United States Patent

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[54] **FLAT CURL-FREE U-SEALING ADHESIVE TAPE APPLYING MACHINE**
5 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **156/461,** 156/468
[51] **Int. Cl.** **B32b 31/18**
[50] **Field of Search** 156/461, 468, 530

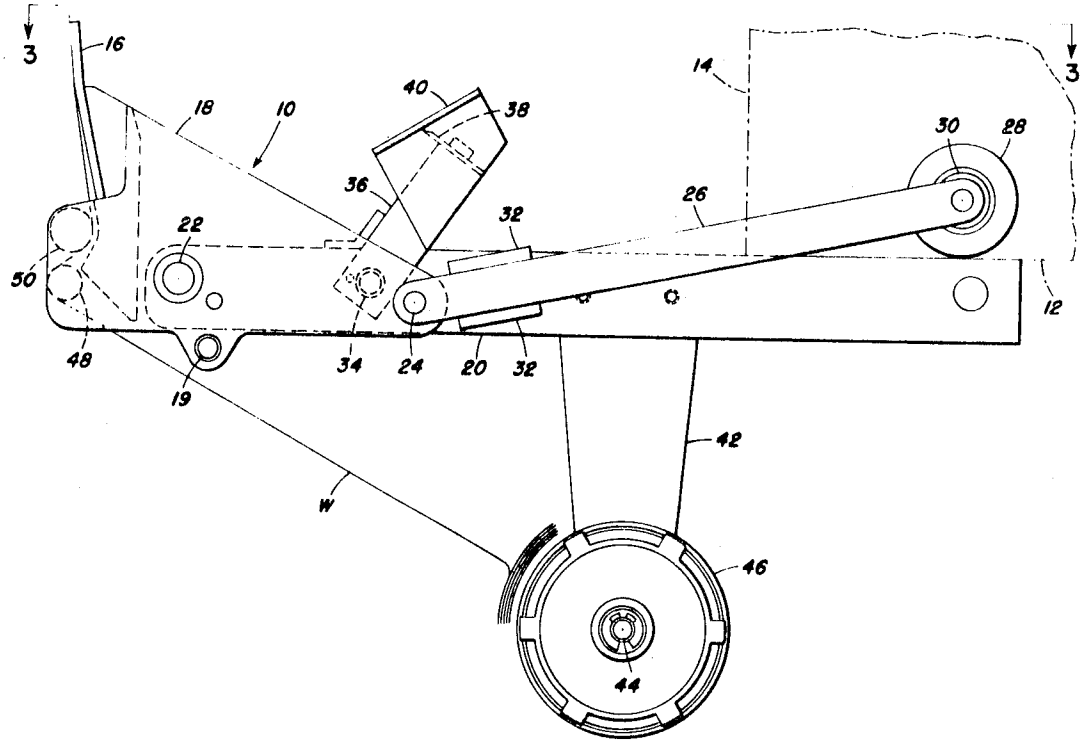
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ABSTRACT: This invention relates to a tape-applying machine and, in particular, to an improved U-sealer for cuboid objects or cartons. The apparatus or U-sealer includes a tape-applying member and a presser roller adapted to apply pressure-sensitive adhesive tape to a carton conveyed along a linear path. The tape-applying member is retractably interposed in the travel path of the carton and includes an upstanding end portion of the adhesive tape in an unsupported condition. This physical characteristic is imparted to the tape by cooperative grooving rollers which provide a longitudinal stiffening ridge or groove in the tape prior to application to the carton.



