the runway 10 is increased temporarily by compression of the resilient material 36.

As will readily appear from Figs. 9-13 of the drawing, the return bend 26 and the portion of the leg 23 adjacent its junction with the leg 24 form inclined internal shoulders which cooperate with the leg 24 to form an undercut groove including the channels or channel portions 25 and 27 as parts thereof. Channel 27 is disposed away from the body of the material 12 along the free edge of the runway. The undercut groove has its opening facing towards the portion 23 which has two surfaces, one of which is attached to material 12 while the other is opposite the opening of the undercut groove. The opposed surfaces of parts 23 and 24 form a diverging acute angle with one another.

It is readily apparent that in connection with slide fasteners of the type herein disclosed, it is desirable to reduce the friction between the slide and the runways, particularly where rubber or similar material is employed.

By forming the runways as described with the metallic, plastic or other reinforcing elements exposed along the edges of the runway that are engaged by the slide, it will be seen that substantially a metal trackway is provided, and it is intended that the reinforcing elements be spaced sufficiently close together so that this metal trackway is substantially continuous and only relatively small intervening portions of rubber lie between the reinforcing elements. In this manner the metallic and other rigid surface presented is substantially continuous and friction is reduced to a minimum. Consequently, the fastener as described has longer life than if metal to rubber contact were provided.

It will also be clear from the preceding description that the resilient or flexible portions which assist in the action of interlocking the runways with each other, bear no relation to the strength of the fastener, because all strain applied to the fastener which would tend to separate the runways is taken by the rigid reinforcing material of which the runways are provided, whereas in prior constructions with which I am familiar, the strength of the fastener was limited by the flexible portions which are used in the opening and closing actions of the fastener.

The fastener as described may be very easily and cheaply manufactured and yet it produces a fastener of considerable strength, ease of operation, long life, together with the fact that the

joint is completely closed to present a neat and attractive appearance.

It is, of course, to be understood that the above description is merely illustrative, and in nowise limiting and that I desire to comprehend within my invention such modifications as are comprehended within the scope of the following claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a slide fastener, a plurality of continuous runways relatively inflexible transversely thereof but relatively flexible longitudinally thereof, one of said runways having spaced shoulders thereon to receive the other runway therebetween, said other runway carrying a strip of resilient material of less transverse rigidity projecting beyond one edge thereof only, the combined width of said other runway and strip being greater than the distance between said shoulders, and a slider slidable on said runways for compressing said strip to reduce said combined width and permit engagement of said other runway with said shoulders.

2. In a slide fastener, a plurality of continuous runways relatively inflexible transversely thereof but relatively flexible longitudinally thereof, one of said runways having shoulders thereon for engagement with the other runway to interlock the same together, each runway comprising a strip of flexible, resilient, impervious material having spaced, substantially parallel, rigid reinforcing elements extending transversely thereof with the ends exposed at an edge of the runway so that the runways may flex in one direction but resist flexing in other directions, and a slide engaging said runways and running on the exposed edges of the reinforcing elements to vary the effective width of one of the runways to permit entrance of the other runway thereinto for engagement with the said shoulders.

3. In means for detachably connecting two members, means on one of said members forming a groove of predetermined normal width, means in said groove yieldable for increasing the width of said groove beyond said normal width, and the other member forming a strip insertible in said groove upon yielding of said yieldable means.

4. In a slide fastener, a pair of complementary runways which are relatively flexible about transverse axes and relatively inflexible about longitudinal axes, and a slider supported on said runways for sliding movement in opposite directions to couple and uncouple said runways, one of said runways having thereon a pair of transversely spaced longitudinal shoulders forming therebetween a channel interlockingly receiving said other runway when said runways are coupled, the plane of said channel being disposed substantially parallel to the common plane of said runways when coupled, and the normal effective width of said channel being less than the normal effective width of said other runway, a longitudinally extending yieldable member forming a part of said channel and progressively compressed transversely by said slider in its sliding movement in one direction to effect entrance of said other runway into said channel for interlocking engagement of said runways.

