United States Patent

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[31] **P 18 11 663.7**

[54] **LOCK SLIDER**
7 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **24/205.14**
[51] **Int. Cl.** **A44b 19/30**
[50] **Field of Search** ..... 24/205.14, 205.16 A

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ABSTRACT: An automatic lock slider of plastic material provided with a bow-shaped combined holding and locking means comprising an elongated lug integrally connected at least at one end thereof to the upper plate of the slider body for holding a pull tab, and resiliently bendable elongated detent means integrally connected at one thereof to the lug in the region of the other end of the latter and carrying on it its free end a locking tooth for locking engagement with the interlocking elements of a slide fastener.

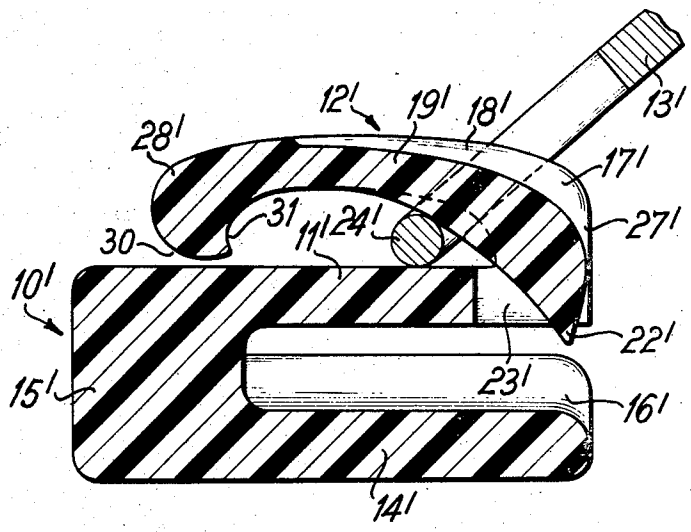


FIG. 1

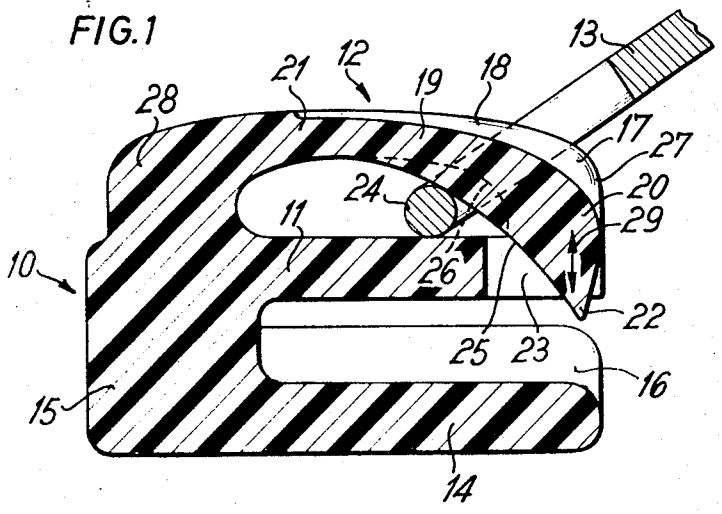


FIG. 2

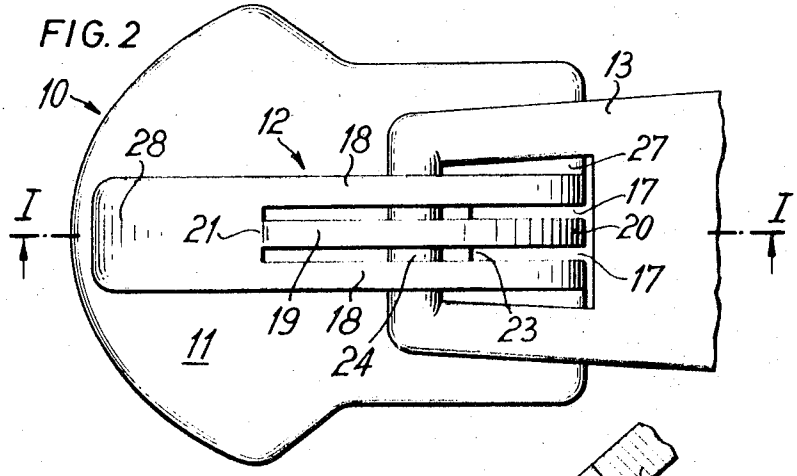
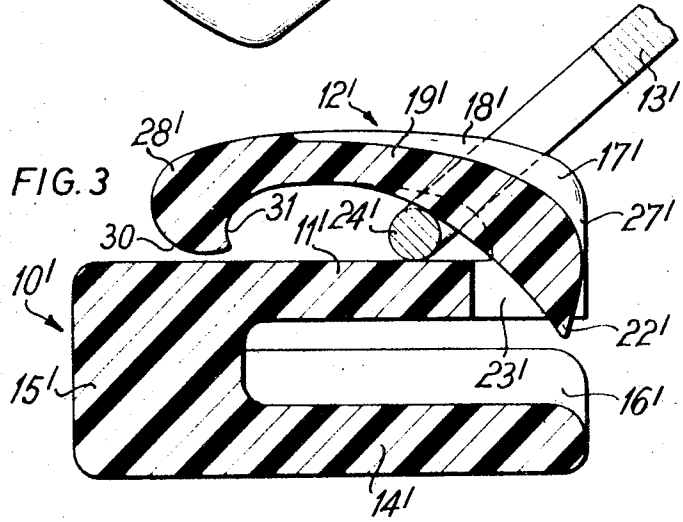


FIG. 3



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LOCK SLIDER

BACKGROUND OF THE INVENTION

The present invention relates to an automatic lock slider in which the slider body composed of an upper and a lower slider plate connected to each other at one end thereof by an opening wedge in substantially parallel spaced relationship is formed in one piece from plastic material, together with a lug, serving to support a pull tab, and a locking tooth which extends into the channel between the slider plates through which the interlocking elements of a slide fastener pass.

Such automatic lock sliders may be injection molded from plastic material. The locking tooth, in constructions known in the prior art, is integrally connected to the bottom face of the upper slider plate at one end of the channel distant from the connecting opening wedge. To disengage the locking tooth from the interlocking elements of the slide fastener, during movement of the slider in fastener-opening direction, it