

Sept. 25, 1951

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2,569,298

SLIDER FOR SLIDE FASTENERS

Filed May 10, 1948

2 Sheets-Sheet 1

FIG. 1

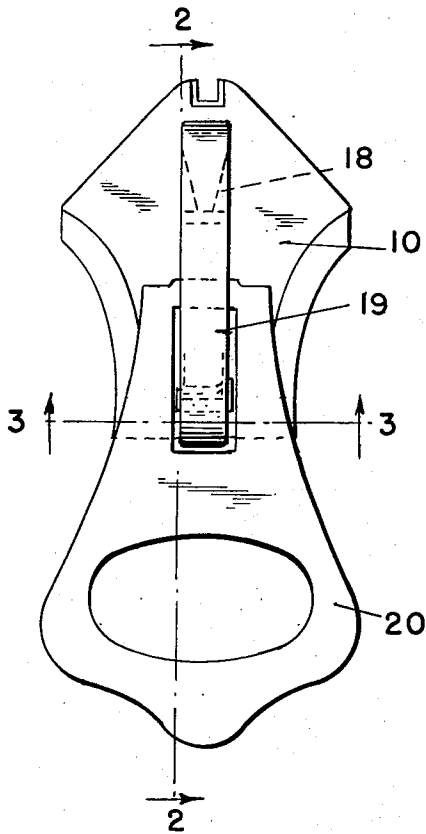


FIG. 2

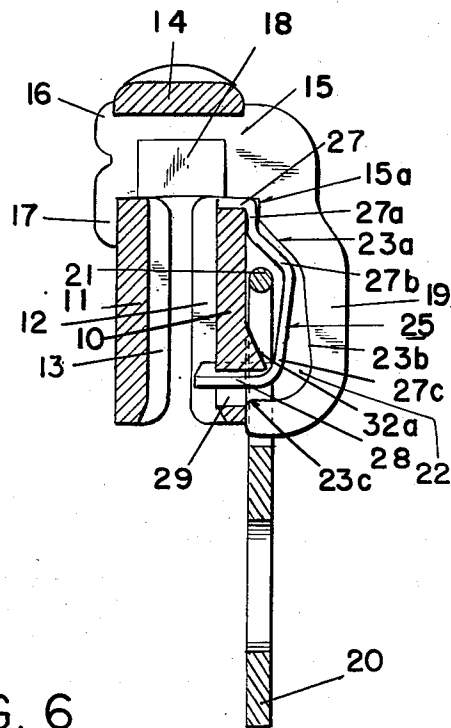
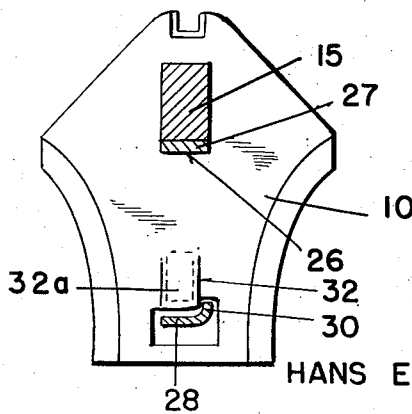
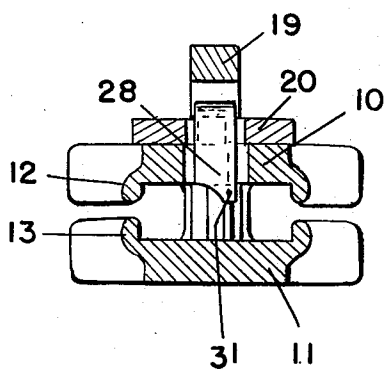


