July 21, 1953 P. W. HERRLINGER 2,646,020

TAPE MOISTENING DEVICE

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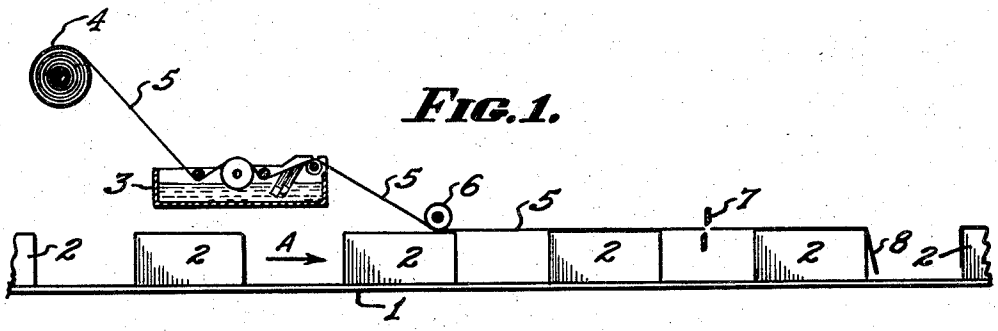


FIG. 1.

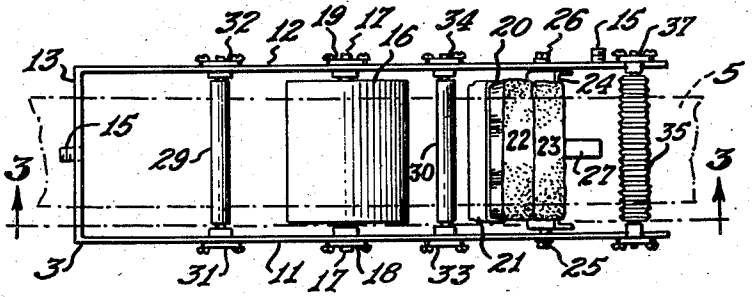


FIG. 2.

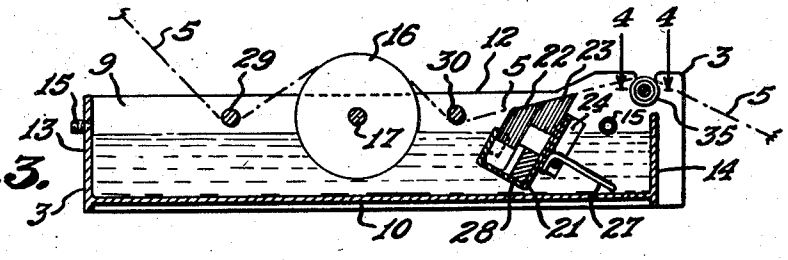


FIG. 3.

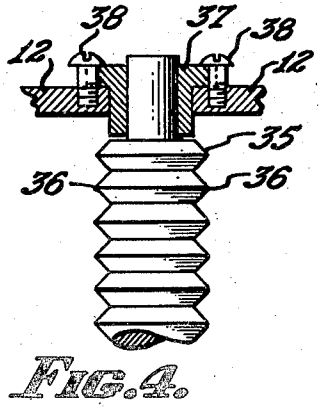


FIG. 4.

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TAPE MOISTENING DEVICE

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1 Claim. (Cl. 118—217)

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My invention relates to a tape moistening device for gummed tape bearing adhesives of the water or solvent moistenable type requiring activation by a solution or solutions of the various kinds familiar to those skilled in the art. In particular, my invention relates to a tape moistening device for use where continuous lengths of gummed tape are to be moistened immediately prior to the application of the tape to shipping containers and the like moved along on a conveyor belt.

The primary object of my invention is to provide a means for properly moistening gummed tape so as to completely and uniformly activate the entire area of the gumming for maximum permanent adhesion, as well as for quick sticking performance in a continuous taping operation.

