Sept. 2, 1958 H. ERDMANN 2,849,775

SLIDERS FOR SLIDE FASTENERS

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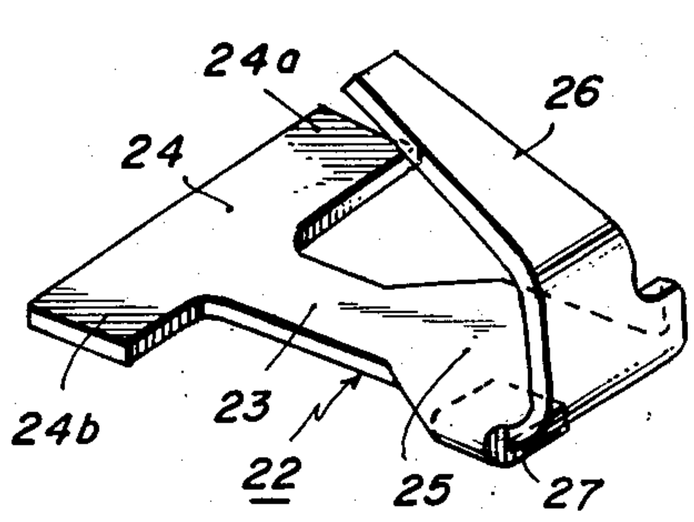
FIG. 1