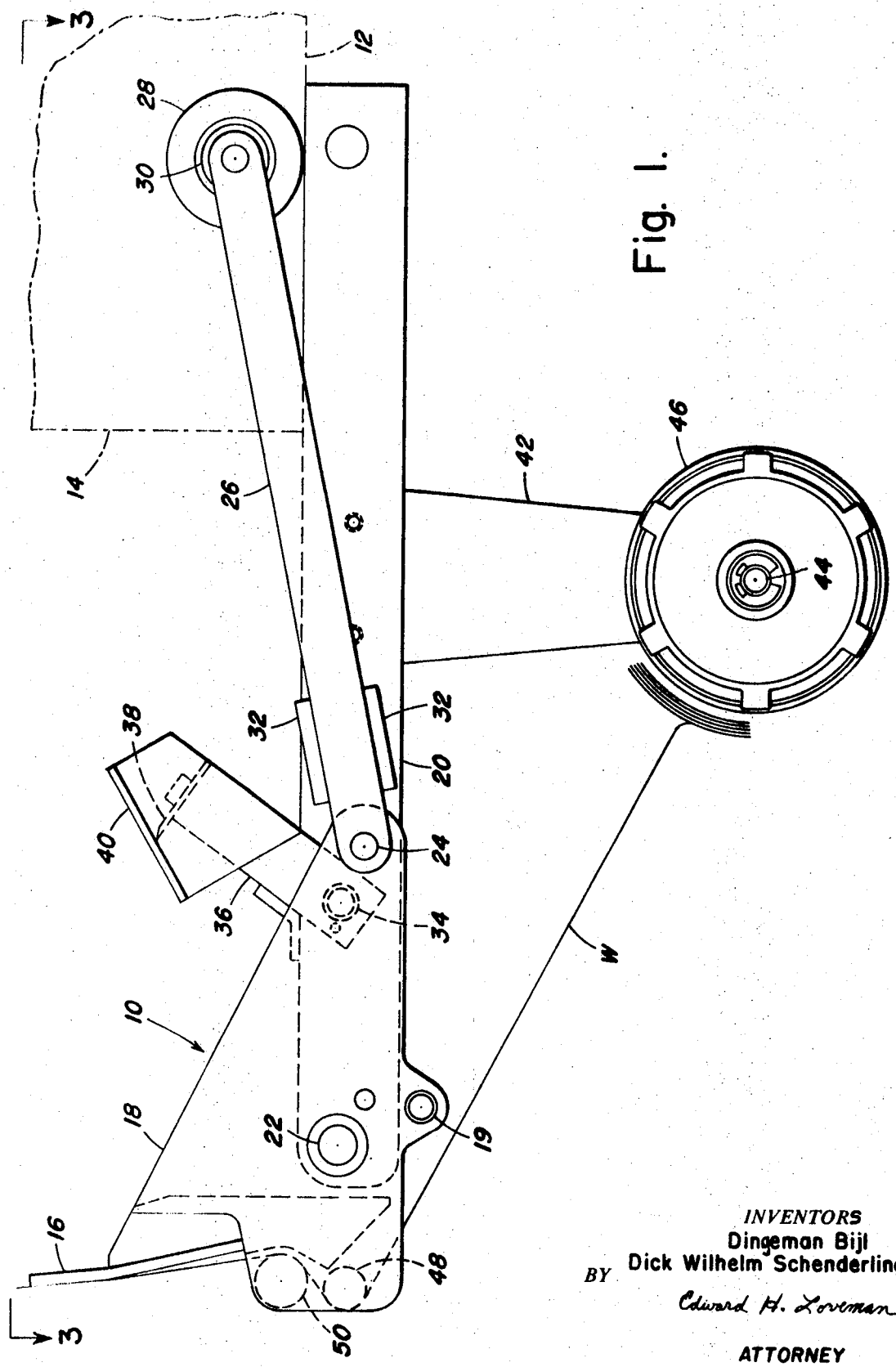


Fig. 1.