is necessary in these known constructions that the upper slider plate is in the region of the locking tooth of sufficient elasticity. In order to provide for the elastic deformation of the portion of the upper plate which the locking tooth is connected, the upper plate is in the region of the locking tooth formed with a cavity and by a pair of longitudinally extending slots separated from the remainder of the upper slider plate. This construction inherently entails a considerable disadvantage, in that the upper slider plate is considerably weakened at the end of the channel in which an interlocking of the interlocking elements passing therethrough has to be enforced, so that a slider of the aforementioned kind will not properly stand up under extended use, but is liable to break at this weakened portion. Since a damaged slider on a pair of slide fastener stringers cannot be easily replaced by a new one, it is usually necessary to replace the complete slide fastener with the slider thereon.

Automatic lock sliders are also known in the art, which for connecting the pull tab to the slider body are provided with a separate resiliently prestressed cap of plastic material which carries at one end thereof a locking tooth adapted to engage with the interlocking elements of the slide fastener. Such separate caps are of complicated shape and the portion thereof for tiltably connecting the cap to the slider body, are likewise of complex nature. Such lock sliders have the additional disadvantage that the manufacture thereof requires the production of a plurality of separate parts and the rather expensive assembly of these parts to each other. In addition, these parts have to be manufactured to very close tolerance and must be assembled in a very exact manner to each other which makes the manufacture of such lock sliders by mass production methods rather difficult.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an automatic lock slider which overcomes the disadvantages of such lock sliders known in the art.