FIG. 6

FIG. 3



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FIG. 4

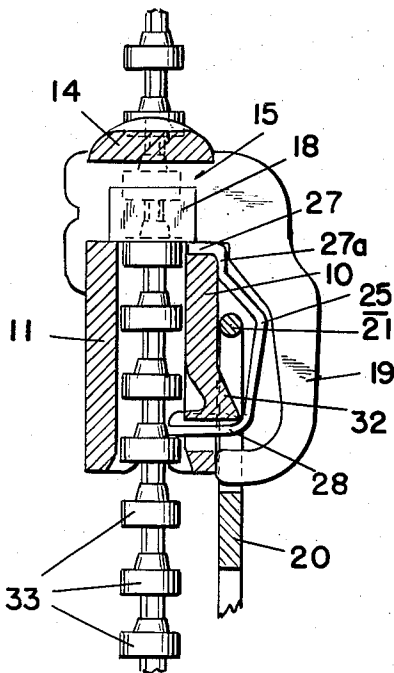


FIG. 5

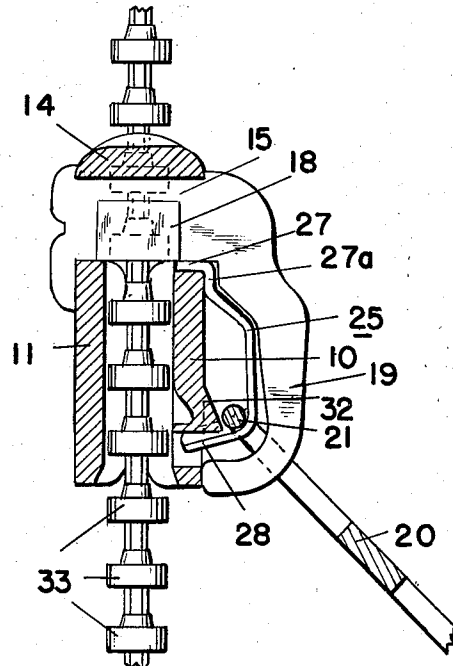
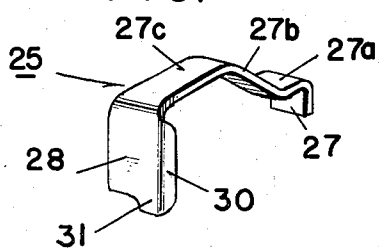


FIG. 7



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# UNITED STATES PATENT OFFICE

2,569,298

## SLIDER FOR SLIDE FASTENERS

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Application May 10, 1948, Serial No. 26,113

2 Claims. (Cl. 24—205.14)

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This invention relates to improvements in sliders for slide fasteners, and more particularly to an automatic lock slider capable of locking the slider to the fastener at any point of its travel along the length of the fastener chain, thereby to secure it against accidental opening when, for example, the chain is exposed to a lateral pull above the slider.

The automatic lock slider according to the present invention is of the type in which locking of slider to fastener is achieved by a locking pin which is normally urged by spring means, with which it is formed integral, into the space between two of the fastener elements of the chain contained in the slider body, and is lifted to an inoperative or non-locking position upon actuation of the pull tab in either fastener opening or closing direction. Usually, the spring means takes the form of a spring leaf arranged in the eye or opening between the outer face of the front slider wing and the inner edge of the bail by which the pull tab is hingedly connected to the slider, the spring leaf being shaped to provide inclined surfaces against which the hinge pin of the pull tab engages when the latter is pulled in either opening or closing direction, thereby to lift the locking pin out of its normal engagement with the fastener elements as required for the free actuation of the slider.

Difficulties have been encountered with automatic sliders using a spring as a locking means in making the spring sufficiently strong to withstand the required considerable opening (pulling) force working against the lock, without reducing the flexibility of the spring. The spring when subjected to a pulling force is likely to break, bend or become distorted and a slider with such an impaired spring would not be usable again after the pulling force had been applied only once. Moreover, it is important that the free end of the spring have a fixed locking position within the eye, thereby maintaining constant the critical distance that the locking pin projects into the slider body, it being obvious that if this distance is too small the locking pin is ineffective while, if too great, the locking pin has locking action when such is not desired. The desirable fixed locking position of the spring permits the spring and its locking pin to be designed to relatively close tolerances, a feature not possible of attainment heretofore with loosely mounted and/or located springs. Furthermore, it is important to so shape the spring that the forces destined to lift it from its normal locking position when the pull tab is actuated work in a direction substan-

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tially normal to the plane of the upper wing, because longitudinal deformation of the spring is best avoided by causing it to lift in a direction substantially perpendicular to this plane, and its middle length portion to assume a position substantially parallel to such plane.

