

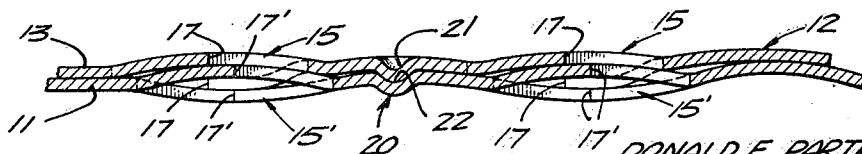
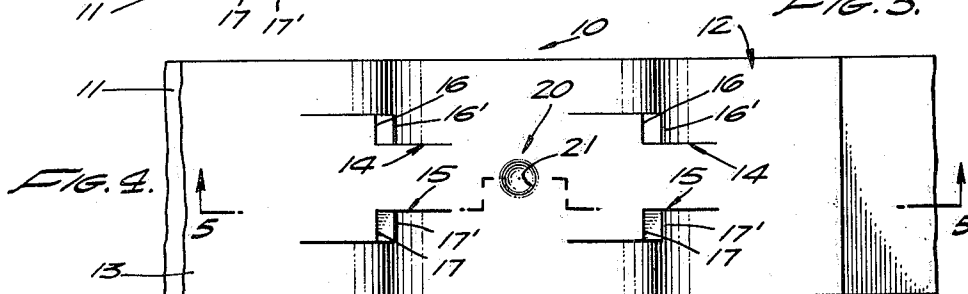
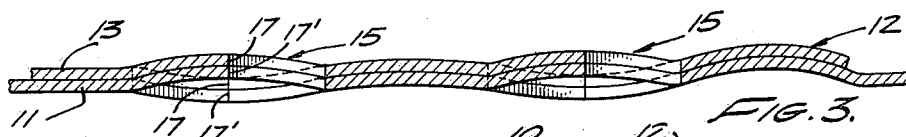
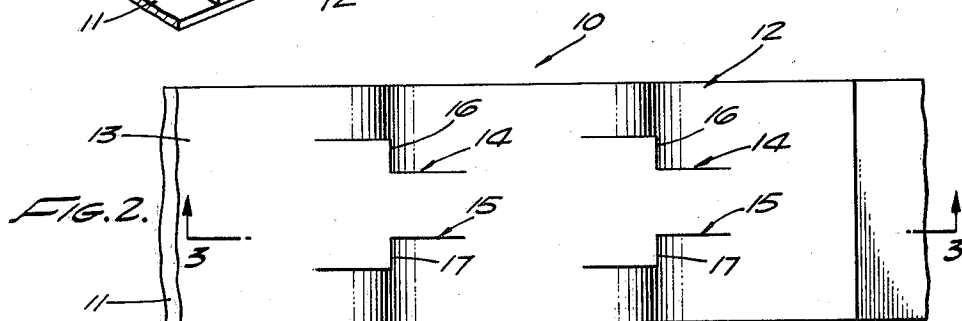
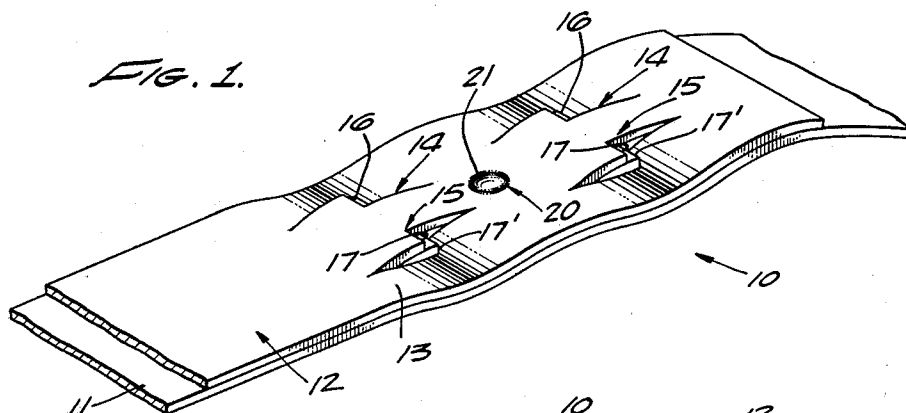
June 15, 1965

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3,188,706

FASTENERLESS SPLICE AND METHOD OF FORMING SAME

Filed June 29, 1962



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3,188,706 FASTENERLESS SPLICE AND METHOD OF FORMING SAME

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Filed June 29, 1962, Ser. No. 206,424

4 Claims. (Cl. 24—20)

This invention relates to fastenerless joints or splices and to methods of making the same and more particularly to a splice of this type characterized by its permanently interlocked nature, its high strength, its compactness and its simplicity.