It has become the practice in various industries to close and seal shipping containers while they are being moved along in spaced relationship on a conveyor. In an operation of this nature, means are provided along the path of travel of the containers for infolding the top closure flaps and for applying gummed tape to the meeting edges of the top closure flaps so as to seal them shut. The gummed tape is applied in a continuous length and spans the intervals between adjacent cartons on the conveyor. Immediately following the application of the tape to the containers, severing means act to cut the tape in the span between the containers and means are also provided to fold the free edges of the tape down about the ends of each container and securing it to the end walls thereof. Hence the cutting and folding of the tape must be done before the gumming on the tape dries, and it becomes essential that the tape gumming be completely and sufficiently activated so as to assure proper adhesion of the tape with end portions of the containers.

The tape moistening devices currently being employed in the type of operation just described are inadequate and consequently do not provide properly moistened tape. Many tape users lay the blame for the poor performance of the tape on the tape manufacturer, whereas a large percentage of the adhesion failures occurring in the use of gum tape are not due to any inherent defect in the tape or its gumming, but rather are due largely to the abuses in tape application that can be charged to improper moistening of the tape.

Tape moistened by means of the moistening devices currently available is, in a great many instances, either inadequately moistened, or, if moistened adequately, is often streaked or puddled, i. e., the moistening liquid is either applied so sparingly that the gumming is not sufficiently activated, or else, it is applied so freely as to produce overly wet areas interspaced with exceedingly dry areas. This condition also decreases the efficiency and adhesion performance of the tape. The resulting sealing operation under such moistening conditions represents only a fraction of the efficiency of which the tape is capable, and the inevitable result is that the tape is unsatisfactory to the tape user. Basically, this fault is due to improper tape moistening rather than to the inadequacy of the tape, and usually the fault is the result of the application of too little moistening liquid rather than too much.

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As has been observed by my co-worker, Howard L. Heise, in his patent application, Serial No. 208,209, filed January 27, 1951, and entitled Means for Moistening Gummed Tape, every tape gumming displays a moistening pattern proportional to its co-efficient of interfacial tension with respect to water—considering water as the moistening liquid—as well as to the amount of water applied. The moistening pattern of almost all adhesives becomes coarser as the water level in the moistening device is raised, or as the speed at which the tape is dispensed is increased or altered, whereas the amount of moistening water applied to the tape is increased. This has been found to be true with either single or double brush type machines as well as with machines employing roller type moistening means. This condition detracts from the performance of the tape where generous moistening is required because the strength of the wet tack is lowered disproportionately to the amount of water applied by reason of the excessive dilution of the puddled areas as well as the reduced total area of activated gumming. A moistening machine that is capable of applying a generous or adequate amount of water, therefore, generally produces a moistened tape with a puddled pattern that reduces performance and speed of operation. Under such circumstances the user is inclined to reduce the solution level in the water pan and, as likely as not, excessively reduces the application of moistening liquid to a point inadequate for satisfactory taping results. Inadequate and poorly designed dispensing and moistening equipment have been found to be the principal underlying source of troubles that plague tape users.

It is thus a principal object of my invention to provide a tape moistening device particularly

suited to the needs of the tape user who applies moistened tape in continuous lengths in the manner hereinbefore described.

It is a principal object of my invention to provide a tape moistening device which will apply an adequate amount of water or other moistening liquid to the tape gumming in an even and uninterrupted manner without permitting the gumming to become streaked or puddled.

A further object of my invention is the provision of tape moistening means which is of simplified construction and capable of operating at high rates of speed.

These and other objects of my invention which will be referred to hereinafter or which will be apparent to one skilled in the art upon reading these specifications, I accomplish by that construction and arrangement of parts of which I shall now describe an exemplary embodiment.

Reference is now made to the accompanying drawings wherein:

Figure 1 is an elevational view representing in somewhat diagrammatical fashion the manner in which a continuous length of tape is fed through my moistening device and applied to the containers.

Figure 2 is a plan view of my tape moistening device.

Figure 3 is a side elevational view taken along the line 3—3 of Figure 2.

Figure 4 is a partial plan view taken along the line 4—4 of Figure 3.