It is an additional object of the present invention to provide an automatic lock slider in which the slider body, the lug and the detent means can be integrally formed with each other so that the manufacture thereof is greatly simplified.

It is a further object of the present invention to provide an automatic lock slider of the aforementioned kind which is rugged in construction and will stand up properly under extended use.

It is also an object of the present invention to provide a lock slider of the aforementioned kind in which overstressing of resiliently bendable detent means provided thereon is positively avoided.

With these objects in view, the automatic lock slider according to the present invention, which is formed of plastic material, mainly comprises a slider body including an upper and a lower slider plate, an opening wedge integrally connecting the plates at one of the ends thereof in spaced substantially parallel relationship to each other, and a pair of flanges extending from at least one of said plates toward but short of the other plate to define with the plates a channel for the passage of the interlocking elements of a slide fastener therethrough. The lock slider according to the present invention further comprises combined holding and locking means composed of an elongated lug integrally connected at least at one end thereof to the upper slider plate in the region of the other end of the latter, which lug has a concave face facing the top plate of the slider, and elongated resilient detent means extending substantially parallel to said lug. The detent means are separated from the lug by a longitudinally extending slot and being integrally connected at one end thereof to a region of the other end of this lug. The detent means are provided at the free end thereof with a locking tooth integrally formed with the remainder of the detent means and the latter are biased to stay in unstressed condition in a locking position in which the free end of the locking tooth extends beyond the bottom face of the upper slider plate towards the lower slider plate for locking engagement with an interlocking element of a slide fastener. The detent means are resiliently movable from the aforementioned locking position to a raised inactive position and the detent means have a cam face deviating with a portion thereof, at least in the locking position of the detent means, from the concave face of the lug towards the upper face of the slider plate. A pull tab movably held between the upper face of the upper plate and the concave face of the lug cooperates with the aforementioned portion of the cam face to raise the detent means to the inactive position when a pull is exerted on the tab to move the slider in fastener-opening direction along a slide fastener. In this construction a weakening of the upper slider plate by longitudinal slots extending therethrough is avoided while the lug fixedly connected to the upper slider plate will assure a secure attaching of the pull tap to the slider. By forming the longitudinally extending slot in the holding and locking means of sufficient length, detent means of sufficient resiliency will be obtained so that the locking tooth may be easily brought out of the engagement with the interlocking elements of the slide fastener during exertion of a pull on the tab in which the slider is moved in opening direction of the slide fastener. By arranging the concave face of the lug and the cam face of the detent means in the specific manner as mentioned above, the bending of the resilient detent means during exertion of a pull in the aforementioned manner on the pull tab, will be limited so as to prevent overstressing of the resilient detent means.

In a preferred arrangement the holding and locking means are formed with two such longitudinally extending slots which divide the bow-shaped holding and locking means into three parts integrally connected to each other at one end thereof, that is the detent means is in this construction arranged between the two slots and a pair of outer lug parts.

The upper slider plate may be formed at the other end thereof with a cutout through which the locking tooth may extend in the locking position of the detent means.

The pull tab may have a transverse portion located between the concave face of the lug and the upper face of the slider plate and this transverse portion may be integrally connected at opposite ends to the remainder of the pull tab. In this construction the lug may by resiliently bendable and biased to maintain in unstressed condition the free end of the lug spaced a distance from the upper face of the upper slider plate, which distance is slightly smaller than the smallest cross-sectional dimension of the transverse portion of the pull tab. In this arrangement the lug has preferably at the free end thereof a curved outer lead-in face extending with an inner portion thereof substantially parallel to the upper face of the upper slider plate towards said concave face of the lug to facilitate introducing of the transverse portion of the pull tab in the space between the concave face of the lug and the upper face of the upper slider plate, whereas the concave face of the lug extends with a portion thereof in the region of the free end of the lug substantially normal to the upper face of the upper slider plate to thereby form a stop face for the transverse por-

tion of the lug. In this way assembly of the pull tab with the other elements of the slider is greatly facilitated and at the same time the pull tab will be securely attached to the slider.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an enlarged longitudinal cross section of a lock slider according to the present invention, the cross section being taken along line I—I of FIG. 2;

FIG. 2 is a top view of the lock slider shown in FIG. 1; and

FIG. 3 is a longitudinal section through another embodiment of a lock slider according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The lock slider according to the present invention is formed from plastic material, preferably by injection molding and all elements of the lock slider with the exception of the pull tab are integrally formed with each other.