The invention has application to the formation of permanently interlocked splices in stiff sheet material generally and is particularly useful in permanently splicing the overlapped ends of banding and strapping materials of the type commonly employed in wrapping packaged goods for shipment and handling. In such applications the banding material is wrapped about the packaging and tensioned to a suitable degree prior to splicing its overlapped ends. Heretofore resort has been had to various expedients to provide a splice without reliance on supplemental fasteners, keys, seals or other expedients usually employed in connection with upsetting, interlocking or shearing the strapping itself. These various techniques, however, leave much to be desired, both as respects the series of steps and time required to complete the splice, the strength of the resulting splice and the weakening of the available band strength as an incident of the splicing operation.

By the present invention there is provided an improved and superior splice of the type requiring no auxiliary pieces or fasteners of any kind and yet one which provides a permanently interlocked high strength splice between the overlapped ends of tensioned banding. The banding is slightly overtensioned initially, then slit and simultaneously deformed, then relaxed to a very slight degree to permit the characteristic very limited relative movement of the overlapped ends required to interlock the parts, following which the spliced parts are further deformed in a manner to permanently hold the parts positively interlocked without at the same time weakening the band assembly as a whole.

Accordingly it is a primary object of the present invention to provide an improved high-strength fastenerless splice for use in holding the overlapped ends or edges of stiff sheet material locked together.

Another object of the invention is the provision of an improved high efficiency splice for mechanically locking two thin sheet parts together without auxiliary devices of any kind.

Another object of the invention is the provision of an improved method of splicing the overlapped ends of thin strip material together.

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

Referring now to the drawings in which preferred embodiments of the invention are illustrated.

FIGURE 1 is a perspective view of a pair of strips locked permanently spliced together in accordance with the present invention;

FIGURE 2 is a top plan view of the splice at the end of the slitting operation;

FIGURE 3 is a longitudinal sectional view taken along line 3—3 on FIGURE 2;

FIGURE 4 is a view similar to FIGURE 2 but showing the finished splice; and

FIGURE 5 is a longitudinal sectional view taken along line 5—5 on FIGURE 4.

The completed joint or splice embodying an exemplary arrangement of a fastenerless positively and permanently interlocked splice, designated generally 10, is illustrated in FIGURES 1 to 5. As therein shown by way of example, splice 10 is made between the overlapped ends of steel banding used to strap goods being shipped. In accordance with well known practice employed in band wrapping such goods, the free end 11 of continuous metal banding is fed from a supply coil clockwise from the right of FIGURE 1 and wrapped counterclockwise about the package to be banded, the free end 11 being tucked below the main body of supply strip 12 coming from the supply coil. Reference character 12 will therefore be understood as designating the band encircling the package whereas 11 and 13 represent the overlapped portions desired to be spliced together in a permanent manner.

Any suitable stretching and splicing means may be used to tension the band proper about the package and thereafter to splice the ends together. However, the combination tensioning and splicing machine shown in my copending application for United States Letters Patent Serial No. 206,457, filed concurrently herewith, entitled Splicing Machine, is particularly suitable. However, it will be understood that strapping jacks and splicing machines of other constructions well known to the art may be employed for tensioning the main body of the strap and for splicing the overlapped ends and that hand-held punches or other suitable means may be employed to lock the splice permanently in assembled condition in accordance with the present invention principles.

Assuming that the opposite ends 11 and 13 are suitably held in a manner to place the main body of the strapping under tension about the package, the next step is to form stepped slits through and lengthwise of these ends. It will be understood that the slits may be of various configurations with one pair of adjacent ends closer together than the other and so arranged that a wider portion of the intervening material between the slits may be interlocked behind another portion of the intervening material, the object being to interlock the wider portion of one end of the slitted band behind a portion of the narrower material in the other end as will be more fully understood from following portions of this specification. Slits 14 and 15 are stepped intermediate their opposite ends and in a direction opposite to one another with the result that the intervening material is of generally T-configuration. Slits 14 and 15 are formed simultaneously through strip ends 11 and 13 and are therefore in exact registry with one another. For purposes of clarity, the portions of the slits in the exterior end 13 are designated by plain numerals whereas the corresponding parts of the slits in the lower end 11 are designated by the same numerals distinguished by the addition of a prime.

Note that the opposite ends of each of slits 14 and 15 are parallel to one another but offset laterally sufficiently to form narrow shoulders 16 and 17 in end 13 and corresponding shoulders 16', 17' in underlying end 11.

Slits 14 and 15 are formed by bulging the mid portions of a short length of the overlapped ends upwardly while bulging the material to either side of this area downwardly to form the slits by shearing action.

The opposite bulging or displacement of the strip material in the manner just described is sufficient that the remote surfaces of the overlapped ends are pressed slightly beyond one another in the manner best illustrated in FIGURE 3. It follows from the foregoing that relaxation of the tension on the main body of the strapping, or bodily

movement of the overlapped ends relative to one another, permits shoulders 16', 17' of the underlying end 11 to slide over and overlap with the underlying surfaces of shoulders 16, 17 of upper strip end 13. Relative lengthwise movement sufficient to overlap the shoulders by a distance equal to at least the thickness of the material being spliced is found adequate to provide a very high-strength positive splice.