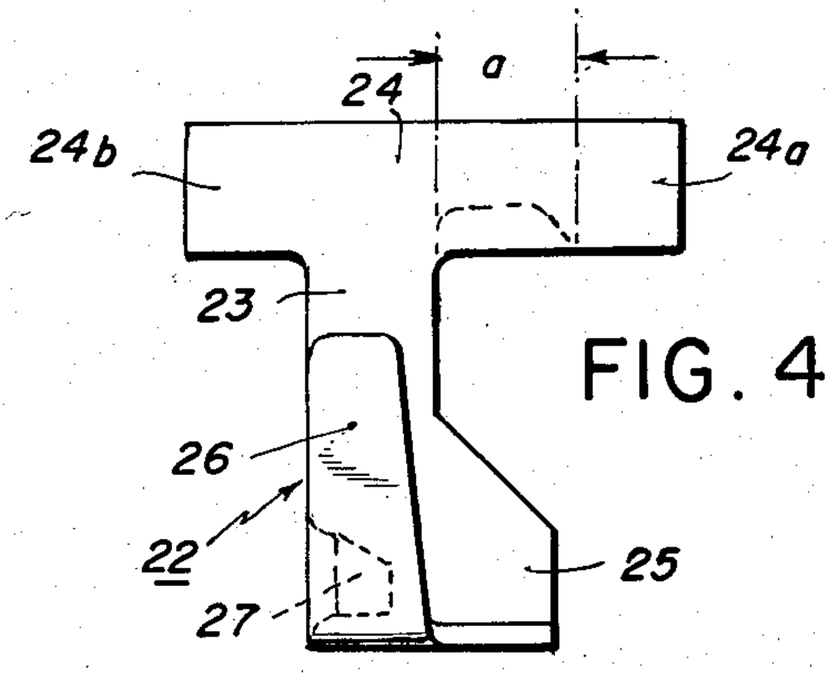


FIG. 4

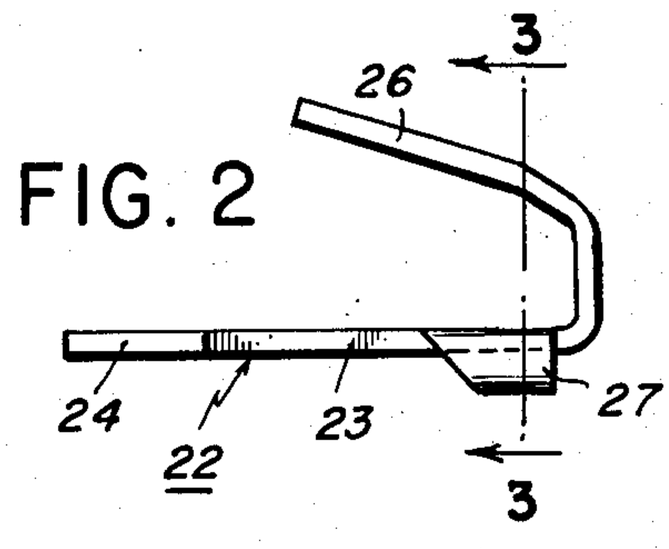


FIG. 2

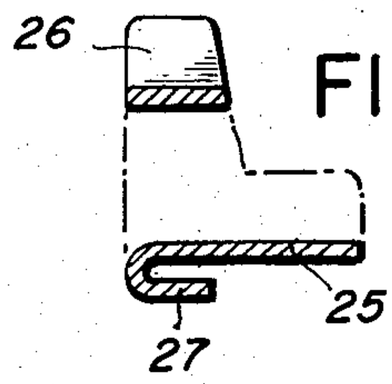
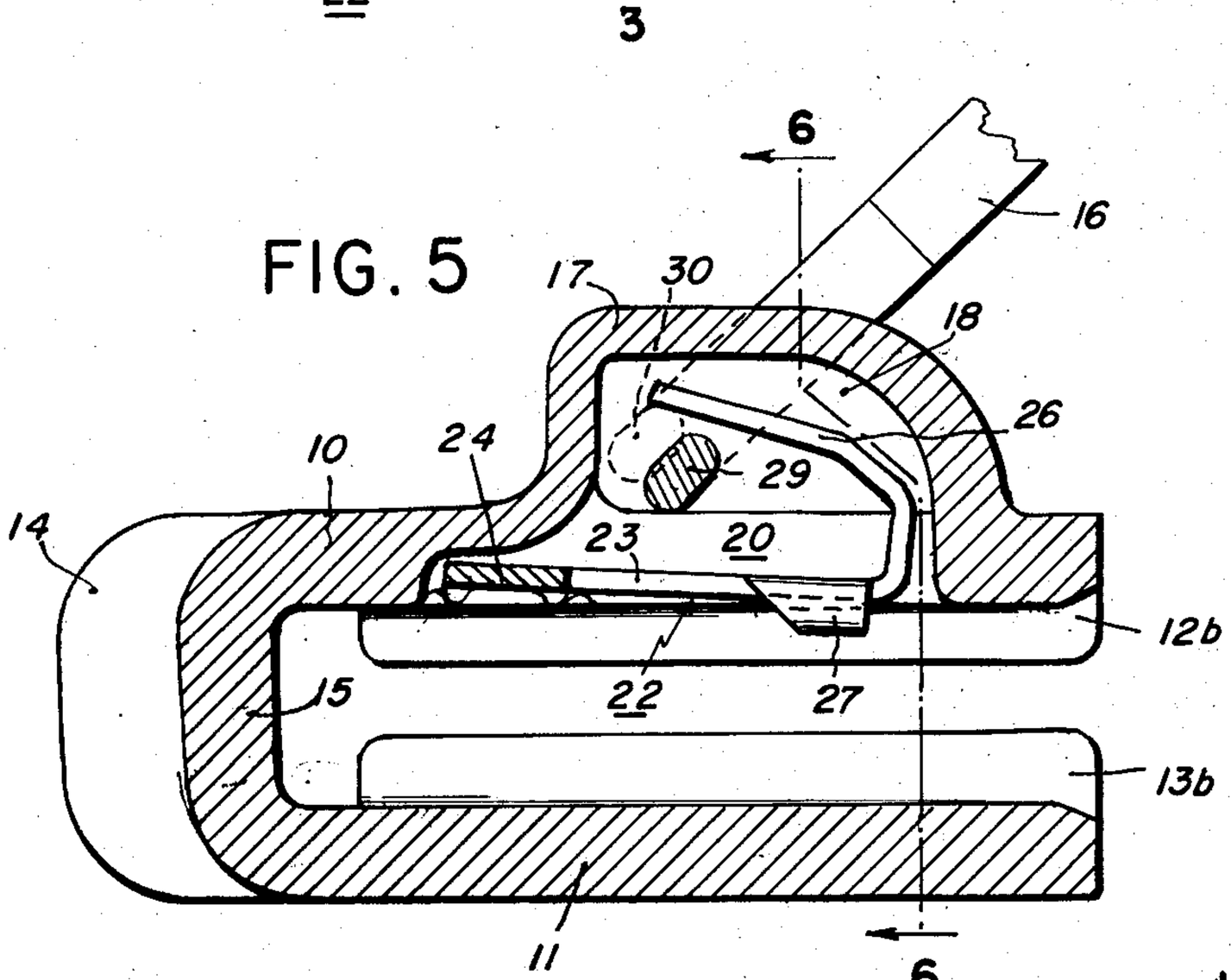


