March 17, 1942. J. W. LESLIE 2,276,988

SLEEVELESS STRAP JOINT

Filed Sept. 7, 1940

Fig. 1.

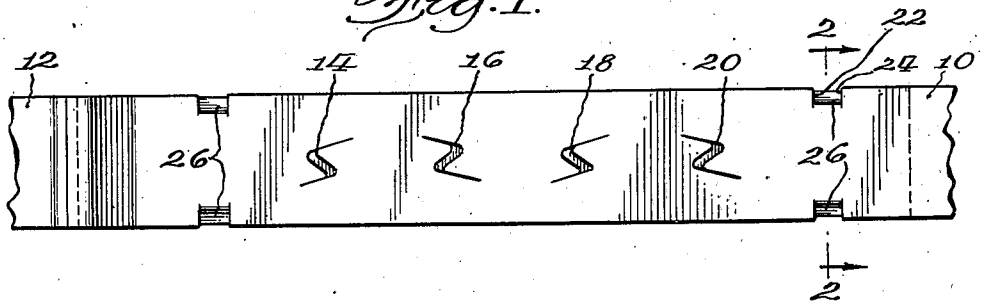


Fig. 2.

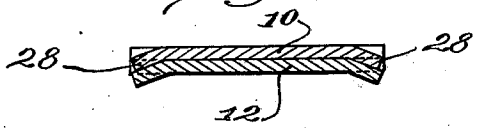


Fig. 3.

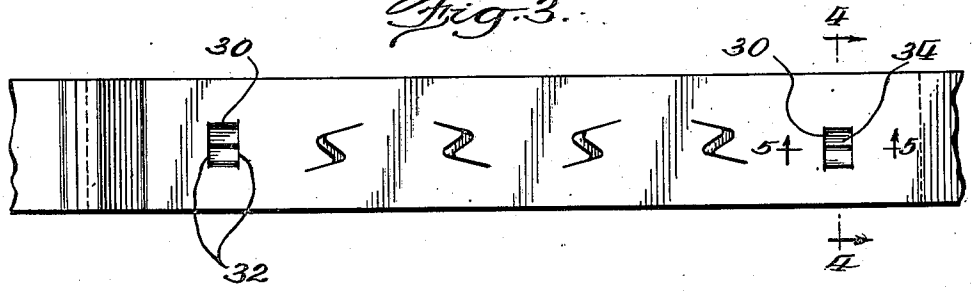


Fig. 4.

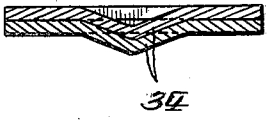
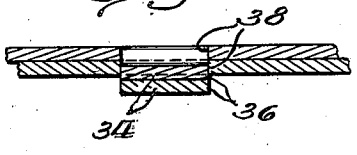


Fig. 5.



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UNITED STATES PATENT OFFICE

2,276,988

SLEEVELESS STRAP JOINT

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Application September 7, 1940, Serial No. 355,730

6 Claims. (Cl. 24—20)

This invention relates to sleeveless strap joints.

More particularly, it relates to a locking means for use with sleeveless strap joints of the type in which interengaging elements formed in overlapped portions of the metal strap material normally effectively resist separation of the strap portions only so long as the strap is under continuous tension.

In the design and formation of sleeveless strap joints, one of the essential characteristics of a good joint is that it effectively resists separation of the strap portions when under load. In the provision of a strap joint having the above desirable characteristic, good design requires that the formation of the joint should not unnecessarily weaken the strap body. With these desirable characteristics in mind it will be seen that any sleeveless strap joint is a compromise between maximum strength in the bond between the strap ends and maximum strength in the strap in the vicinity of the joint.