5. In a slide fastener, a pair of complementary runways relatively flexible about transverse axes and relatively inflexible about longitudinal axes, and a slider supported on said runways for sliding movement in opposite directions to couple and

uncouple said runways, one of said runways having thereon a pair of transversely spaced longitudinal shoulders forming therebetween a channel interlockingly receiving said other runway when said runways are coupled, said other runway when in said channel being disposed substantially parallel to the common plane of said runways when coupled and being of strip like form and the normal effective width of said channel being less than the normal effective width of said other runway, said other runway having a longitudinally extending yieldable member of less transverse rigidity than said other runway forming one edge portion thereof only, said yieldable member being progressively compressed transversely by said slider in its sliding movement in one direction to reduce the effective width of the strip like runway and effect entrance thereof into said channel for interlocking engagement of said runways.

6. The structure defined in claim 4, wherein said yieldable member extends continuously along said channel and forms a gasket effecting a fluid-tight seal between said runways when they are coupled.

7. The structure defined in claim 5 wherein said yieldable member extends continuously along said channel and forms a gasket effecting a fluid-tight seal between said runways when they are coupled.

8. In fastening means of the class described, a pair of runways attachable to members to be detachably connected thereby, one of said runways forming substantially an undercut groove having an internal shoulder along its free edge, the other runway comprising a strip having its inner edge substantially free of attachment to the member to which it is attached, said strip lying within said groove when the runways are engaged with the inner edge of the strip engaging said shoulder, and means located in said groove at a point spaced from said free edge when the runways are engaged for yieldingly urging said inner edge against said shoulder, said means being carried by one of said runways.

9. In fastening means of the class described, a pair of runways attachable to members to be detachably connected thereby, one of said runways including a portion adapted to be secured to one of said members and further including means connected to such portion forming a groove having its opening facing towards the plane of the member to which such portion is attached, and having an internal shoulder along its free edge, the other runway comprising a member lying within said groove when the runways are engaged with one edge of said member engaging said shoulder, and means located in said groove when runways are engaged for yieldingly urging said edge against said shoulder, said means being carried by one of said runways.

10. In fastening means of the class described, a pair of runways attachable to members to be detachably connected thereby, one of said runways including a portion adapted to be secured to one of such members and means connected to said portion forming an undercut groove having its opening facing towards said portion and having an internal shoulder along its free edge, the other runway comprising a member lying within said groove when the runways are engaged with one edge of said member engaging said shoulder, and means located in said groove when said runways are engaged for yieldingly urging said

9

edge against said shoulder, said means being carried by one of said runways.

11. In fastening means of the class described, a pair of runways attachable to members to be detachably connected thereby, one of said runways comprising a first part having one surface adapted to be attached to one of said members and having a second opposite surface, and a second part connected along its inner edge to said first part and having a third surface facing said second surface and forming a divergent acute angle therewith, and means along the outer edge of said second part directed towards said first part so as to form an internal shoulder along the edge of said second part, thus forming a groove, the other runway comprising a strip lying within said groove when the runways are engaged with one edge of said strip engaging said shoulder, and means located in said groove when said runways are engaged for yieldingly urging said edge against said shoulder, said means being carried by one of said runways.

12. In fastening means of the class described, a pair of runways attachable to members to be detachably connected thereby, one of said runways forming substantially an undercut groove, the other runway comprising a strip having its inner edge substantially free of attachment to its supporting member, and means operative when said strip is disposed in the undercut groove formed by said first-named runway for yieldingly urging the free inner edge of said strip toward engagement with the other adjacent portion of

10

said undercut groove, said last named means being supported by said strip.

13. In fastening means of the class described, a pair of runways attachable to members to be detachably connected thereby, one of said runways forming substantially an undercut groove, the other runway comprising a strip having its inner edge substantially free of attachment to its supporting member, and means operative when said strip is disposed in the undercut groove formed by said first-named runway for yieldingly urging the free inner edge of said strip toward engagement with the other adjacent portion of said undercut groove, said last named means being disposed in said undercut groove.

ALEXANDER M. BROWN.

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