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H. E. BANNIES

3,572,191

SEAM CLOSING TOOL

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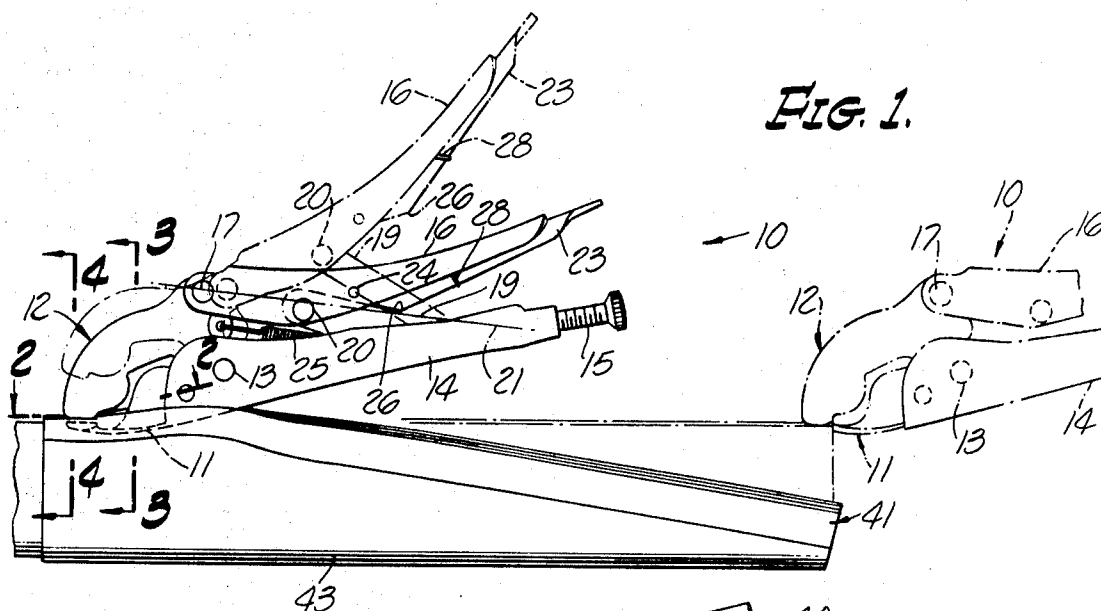


FIG. 1.

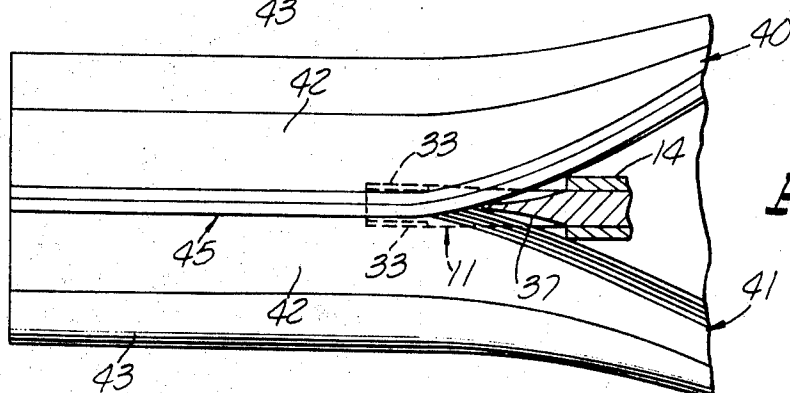


FIG. 2.

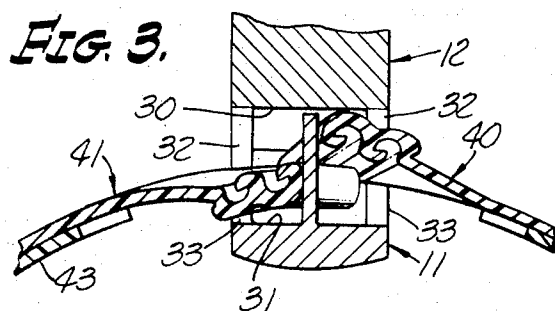


FIG. 3.

