June 16, 1936. J. S. FORSTER 2,044,161

SEPARABLE FASTENER

Filed Aug. 10, 1934

Fig. 1.

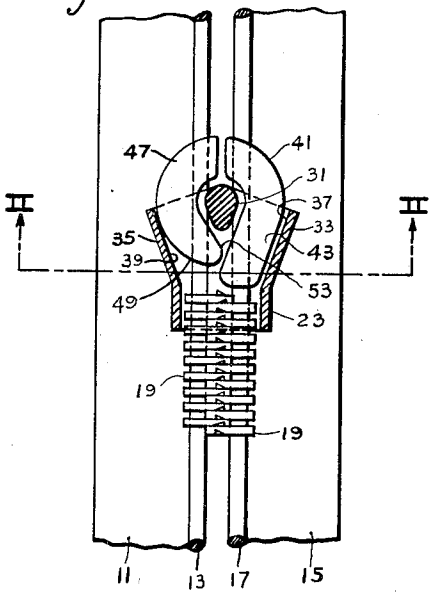


Fig. 3.

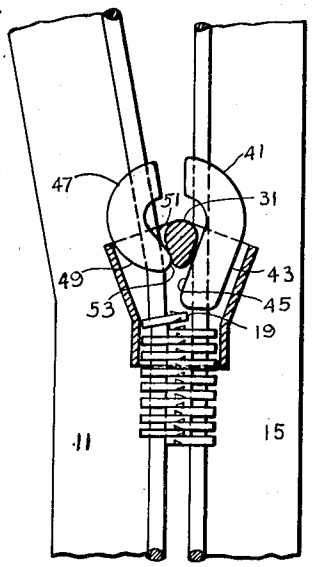


Fig. 2.

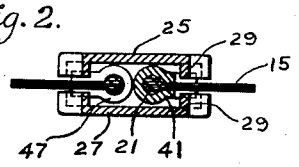


Fig. 4.

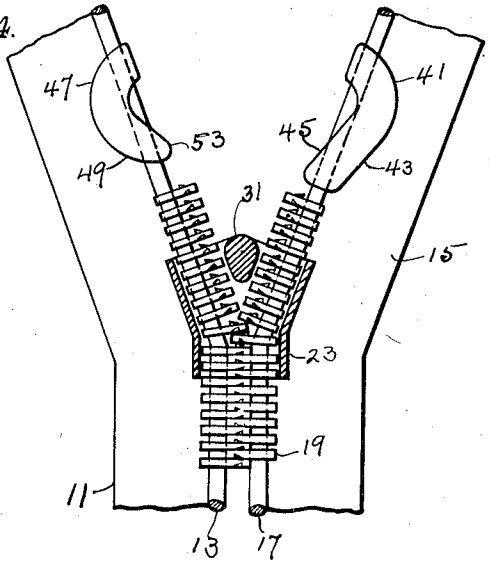


Fig. 6. Fig. 5. Fig. 7. Fig. 8.

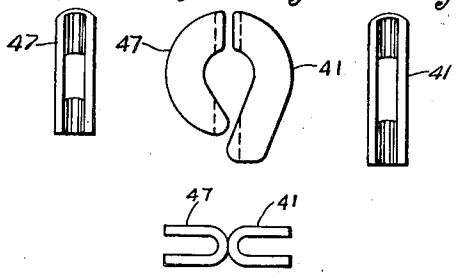


Fig. 9

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SEPARABLE FASTENER

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6 Claims. (Cl. 24—205)

My invention relates to sliding fasteners and particularly to stop and closing means for the upper ends thereof.

An object of my invention is to provide a sliding fastener that shall embody simple means to ensure that the entire length of the fastener shall be securely closed.

Another object of my invention is to provide a separable fastener having stop members at the upper end that shall permit the greater portion of the slider to travel beyond the topmost locking members in the closing operation and to move smoothly and evenly onto the locking elements during the opening movement.