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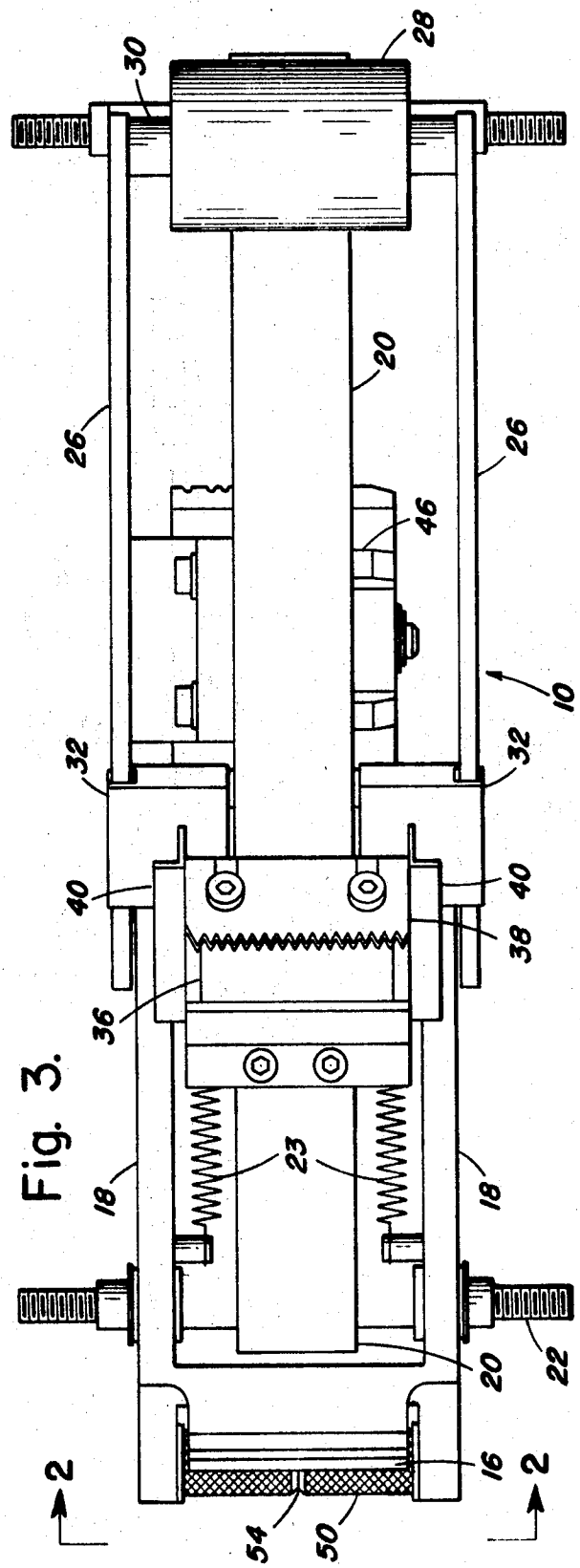


Fig. 3.

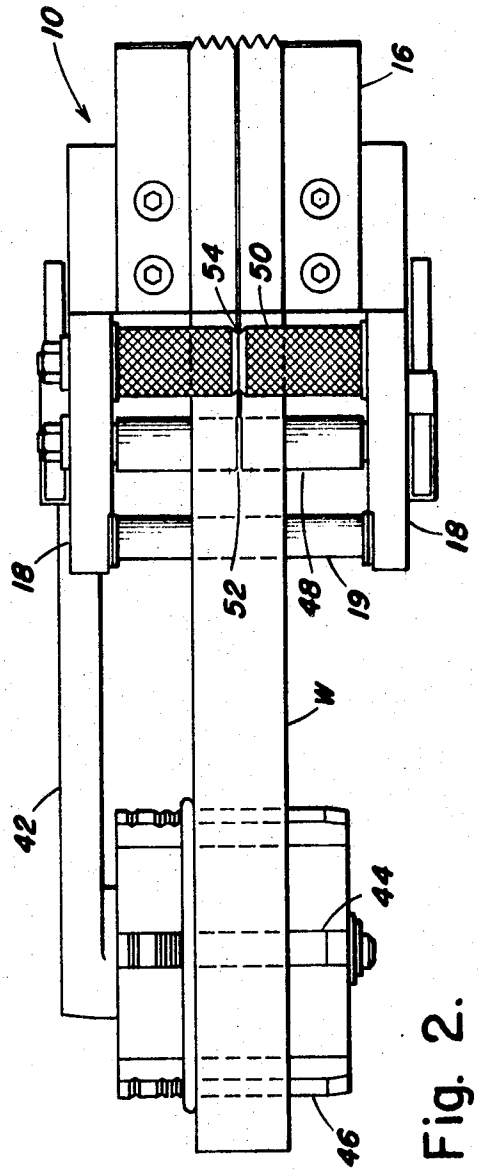


Fig. 2.

