Sept. 30, 1958 L. TRIOLO 2,854,164

TAPE APPLYING MACHINE

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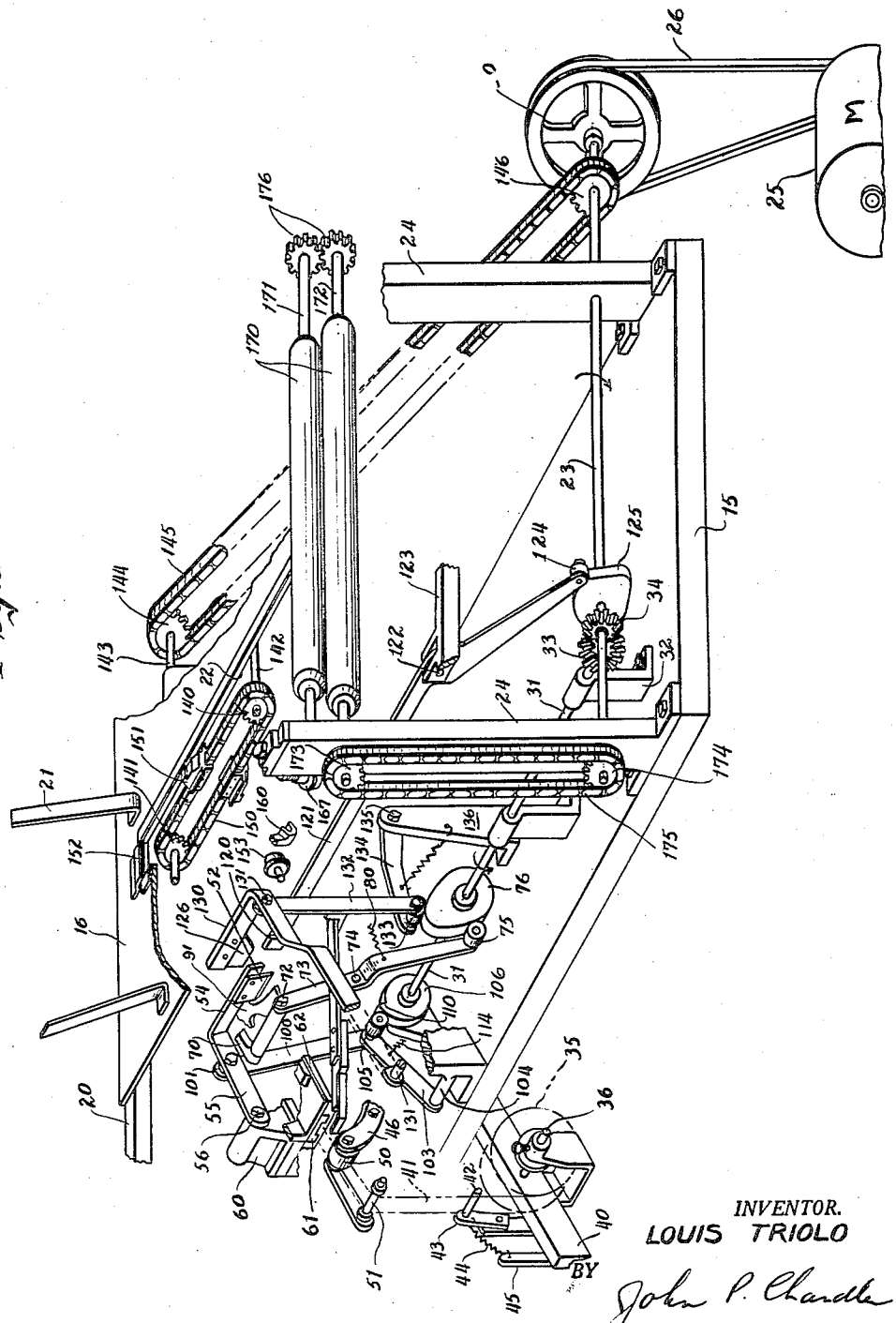


