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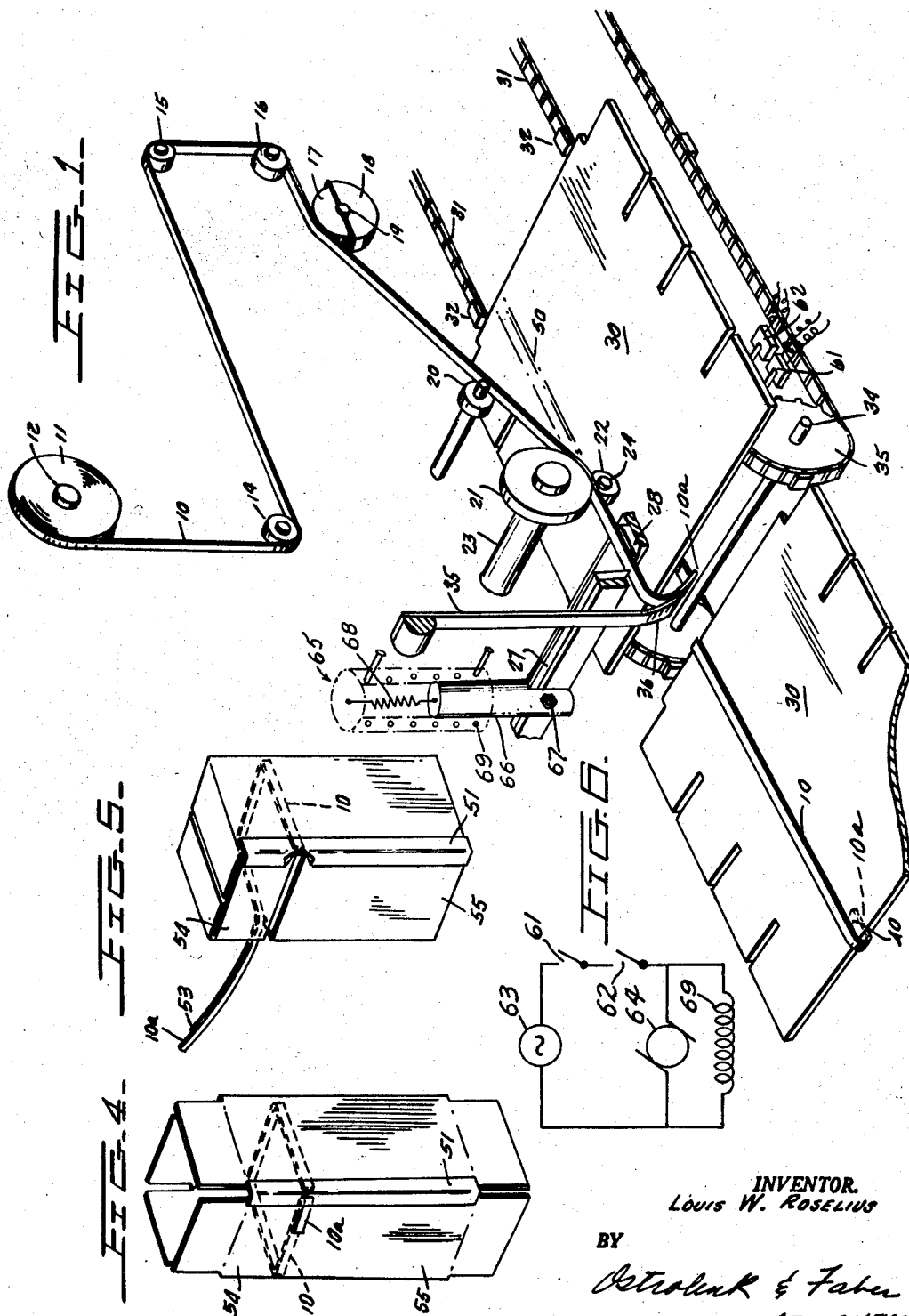
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TAPING MACHINE

Filed May 24, 1954

2 Sheets-Sheet 1



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1

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TAPING MACHINE

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5 Claims. (Cl. 93—1)

My present invention relates to a method for applying a tear-off tape to a box blank and more particularly to a method for utilizing a modification of a taping machine of the type shown in Patents No. 2,248,744 and 2,467,275 in order to apply an opening or tear-off tape in such manner as to permit the simplified opening of the box.

