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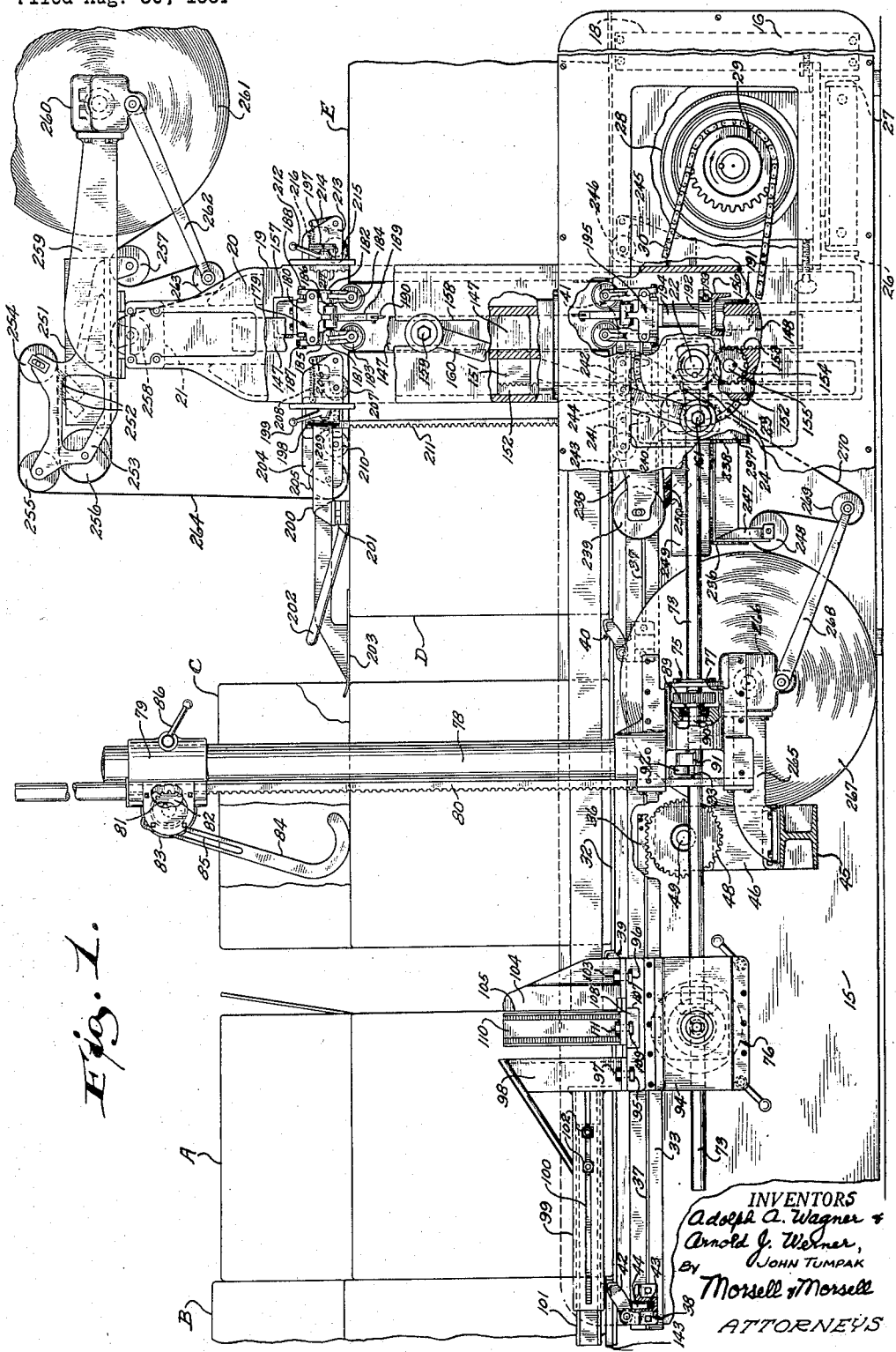
A. A. WAGNER ET AL

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TAPING MACHINE

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TAPING MACHINE

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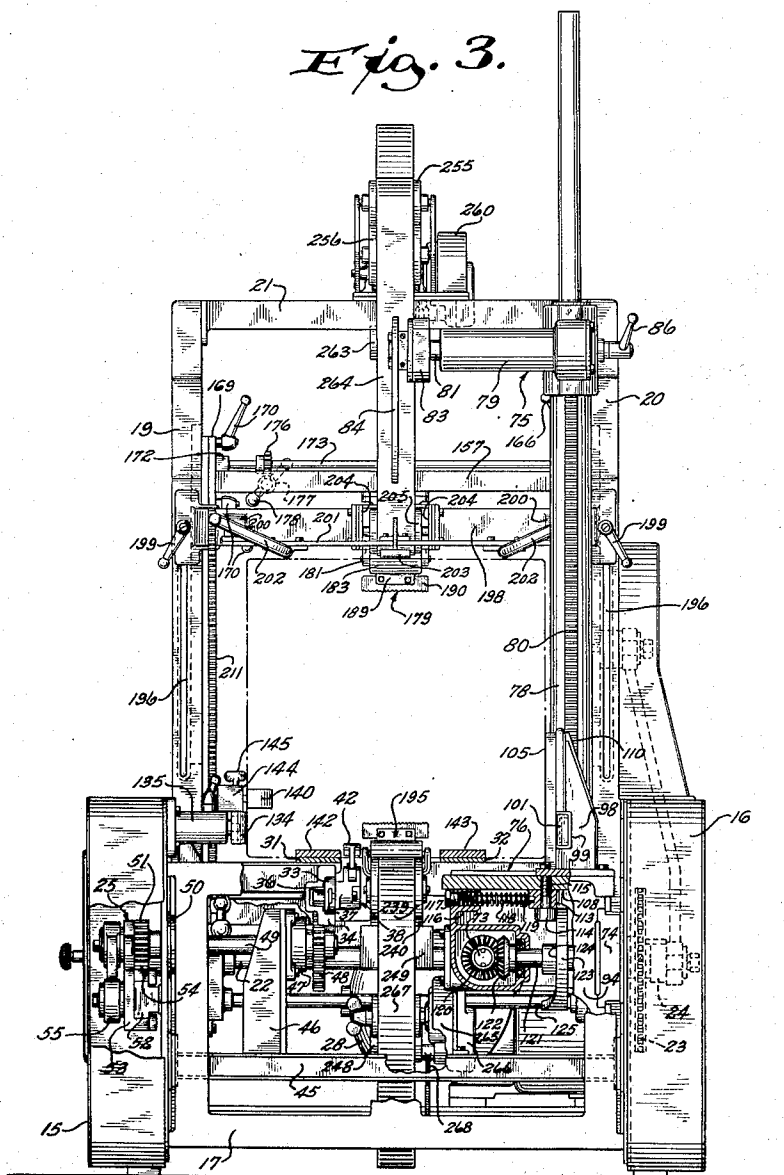
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Fig. 3.