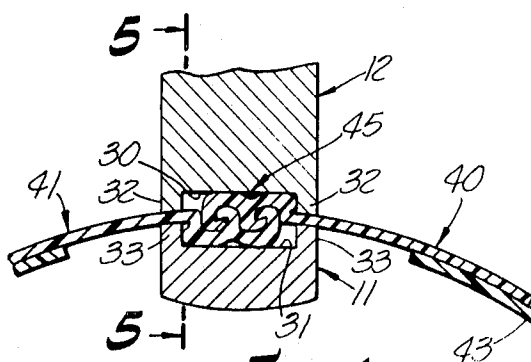


FIG. 4.

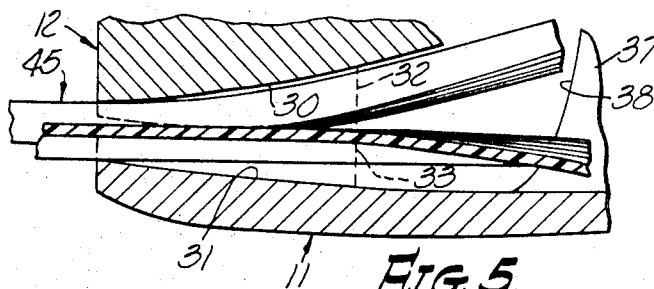


FIG. 5.

HANS E. BANNIES
INVENTOR.

BY

[Signature]
ATTORNEYS

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3,572,191

SEAM CLOSING TOOL

Hans E. Bannies, Laguna Beach, Calif., assignor to
Walter A. Plummer, Sherman Oaks, Calif.

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12 Claims

ABSTRACT OF THE DISCLOSURE

A plier-like closure tool for use in opening and closing seam-forming tape of the type having tongues and grooves along their juxtaposed faces shaped to interlock to form a separable seam as the tongues and grooves are pressed together from the remote surfaces of their overlapped edges. The tool jaws are specially contoured to embrace and retain the overlapped tape edges in proper position for camming them into interlocking engagement and including means effective to hold the jaws in spaced-apart operating position. The tool includes adjustable means for accommodating the tool jaws to use with tapes of differing thicknesses.

This invention relates to closure devices for interlocking seam-forming tapes and more particularly to a hand supported tool readily manipulated by one hand. The tool has the appearance of a modified pair of pliers and includes a pair of jaws pivotable between a normally open position and a closed operating position effective to interlock a pair of tapes as the tool is pulled therealong. Toggle linkage means located between the operating handles functions automatically to lock the jaws in their operating position without permitting the jaws to pinch the tape elements. The linkage includes adjustable means for varying the distance between the jaws when closed to accommodate tapes of different thicknesses as well as a quick release device for releasing the locking means and allowing a spring to pivot the jaws to their open position. One jaw is relatively thin thereby permitting the tool to be inserted between the underside of the seam and and object being enclosed.

Suitable means for use in rapidly and accurately closing seam-forming tapes of extruded thermoplastic type widely used for many applications has presented vexatious problems. One of the most common types of these tapes is conveniently designated M-type seam because each edge of the two tapes constituting the seam proper is of M-shape in cross-section and includes two pair of parallel grooves shaped to mate with the legs of the similarly formed oppositely facing identical tape. The legs are commonly referred to as tongues because they fit between and have interlocking engagement between the legs of the other tape. This seam opens readily if not fully closed and it not infrequently happens that a short length of the seam is improperly closed with the result that the tape opens readily as a load is applied.