Desirably, two sets or pairs of slits 14 and 15 are arranged in closely spaced relation lengthwise of the strip to safeguard against the possibility of the splice being weakened by relative rotary movement of the spliced ends occurring in the plane of the splice. Such rotary movement is strongly resisted by even a single set of slits 14, 15 by the fact that the edges of super-imposed ones of the slits lie in the same plane and interengage with one another owing to the opposite bulging of the material to either side of the slits.

After the shoulders of the two ends have been interlocked, the spliced ends are permanently locked against reverse or unlocking movement by simultaneous and nested deformation of the ends in an area closely adjacent at least one pair of slits 14, 15. This unique locking deformation, designated 20, comprises, by way of example, deeply nested dimples 21, 22. The shape and size of dimples 21, 22 is not particularly important and the dimension of these may vary widely. However, it is generally advantageous to keep the dimples small to avoid unnecessarily weakening the strength of the main body of the stripping.

The locking deformations are preferably formed simultaneously by a semi-punching operation performed in a manner to avoid shearing of the strip material but assuring that the deformed portions will nest sharply against one another without any objectionable tendency of the nested surfaces to cam strip ends 11, 13 away from one another. On the contrary, the deep indentations 21, 22 serve to lock the ends against relative lengthwise movement of the ends and particularly in a direction to disengage the overlapped shoulders 17, 17' and 16, 16'.

As herein shown, locking deformation 20 is shown positioned generally midway between two pairs of interlocked slits. However, it will be understood that the locking indentation may be disposed in other locations and that more than one set of nested deformations may be employed.

Although the described splice has been illustrated and described as between the overlapped ends of narrow stripping, it will be understood that this type of splice and the principles of the invention may be employed in wide variety of sheet metal constructions to hold the parts spliced together with the interlocked pairs of slits disposed in side-by-side relation across the width of the splice.

While the particular fastenerless splice and method of forming same 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 permanently interlocked joint for use between the overlapped ends of a band tie of the type made from high-strength stiff deformable material, said joint comprising a plurality of pairs of slits located between the lateral edges of said overlapped ends and shaped to interlock with one another with a portion of one band

end displaced from the plane of one surface of the band sufficiently to interlock with a portion of the other band end in an area closely associated with the slits in the latter band end, and means located between said adjacent pairs of said slots for positively locking the band ends interlocked comprising internested complementally deformed portions of said band ends located closely between adjacent pairs of said slits and cooperating therewith in holding said band ends against relative displacement lengthwise of said band ends.

2. A permanently interlocked joint formed between tightly compacted overlapped portions of a pair of members of stiff sheet material, said joint comprising a plurality of associated pairs of stepped slits in spaced apart relation generally parallel to load forces tending to separate said joint, said stepped slits permitting deformation of the material adjacent said slits sufficiently for stepped portions of slits in one sheet to underlie and interlock with stepped portions of the slits in the second sheet, and means for locking said stepped portions permanently and positively interlocked comprising internested dimples formed in overlapped portions of said sheets in an area closely adjacent and between said interlocked slits, said interlocked slits being effective to hold the overlapped area of said sheets in intimate contact and said dimples firmly seated in compact internested relation to one another.

3. A permanently interlocked joint as defined in claim 2 characterized in that said stepped slits are arranged in pairs closely spaced to one another laterally of the direction of load and with the steps in one slit of each pair facing in the opposite direction from the steps in the other slit, said steps being relatively narrow and extending crosswise of the direction of load on the joint, the portions of said steps extending in opposite directions crosswise of the length of said slits being displaced in a direction normal to the plane of said sheets and being interlocked one behind the other to hold said sheets rigidly pressed together, and the longer portions of the slits in the two sheets being in edge-to-edge abutment and effective in cooperation with said internested dimples to resist relative rotary movement of said sheets in the plane of said joint.

4. A permanently interlocked joint between the overlapped ends of a metallic band tie, said joint including similar T-shaped depressions formed in superimposed areas of each band and including oppositely stepped elongated slits so as to form laterally extending shoulders, said T-shaped portions being displaced slightly from one another lengthwise of said band ends with the shoulder portions of one pair of slits in one band end underlying and interlocking with the opposed shoulder portions of the pair of slits in the other band end, and means for positively interlocking said band ends against withdrawal from the said interlocked portion thereof, comprising complementally shaped nested deformations of said overlapped band ends located between said interlocked stepped slits.

References Cited by the Examiner

UNITED STATES PATENTS

119,844	10/71	Hamlin	24—20
180,910	8/76	Olmsted	24—20
1,393,791	10/21	Kimball et al.	24—23

FOREIGN PATENTS

223,044	7/09	Australia.
719,021	11/54	Great Britain.

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