The lock slider **10** according to the present invention, illustrates in FIGS. 1 and 2, comprises a slider body composed of an upper slider plate **11** and a lower slider plate **14** integrally connected at one of the ends thereof by an opening wedge **15** in substantially parallel and spaced relationship. The slider body further comprises a pair of flanges **16** which may extend from the lower slider plate **14** toward but short of the upper slide plate **11** so as to form with the plates a channel for the passage of the interlocking elements of a slider fastener (not shown in the drawing) therethrough. Instead of providing upwardly extending flanges on the lower slider plate it is also possible to provide downwardly extending flanges on the upper slider plate, or shorter flanges extending toward each other on both plates.

The lock slider **10** comprises further elongated, bow-shaped holding and locking means **12** extending in longitudinal direction of the slider body upwardly from the upper slider plate and being formed with two parallel slots **17** which extend from the other or the right end, as viewed in FIGS. 1 and 2, of the slider toward but short of the left end thereof so as to divide the combined holding and locking means **12** into three parts, that is two outer lug parts **18** and a central detent means **19** integrally connected at the left end, as viewed in FIGS. 1 and 2, to each other and separated from each other over a major portion of their length by the longitudinally extending slots **17**. The elongated resiliently bendable detent means are connected only at the end **21** to the lug **18** whereas the free end of the detent means carries integrally connected thereto a locking tooth **22** which, in unstressed condition of the detent means, extends through a cutout **23** in the upper slider plate beyond the bottom face of the latter, as clearly shown in FIG. 1. The locking tooth **22**, in the locking position as shown in FIG. 1, is thus adapted to engage an interlocking element of a slide fastener on which the slider **10** is mounted to thus prevent accidental movement of the slider relative to the slide fastener. In the embodiment shown in FIGS. 1 and 2, the lug parts **18** are integrally connected at opposite ends **27** and **28** to the upper slider plate.

While FIG. 1 shows a cutout **23** in the upper slider plate **11**, it is also possible to make the detent means **19** longer so that the locking tooth **22** would be located beyond the right end, as viewed in FIG. 1, of the upper slider plate and in such a construction it is obviously possible to omit the cutout **23** in the upper slider plate.

The bow-shaped lug has a concave bottom face **26**, whereas the detent means has a cam face **25** which deviates from the concave face **26** at least with a portion thereof toward the upper face of the upper slider plate, at least in the locking position of the detent means as shown in FIG. 1.

The lock slider further comprises a pull tab **13** which has a transverse portion **24** of a cross section of preferably circular outline located in the space between the cam face **26** of the detent means **19** and the upper face of the slider plate and connected to the remainder of the pull tab by a pair of arms straddling the lug **18**. In the construction shown in FIGS. 1 and 2, the transverse portion **24** is preferably split and to assembly the pull tab **13** with the remainder of the slider, the arms which connect the transverse portion **24** to the remainder of the pull tab **13** are first formed in outwardly spread position so that the inner ends of the split transverse portion **24** are spaced from each other for a distance slightly exceeding the width of the lug, and then the arms are bent inwardly until the two ends of the split transverse portion meet beneath the detent means to thereby securely attach the pull tab to the remainder of the slider.