The means commonly used heretofore for closing such tapes comprises a slider device customarily permanently associated with the seam and having a pull tab which can be grasped between the thumb and index finger and pulled in either direction to either open or close the seam. Such sliders are subject to numerous disadvantages and objections obviated by the present invention. For example, it is difficult to thread the slider onto the two tapes initially or should it become disassembled from the tapes during use. Also, such sliders are easily damaged or deformed with the result that they malfunction or fail to operate. Not infrequently the sliders jam in use or engage objects within the seam being closed causing damage or stoppage of the slider.

To avoid these and other shortcomings of prior devices

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for closing seam-forming tapes, there is provided by this invention an easily manipulated hand-supported tool having the general appearance of modified pliers. The two jaws pivot between a fully-open and a fully-closed position in the latter of which they automatically lock by toggle linkage means rigidly supporting the jaws immovably in a desired spaced-apart relation. In this operating position the jaws are incapable of gripping the seam components yet certain surfaces thereof are properly spaced to press the tongues and grooves of the seam to their fully assembled positions. The jaws are readily insertable between the tapes without need for any special assembly operations such as threading the tongue and groove parts together in a prescribed manner. The tool can also be quickly released to its open position at any time whereupon it is immediately withdrawable from the seam. Although the tool is particularly efficient in closing the seam, it is likewise manipulatable in the reverse direction to open the seam.

Accordingly, it is a primary object of the present invention to provide an improved inexpensive closure tool for use in the rapid and positive engagement and disengagement of interlocking seam-forming components. The jaws are shaped to straddle the two halves of the seam proper and are shaped to cam the parts progressively into interlocking engagement as the tool is pulled lengthwise of open portions of the seam.

It is therefore a primary object of the present invention to provide a simple rugged hand-held seam closure tool quickly and easily clamped astride open parts of interlocking seam components and effective to cam the same into and out of locking engagement depending upon the direction of movement of the tool therealong.

Another object of the invention is the provision of a hand-held plier-type seam closure tool movable between open and closed operating positions in the latter of which it remains locked until released with the jaws rigidly held against further closing or opening until the lock is manually released.

Another object of the invention is the provision of a seam-closing hand-held tool easily assembled about seam forming tapes and lockable in this assembled position and featuring means for the quick release of the tool from the seam at any point therealong.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawing to which they relate.

Referring now to the drawing in which a preferred embodiment of the invention is illustrated.

FIG. 1 is a general elevational view of the invention closure tool assembled to a seam in the process of being closed;

FIG. 2 is a top plan view of a seam in the process of being closed and containing a fragmentary portion of the closure tool parts in cross-section as viewed along the curved line 2—2 on FIG. 1;

FIGS. 3 and 4 are cross-sectional views taken along line 3—3 and 4—4, respectively, on FIG. 1; and

FIG. 5 is a fragmentary enlarged cross-sectional view taken along line 5—5 on FIG. 4.

Referring initially more particularly to FIG. 1, there is shown a preferred embodiment of the invention seam closure tool designated generally 10 and having the general appearance of a pair of pliers. This tool includes a pair of dissimilar jaws 11, 12 pivotally interconnected by pin 13. Jaw 11 extends rearwardly from pin 13 to provide an operating handle 14 generally U-shaped in cross-section and supporting an adjustable stop screw 15 at its outer end. A second handle 16 of generally U-shape in cross-section is pivoted to jaw 12 by a pivot pin 17.

Handle 16 cooperates with jaw 12 and with a link 19 to provide a toggle linkage, link 19 being pivoted between the sides of handle 16 by a pin 20 and the rear end of link 19 being slidably supported between the side walls of handle 14 with its rear end abutting the inner end of the adjustable stop screw 15. The dot-and-dash straight line 22 as drawn passes through the axis of pivot pin 17 and the point of contact of the rear end of link 19 with stop screw 15. It will be noted that the axis of pivot pin 20 is slightly below this center line in the closed operating position of jaws 11, 12. Accordingly, in this position the toggle is effective to lock jaws closed. However, when handles 14, 16 are in the open position as represented by the dot-and-dash line showing at the left hand end of FIG. 1, pivot pin 20 is well above center line 21 and the toggle is broken or unlocked.