FIG. 3

FIG. 5



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SLIDERS FOR SLIDE FASTENERS

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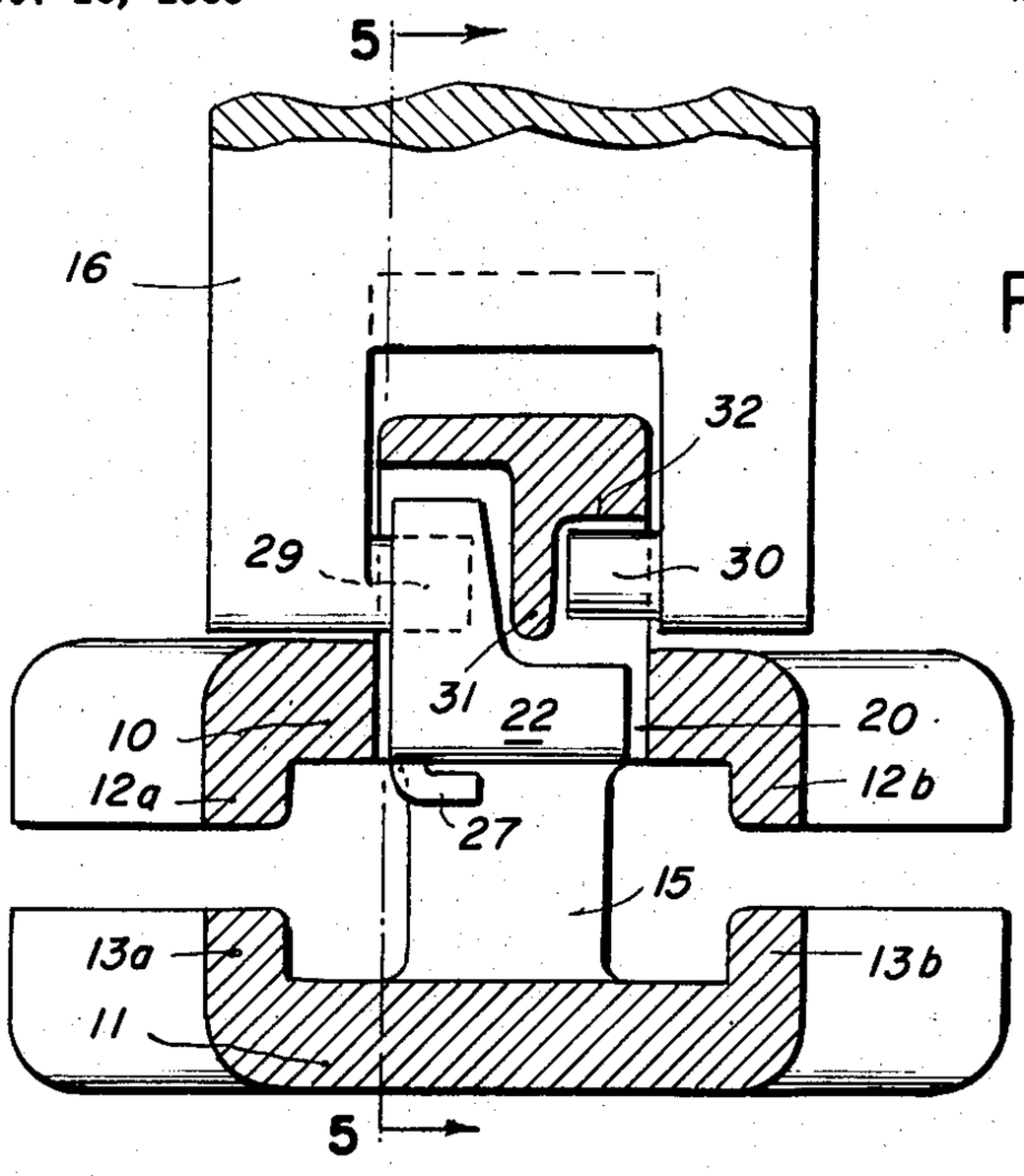
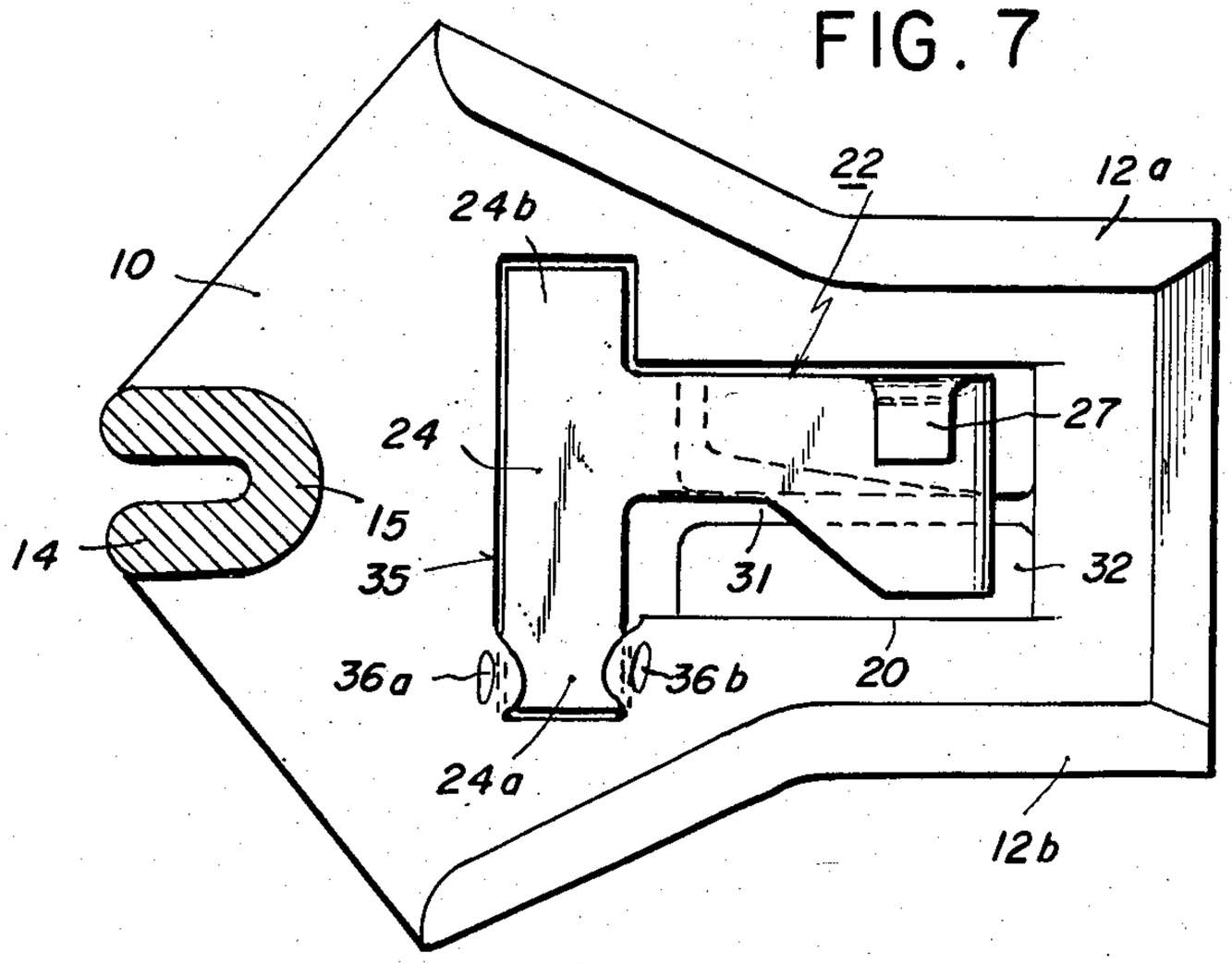