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FLAT CURL-FREE U-SEALING ADHESIVE TAPE APPLYING MACHINE

This invention relates to a tape-applying machine and, more particularly, to an improved machine for applying pressure-sensitive adhesive tape to a carton or similar cuboid object.

Tape-applying machines, generally designated as U-sealers, essentially include a guide surface, such as a set of rails or table top, along which a carton to be sealed may be conveyed by suitable conveying means. The U-sealer includes a retractable upright tape-applying member which is adapted to apply the end portion of a continuous length of adhesive tape supplied from a supply reel, to the advancing face of a carton. As the carton moves against and then past the tape-applying member, the latter is displaced by the carton and continues to apply tape to the bottom surface of the carton. When the carton finally passes the tape-applying member, the adhesive tape may be pressed against the rear or retreating surface of the carton by a suitable presser member, which may be in the form of a rotatable pressure roller. During the final movement of the tape-applying member, as the continued travel of the carton permits the member to return to its original upright position, a cutter severs the tape applied to the carton and allows the leading edge or end of the remaining tape supply to be positioned adjacent to the tape-applying member. This, in effect, will position the apparatus for applying adhesive tape to the following carton in an identical sequence as described above.

In presently used U-sealers, in order to maintain the leading end of the adhesive tape in position against the surface of the upright tape-applying member, whereby a carton will be pressed against the tape when conveyed along the guide surface, suitable retaining fingers or clamps must be utilized. These retaining fingers include pivotable clamps which cover the side edges of the adhesive tape, thereby preventing the tape from falling away from the surface of the tape-applying member under the influence of gravity or the inherent lack of stiffness of the adhesive tape per se. As the carton to be sealed approaches the tape-applying member and contacts the fingers, retaining clamps are pivoted out of the carton travel path by pivoting means thereby allowing the carton to press against the tape on the tape-applying member. One such prior art U-sealer incorporating mechanism of this type is described in Larkin U.S. Pat. No. 3,079,977.

Although the aforedescribed U-sealers are generally satisfactory in operation, difficulties have been encountered in connection with the adhesive tape retaining fingers and clamps. In addition this type of mechanism is also subject to frequent mechanical failure, since numerous delicate components and tension spring elements are in constant reciprocating motion. Another drawback of this particular prior art tape retaining mechanism lies in that the numerous components and elements must, of necessity, be machined and manufactured to extremely close tolerances, obviously an expensive and economically undesirable feature.

In order to obviate the foregoing and other disadvantages encountered in the prior art, the present invention provides for a U-sealer adapted to apply pressure-sensitive adhesive tape to cartons or the like, and wherein said U-sealer incorporates a novel and advantageous mechanism for imparting a stiffening characteristic to the upstanding tape end portion, thereby obviating the need for complex and expensive tape end retaining means and clamps. The novel and unique mechanism according to the present invention includes a pair of parallel-spaced rotatable rollers interposed between the supply roll of adhesive tape and the tape-applying member. The rollers have, respectively, complementary raised and grooved knife edge portions, which may be of a simple centrally positioned or a plurality of spaced portions against which the tape is pressed. As the adhesive tape passes over the first roller having the raised portion or knife edges, one or more continuous longitudinal, generally V-shaped grooves or indentations are formed in the surface of the tape. The grooves or indentations in the adhesive tape are then adapted