Simple and highly effective means for unlocking the toggle linkage comprises a lever 23 pivoted to handle 16 by pin 24 and having a fulcrum 26 bearing against the upper edge of toggle link 19. Lever 23 is normally held in retracted position by spring 28. When the outer end of lever 23 is depressed by the operator's finger, it pivots about fulcrum 26 with the result that the left hand end of lever 23 operates through pin 24 to expand handle 16 away from its locked position, this movement being expedited by a tension spring 25 connected as shown between jaw 12 and a rearward portion of handle 14.

Referring now more particularly to FIGS. 2 through 5, it will be understood that jaws 11 and 12 are each provided with a shallow broad groove 30, 31 each having low-height side walls 32, 33 bordering either longitudinal edge of the jaws (FIG. 4). The wide bottoms 30, 31 of these grooves diverge rearwardly toward the handle end of the tool in the manner best illustrated in FIG. 5. At their rear ends the groove bottoms are sufficiently separated from one another to permit free lateral movement of the open tapes away from one another, as is clearly shown in FIG. 2. At the forward end of the grooves, however, the groove bottoms are separated by a distance corresponding generally to the fully assembled positions of the interlocking tongues and grooves. Accordingly, it will be appreciated that the sloping bottoms of grooves 30, 31 serve to cam the tongues and grooves into their fully interlocked positions as the tool is pulled in one direction lengthwise of the open seam components.

It will also be evident from FIG. 2 in particular that grooves 30, 31 open laterally through the sides of the jaws and provides ample space for the entry of the two tape parts into overlapping position just prior to being cammed into interlocking engagement. Upstanding longitudinally and centrally from the inner face of lower jaw 11 is a generally wedge shaped camming or guide member 37 the forwardly facing edge 38 of which is quite thin and effective to hold the two tapes properly positioned for entry between the jaws. A further function of the pointed forward edge of member 37 is to cam the tapes apart as the tool is moved to the left as viewed in FIG. 2 for the purpose of opening the seam. Very slight operating pressure need be applied to the tool and partition 37, 38 is alone effective to separate the seam provided a sufficient length is already separated for the open ends thereof to lie along either side of edge 38 (FIG. 5).

The seam forming tapes are illustrated in the drawing as comprising two identical tapes 40, 41 having the mounting web 42 of each bonded to the lateral edges of a tubular jacket 43. The overlapping edges of each tape include a pair of complementally shaped tongues and grooves of the configuration clearly illustrated in FIGS. 3 and 4 which interlock to form the closed seam 45. As is clearly illustrated in FIG. 4 the width of grooves 30, 31 is equal to or slightly greater than the closed width of seam 45. It will also be observed from this figure taken through the forward end of the jaws that the distance between the bottoms of these grooves at this point corresponds generally to the thickness of the closed seam. Likewise,

to be noted is that fact that the distance between the edges of side walls 32, 33 of the jaws is slightly in excess of the thickness of mounting webs 42 with the result that these side walls cannot grip or pinch the mounting webs as the tool is drawn along the seam components.

In use, the open jaws of the tool are inserted astride the inner one of the unit surface of the lower tape and the under tape is then laid across the end of first tape and handle 16 is depressed to apply pressure to the overlapped portions of the tape. As the handles are pushed toward one another the axis of pivot pin 20 for the toggle mechanism passes below dotted line 21 thereupon locking the jaws in closed position. The jaws cannot be moved closer together because the rear end of link 19 abuts the inner end of stop screw 15 thereby preventing any further closing movement of the parts. The user now pulls the tool rearwardly or to the right as viewed in FIG. 1 and can apply whatever pressure he wishes to the handles of the tool without fear of gripping the tapes or injuring them. As the tool is moved rearwardly the various camming surfaces described above cooperate with one another to force the angles and grooves progressively into their locked positions as is illustrated in FIG. 4.