FIG. 6

FIG. 7



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SLIDERS FOR SLIDE FASTENERS

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3 Claims. (Cl. 24—205.14)

This invention relates to improvements in sliders for slide fasteners and is more particularly directed to an improved locking spring and a mounting therefor, for use with automatic lock sliders generally as disclosed in my prior Patents Nos. 2,622,296 and 2,622,297, dated December 23, 1952.

Previously, much time and effort have been expended in devising a locking spring for an automatic lock slider which is both sturdy and sensitive. The desideratum is a locking spring which is capable of withstanding the relatively considerable, as well as the continually applied, forces acting to distort it. Also, the spring must be sufficiently sensitive as to be readily operable by the trunnions of the slider pull tab upon the latter being manipulated to lift the locking pin from its locking position, and it must also be capable of returning said pin positively yet easily and smoothly to its locking position when the pull tab is released to assume its normal lowered position.

A main object of the present invention is the provision of an automatic lock slider incorporating an improved locking spring whose design and mounting are such that it effectively satisfies the conflicting requirements of such a locking spring as explained above.

More particularly, an object of the invention is to provide a construction and mounting of locking spring for use with automatic lock sliders which is based on the discovery that when a leaf spring acts in torsion, it possesses the necessary strength and toughness on the one hand, and sensitivity on the other, as makes it ideally suited for use as the locking spring of an automatic lock slider.

Another object of the invention is the provision of an automatic lock slider incorporating a locking spring having a leaf-spring arm, one end of which is secured to the slider front wing, and an inclined lifting arm extending integrally from its other end and being liftable by at least one trunnion of the slider pull tab as the latter is manipuated to actuate the slider in fastener opening direction, which is characterized in that the leaf-spring arm is so secured that it acts in torsion responsively to the pull tab trunnion applying a lifting force on the lift arm.

Yet another object of the invention is the provision of an automatic lock slider incorporating an improved locking spring as aforesaid and which is further characterized by the secured end of the leaf-spring arm being offset laterally from the arm proper, whereby said leaf-spring arm is in effect twisted about a longitudinal axis upon the lifting arm of the spring being lifted by manipulation of the pull tab in fastener-opening direction.

The above and other objects and advantages of the improved lock-slider spring and novel mounting therefor according to the present invention will appear from the following detailed description, in which reference is had to the accompanying drawings illustrating the improved spring applied to an automatic lock slider of the type disclosed in my prior aforesaid Patent 2,622,297, in which:

Fig. 1 is a perspective view of the improved locking spring for a lock slider as herein proposed;

Fig. 2 is a side view of the spring shown in Fig. 1;

Fig. 3 is a section taken along line 3—3 of Fig. 3;

Fig. 4 is a top plan view of the improved locking spring shown in Fig. 1 and which further indicates the zone of the leaf-spring arm which is subjected to torsion;

Fig. 5 is a longitudinal section through an automatic lock slider incorporating the improved locking spring of the invention, the view being taken on line 5—5 of Fig. 6;

Fig. 6 is a transverse section taken through the slider illustrated in Fig. 5 on line 6—6 thereof; and

Fig. 7 is a horizontal section taken through the slider shown in Fig. 5 on line 7—7 thereof, the view further affording a plan view looking onto the underface of the slider front wing.