to pass through the groove in the second roller, the latter of which conveys the grooved tape upright toward the generally upstanding tape-applying member. The formation of the longitudinal groove in the adhesive tape forms a type of "backbone," imparting a somewhat more rigid and stiffer characteristic or increased bending moment to the freely upstanding tape end portion. This, in effect, will permit the tape end to remain in a generally unsupported upright position adjacent to the surface of the tape-applying member. From the foregoing, it becomes readily apparent that the present U-sealer is of a simpler, more dependable construction than those in the prior art. If desired, a generally cross-sectional V-shaped support member may be positioned adjacent to and coextensive with the tape-applying member to give some support to the upwardly traveling adhesive tape.

Accordingly, it is a primary object of the present invention to provide an improved and simplified U-sealer for applying pressure-sensitive adhesive tape to the surface of a carton or similar cuboid object.

Another object of the present invention is to provide a novel U-sealer including a device adapted to facilitate the end portion of a continuous web of adhesive tape to remain in freely unsupported upright position adjacent to an upstanding tape-applying member.

A further object of the present invention is to provide a U-sealer as described hereinabove including cooperative paired rollers adapted to impart a longitudinal stiffening groove to the adhesive tape so that the latter may remain in an unsupported position adjacent to the carton-contacting surface of a tape-applying member. These and other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the detailed description when considered in connection with the accompanying drawings in which:

FIG. 1 is a side elevational view of a U-sealer according to the present invention;

FIG. 2 is a front elevational view of the U-sealer of FIG. 1; and

FIG. 3 is a top plan view of the U-sealer of FIG. 1. Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, a U-sealer is generally designated as **10**. The U-sealer **10** defines a travel path **12** for a carton **14**, shown diagrammatically, with the carton **14** being conveyed from left to right either manually or through suitable mechanical propelling means (not shown). A tape-applying member **16** consisting of an essentially flat plate is carried on a pair of spaced lever plates **18**, joined by a rod **19**, which prevents the tape from striking the lever plates, and pivotally mounted to a frame **20** about a pivot shaft **22**. A pair of return tension springs **23** bias the lever plates **18** into a position whereby the tape-applying member **16** is normally maintained in the path of cartons **14** traveling along path **12**.

Attached to lever plates **18**, and pivotable relative thereto about pivot point **24** are spaced parallel levers **26**, between the distal ends of which a presser roller **28** is rotatably journaled on shaft **30**. The levers **26** are adapted to be retained in slidable engagement within slides **32** on both sides of frame **20**.

Separately pivot to the frame **20** about pivot point **34** is a knife arm **36** having a cutter blade **38** positioned below plate members **40**. The plate members **40** are positioned one on each side of the cutter blade **38**.

Attached to the frame **20** is a depending frame member **42** having a horizontal shaft **44** rotatably journaled therein at its lower end. A supply roll **46** containing a continuous web of pressure-sensitive adhesive tape W is mounted on shaft **44** and retained thereon through suitable fastener means.

The leading end of adhesive tape web W is extended or unwound from supply roll **46** and led toward the tape-applying member **16**, as illustrated in FIG. 1 of the drawings, and positioned adjacent to its carton contacting surface so that the end of the tape W just extends above the tape-applying member. The nonadhesive back of the tape W faces the tape-applying

member 16, so that the adhesive surface of the tape is in carton-engaging position.

In order to maintain the leading end portion of the adhesive tape W in a generally unsupported upstanding position adjacent to tape-applying member 16 without the use of cumbersome mechanical devices, a pair of spaced, parallel rollers 48 and 50 are rotatably journaled between spaced lever plates 18 subjacent to tape-applying member 16. Essentially, the adhesive tape W is entrained about the forward peripheral portion of lower roller 48 and then looped inwardly and upwardly about the rear or inner peripheral portion of upper roller 50. The adhesive tape W then is conveyed upwardly toward and along the carton-engaging surface of tape-applying member 16.