Fig. 1

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Fig. 2

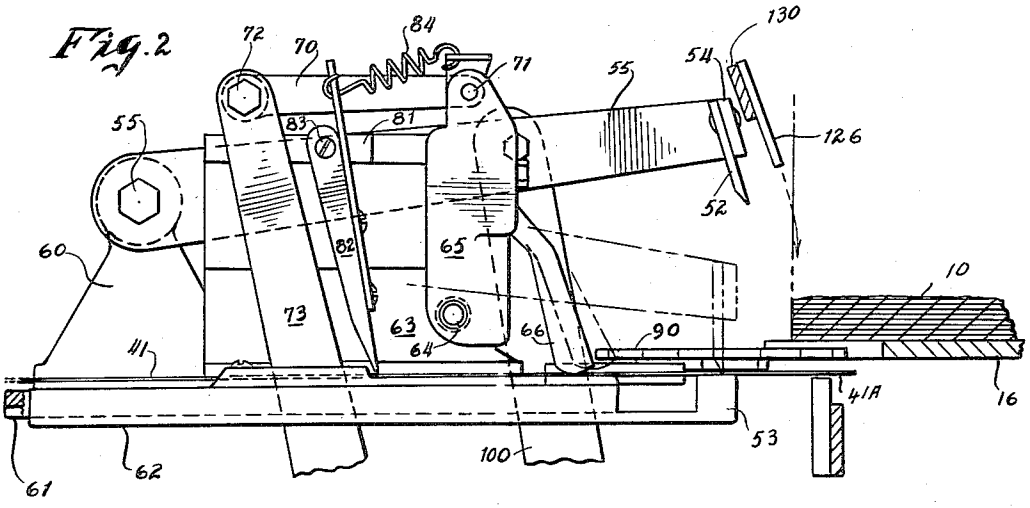
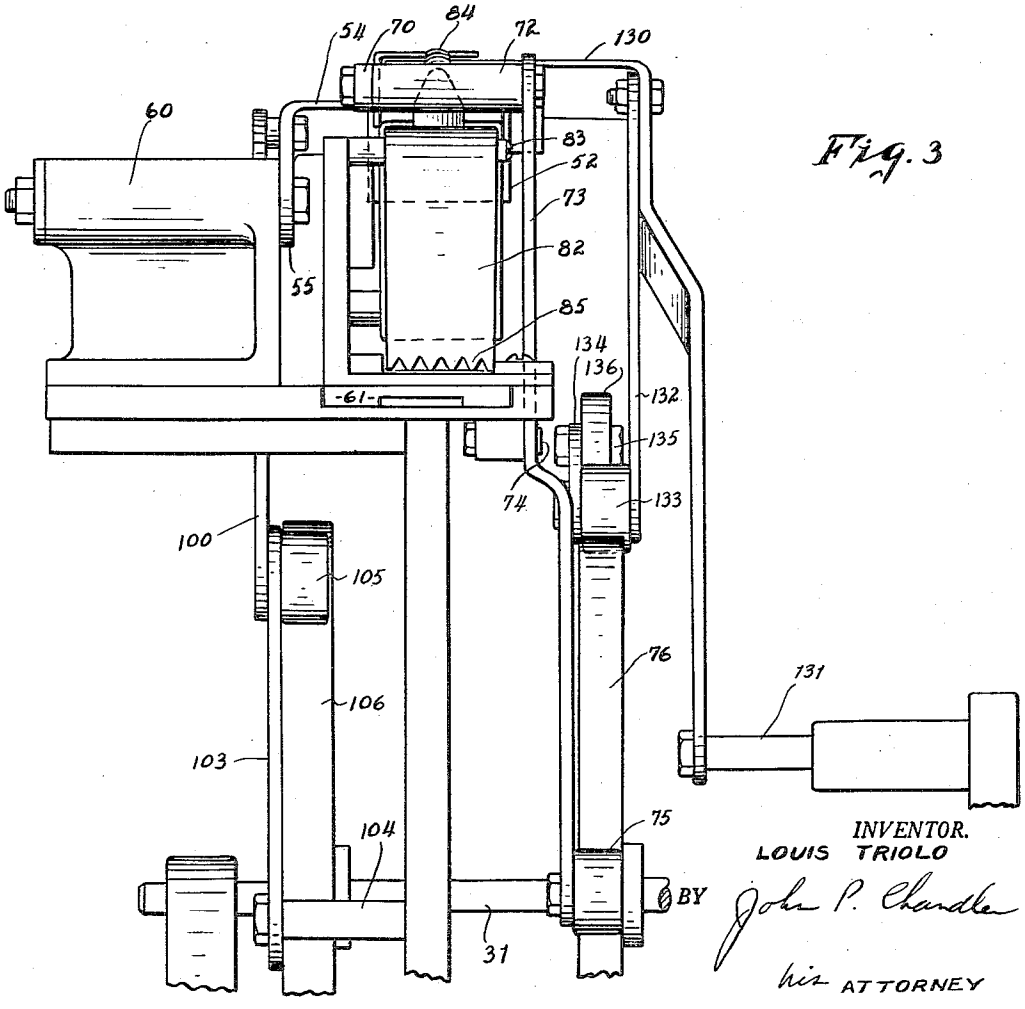