Accordingly, a principal object of the invention is the provision of an automatic lock slider for slide fasteners characterized as above which will withstand a sufficient pulling force many times without breakdown, bending or distortion of any of its component parts, and without causing any damage to the elements of the fastener chain on which the slider is mounted.

A further object of the invention is the provision of an automatic lock slider as above, wherein the spring is mounted in such manner that the length of the spring which protrudes into the slider and engages the chain in locking action may be held to close tolerances, for the purpose of obtaining springs which will be uniform with respect to withstanding the pulling force on the chain of fastener elements and which will slip or release the chain without damaging it when a predetermined force has been reached, this being achieved by providing a stop for the free end of the spring limiting the amount of protrusion of its pin end through the slider front wing to a definite amount.

A further object of the invention is the provision of an automatic lock slider as above, which operates smoothly and with a minimum of scratching when the spring lock is lifted and disengaged by the action of the pulltab, this being achieved by constructing and mounting the spring so that the pin end of the spring during lifting moves in a substantially straightline path which is perpendicular to the plane of the slider wings, and by locating the anchored end of the spring flat against the outer face of the front wing, with the result that the flexing point or hinge of the spring lies practically in the plane of the front wing, that is to say, at the lowest possible point relative to the locking pin extending from the free end of the spring. This has the effect that the element surface engaged in the locking position is tangential to the circular path of the spring end so that the end of the pin moves out of engagement practically parallel to the surface of the element, thus avoiding additional lifting forces otherwise required to bend the locking pin backward in order to get it out of engagement.

Still a further object of the invention is the provision of an automatic lock slider of the speci-

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fied character, wherein the locking pin is suitably reinforced so as to enable it to withstand the bending forces exerted on it by the chain to be locked. This is preferably achieved by forming the locking pin with a reinforcing rib contained within the overall width of the spring which is preferably constant from its anchored to its locking pin end, thereby to simplify and facilitate the assembly of the spring and to obtain consistency in the operation thereof.

The above and other objects and features of advantage will be apparent from the following detailed description of the invention, taken with the accompanying drawing, in which—

Fig. 1 is a plan view of the improved automatic lock slider according to the invention;

Fig. 2 is a longitudinal section taken along line 2—2 of Fig. 1, illustrating the spring in its normal locking position;

Fig. 3 is a transverse section taken along line 3—3 of Fig. 2;

Fig. 4 is a longitudinal section similar to Fig. 2 but showing the slider locked to the slide fastener chain;

Fig. 5 is a view similar to Fig. 4 but illustrating the locking pin in its raised or inoperative position;

Fig. 6 is a plan view of the automatic lock slider as shown in Fig. 1, but with the bail, pull tab and spring cut away at the plane of the outer face of the front slider wing; and

Fig. 7 is a perspective view illustrating the constructional details of the spring and integral locking pin according to the invention.

Referring to the drawings, the illustrated slider is of more or less conventional construction and comprises a front wing 10 and a rear wing 11, the side edges of which are bent to form flanges 12, 13 defining a Y-shaped slider channel and functioning also to guide the fastener elements in their movement through the channel as the slider is actuated in either direction. The wings 10 and 11 are connected by a neck 14 and by a rivet 15, the head of which is extended downwardly over the outer face of the front wing 10, and the rear end of which is secured to the rear wing 11 by bending its prong-like shank terminals 16, 17 tightly against the outer face thereof. The middle or shank portion of the rivet 15 is formed as a wedge-like divider 18 functioning to effect disengagement of the fastener elements moving through the slider channel upon downward movement of the slider relative thereto, as is well known. The head part of the rivet is specially formed to provide a generally U-shaped bail 19 which secures a pull tab 20 to the slider, by virtue of the hinge pin 21 of the tab extending through the bail eye 22.