In the drawings, the improved locking spring of the invention has, in the interest of simple disclosure, been illustrated as applied to an automatic lock slider as generally disclosed in my aforementioned prior Patent 2,622,297. Referring to Figs. 5, 6 and 7 herein, such a slider comprises a front wing 10 and a rear wing 11, both provided with facing side-edge flanges 12*a*, 12*b* and 13*a* and 13*b* as indicated, and being connected in spaced, parallel relation by a neck portion 14 having an inward projection 15 which, as is well known, serves as a divider for disengaging and thereupon separating the interengaged fastener elements moving relatively through the slider channel when pull in fastener-opening direction is applied to pull tab 16. A bail 17 serving to connect said pull tab to the slider body is struck out from the material of the front wing 10, the bail being shaped to form an elongated eye 18. The aforesaid formation of the bail leaves an opening 20 in the slider front wing which interconnects the eye 18 and the slider channel. Said opening also provides for the accommodation of the improved locking spring of the invention which is designated 22.

Generally speaking, said locking spring 22 corresponds to the locking spring of the automatic lock slider disclosed in my above Patent 2,622,297 in that it is generally U-shaped when viewed from the side, as in Fig. 2. More particularly, said locking spring comprises a leaf-spring arm 23 terminating at one end in a cross bar formation 24 and having its other or free end widened as at 25, and thereupon merging into an upwardly-outwardly inclined lifting arm 26 which, by reference to Fig. 4, is offset to one side of the longitudinal center line of the locking spring considered as a whole. Near its free end, the leaf-spring arm 23 is provided with a depending locking pin 27 which, as is well understood, is adapted in the normal unstressed position of the spring to enter the space between any two adjacent fastener elements of the fastener then disposed in the slider channel immediately below same.

As best seen in Fig. 6, the pull tab 16 is connected to the slider body by means of trunnions 29, 30 which project from opposite sides into the eye 18 of the aforesaid bail 17. Due to the elongation of the eye, the pull tab, in addition to its usual pivotal movement, is also permitted limited longitudinal movement with respect to the slider. To positively guide the pull tab in its longitudinal movement aforesaid, the eye of the bail is divided into longitudinal side compartments by means of a longitudinal rib 31 depending inwardly from the under surface of the bail into the space between the trunnions 29 and 30. Whereas one side compartment of the eye 18 has normal depth as required to accommodate the lifting arm 26 of the locking spring in addition to the trunnion 29, the other side compartment has reduced depth which is only slightly greater than the major diameter of the opposite or companion trunnion 30, as results from the bail to the right

of the rib 31 having the increased thickness as is shown in Fig. 6. Said figure also shows the under surface 32 of the bail which defines the top edge of the eye compartment for trunnion 30 to be formed as a straight guide track on which said trunnion may bear as the pull tab partakes of its longitudinal movement. As explained in my aforesaid patent, such rib and track construction is of advantage in positively preventing uncontrolled movement of the pull tab as might result in the trunnion 29 moving into the space between the ball and lifting arm 26 of the spring, which, of course, would destroy the effectiveness of the latter.

Reverting to the locking spring 22, the cross bar end 24 of its leaf-spring arm 23 seats in a correspondingly shaped recess 35 which opens through the under face of front slider wing 10 and is also in communication with the front wing opening 20. Thus, the locking spring is adapted to be assembled from the under-face side of the front wing. When so assembled, the leaf-spring arm 23 of the spring is accommodated within the section of the slider front wing, its locking pin 27 normally depends into the slider channel, and its inclined lifting arm 26 extends forwardly through the front wing opening 20 into the eye 18 of the bail 17, wherein it is disposed outwardly of the pull tab trunnion 29. Accordingly, upon the operator lifting the pull tab 16 to actuate the slider in fastener-opening direction, the trunnion 29, by its camming action on the spring arm 26, flexes said leaf-spring arm 23 forwardly, and thereby lifts the locking pin 27 out of its normal locking engagement with fastener elements then within the slider body.