Heretofore in the manufacture and sale of shipping cartons, particularly corrugated board cartons, it has been customary to make a tubular box blank and pass the tubular box through a taping machine with the two outer panels folded flat in face to face relation with the other two panels of the box and with the edges abutting. Tape was then applied to the folded box blank which was then shipped flat.

At the point of use, the box was erected by unfolding the same into proper lateral form, closing the flaps at one end, filling the box and then closing the flaps at the other end.

The opening of the box thereafter required either a cutting of the walls of the corrugated box or a cutting or tearing of the sealing members.

More recently, regulations established by various interstate and intrastate regulatory bodies have been changed to permit a weakening of a portion of the inside of the box wall in order to facilitate separation of one portion of the box from another in order to permit opening of the box.

In the case of boxes made of corrugated board, one form of such weakening is the scoring or cutting of one of the outer liners of the corrugated board to provide a weakening or tear line. In order to make use of this weakening or tear line, it is desirable to place a strong tape or cord along the tear line appropriately secured to the box with one end of the tape or cord accessible for manipulation. Pulling on the accessible end of the tape or cord will cause the said tape or cord to tear through the box blank at the cut portion and thereby separate one section of a box blank from the other.

My invention is directed specifically to a simplified and economical method for applying a tape to the box in an area at which the separation of portions of the box blank is to occur.

Accordingly, it becomes necessary in the device and method contemplated by my invention to apply the tape so that it extends along one side, preferably the interior, of the box blank and is anchored thereto; an end of the tape must, however, project beyond the box blank to the exterior so that it may readily be grasped and pulled to effect the separation above described.

More specifically, my invention contemplates taking the open box blank after it has been appropriately scored or weakened along the tear or separation line, applying the tape along the tear or separation line on the surface of the blank which is to form the interior of the box and bending a portion of the tape beyond the edge of the blank so that it extends on the side of the blank which is to form the exterior of the box.

2

Thereafter when a box is taped or otherwise secured together in tubular form, the original tear or tape will extend around the interior of the box blank with the portion thereof to be accessible for grasping extending through the same to the exterior of the box where it may be grasped and taped through the edge of the box and along the predetermined weakening or tear line should one be provided.

Accordingly, the primary object of my invention is the provision of a method and mechanism for applying a tear-off tape to a box blank in such manner that the main portion of the tape will extend along one surface of the box blank while a part of the tape will extend beyond the edge of the box blank and be accessible from the exterior side of the box when the blank is formed into a box.

The foregoing and many other objects of my invention will become apparent in the following description and drawings in which:

Figure 1 is a schematic view in perspective of the tear-off tape applying apparatus of my invention.

Figure 2 is a schematic side view of the tear-off tape applying mechanism showing the position of the blank and the tape immediately before the initiation of the tape applying operation.

Figure 3 is a view corresponding to that of Figure 2 showing the tear-off tape applying step immediately following the step of Figure 2.

Figure 4 is a view in perspective of a box blank with the tear-off tape applied and the box completing tape also applied thereto.

Figure 5 is a view in perspective of a closed box with the tear-off tape in use.

Figure 6 is a circuit diagram showing the electrical operation of the target switches.

Referring first to Figures 1, 2, and 3, my novel tape applying apparatus utilizes essentially the operative elements described in the taping machine shown in Patents No. 2,248,744 and 2,467,275, assigned to the assignee of the present invention.

Essentially, the tear-off tape 10 is a pre-gummed tape which is taken from a supply roll 11 mounted on an appropriate spindle 12. The pre-gummed tape 10 in dry form is then led over the guide rollers 14, 15, 16 to the moisture applicator roll 17 which rotates in the moisture container 18 on the spindle 19.

The now moistened tape is led past the guide roll 20 and delivered by the feed rolls 21 and 22 operating on their respective shafts 23 and 24 to the applying position. A cut-off knife 27 operating against an appropriate blade 28 is provided to cut the tape 10 to appropriate lengths as determined by the operation of the mechanism.