In accordance with the novel and advantageous concept of the present invention, the lower roller 48 has a centrally located peripherally raised portion 52, generally in the form of a V-shaped knife edge. As the adhesive tape is conveyed over the roller 48, the knife edge 52 will impart a continuous longitudinal groove or edge to the tape web W. Similarly, roller 50 has a knurled surface adapted to grip the adhesive surface of tape web W and convey the latter upwardly toward tape-applying member 16. The roller 50 has a centrally located peripheral groove 54 in line with knife edge 52 on roller 48, and with said groove 54 being adapted to receive the longitudinal groove or ridge in tape web W, so that the groove is maintained in the tape as it is conveyed toward the tape-applying member. The longitudinal groove in the tape web W will form essentially a "backbone" or stiffening characteristic increasing its bending moment so that it can remain in an upstanding unsupported manner adjacent to the tape-applying member 16.

During operation of the U-sealer 10, a carton 14 is advanced along travel path 12 until it contacts the tape-applying member 16 and the tape W lying against the surface of the latter. Continued motion of the carton 14 toward the right will cause tape-applying member 16 to fold down below travel path 12. As the carton 14 continues its travel the presser roller 28 and then the knife arm 36 are also depressed by the carton. Concurrently, tape is unwound from supply roll 46 and applied to the bottom of the carton 14. As the tape passes the presser roller 28, the latter will securely apply the tape to the carton 14. This will also eliminate the longitudinal groove or ridge in the tape.

When the trailing edge of the carton 14 passes the plate members 40 which are part of knife arm 36, the knife blade or cutter 38 will move up, being suitably spring-loaded, and cut the tape web W in proximity to the tip of tape-applying member 16. Simultaneously, the tape-applying member will move into its vertical position as the presser roller 28 moves up to press the trailing edge of the severed tape against the rear surface of the carton 14. The apparatus or U-sealer 10 is now in position to apply tape to the next or succeeding carton 14.

From the foregoing it becomes readily apparent that the U-sealer according to the present invention is of a simplified and economically advantageous construction when compared to prior art U-sealers.

It should also be understood that the foregoing relates to only a preferred embodiment of the invention, and that it is intended to cover all changes and modifications of the example of the invention herein chosen for the purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention.

What is claimed is:

1. In a U-sealer comprising a frame portion;

a retractable tape-applying member consisting of an essentially flat plate supported by said frame portion,

a pressure member for applying a severed rear end portion of tape to the retreating face of a carton being taped,

an arm carrying said presser member, mounting means slidably attaching said arm to said frame portion,

connecting means pivotally linking said tape-applying member and arm to displace said presser member to a starting position by retraction of the tape-applying member,

means for supplying a continuous length of tape to said tape-applying member,

and a spaced pair of rotatable roller means interposed between said tape-supplying means and said tape-applying member, at least one said last-mentioned rollers means including a peripherally raised ridge portion comprising a raised knife edge extending about the axial center of said roller means to impart a longitudinal central stiffening "backbone" to said tape which is otherwise flat, whereby the leading portion of the successive substantially flat tape segment is maintained in upstanding generally unsupported position adjacent to the flat plate of said tape-applying member.

2. A U-sealer as defined in claim 1 wherein said raised ridge portion comprises a raised knife edge extending about the axial center of said roller means, so as to form said groove in said tape at the approximate centerline thereof.

3. A U-sealer as defined in claim 1 wherein the other of said roller means is interposed between said first roller means and said tape-applying member,

said tape being entrained about said other roller means and conveyed by the latter into contact with said tape-applying means.

4. A U-sealer as defined in claim 3 wherein said other roller means includes a peripherally grooved portion,

said grooved portion being in axial alignment with the raised ridge portion of said first roller means, whereby the groove in said tape is adapted to be conveyed in complementary relationship through said groove.

5. A U-sealer as defined in claim 3 wherein said other roller means includes a generally knurled circumferential surface so as to engage the surface of said tape for conveyance toward said tape-applying member.

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