The tool can be released and removed from the tapes at any time simply by depressing the outer end of lever 23. Fulcrum 26 then bears against link 19 forcing pivot pin and handle 16 upwardly to the open position of the tool. If the tool is left in place until the jaws reach the rear end of the seam, as is illustrated in the dotted line showing at the right end of FIG. 1, then the tool simply feeds off the end of the fully closed tapes and will remain in closed position unless and until the handles are pulled away from one another to break the toggle lock.

While the particular seam closing tool herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim:

1. A hand supported plier-like tool for use in opening and closing a pair of interlocking seam forming tapes progressively as the tool is pulled lengthwise of the overlapped edges thereof and which tapes are of the type extruded from thermoplastic material having continuous tongues and grooves extending lengthwise of their juxtaposed overlapped faces, said tool comprising a pair of jaws pivotally connected for movement toward and away from a spaced-apart operating position and including a pair of operating handles extending therefrom and shaped to be gripped in the user's hand, the facing surfaces of said jaws each having similar oppositely facing shallow grooves flaring in depth rearwardly and sufficiently wide to freely seat the mateable tongue and groove edges of a respective one of said pair of seam-forming tapes, and said shallow grooves opening laterally and rearwardly toward said operating handles to permit disassembled portions of said tapes to enter said grooves from the rear ends of the grooves as said tool is pulled rearward lengthwise of a pair of tapes being interlocked together.

2. A tool as defined in claim 1 characterized in that said jaws are relieved laterally of their rear ends to provide clearance for said tapes to move laterally of one another and into overlapping registry as respects the tongues and grooves thereof.

3. A closure tool as defined in claim 1 characterized in that the rear ends of the sides of said shallow grooves open laterally from the opposite sides of said jaws.

4. A tool as defined in claim 3 characterized in that one of said jaws includes partition means extending longitudinally centrally of said shallow grooves in an area spaced rearwardly of the rear ends of said grooves and

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effective to keep said grooves aligned with the length of the tapes undergoing mating.

5 5. A tool is defined in claim 1 characterized in the provision of toggle linkage means pivotally connected to said handles and operating to limit closing movement of said jaws with the juxtaposed edges of said jaw grooves lying parallel to one another and spaced apart by a distance corresponding to the thickness of the mounting webs of the tapes on which said tool is to be used.

10 6. A tool as defined in claim 5 characterized in the provision of means for adjusting the spacing between the bottoms of said grooves in the closed operating positions thereof.

15 7. A tool as defined in claim 5 characterized in that said toggle linkage means includes means for automatically locking said jaws in closed position as an incident of their movement to closed position.

20 8. A tool as defined in claim 7 characterized in the provision of means operable to unlock said toggle linkage means, and spring means effective to move said jaws to their open positions upon unlocking of said toggle linkage means.

25 9. A tool as defined in claim 1 characterized in that one of said jaws is long, thin and contoured to fit snugly against the underside of a seam undergoing closing by said tool.

10. A tool as defined in claim 1 characterized in that the bottoms of said grooves converge toward one another from their rear ends toward their forward ends where the

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distance between said bottoms corresponds generally to the thickness of the fully closed seam.

11. A tool as defined in claim 10 characterized in the provision of readily adjustable means for regulating the distance between the bottoms of said jaw grooves when the jaws are locked in the closed positions thereof.

12. A tool as defined in claim 9 characterized in that the handles of said tool are inclined outwardly away from the general plane of said one long thin jaw and in a convenient position to be gripped in the operator's hand closely spaced outwardly of the exterior side of said tape while said long thin jaw is located on the opposite side of said tapes and generally parallel thereto.

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THERON F. CONDON, Primary Examiner

R. V. PARKER, JR., Assistant Examiner

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