Briefly, in the practice of my invention, I provide a moistening device comprising a receptacle for the moistening liquid. Mounted in the receptacle for contact with the moistening liquid is a moistening roll capable of applying a predetermined quantity of moistening liquid to the gummed tape as it is passed over the moistening roll. Also mounted in the receptacle in contact with the moistening liquid therein is a brush applicator adapted to contact the moistened tape subsequent to its passage over the applicator roll, the brush applicator serving to smooth out and evenly distribute the moistening liquid applied by the roll applicator. Thus, the roll applicator is the primary means for applying the moistening liquid to the tape and the brush serves as a secondary means for evenly distributing the liquid and preventing the formation of streaked or puddled areas. I have found that by use of a roll applicator as a primary means of applying the moistening liquid, there is no dependence on the capillary action of a brush, as has been the practice heretofore, and consequently a constant flow of moistening liquid is assured. Where conventional brush applicators are employed, there is a possibility that dirt accumulation will cut down the capillary action which transfers the moistening liquid from the receptacle to the gummed surface of the tape, resulting in less moistening liquid applied to the tape. By means of my present invention, I employ a more positive primary application of moistening liquid and dirt accumulation becomes no problem. Some moistening liquid will, of course, be transmitted to the tape by my secondary brush, but this additional application of moistening liquid is supplementary only and serves to assure even distribution and proper moistening of the tape.

For a better understanding of the details of my invention, reference is now made to Figure 1 of the drawings wherein I have illustrated the manner in which my tape moistening device will be used by the tape user. A conveyor is indicated generally at 1 upon which are moved a plurality of containers or cartons 2 which are to be sealed. The cartons are moving in the direction of the arrow A, as will be readily evident. The tape moistening device, indicated generally at 3, is positioned above the path of travels of the containers 2 and receives the length of gummed tape 5 from the supply roll 4. The length of gummed tape 5 is withdrawn from the supply roll, passed through the moistening device in a manner which will be described in detail hereinafter, and from the moistening device it is carried into contact with the tops of the containers being sealed, passing under the applicator roll 6 which serves to apply the tape to the tops of the containers. As will be clearly evident from the drawing, the length of tape spans the intervals between adjacent containers and is severed intermediate the span by means of the knife 7. The free ends of the tape, such as the portion 8 (see Figure 1), are then folded down about the ends of the containers and secured thereto. The means whereby this is accomplished have not been illustrated since they form no part of the present invention. Likewise, the containers are illustrated with their top closures in closed condition, it being understood that if the gummed tape is the means for securing the top closure flaps in the closed condition, sweep means or the like will be provided to infold the closure flaps and hold them in the infolded condition until the tape has been applied and firmly adhered. Of course, if the top closure flaps are infolded and secured prior to the application of the tape, in which instance the tape serves merely as a sealing means for the crevices between the flaps and as additive sealing means, these operations will occur prior to the passage of the containers beneath the tape moistening device and the applicator roll.

Referring now to Figures 2 and 3, the moistening device 3 comprises a liquid receptacle 9 having a bottom 10, side walls 11 and 12 and end walls 13 and 14. The liquid receptacle may, if desired, be provided with one or more overflow outlets 15 which may be arranged at different heights depending upon the amount of moistening liquid to be maintained in the receptacle. If the moistening liquid is water, and it is desired to maintain a continuous flow of water into the liquid receptacle, one of the overflow openings 15 may have a pipe connected thereto to carry off any overflow, thus maintaining the liquid level in the receptacle constant at all times.

The primary moistening means of the device comprises the roll 16 having shaft 17 journaled in the bearings 18 and 19 secured to the walls 11 and 12 respectively. The applicator roll is of a width at least as great as the width of the tape to be moistened and of a diameter sufficient to permit the roll to contact the moistening liquid in the receptacle at the various operating liquid levels. The roll may be made of metal, ceramic material, plastics or rubber and its formation does not constitute a limitation on my invention. Generally speaking, such rolls have a smooth contacting surface, although with my invention this is not necessary and the contacting surface of the roll may be pocked or otherwise configured to carry a greater amount of moistening liquid if such is necessary, the secondary applicator or brush serving to smooth out the liquid applied by the primary applicator. The size of the applicator roll 16 does not constitute a limitation on my invention and will be determined by the factors involved, such as the type of gumming carried on

the tape and the speed of the tape. However, in all instances I have found that a roll applicator will apply a sufficient amount of moistening liquid to the tape even at high speeds. The application of the moistening liquid is a positive one and no reliance is placed on capillary action as is the case where brush applicators are employed.