The detent means **19** are resiliently bendable so as to move the locking tooth **22** in the direction as indicated by the arrows **29**. In order to lift the locking tooth **22** from the locking position as shown in FIG. 1, a pull has to be exerted on the pull tab **13** in the direction towards the right, as viewed in FIG. 1, whereby the transverse portion **24** of the pull tab will engage the cam face **26** to thereby raise, upon continuation of the pull, the locking tooth from the position shown in FIG. 1 to an upper unlocked position in which the lower end of the locking tooth **22** will be upwardly displaced beyond the bottom face of the upper slider plate **11** to thereby bring the locking tooth out of engagement with an interlocking element of a slide fastener passing through the channel between the opposite faces of the upper and lower slider plate. Upward movement of the locking tooth **22** is limited since during upward bending of the detent means **19**, the transverse portion **24** of the pull tab **13** will finally engage the concave face **25** of the lug to thereby stop further upward bending of the detent means. After release of the pull tab **13**, the resiliently stressed detent means **19** will move the transverse portion **24** of the pull tab back towards the left, as view in FIG. 1, and the locking tooth **22** will move again to the locking position as shown in FIG. 1 to thereby engage with one of the interlocking elements of the slide fastener and thus prevent accidental movement of the slider in opening direction along the slide fastener.

In the embodiment shown in FIGS. 1 and 2 the lug **18** is connected at opposite ends **27** and **28** to the upper slider plate and since the slots **17** end short of the end **21** of the lug, this construction provides for a very secure attachment of the lug **18** to the upper slider plate. However, this construction necessitates a rather difficult attachment of the pull tab to the slider, in the manner as described above.

FIG. 3 illustrates a further embodiment of the lock slider according to the present invention which facilitates attachment of the pull tab to the remainder of the slider. Elements of the lock slider shown in FIG. 3 having the same function as the elements described above in connection with FIGS. 1 and 2 are referred to with the same reference numerals, to which, however, a "prime" is added.

The lock slider **10'** as shown in FIG. 3 comprises again an upper slider plate **11'** and a lower slider plate **12'** connected at one end thereof in substantially parallel and spaced relationship by an opening wedge **15'** and the lower slider plate is again provided with a pair of flanges **16'** extending upwardly therefrom toward but short of the upper slider plate **11'**. The slider as shown in FIG. 3 is, in the same manner as the slider described above in connection with FIGS. 1 and 2 provided with elongated, bow-shaped holding of the locking means **12'** extending in longitudinal direction of the slider body and being formed with a pair of slots **17'**, only one of which is shown in FIG. 3, which divide the elongated holding and locking means into two outwardly located lug parts **18'** and a central detent means **19'** integrally connected to each other at the left end, as viewed in FIG. 3, and the detent means has again at the right end thereof, as viewed in FIG. 3, a locking tooth **22'** which extends through a cutout **23'** in the upper slider plate beyond the bottom face of the letter. The essential difference between the lock slider construction shown in FIG.

3 and that shown in FIGS. 1 and 2 is that the lug 18' is only connected at its right end, as viewed in FIG. 3, at 27' to the upper slider plate, whereas the left end 28' is not connected to the upper slider plate but spaced therefrom in the unstressed condition of the lug a short distance, as shown in FIG. 3. The end 28' of the lug preferably has a curved outer lead-in face 30 which has an inner face portion substantially parallel and spaced from the upper face of the upper slider plate 11'. In this construction it is possible to omit the split in the transverse portion 24' of the pull tab 13' and to assemble the pull tab 13' with the remainder of the lock slider by simply pushing the transverse portion 24' from the left, as viewed in FIG. 3, against the lead-in face 30 to thereby resiliently bend the lug 18' until the transverse portion 24' of the pull tab snaps in two the space beneath the bow-shaped lug and the upper face of the upper slider plate, whereafter the lug 18' will again resiliently move back to the position as shown in FIG. 3 to thereby reduce the distance between the lower face portion of the lead-in face 30 and the upper face of the upper slider plate 11' to thus hold the lug 13' in the space beneath the bow-shaped lug. The concave inner face of the lug has preferably in the region of the end 28' a face portion 31 which extends substantially normal to the upper face of the upper slider plate to thereby form an abutment face for the transverse portion 24' which will prevent when a pull is exerted on the pull tab 13' towards the left, as viewed in FIG. 3, disengagement of the pull tab from the lug.