Fig. 3



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Fig. 4

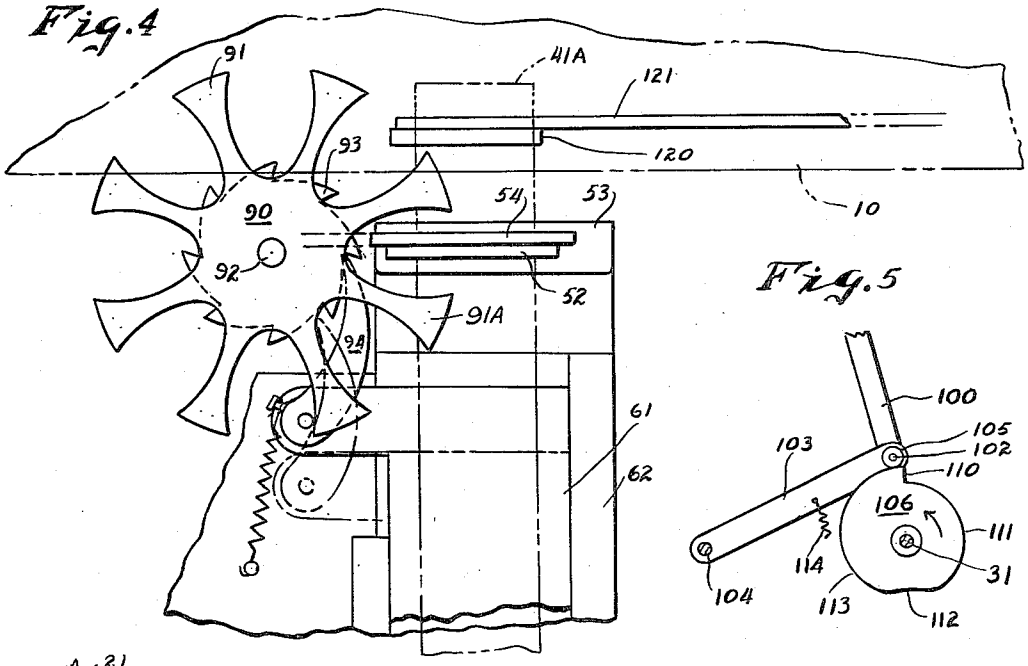


Fig. 5

Fig. 6

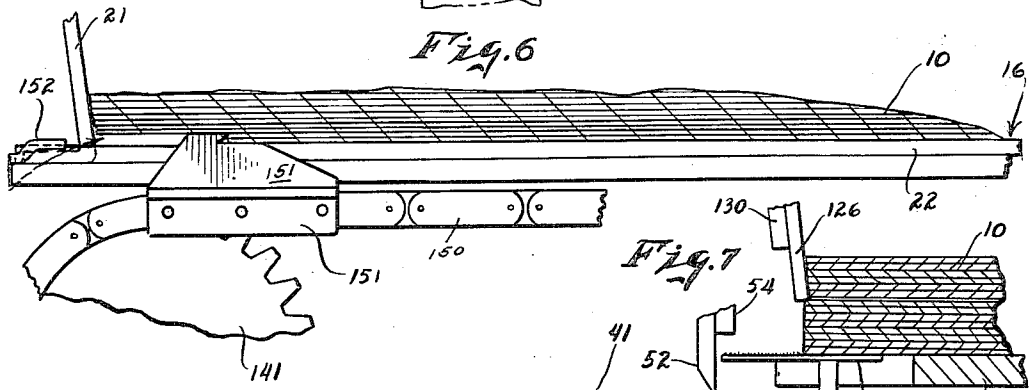
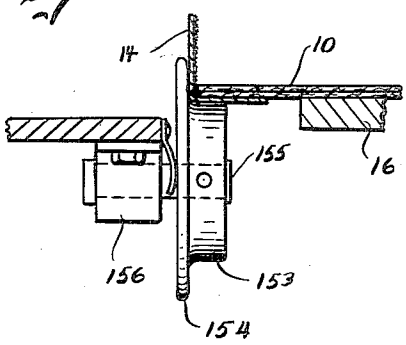