The secondary or brush applicator is indicated at **20**, and, as best seen in Figure 3, comprises a generally U-shaped brush holder **21** in which are mounted the brushes **22** and **23**. Of course, a single brush may be used if desired. The U-shaped brush holder **21** is mounted on a second U-shaped member **24** which, as clearly seen in Figure 2, is pivotally mounted at **25** and **26** to the side walls **11** and **12** respectively of the liquid receptacle. The brush holder **21** and the brushes **22** and **23** are thus free to pivot within the receptacle. Due to the positioning of the parts, their pivoting action in a counterclockwise direction is limited by the bottom of the receptacle; and in a clockwise direction, their pivoting movement is limited by the arm **27** secured to the U-shaped member **24** and adapted to rest against the bottom of the receptacle. A weight **28** is provided in the U-shaped brush holder beneath the brush **23** and this weight tends to normally urge the brush holder to move in a counterclockwise direction. As will be evident from Figure 3 of the drawings, the purpose of urging the brush holder and brushes to move in a counterclockwise direction is to force the brushes, which have tapered upper surfaces, into contact with the tape **5**, the pressure created by the weight **28** being sufficient to maintain the brushes in full contact with the tape and thus eliminate the necessity of providing pressure means above the tape acting to press it into contact with the brushes.

Guide means in the form of lead-in roll **29** and lead-out roll **30** are journaled in the bearings **31**, **32** and **33**, **34** respectively, to maintain the tape in proper contact with the roll **16**. These guide rolls are important in a high speed operation to assure proper contact between the undersurface of the tape and the moistening roll. Furthermore, lead-out roll **30** also cooperates with the carrier roll **35** to dispose the tape in proper position to be contacted by the brushes **22** and **23**.

Since the carrier roll **35** contacts the under or moistened surface of the tape, it is grooved in the manner illustrated in Figure 4 so that only the extremely thin outer edges **36** of the grooves actually contact the moistened surface of the tape. Such precautions need not be taken with the lead-in roll **29** or the lead-out roll **30** since these rolls contact the uppermost, ungummed surface of the tape. As before, the carrier roll **35** may be journaled in bearings, such as the bearing **37** secured to the wall **12** of the receptacle by means of the screws **38**. The opposite end of the carrier roll will, of course, be attached to the opposite wall **11** of the receptacle in like manner.

As will now be apparent, the passage of a length of gummed tape through my moistening device will result in the complete and positive moistening of the tape gumming and the elimination of failure due to faulty adhesion that can be attributed to faulty moistening. The moistening device is a relatively simple one both to operate and maintain and once started is fully automatic in its operation in the sense that it needs no attention other than the maintenance of the proper water level in the reservoir. As already indicated, this can be accomplished by means of a constant flow of moistening liquid into the receptacle and an overflow to draw off any excess liquid and return it to the source of supply.

Modifications may, of course, be made in my invention without departing from the spirit of it. Having described my invention in an exemplary embodiment, what I claim as new and desire to secure by Letters Patent is:

In combination in a tape moistening device for moistening continuous lengths of gummed tape at high speeds in an even and uninterrupted manner without permitting the gumming to become streaked or puddled, a liquid receptacle, a primary moistening means mounted in said receptacle comprising a roll applicator adapted to be rotated by the movement of the tape over said roll, a lead-in roll for positioning the tape prior to its passage over the roll applicator, a lead-out roll on the other side of said roll applicator, said lead-in and lead-out rolls being positioned beneath the upper surface of said applicator roll so as to cause the tape to be tensioned over said applicator roll, a secondary moistening means comprising a brush applicator mounted in said receptacle ahead of said lead-out roll and adapted to be contacted by the tape as it passes beyond said lead-out roll so as to evenly distribute the moistening liquid applied to the tape by the applicator roll, said secondary moistening means including a brush holder pivotally connected to said receptacle, and counter-balancing means for causing said brush applicator to be normally pivoted to a position in which it contacts the under surface of the tape, said counter-balancing means acting to maintain said brush applicator in contact with the tape under predetermined pressure, a carrier roll beyond said brush applicator for receiving the moistened tape as it passes over said brush applicator, said carrier roll being positioned relative to said lead-out roll so as to position the tape in substantially planar condition for contact by said brush applicator, said carrier roll comprising a grooved roll in which the contacting surfaces of the roll are reduced to a minimum.

PAUL W. HERRLINGER.

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