The lock slider as illustrated in FIG. 3 will operate in the same manner as discussed above in connection with FIGS. 1 and 2, that is during exertion of a pull on the pull tab 13' towards the right, as viewed in FIG. 3, the detent means 19 will be resiliently bent and the locking tooth 22' will be moved upwardly and out of engagement with an interlocking element of a slide fastener so that the slider may be moved relative to the slide fastener towards the right, as viewed in FIG. 3, whereas upon release of the pull tab, the locking tooth 22' will again move to the locking position as shown in FIG. 3.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of automatic lock sliders differing from the types described above.

While the invention has been illustrated and described as embodied in an automatic lock slider with a bow-shaped holding and locking means extending in longitudinal direction of the slider body and formed with at least one slot which divides the holding and locking means into a holding lug and a resiliently bendable detent means integrally connected at one end thereof to the holding lug, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

I claim:

1. An automatic lock slider for slide fasteners, said lock slider being formed from plastic material and comprising a slider body including an upper and a lower slider plate, an opening wedge integrally connecting said plates at one of the ends thereof in spaced substantially parallel relationship, and a pair of flanges extending from at least one of said plates toward but short of the other plate to define with said plates a channel for the passage of interlocking elements of a slide fastener therethrough; elongated bow-shaped holding and locking means extending in longitudinal direction of said slider body and being formed with at least one slot extending from the other end of said slider body towards but ending short of said one end and dividing said holding and locking means into an elongated lug and resilient detent means extending substantially parallel to said lug and integrally connected thereto at the end of said slot, said lug being integrally connected only at one end thereof to said upper slider plate in the region of the other end of the latter and having an opposite free end and a concave face facing said upper slider plate, said detent means having at the free end thereof a locking tooth and being biased to stay in unstressed condition in a locking position in which said locking tooth extends beyond the bottom face of said upper slider plate for interlocking engagement with an interlocking element of a slide fastener, said detent means being resiliently movable from said locking to a raised inactive position and having a cam face deviating with a portion thereof at least in said locking position from said concave face of said lug towards the upper face of said upper slider plate; and a pull tab held between said upper face of said upper slider plate and said concave face of said lug and cooperating with said portion of said cam face to raise said detent means to said active position when a pull is exerted on said tab to move said slider in fastener opening direction along a slide fastener.

2. An automatic lock slider as defined in claim 1, wherein said holding and locking means is formed with two of said slots and wherein said detent means is located between said slots.

3. An automatic lock slider as defined in claim 2, wherein said slots are arranged symmetrically with respect to a longitudinal plane of symmetry of said slider.

4. An automatic lock slider as defined in claim 1, wherein said upper slider plate is formed in the region of said other end thereof with a cutout through which is said locking tooth extends in said active position of said detent means.

5. An automatic lock slider as defined in claim 1, wherein said pull tab has a transverse portion located between said concave face of said lug and the upper face of said upper slider plate and being adapted to engage said cam face, said transverse portion being integrally connected at opposite ends to the remainder of said pull tab, and wherein said lug is resiliently bendable and is biased to maintain in unstressed condition said free end of said lug spaced a distance from said upper face of said upper slider plate which is slightly smaller than the smallest cross-sectional dimension of said transverse portion of said pull tab.

6. An automatic lock slider as defined in claim 5, wherein said transverse portion of said pull tab has a cross section of substantially circular outline.

7. An automatic lock slider as defined in claim 6, wherein said lug has at said free end thereof a curved outer lead-in face extending with a face portion thereof substantially parallel to said upper face of said upper slider plate towards said concave face of said lug to facilitate introducing of said transverse portion of said pull tab beneath said concave face of said lug, whereas said concave face extends with a portion thereof in the region of said free end of said lug substantially normal to said upper face thereby form a stop face for said transverse portion.