Fig. 7

Fig. 8



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Fig. 9

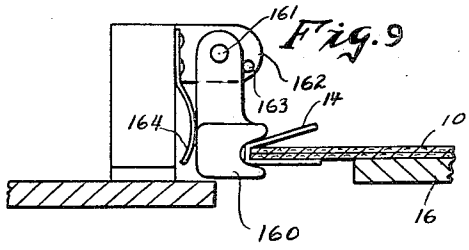


Fig. 11

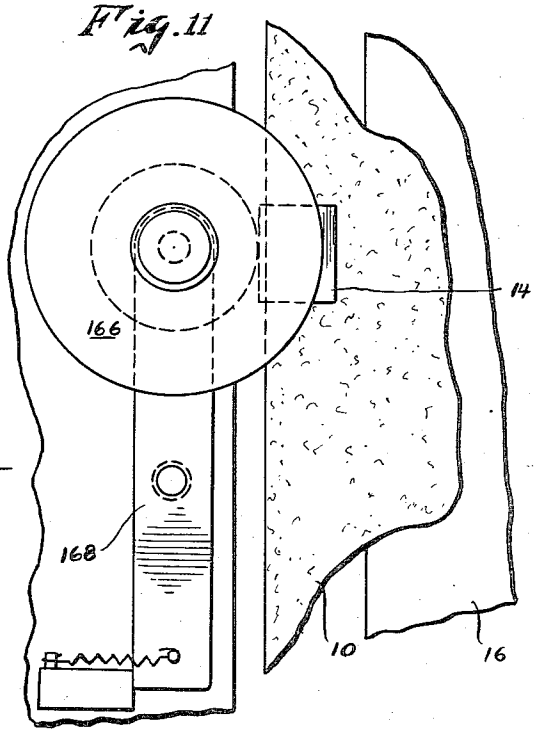
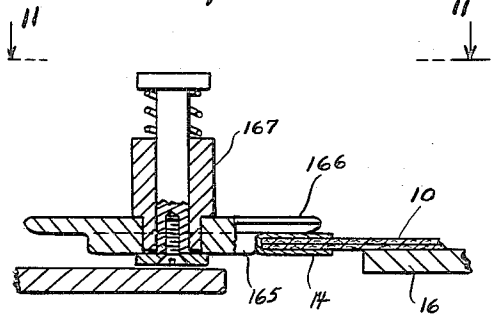


Fig. 10



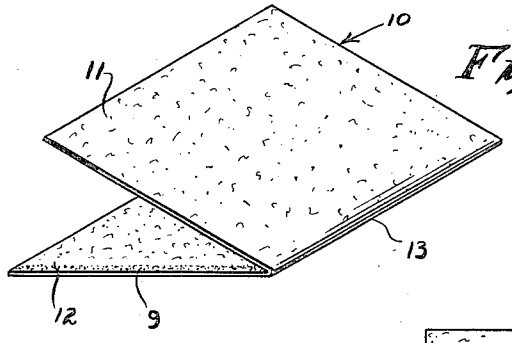
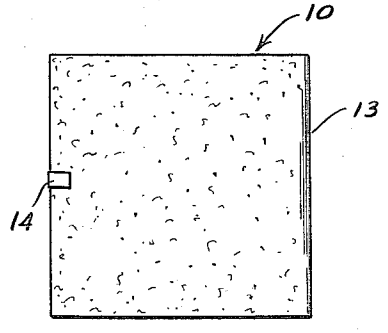


Fig. 12

Fig. 13



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2,854,164

TAPE APPLYING MACHINE

Louis Triolo, Brooklyn, N. Y.

Application June 5, 1957, Serial No. 663,741

9 Claims. (Cl. 216—29)

This invention relates to a high speed machine for applying short lengths or tabs of tape having a coating of pressure sensitive adhesive thereon to box blanks or other articles. It relates more particularly to an automatic machine for performing one operation on a phonograph record envelope, the operation consisting in applying an adhesive tab to the two free edges of a folder to prepare that component of a record envelope before the labels are adhesively applied to both outside faces.

The application of pressure sensitive tape by high speed machinery has presented special problems in the box making art, primarily because the behavior of the adhesive is wholly different from that of glue which is freshly applied to a paper blank or binding strip. The glue does not cause permanent adhesion until the parts are pressed tightly together whereas the moment the pressure sensitive tape contacts a surface, even a moving one, the adhesion is partially or completely assured. Another problem resides in the fact that the tension required to unroll the tape from the roll is not uniform and the tape feeding device must be equally positive whether a section of the tape unrolls easily or with greater difficulty.

An important object of the present invention is to provide an improved tape feeding and cutting assembly which will insure constant feeding at high speeds and will also provide supplemental feeding means for the leading end of the tape to insure its being positioned adjacent the word to which it is to be applied.