As seen in Fig. 2, the bail eye is elongated, being defined by the plane outer face of the front wing 10 and the inner edges 23a, 23b, 23c of the bail, of which the short-length edge 23a slants outwardly from said outer face by a substantial angle, the longer edge 23b similarly slants outwardly but by a lesser angle so that it is inclined by only a slight angle out of parallelism with said outer face, and the edge 23c extends substantially normal to said outer face. Disposed in said eye is a leaf spring 25 which is so anchored at its upper end as to properly secure and locate as well as to provide the lowest possible flexing point for its free or locking end. To effect these desirable objectives, the upper end of the spring is formed with right-angularly disposed portions, of which the terminal portion 27 extends rearwardly into

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a slot or opening 26 formed in the front slider wing, and the portion 27a engages flat against the outer face of the front slider wing 10. As best seen in Fig. 6, the slot 26 may be formed as a continuation of the front wing opening for the shank rivet 15, the terminal portion 27 extending the full width and depth of the slot. In its portion adjacent the shank, the rivet head is formed with a short-length edge portion 15a which extends parallel to and is slightly spaced from the front wing outer surface so as to bear with pressure on the spring end portion 27a. The described arrangement is therefore such that the right-angular terminal 27 and the immediately adjacent end portion 27a of the spring are firmly and securely held with substantial pressure against the bottom and side edges of the wing slot 26 and against the outer face of the front wing adjacent said opening by the rivet itself, no extraneous spring fastening or securing means being required.

By reference to Figs. 3 and 4, the spring 25 extends downwardly from its anchored upper end, having a short-length portion which is slanted outwardly from the outer face of the front wing as at 27b by an inclination corresponding to that of the bail under-edge portion 23a, an elongated portion which is oppositely slanted to extend somewhat inwardly or away from the corresponding ball under-edge portion 23b and to incline towards the outer face of the front wing by a small angle as indicated at 27c, and terminating at its free end in a rearwardly bent end 28. Said end functions as a locking pin and accordingly is of length to project through a pin-opening 29 provided in the slider front wing 10 near the lower end of the bail eye 22 and to enter the space between two adjacent fastener elements 33 (Fig. 4). Preferably, the locking pin 28 is bent relative to the spring leaf proper so that in the normal position of the spring the locking pin is disposed normal to the plane of the front wing, it being here noted that ends 27, 28 of the spring are disposed in substantially parallel relationship.

As seen in Figs. 6 and 7, one side edge of the locking pin 28 is bent at right angles thereto, so as to form a reinforcing rib or flange 30, the bend line between locking pin proper and rib being on the line of the pin side edge, so that the width of the spring is maintained constant throughout substantially its entire length, a feature which facilitates spring assembly and provides consistent spring performance. If desired, the terminal edge of the locking pin 28 may be indented as shown to form a depending corner locking point as indicated at 31.

According to a further feature of the invention, the front wing 10 adjacent the upper edge of its pin-receiving opening 29 is provided with a protruding cam portion or hump 32 which is preferably formed by coining the upper edge of said opening to the shape illustrated. The hump provides an inclined surface 32a terminating in a knife edge against which the spring is adapted to abut at about the line of junction of its inclined length portion 27c and the rearwardly extending locking pin 28. By dimensioning the height of the hump 32 and hence the distance that its terminating knife edge is disposed forwardly of the outer face of the front wing, it acts normally to maintain the spring under a certain tension when the end portion 27a thereof is pressed flat against said front wing face. This pre-tensioning of the spring must necessarily be overcome before the locking pin 28 can be moved

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out of its locking position by any force acting on it. Hence, the locking pin is securely locked with the chain, as in Fig. 4, against accidental forces tending to dislocate it, and at the same time the critical distance that the locking pin extends into the slider body can be held to close tolerances.