According to the invention, the locking spring 22 is specially secured and anchored to the slider front wing 10 so that when its lifting arm 26 is engaged and thereupon lifted by trunnion 29 as aforesaid, its leaf spring arm is placed in torsion; that is to say, it is twisted longitudinally about its point of securement. By reference to Fig. 7, such is simply achieved by securing only the one end portion 24*a* of the aforesaid cross bar termination 24 of the leaf-spring arm 23 which is disposed to the opposite side of the spring center line from said lifting arm 26, to the slider front wing 10. Preferably, this securement is effected by peening the material of the wing which extends along the edges of the recess 35 in which the cross bar seats over onto said cross-bar end portion 24*a* at the opposite points indicated at 36*a*, 36*b*. Since the spring-leaf arm 23 is anchored only as aforesaid, analysis will show that as the trunnion 29 imposes a lifting force on the lift arm 26 of the spring, the leaf-spring arm thereof is placed in torsion. More particularly, said arm 23 tends to twist about a longitudinal line or axis extending through the zone designated *a* of the spring (Fig. 4) which lies intermediate the anchored terminus of the cross bar 24*a* and the leaf-spring arm proper.

Theoretical considerations, corroborated by actual tests, established that a locking spring anchored as aforesaid so that its leaf-spring arm is placed in torsion when a lifting force is applied to its lifting arm is particularly capable of satisfying the requirements as to sturdiness and sensitivity of locking springs used in automatic lock sliders of the type under consideration. Actually, consequent to the substantially increased sensitivity of the locking spring as a whole, locking pin 27 may be simply folded in under the broadened end of the leaf-spring arm 23 from which it extends, rather than depending vertically from said arm as in a locking spring according to my prior patent aforesaid.

It is also to be noted that the anchoring end portion

24*a* of the cross bar 24 of the locking spring may be and preferably is formed longer than the opposite cross-bar end portion 24*b*, since the latter portion serves principally to insure against any bodily displacement of the locking spring as a whole. As a matter of fact, the shorter cross-bar end 24*b*, although advisable for practical reasons, is not necessary to the invention and may be eliminated if such is considered desirable for ease in manufacturing and/or to suit the needs of a particular slider application, the longer cross-bar 24*a* in such case acting as a laterally extending offset formed on the anchoring end of the locking spring

Without further analysis, it will be appreciated that the improved locking spring and mounting as taught by the present invention achieves the objectives therefor as set forth in the foregoing. However, as any changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings should be interpreted as illustrative and not in a limiting sense.

I claim:

1. An automatic lock slider for slide fasteners comprising front and rear slider wings connected at their upper ends by a neck and cooperating therewith to define a slider channel, a bail extending from the front wing and forming therewith an elongated eye, a pull tab having at least one trunnion extending into the eye and providing a pivotal connection between said pull tab and front wing, a generally U-shaped locking spring including a longitudinal leaf-spring arm operatively associated with the upper wing, a lifting arm extending forwardly from the free end of the leaf-spring arm into the eye and being disposed therein between the bail and the trunnion whereby to be liftably engageable by said trunnion, and a locking pin depending in the opposite direction from said free end of the leaf-spring arm and normally projecting into the slider channel but retractible therefrom responsively to flexing of the leaf-spring arm as results from lifting of said lifting arm, the other end of the leaf-spring arm having a laterally extending offset portion, and securing means operative between said front wing and said offset portion, said securing means providing the sole securement for the locking spring as a whole whereby the leaf-spring arm thereof is placed in torsion responsively to said trunnion imposing a lifting force on said lifting arm of the leaf-spring.

2. An automatic lock slider as set forth in claim 1, wherein said offset portion comprises one arm of a cross bar formed on said other end of the leaf-spring arm.

3. An automatic lock slider as set forth in claim 1, wherein said offset portion comprises one arm of a cross bar formed on said other end of the leaf-spring arm, and said securing means is effective on the terminal portion of said one arm and thereby at a location thereof which is disposed well to the side of the longitudinal center line of the locking spring as a whole.

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