Another object of the invention is to provide an improved holding arrangement for the forward end of the tape when the reciprocating feeder returns to start a new feeding cycle.

A further object of the invention is to provide an automatic machine which feeds the severed tab to one face of the work, wraps the free end around the opposite face and then presses it in permanent adhesion with both faces and finally discharges the finished work.

The use of normally tacky, pressure sensitive tape in the box and envelope making arts is rapidly increasing, primarily because the tape has a tensile strength many times that of paper tabs and also because it has a measure of elasticity enabling the container to withstand shocks without breaking the tab. As the speed of the machine applying operation increases the problems of severing the tab and delivering the severed tab to applying position multiply and most machines of this character find their moving parts become fouled with the sticky tabs if the speed exceeds a relatively low number per minute.

An important object of the present invention is to provide a machine of this character whose speed of operation is virtually limited only by the speed at which the blanks to which the tab has been applied can get out of the way for the next operation.

In the drawings:

Fig. 1 is a broken perspective view showing the principal operating parts of the machine of the present invention.

Fig. 2 is a broken side elevation of the feeding and cutting assembly.

Fig. 3 is a front elevation looking to the right of the assembly shown in Fig. 2.

Fig. 4 is a broken plan view showing the slide, the tape cutter and cooperating anvil and the star-wheel feed assembly.

Fig. 5 is a front elevation of the cam for operating the tape cutter.

Fig. 6 is a broken side elevation of the platen for the blanks and showing the conveyor system.

Fig. 7 is a broken section showing the cutter and the adhesive tab cut from the tape at the moment of application to the lower face of the folder.

Fig. 8 shows the means for turning up the free end of the tab prior to application to the upper face of the folder.

Fig. 9 shows the tab folded over but not pressed.

Fig. 10 shows the means for pressing the tab.

Fig. 11 is a broken plan view showing the pressing assembly.

Fig. 12 is a perspective view of the folder in partially open position.

Fig. 13 is a plan view of the folder with the tab applied thereto as completed by the machine of the present invention.

Figs. 12 and 13 show the blank 10 which is operated on by the machine of the present invention. It is a square folder having upper and lower walls 11 and 12 joined by a hinge line 13. The two free edges opposite the hinge line are joined by a short length of pressure sensitive tape 14 which overlies the outer faces of these upper and lower walls. One of the remaining edges may have an internal glue line 9.

The machine of the present invention is supported by framework mounted on a rigid base 15. The folders 10 are mounted in superimposed relation on a platen 16 supported on a frame member 20 above the base. Guide plates 21 retain the stack in vertical alignment. The platen is formed with a central longitudinal slot 22 and after the adhesive tab is initially applied to lower wall 12 of the folder in the manner hereinafter described a conveyor system moves the folder through a folding and creasing station which folds the free end of the tab upwardly and over the top of the upper wall, then presses it down firmly, and finally discharging the finished folder shown in Fig. 13.

The moving parts are actuated by a first cam shaft 23 journalled in upstanding frame members 24. A motor 25 drives a belt 26 which drives a pulley 30 keyed to this cam shaft. A second cam shaft 31 is journalled in bearings 32 and a beveled gear 33 keyed to shaft 31 is driven by a beveled gear 34 keyed to shaft 23.

A supply roll 35 of the pressure sensitive tape is mounted for free rotation on a spindle 36 mounted on a frame member 40. The pressure sensitive tape sometimes unwinds erratically and some of the shock is absorbed by means of a finger 42 mounted on a pivoted lever 43. A spring 44 connected with a fixed arm 45 urges the lever to the left when viewed as in Fig. 1. The tape travels to the left of finger 42.

A fixed frame member 46 supports an idler roller 50 over which the tape passes after it travels over a fixed pin 51. Cutting of the tape is effected by a knife 52 which strikes a fixed anvil 53. The knife is mounted on leg 54 of and L-shaped knife arm 55 pivoted at 56 on a fixed frame member 60.