With pull tab 20 secured to the slider by its hinge pin 21 extending through the eye of the bail 19 intermediate the slider front wing and the spring 25 as illustrated, a pull exerted on pull tab 20 in a direction to move the slider downwardly results in the hinge pin riding up the inclined face 32a of hump 32, thus lifting the spring and raising the locking pin 28 out of the path of the fastener elements 33, as seen in Fig. 5. Due to the special shaping of the spring body and the camming action of the hump 32, the force exerted on the spring by the pull tab hinge acts mainly in a direction as to effect substantially vertical lifting movement of the locking pin 22 out of the path of the fastener elements. Also, the middle part 27c of the spring tends to assume a position nearly parallel to the inner edge portion 23b of the bail and the outer face of the slider front wing as well. When the pull tab is pulled upwardly, its hinge pin 21 engages against the inclined portion 27b of the spring, exerting sufficient force thereon as to similarly effect lifting of the locking pin 28 in vertical direction out of the path of the fastener elements 33. Under both conditions of pull tab actuation, excessive lifting of the spring by the hinge pin is prevented by the inner edges of the bail. It will also be appreciated that upon release of the pull tab following actuation thereof in either direction, the spring returns to its normal pre-tensioned locking position.

Without further analysis, it will be observed that the locking spring as described is firmly and securely anchored at its one end and so that its other end may operate in highly effective manner both in locking and unlocking the slider. Due to the provision of the hump 32 and its function of imparting a pre-tension on the spring when its locking end is in its normal locking position, the length of the locking pin may be determined exactly, with assurance that it always extends into the space between adjacent fastener elements the critical distance required for sure and certain operation of the slider. The described features provide the advantage not only of effective but also consistent locking action for the life of the slider.

As many changes can be made in carrying out the above construction 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 shall be interpreted as illustrative and not in a limiting sense.

#### I claim:

1. An automatic lock slider for slide fasteners comprising front and rear wings, a rivet connecting said wings and having a head shaped to provide a bail cooperating with the outer plane face

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of the front wing to form an elongated eye defined by said outer plane face and the under edge of the bail, said under edge having a short-length portion adjacent the rivet which is slanted outwardly from said outer plane face by a substantial angle, an intermediate longer portion which is slanted outwardly from said outer plane face by a lesser angle and a lower end portion which extends substantially normal to said outer plane face, a leaf spring operatively disposed in said eye, said leaf spring having an upper end portion which is anchored flat against said outer plane face by the bail whereby its flexing point is disposed substantially in the plane of said outer face and upper and lower inclined portions of which the upper portion disposed adjacent the anchored end has length and is slanted outwardly from said outer plane face by an inclination corresponding substantially to that of the short-length under edge portion of the bail and the lower portion has greater length than and is oppositely slanted with respect to said upper portion so as to incline away from the elongated under-edge portion of the bail by a substantial angle and towards said outer plane face by a small angle, said oppositely slanted portion terminating at its free end in a rearwardly extending locking pin which is disposed substantially perpendicularly to said outer plane face and projects through an opening provided therefor in the front wing into locking engagement with fastener elements disposed in the slider, a pull tab having its hinge pin extending transversely through the bail eye and disposed rearwardly of the leaf spring, and a hump protruding from the outer plane face of the front wing immediately above said opening and terminating in a raised knife edge on which the free end of the leaf spring normally bears with spring pressure, said hump providing a cam surface for said hinge pin which is slanted outwardly from said outer plane face by an angle such that the hinge pin in riding up said cam surface is adapted to flex the leaf spring to a position in which its oppositely slanted portion is disposed substantially parallel to said outer plane face, thereby to effect substantially vertical lifting movement of the locking pin out of the path of the fastener elements.

2. An automatic lock slider as set forth in claim 1, wherein the locking-pin is provided with a reinforcing rib disposed at right angles to its plane and the width of the leaf spring from its upper to its locking-pin end is substantially uniform throughout.

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