Since the principal force the joint is to resist acts in tension and tends to pull the overlapped strap ends apart, most sleeveless joints are not designed to resist an oppositely acting force which would normally occur only as a small force and only if the strap became slack during shipment because of compression of the package about which the strap is bound. That is, this oppositely acting or compressional force is frequently not considered in the design of a joint since it is not desired to weaken the strap additionally by providing interengaging elements to resist a force that occurs only infrequently.

In some types of joints, the interengaging elements in both strap portions are formed together at one operation and the step of interlocking these elements is accomplished by slight relative longitudinal movement between the strap portions after removal of the joint forming tool. This type of joint is quite easily unlocked unless the strap is continuously kept under tension.

It is, therefore, an object of my invention to provide novel means for use in connection with a strap joint which normally resists tensional forces only, to prevent compression or shrinkage of a bale or package from permitting the joint to separate.

An additional object of my invention is to provide a strap joint of the type wherein overlapped strap portions are cut and deformed together and later slipped under tension to accomplish engagement of the interlocking elements, with novel means to prevent reverse slipping of the overlapped strap portions.

Another object of the present invention is to provide a sleeveless strap joint with locking means without additionally weakening the strap body.

Still another object is to provide a sleeveless strap joint which resists both tensional and compressional forces.

Other objects and advantages of the present invention will become apparent from the following description and accompanying drawing in which similar characters of reference refer to similar parts throughout the several views and in which:

Fig. 1 is a plan view of a sleeveless strap joint incorporating the present invention;

Fig. 2 is an enlarged transverse sectional view taken in the direction of the arrows along the line 2—2 of Fig. 1;

Fig. 3 is a plan view of a sleeveless strap joint incorporating an alternative embodiment of my invention; and

Figs. 4 and 5 are sectional views taken in the direction of the arrows along the lines 4—4 and 5—5, respectively, of Fig. 3.

Referring to Fig. 1 of the drawing, a pair of strap portions 10 and 12 are shown in overlapped relation and joined by interengaging elements 14, 16, 18 and 20. These interengaging elements are cut and deformed from the stock of the strap in the manner described in detail in my copending application filed September 7, 1940 and which has been given Serial No. 355,728. They form no part of the present invention, however, but are illustrated merely as an example of a sleeveless strap joint in which the metal in both strap portions is cut and deformed together and the joint locked by slight slippage of the two strap portions relative to each other when the forming tool is removed. A joint of this type is easily unlocked by reverse relative movement of the strap portions. To prevent this reverse relative movement and the consequent unlocking of the joint, I first tension the strap and form the joint elements 14, 16, 18 and 20 or any other joint of this general type. The forming tool is then removed so that the overlapped strap ends can be slipped under the tenson in the strap to form the joint. After the strap ends have slipped relative to each other and thus interlocked the joint elements, I form two closely spaced parallel cuts 22 and 24 extending a short distance laterally inwardly from the edges of each of the overlapped strap portions and thus form registering fingers 26

which are bent obliquely downwardly to form a flange 28 at the edge of the upper strap, as best seen in Fig. 2, which has its vertical faces in contact with the vertical edges of the transverse cuts 22 and 24 in the lower strap. These planes of contact between the strap portions in transverse planes normal to the faces of the straps effectively prevent relative longitudinal movement between the strap elements in either direction unless the force tending to produce such longitudinal movement is sufficient to break off or distort the finger 26. To minimize the possibility of such failure, I prefer to form two of these interlocking elements arranged on opposite sides of the strap. If the principal joint in the strap extends longitudinally for a considerable distance as does the joint shown in Fig. 1, it may be desirable to provide four of these interlocking fingers 26 arranged with two at each end of the principal joint. Such an arrangement is shown in Fig. 1.

In the formation of these interlocking fingers 26, care should be exercised so that the cuts 22 and 24 do not extend inwardly toward the center of the strap sufficiently to weaken the straps more than the principal joint elements 14, 16, 18 and 20. That is, if the formation of the principal joint elements weakens the strap a matter of 30% or so, no additional weakening of the strap need be caused by the formation of the locking fingers 26 if the cuts 22 and 24 are sufficiently short and spaced longitudinally relative to the principal joint elements.