Means for feeding the tape include a slide 61 mounted in a fixed trackway 62. Suitable spring tensioning means (not shown) retain the slide down firmly against the trackway. A vertical plate 63, which may be formed as an angle bar, is secured to the upper face of the slide

and provides a pivotal support as 64 for a drive pawl 65 which carries a blade 66 which contacts the tape and it is the forward movement of this blade, acting with a wedging action, which advances the slide, carrying with it the tape. A link 70 is connected at one end 71 with the upper end of drive pawl 65 and at the other end with a cross pin 72 carried at the upper end of a lever 73 centrally pivoted on the frame at 74. At its lower end lever 73 has a roller 75 which engages a cam 76 keyed to cam shaft 31. Thus the constantly rotating cam shaft imparts forward motion to lever 73 and a spring 80 returns it. On this return stroke the rear face of the drive pawl engages a fixed stop 81 on plate 63 and returns the slide to starting position. During this return movement of the slide the blade 66 is above and therefore not in contact with the tape but the tape is engaged by a finger 82 pivoted at 83 on the plate and it is urged clockwise by a spring 84. The lower edge of this finger is serrated as shown at 85 (Fig. 3). During this rearward travel of the slide the leading end of the tape is secured against rearward travel due to the fact that the cutter is down and holds the tape firmly against the anvil. For the sake of clarity it may be mentioned at this point that for every cycle of operation of the slide (forward and then rearward travel) the knife descends twice. On its first movement it descends slowly and merely pins the tape to the anvil and holds it there during rearward travel of the slide, as just described. When the slide again moves forwardly the knife ascends, freeing the tape for forward travel by the means about to be described, and thereafter the knife descends a second time with a quick chopping action, severing the tab from the web.

The slide assembly feeds the tape web as a whole and a second feeding means assure the leading end of the tape being fed to folder applying position just prior to the tab being severed from the web. This latter means (Fig. 4) comprise a generally star shaped wheel 90 having spaced radial fingers 91 which overlay the tape. This star wheel is mounted on a vertical shaft 92 journalled in the frame. Also keyed to this shaft is a ratchet wheel having as many teeth 93 as the star wheel has fingers. This ratchet wheel is intermittently driven by a pawl 94 carried by the slide. The anvil 53, previously referred to, is carried at the forward end of fixed trackway 62. When the knife ascends, relatively slowly, following its first descent, the adhesive tape adheres to it and the tape is drawn upwardly into adhesive contact with the lower face of one of the radial fingers 91. During the next forward travel of the reciprocating slide the star wheel is turned one increment and this adhesion between tape and finger, while of a low order, is nevertheless sufficient to advance the tape outwardly to the position shown at 41A in Fig. 4.

The knife arm 55 is driven by a lever 100 pivoted to the latter at 101. At its lower end (Fig. 5) lever 100 is pivoted at 102 to a second lever 103 pivoted at 104 on the frame. A roller 105 engages a cam 106 keyed to cam shaft 31. A sharp decline 110 produces the cutting blow at the end of the feeding cycle and the roller then rides up a gradual lifting surface 111 and then descends in valley 112 during the tape holding operation. A second lifting surface 113 raises the roller in preparation for the cutting blow. A spring 114 urges the roller into contact with the cam.

It will be clear from the foregoing that each time the slide advances, the blade 66 is in contact with the tape, i. e., the full line position of Fig. 2, and the tape is thus pinned or wedged between the blade and the slide so that as the slide and blade advance, the tape is carried with it. When operation of the machine first commences the first forward travel of the slide advances the leading edge of the tape to a position just to the right of knife 52 (Fig. 2) and this leading section of the tape is pinned to the anvil by the knife during rearward travel of the slide preparatory to the next forward cycle.

The knife now ascends relatively slowly and draws the forward section of the tape upwardly into adhesive contact with the finger of the star wheel located just to the rear of the knife, i. e., that shown at 91A in Fig. 4. The tape is now fed forwardly a second time by the slide and this time the leading edge of the tape is advanced to the position of 41A by the star wheel finger 91A. The knife now descends for its second or chopping blow and severs the tab from the strip of tape.

The foregoing structure constitutes the first phase of the present invention insofar as it relates to the feeding and cutting of the tape.

It will be noted from Fig. 11 that the left margin of the folder extends beyond the edge of the platen. The tab is pressed initially against the lower face of folder 10 by a presser block 120 mounted at the outer end of bell crank lever 121, pivoted at 122 on frame 123. The opposite arm of the lever has a roller 124 which engages a cam 125 fast on cam shaft 23.

This pushing up of the folders is immediately counteracted by a down pusher 126 mounted at one end of an L shaped arm 130 pivoted at 131 on the frame. This arm is operated by a lever 132 having a roller 133 at its lower end, the roller being mounted at the outer end of an arm 134 pivoted at 135 on frame 136.