Another object of my invention is to provide a pair of upper stop members that shall cooperate in one sequence with a slider during the closing movement and in the reverse sequence during the opening movement.

Another object of my invention is to provide a pair of upper stop members so shaped and located as to constitute, in effect, a continuation of the locking elements alternately secured to the pair of stringers.

Other objects of my invention will either be pointed out specifically hereinafter or will be apparent from a description of a device embodying my invention.

In practicing my invention, I provide, in addition to the usual series of locking elements secured in alternation to a pair of stringers, a pair of upper stop members, of substantially elbow or arcuate shape, having outer surfaces adapted to be engaged by the inner faces of outer portions of the slider in a certain sequence, and having also inner surfaces adapted to be engaged by the internal cam of the slider in the reverse sequence. The longitudinal extent of the two stop members is slightly different and they are located, one on each stringer, in an alternation continuing that of the locking elements.

In the drawing,

Figure 1 is a view, mainly in front elevation, with the slider shown in section, of a device embodying my invention,

Fig. 2 is a view, in lateral section therethrough, taken on the line II—II of Fig. 1,

Fig. 3 is a top plan view similar to Fig. 1 of the drawing, but showing the fastener in a slightly opened position,

Fig. 4 is a view similar to Figs. 1 and 3, but showing the fastener in partially open position,

Fig. 5 is a top plan view of one stop member embodying my invention,

Fig. 6 is a view in side elevation thereof,

Fig. 7 is a top plan view of a second stop member embodying my invention and shown in proper operative position relatively to the first stop member,

Fig. 8 is a view in side elevation of the stop member shown in Fig. 7, and,

Fig. 9 is a view in end elevation of the two members shown in Figs. 5 and 7.

As has already been stated, my invention is related to a specific form of stop means for the upper end of a separable fastener and I have therefore shown only a left hand stringer 11 having a bead 13 at its right hand edge and a second stringer 15 having a bead 17 at its left hand edge. A plurality of locking elements 19 of any suitable or desired construction usual in this art are located in alternation on the beads 13 and 17 respectively. It is to be understood that the locking elements 19 severally include any desired form of bifurcated member which is provided with an inner enlarged opening 21, the bead 13 or 17, as the case may be, being adapted to be located within this enlarged opening 21, so that when the bifurcated member has been placed in proper operative position on the stringer 15 and the bead thereon, the locking element will be held securely thereon so that, other conditions being provided, the separable fastener can be easily and properly actuated by a slider 23. This slider is of a kind also well known in the art and includes an outer portion 25 and an inner portion 27, each having laterally-extending edge or flange portions 29 facing each other and spaced slightly apart so that the stringer may move between such edges, in a manner well known in the art. The slider has a substantially Y-shaped opening internally thereof constituted more particularly by a central cam 31 having substantially the lateral section shown in Figs. 1, 3, and 4 of the drawing, in combination with the outwardly extending walls 33 on the right hand side (as seen in Figs. 1, 3 and 4 of the drawing), and the outwardly extending walls 35 on the left hand side, each of which is constituted by the flanges 29 and which have the inner operating or actuating surface 37 and 39 respectively, which actuating surfaces extend at a proper angle relatively to the longitudinal axis of the fastener.

Any desired number of the locking elements 19 may be provided in accordance with the desired length of the opening which is to be served by the separable fastener. I have not shown any lower stop members, although it is to be understood that any suitable or desired type of such

lower stop members is to be provided, as is usual in such devices.

I will now describe the particular part of the separable fastener which embodies my invention. I provide a first upper stop member 41 which is of elbow or of substantially arcuate shape longitudinally of the fastener and which is of substantially U-shape in lateral section, as will be seen more particularly from Fig. 9 of the drawing. This stop member is relatively long and has an outer face or surface 43 which extends angularly relatively to the longitudinal axis of the fastener at substantially the same angle as does the actuating surface 37 of portions 33 of the slider. Member 41 is further provided with an inner actuating face 45 which extends substantially parallel to the outer face 43 thereof.