In operation, an opened blank 30, perforated or weakened along the lines 50, is fed by appropriate feed means including the feed chain 31 and feed slat 32 toward the tape applying position. The chain 31 is driven in any suitable manner by drive means which may be connected to the shaft 34 of sprocket 35.

In the ordinary operation of my invention, the free end of the tape 10 extending from the supply roll 11 terminates exactly at the knife 27 owing to the fact that the previous length of tape was cut off at that point. When the blank 30 is moved along the predetermined path by the slat 32 on chain 31, it strikes a target 61 which initiates the tape feeding operation by driving the rolls 21 and 22 to feed the tape past the now opened or separated knife members 27, 28.

The target is so positioned that the free end of the tape 10 will start to move out before the blank reaches the tape applying position and hence the free end 10a of the tape will be driven against the stationary spring

3

guide member 35. The stationary spring guide member 35 is bent or shaped at 36 to deflect the free end 10a of the tape downwardly and past the leading edge 40 of the blank 30. The leading edge 40 of the blank when it strikes the end 36 of the spring guide 35 causes the section 10b of the tape to adhere to the said leading edge owing to the pressure between the moving leading edge 40 of the blank and the section 36 of the spring guide 35.

Thereafter on continued movement of the blank 30, the tape 10 is pressed down as shown in Figure 3 on the upper side of the blank 30 which happens to be the inner side of the box to be formed. As the leading edge 40 of the blank now enters between the delivery belts 45 and 46 driven, respectively, by rollers 47 and 48, the free end 10a of the tape is pressed down on the underside of the box blank 30 while the remainder of the tape is pressed down on the upper side of the box blank 30 along weakened or perforated line 50 of the blank. When the leading end of the blank is actually caught under pressure between the moving belts 45 and 46, further operation of the feed rolls 21 and 22 is no longer necessary since the blank will now by continued movement draw out the tape.

For this purpose, the rolls 21 and 22 move an over-running clutch construction therein to permit free rotation of the rolls 21 and 22 faster than the feeding operation.

At the completion of the drawing out of the tape to the desired length, an appropriate target 62 operated by the trailing edge of the box blank will operate the cutting mechanism to bring the blade members 27 and 28 together to cut off the tape and the belts 45 and 46 will serve to secure the tape in position. Referring to Figures 1 and 6, target switches 61 and 62 are single pole switches having contacts that are biased open. As the blank 30 is fed from right to left, its leading edge first strikes target switch 62 closing its contacts. A short time later the leading edge of the blank 30 strikes target switch 61 and closes its contacts. Since both switches 61 and 62 are now closed, the power means 64 for the tape drive rollers 21 and 22 and the winding 69 of cutter solenoid 65 are now connected to a source of electrical energy 63. The plunger 66 of the cutter solenoid 65 is affixed to cutter 27 by means of bolt 67, with a compression spring 68 biasing the plunger and cutter 27 downward.

When both switches 61 and 62 are closed, blade member 27 is raised by plunger 66 of solenoid 65 which is now energized. This also permits the power means 64 to drive rollers 21 and 22 which then feeds tape 10 past blades 27 and 28. The tape 10 continues to be fed until the trailing edge of the blank 30 passes over switch 62 and permits its contacts to open, thus breaking the circuit to power means 64 and solenoid 65. Plunger 66 is now moved downward by spring 68 so that cutter 27 may cut the tape 10 and feed rollers 21 and 22 stop feeding tape 10.

All of the tape applying elements, the target elements, the cut-off elements and the means operable in response to movement of the box blank 30 have been described in detail in Patents No. 2,248,744 and 2,467,275.

The primary distinction of the present invention over the taping machines shown in the said prior patents is the utilization of the spring guide member 35 and the positioning of the targets in such a way as to permit the tape to be fed out so that it may be overlapped or folded over the leading edge of the box blank and also the positioning of the cut-off target so that the tape will be cut off at the exact end of the box blank.