The conveyor system includes two sprockets 140—141 fast on shafts 142—143, the latter being driven by sprocket 144 fast on shaft 143. A chain 145 connects the latter with a sprocket 146 fast on shaft 23. A conveyor chain 150 has two notched pushers 151. A guard plate 152 is secured at the entrance end of platen slot 22 in which the pushers travel.

Leaving the tab applying station the free edge of the folder 10 (Fig. 8) with tab 14 extending outwardly therefrom first encounters a roller 153 having a folding flange 154 which folds the tab upwardly. This roller is mounted on shaft 155 mounted in bearing 156. Next the edge encounters a substantially C shaped folding block 160 pivoted at 161 on bracket 162. A stop 163 limits outward travel caused by spring 164. The folder then encounters a creasing roller 165 having flange 166 and suitably spring mounted at 167 on pivoted arm 168.

Finally, the folder is delivered to upper and lower friction rollers 170 on shafts 171–172 journalled in frames 24. The latter shaft is driven by sprockets 173–174 and chain 175. Gears 176 impart conjoint rotation to shafts 171–172.

While there have been described herein what are at present considered preferred embodiments of the invention, it will be obvious to those skilled in the art that many modifications and changes may be made therein without departing from the essence of the invention. It is therefore to be understood that the exemplary embodiments are illustrative and not restrictive of the invention, the scope of which is defined in the appended claims, and that all modifications that come within the meaning and range of equivalency of the claims are intended to be included therein.

What I claim is:

1. Means for applying a tab of tacky pressure sensitive tape to a workpiece and comprising a frame, a slide mounted for reciprocating movement on the frame, means for supporting a supply of the tape with its leading edge on the slide adhesive face up, a forwardly movable blade above the slide which contacts the tape and advances the tape and slide, a cutting knife movable on the frame and means for lowering the knife twice during each cycle of operation, a first time to contact and hold the tape against the frame during rearward travel of the slide and a second time with a quick chopping blow to cut the tab from the tape, and means for advancing the cut tab to work applying position, said means comprising a movable member overlying the tape, the knife drawing the tape upwardly into light adhesive contact with said movable member on its first ascent, means for imparting intermittent forward movement to the member.

2. An apparatus for applying a tab of tacky pressure sensitive tape to a work piece and comprising a frame, a slide mounted for reciprocating movement on the frame, means for supporting a supply of the tape with its leading edge on the slide adhesive face up, a forwardly movable pivoted blade which contacts the tape on the slide with a wedging action and advances both, a cutting knife pivoted on the frame and means for lowering the knife twice during each cycle of operation, a first time to contact and hold the tape against the frame during rearward travel of the slide and a second time with a quick chopping blow to cut the tab from the tape, and means for advancing the cut tab to applying position, said means comprising a member with radial fingers overlying the tape, the knife drawing the tape upwardly into adhesive contact with one finger on its first ascent, and means on the slide for contacting and imparting intermittent rotation to the member.

3. An automatic machine for applying a tab of tacky pressure sensitive tape to a work piece and comprising a frame, a slide mounted for reciprocating movement on the frame, means for supporting a supply of the tape with its leading edge of the slide adhesive face up, a forwardly movable pivoted blade which contacts the tape on the slide and advances both, a cutting knife pivoted on the frame and means for lowering the knife twice during each cycle of operation, a first time to contact and hold the tape against the frame during rearward travel of the slide while the blade moves in an idling motion over the tape, and a second time with a quick chopping blow to cut the tab from the tape, and means for advancing the cut tab to tape applying position under the work piece, said means comprising a wheel with radial fingers overlying the tape, the knife drawing the tape upwardly into adhesive contact with one finger on its first ascent, means for imparting intermittent rotation to the wheel, and a driven cam shaft provided with a plurality of cams for driving the moving parts of the machine in timed sequence.

4. An automatic machine for applying a tab of tacky pressure sensitive tape to a blank and comprising a frame, a slide mounted for reciprocating movement on the frame, means for supporting a roll of the tape with its leading edge on the slide adhesive face up, a forwardly movable pivoted blade which contacts the tape on the slide with a wedging action and advances both, a cutting knife pivoted on the frame, and means for lowering the knife twice during each cycle of operation, a first time to contact and hold the tape against the frame during rearward travel of the slide and a second time with a quick chopping blow to cut the tab from the roll, and means for advancing the cut tab to tape applying position, said means comprising a rotary member with radial fingers overlying the tape, the knife drawing the tape upwardly into light adhesive contact with one finger on its first ascent, forward movement of the slide imparting intermittent rotation to the finger, and a driven cam shaft provided with a plurality of cams for driving the moving parts of the machine in timed sequence.