In the embodiment of my invention shown in Figs. 3, 4 and 5 the two strap elements are restrained against reverse movement and consequent unlocking by one or more deformations 30. These deformations are formed along the axis of the strap rather than at the edges and consist of a pair of short spaced-apart parallel transverse cuts 32 with the metal rib 34 between the cuts being deformed downwardly at an obtuse angle to bring the apex of the deformation in the upper strap portion below the plane of the lower strap portion to provide mutually abutting shoulders 36 and 38 therebetween in a manner similar to that provided in the first embodiment. As in the first embodiment described, the principal joint elements are formed, the forming tool removed, and the straps slipped to interlock the joint elements before the locking ribs 34 are formed.

Having described the nature of my invention and two embodiments thereof, what I claim as new and useful and desire to secure by Letters Patent of the United States is as follows:

1. A sleeveless strap joint comprising overlapped strap portions having interengaging elements thereon adapted to resist separation of the strap portions when under tension but having only a slight tendency to resist separation of the strap portions when under compression, one of said overlapped strap portions having a member extending through the plane of the other strap portion to form abutting shoulders between said strap portions in a generally transverse plane, and said abutting shoulders adapted to resist relative movement between the strap portions in a direction opposite to that resisted by said interengaging elements.

2. A sleeveless strap joint comprising overlapped strap portions having interengaging elements thereon adapted to resist separation of the strap portions when under tension but having only a slight tendency to resist separation of the strap portions when under forces acting in the opposite direction, said overlapped portions having a pair of closely spaced short parallel cuts arranged substantially normal to the axis of the strap with the strap metal between said cuts being deformed to provide a rib on one of said strap portions extending into the plane of the other strap portion to form abutting shoulders between said strap portions in a generally transverse plane, and said abutting shoulders adapted to resist relative movement between the strap portions in a direction opposite to that resisted by said interengaging elements.

3. The method of forming a locked sleeveless strap joint in overlapped portions of metal strap which comprises cutting and deforming said overlapped portions to provide registering interengaging elements in each strap portion, slipping said strap portions relative to each other under tension to interengage said elements, and forming one or more additional deformations after the slipping operation to prevent reverse slipping of said overlapped strap portions.

4. The method of forming a locked sleeveless strap joint in overlapped portions of metal strap which comprises cutting and deforming said overlapped portions to provide registering interengaging elements in each strap portion, slipping said strap portions relative to each other under tension to interengage said elements, and finally providing mutually abutting shoulders between said strap portion with the plane of abutment of said shoulders being substantially normal to the strap axis to prevent reverse slipping of said overlapped strap portions, the formation of said mutually abutting shoulders being accomplished after the said slipping operation.

5. In a sleeveless strap joint of the type in which overlapped strap ends are connected together to resist separation in tension by means of joint elements comprised of registering cuts and deformations that interlock when the strap ends are moved slightly in tension, a means for preventing unlocking of said elements when said strap ends are placed under compression which comprises providing an additional joint member extending from one of the strap ends into the other of the strap ends to form abutting shoulders between said strap ends in a generally transverse plane, whereby said abutting shoulders prevent reverse unlocking movement of said strap ends while said inter-engaging elements provide the principal joint strength in tension.

6. A sleeveless strap joint comprising overlapped strap portions having inter-engaging elements thereon adapted to resist separation of the strap portions, some of said inter-engaging elements comprising substantially identical interengaging members on each of said strap portions with the inter-engaging members on one of said strap portions being located out of register with the similar inter-engaging members on the other of said strap portions, and others of said interengaging elements comprising similar cuts and deformations in each of the strap portions with the last said cuts and deformations in one of said strap portions being located in register with the similar cuts and deformations in the other of said strap portions.

JOHN W. LESLIE