I provide further a second stop member 47 also of elbow or of arcuate shape in plan, and of substantially U-shape in lateral section, this second stop member being somewhat shorter, in a longitudinal direction, than stop member 41. It is provided with an outer actuating surface 49 whose radius of curvature is less than that of face 43 of member 41. Member 47 is further provided with an inner surface 51 and particularly cam surface 53 adjacent its lower end, which cam surface is adapted to be engaged by one operating surface of the central cam 31, as will be hereinafter described in detail.

The two stop members 41 and 47 are secured respectively to the right hand stringer 15 and to the left hand stringer 11 in such position thereon that the lower end of stop member 41 is located a proper distance above the uppermost locking element 19 on stringer 11, while stop member 47 has its lower end located above the lower end of stop member 41, the upper ends of the two stop members being located at substantially the same vertical position relatively to each other, as will be seen more particularly by reference to Fig. 1 of the drawing.

As is well known in the art, separable fasteners of this kind depend for their easy and smooth operation upon the principle that the operating surface shall engage one locking element after the other, particularly in the opening movement, to force the uppermost locking element still in engagement with a subjacent locking element outwardly away from that element in order to break the interlock heretofore effective between the two elements. It had heretofore been impossible to move the slider on a separable fastener of this kind upwardly on the locking elements so far that the upper ends of the stringers would extend parallel to each other and would lie closely adjacent to each other, a condition which was necessary to effect full closure of the fastener along its entire length.

It will be noted, particularly by reference to Fig. 1 of the drawing, that one set of inclined operating surfaces 37 of the slider will engage the outer surface 43 of member 41 before the inclined operating surfaces 39 of the slider on the other side thereof engage surface 49 of member 47. However, in the final position surfaces 37 engage surface 43 of stop member 41 while surfaces 39 engage surface 49 of stop member 47 at the same time and force them toward each other, to thereby cause approaching movement of the stringers 15 and 11 into substantial parallelism, so that the fastener is in completely closed position. It will be noted particularly that the greater portion of the slider 23 has been moved beyond the locking elements 19, a condition which was impossible heretofore.

Referring now to Fig. 3 of the drawing, it will be noted that the left hand side of central cam 31 is in operative engagement with the inner cam surface 53 of member 47 and has forced stop member 47 to the left or away from the right hand stringer 15. The uppermost locking element 19 has also been turned slightly upwardly so that it is already out of interlocking engagement with the next lower locking element, which is secured to stringer 15. This position of the slider is the one which occurs shortly after beginning a downward or opening movement of the slider 23.

If the slider 25 is now moved still further downwardly the right hand actuating surface of central cam 31 engages the inner cam surface 45 of stop member 41 and forces it to the right whereby the uppermost locking element 19 on stringer 15 will be turned slightly in a clockwise direction to thereby release it from its initial interlocked relation with the subjacent locking element secured to stringer 11. Further downward or opening movement of the slider, will cause the central cam 31 to come into engagement with the locking elements 19, as is shown in Fig. 4 of the drawing, and I have found it possible, by the use of the stop members hereinbefore described to effect easy and smooth opening of a separable fastener of this general kind.

A brief description of the fundamental principles underlying the design and operation of my improved stop members will make clear the reasons for the smooth operation of a separable fastener embodying these stop members. It is to be noted particularly that the lower end of stop member 41 is located on the right hand stringer 15, in superposed position above the uppermost locking element 19, which in the device shown in the drawing, is located on the right hand stringer. In other words, the lowermost portion of one of the two stop members is located in a continuing alternation on the stringers. The lower end of the other stop member 47 is located at a slightly greater distance on stringer 11 and it also continues the sequential alternation of the locking elements 19, continued in part by the lower end of stop member 41.