5. An automatic machine for applying a tab of tacky pressure sensitive tape to a blank and comprising a frame, means for supporting the work piece on the frame in superimposed relation, a slide mounted for reciprocating movement on the frame, means for supporting a roll of the tape with its leading edge on the slide adhesive face up, a pivoted blade above the slide which is forwardly movable generally parallel therewith which contacts the tape on the slide with a wedging action and advances both, a cutting knife pivoted on the frame and means for lowering the knife twice during each cycle of operation, a first time to contact and hold the tape against the frame during rearward travel of the slide while the blade idles over the tape and a second time with a quick chopping blow to cut the tab from the roll, and means for advancing the leading edge of the cut tab to

applying position, said means comprising a wheel with radial fingers overlying the tape, the knife drawing the tape upwardly into adhesive contact with one finger on its first ascent, means for imparting intermittent rotation to the wheel, a conveyor for removing the lower blank, and a driven cam shaft provided with a plurality of cams for driving the moving parts of the machine in timed sequence.

6. A machine for applying a tab of normally tacky, pressure sensitive adhesive tape to a work piece, said machine comprising a frame, means on the frame for supporting a roll of the tape with its leading edge extending towards the work piece, means for advancing the tape, a cutting knife pivotally mounted on the frame and means for lowering the knife two times during each cycle of operation, a first time to contact and hold the tape against the frame, and a second time with a chopping blow to sever a tab from the roll, means for advancing the leading tape section to applying position comprising a wheel with a plurality of radial fingers overlying the tape, the knife drawing said tape section upwardly into adhesive contact with one finger on its first ascent, means for imparting step-by-step rotation to the wheel to advance the tab to the work piece.

7. An automatic machine for applying a tab of normally tacky, pressure sensitive adhesive tape to upper and lower faces of a blank, said machine comprising a frame, a slide mounted for reciprocating movement on the frame, means for supporting a roll of the tape with its leading edge on the slide, a forwardly movable member which contacts the tape on the slide and advances said tape and slide, a cutting knife pivotally mounted on the frame and means for lowering the knife two times during each cycle of operation, a first time to contact and hold the tape against the frame during rearward travel of the slide, and a second time with a chopping blow to sever the length from the roll.

8. An automatic machine for applying a tab of normally tacky, pressure sensitive adhesive tape to upper and lower faces of a blank, said machine comprising a frame, a slide mounted for reciprocating movement on the frame, means for supporting a roll of the tape with its leading edge on the slide, a forwardly movable blade which contacts the tape on the slide and advances said tape and slide, a cutting knife pivotally mounted on the frame and means for lowering the knife two times during each cycle of operation, a first time to contact and hold the tape against the frame during rearward travel of the slide, and a second time with a chopping blow to sever the length from the roll, means for advancing the leading tape section to applying position comprising a wheel with a plurality of radial fingers overlying the tape, the knife drawing said tape section upwardly into adhesive contact with one finger on its first ascent, means for imparting step-by-step rotation to the wheel, a platen supporting the blanks with one edge of the lowermost blank in position to be engaged by said leading edge of the tape, a presser block for effecting initial adhesion of the tape length, a folding roller for folding the tab upwardly, a recessed folding block for folding the tab around the blank, a conveyor for moving the blank from tape applying position to the rollers, and a driver cam shaft provided with a plurality of cams for driving the moving parts in timed sequence.

9. An automatic machine for applying a tab of normally tacky, pressure sensitive adhesive tape to upper and lower faces of a work piece, said machine comprising a frame, a slide mounted for reciprocating movement on the frame, means for supporting a supply of the tape with its leading edge on the slide, a forwardly movable blade which contacts the tape on the slide and advances said tape and slide, a cutting knife pivotally mounted on the frame and means for lowering the knife twice during each cycle of operation, a first time to contact and hold the tape against the frame during rearward travel

of the slide, and a second time with a chopping blow to sever the length from the tape, means for advancing the leading tape section to applying position comprising a wheel with a plurality of radial fingers overlying the tape, the knife drawing said tape section upwardly into light adhesive contact with one finger on its first ascent, means on the slide for imparting step-by-step rotation to the wheel, a platen supporting the work piece with one edge of the lowermost piece in position to be engaged by said leading edge of the tape, a presser block for effecting initial adhesion of the tab, a folding roller for

folding the tab upwardly, a recessed folding block for folding the tab around the piece, a conveyor for moving the piece from tape applying position to the rollers, and a driven cam shaft provided with a plurality of cams for driving the moving parts in timed sequence.

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