Heretofore in taping machines, in order to prevent taping of the flaps, the target which initiated the feeding of the tape for taping of the box blank into a tubular form caused the tape to engage the box blank substantially behind its leading edge and caused the tape to be cut

4

off so that the end of its application would be substantially before the trailing edge.

The present invention, however, requires the positioning of the operating targets so that they will permit the machine to perform the operation of causing the leading edge of the tape to overlap the leading edge of the box blank and the trailing edge of the tape to coincide with the trailing edge of the box blank.

By this means as shown, the leading edge 10a of the tear-off tape 10 is applied around the leading edge 40 of the box blank, while the remainder of the tape coincides with the desired tear-off line indicated by the dashed lines 50 of Figure 1.

After the tear-off tape 10 has thus been applied, the box blank is rotated 90°, folded, and passed through a taping machine of the type described in the above-mentioned patents, which taping machine utilizing substantially the same elements already described, except for the spring guide member 35, applies the tape 51 thereto so that the box may be erected in tubular form as shown in Figure 4.

The box as shown in Figure 4 is folded up with the tape 10 on the inside so that when the tape 51 is applied, the overlapped section 10a of the tear-off tape appears on the outside of the box. Thereafter when the box is closed and sealed and it is desired to open the same, section 10a of the tape is pulled manually as shown in Figure 5, tearing out the exterior strip 53 of the box overlying the tape 10; and a complete pulling out of the tape in this manner results in separation of top section 54 of the closed box from section 55.

As will be seen from the foregoing, my invention does not contemplate an entirely new taping machine but is directed to a modification of a standard taping machine so that it may be utilized to apply the kind of tear-off tape herein set forth.

Accordingly, my invention is directed primarily to the spring guide member 35 which causes the end 10a of the tape to overlap the leading edge 40 of the blank and to the spacing of the tape feeding and cut-off targets in order to achieve this operation.

In the foregoing the invention has been described solely in connection with specific illustrative embodiments thereof. Since many variations and modifications of the invention will now be obvious to those skilled in the art, I prefer to be bound not by the specific disclosures herein contained but only by the appended claims.

I claim:

1. In a machine of the class described, means for moving a box blank edgewise past a tape applying station, a moist tape feed mechanism, a yieldable tape guide at said station for guiding tape against an edge and one surface of said blank and extending in the path of said box blank and disposed to guide tape into said path and to be pushed out of said path by said edge due to the motion of said blank, means disposed to be triggered by said edge for actuating said tape feeding mechanism so as to feed tape against said guide prior to force being exerted thereagainst by said edge, wherein a portion of said tape is disposed intermediate said guide and said edge and wherein said tape is fed at a rate so as to have a predetermined length of free end thereof extending beyond the plane of said box blank to effect a foldable tab, continued motion of said box blank in said path pressing said tape against said guide effecting adherence of said tape to said edge and subsequently effecting yielding movement of said guide out of the path of motion of said blank.

2. In a device as set forth in claim 1, said guide being of flexible material and disposed so as to be flexed in the direction of motion of said blank by continued movement of said blank and serving to exert pressure on said tape during said motion of said blank to effect engagement of said tape with said blank.

3. In a device as set forth in claim 1, including a tape cut-off means disposed upstream of said guide, and means

5

operable by a trailing edge of said blank to actuate said cut-off means at a predetermined time prior to arrival of said trailing edge at said cut-off means so as to foreshorten said tape with respect to the length of said blank in the direction of motion thereof.

4. In a device as set forth in claim 1, said guide being of flexible material and disposed so as to be flexed in the direction of motion of said blank by continued movement of said blank and serving to exert pressure on said tape during said motion of said blank to effect engagement of said tape with said blank, including a tape cut-off means disposed upstream of said guide and means operable by a trailing edge of said blank to actuate said cut-off means at a predetermined time prior to arrival of said trailing edge at said cut-off means so as to foreshorten said tape

5

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with respect to the length of said blank in the direction of motion thereof.

5. In a device as set forth in claim 1, including means downstream of said guide for effecting folding of said tab against an adjacent surface of said blank and effecting pressure on the tape applied to the opposite surface subsequent to engagement effected between said tape and said latter surface by said guide.

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