I have found it possible to move the slider, at least for the greater portion of its length, out of engagement with the locking elements on the stringers and still be able to move the slider downwardly, when desired, to effect opening of the fastener, without any jamming or locking thereof relatively to the locking elements.

Various modifications may be made in the device embodying my invention without departing from the spirit and scope thereof, and I desire therefore, that only such limitations shall be placed thereon as are imposed by the prior art or are set forth in the appended claims.

I claim as my invention:—

1. A separable fastener comprising in combination, a plurality of stringers, cooperative locking elements carried by the stringers, a slider disposed for movement along the cooperative locking elements to bring them into locking engagement or to release them, two stop members of unequal length, one carried on each stringer, the stop members being disposed to cooperate in limiting the movement of the slider and being so disposed on the stringers that their upper ends are in substantial alinement when brought into close proximity to one another, a cam carried by

the slider and disposed to move between the cooperative locking elements as the slider is moved to actuate them, the lower ends of the stop members being disposed to receive the cam as the slider is moved along the locking elements, the shorter stop member being carried by the stringer having the uppermost locking element and being disposed to receive the cam member first as the slider is moved in a direction to release the locking elements to cooperate in starting the separation of the locking elements and assure that the slider may be operated freely.

2. In a separable fastener, in combination, two stringers of locking elements, the locking elements being arranged in staggered relation, a slider for actuating the locking elements, a spreader cam carried by the slider, a plurality of stop members carried by the stringers and disposed to receive the slider when it has completed the locking of the locking elements, the stop members being arcuate in shape and of unequal length, the one disposed above the uppermost locking element being the shorter to provide for engagement of its lower end by the cam member as the slider is moved downwardly to disengage the locking elements to effect the disengagement of the uppermost locking element from the next locking element first and thereby start the separation of the locking elements.

3. In a separable fastener, in combination, two stringers of locking elements, the locking elements being arranged in staggered relation, a slider for actuating the locking elements, a spreader cam carried by the slider, a plurality of stop members carried by the stringers and disposed to receive the slider to retain it in a predetermined position, the stop members being substantially arcuate in shape with concave sides extending inwardly to receive the spreader cam between them, the lower end of the stop member disposed above the uppermost locking element being disposed above the lower end of the other stop member to receive the slider cam just as it is moved downwardly to release the uppermost locking element before the lower end of the other stop member receives the cam member to effect the starting of the release of the locking elements in the proper sequence.

4. A separable fastener comprising in combination, a pair of stringers having opposing series of locking elements secured thereto in alternation, an actuating slider having outer actuating surfaces and an internal cam for moving the locking elements of the opposed series into and out of engagement and a pair of cam stop members, of different lengths, at the upper end of the fastener, the shorter cam member being secured to the stringer having the topmost locking element secured thereto, closing movement of the slider causing an outer actuating surface to first engage the longer cam and then the shorter cam member and opening movement of the slider causing the internal cam to first engage the shorter cam and then the longer cam.

5. A device as set forth in claim 4 in which the cam members are separated to such an extent that the proper opening angle between the stringers is effected before the internal cam engages the locking elements.

6. A separable fastener comprising in combination, a pair of stringers having opposing series of locking elements secured thereto in alternation, an actuating slider having outer engaging surfaces and an internal cam for moving the locking elements of the opposed series into and out of engagement and a pair of arcuate-shaped stop members, having different longitudinal but substantially the same lateral dimensions, at the upper end of the fastener, the lower end of the longer stop member being located above the topmost locking member and the upper ends of both stop members being located at substantially the same height on the fastener, one outer engaging surface of the slider contacting the outer face of the longer stop member before the other outer engaging surface of the slider contacts the outer face of the shorter stop member when the slider is moved to close the fastener and the internal cam engaging first the inner surface of the shorter stop member and then the inner surface of the longer stop member to move the stringers in sequence and to the proper opening angle before disengaging the locking elements when the slider is moved to open the fastener.

JOHN S. FORSTER.