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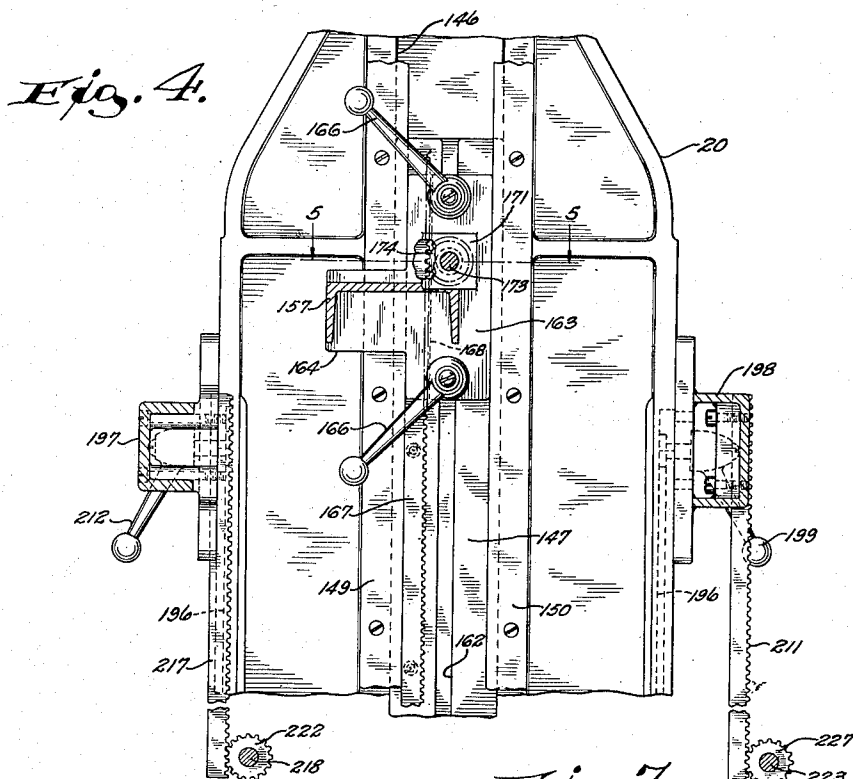


Fig. 6.

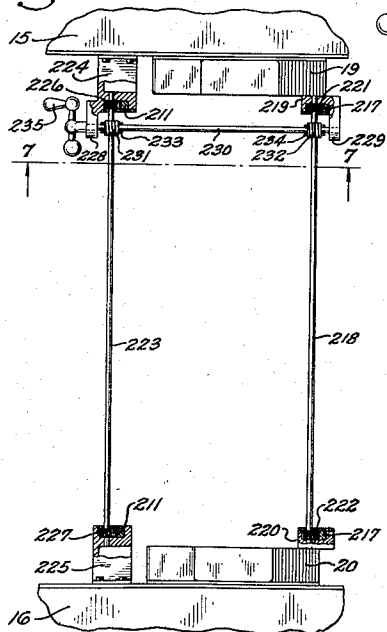


Fig. 7.

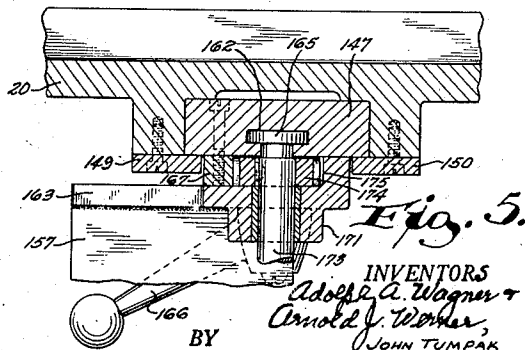
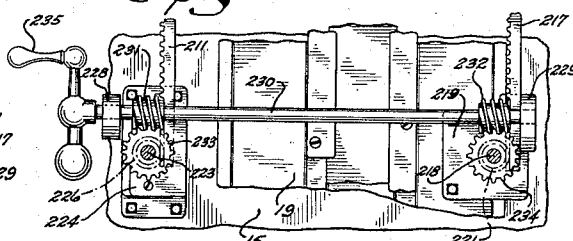


Fig. 5.

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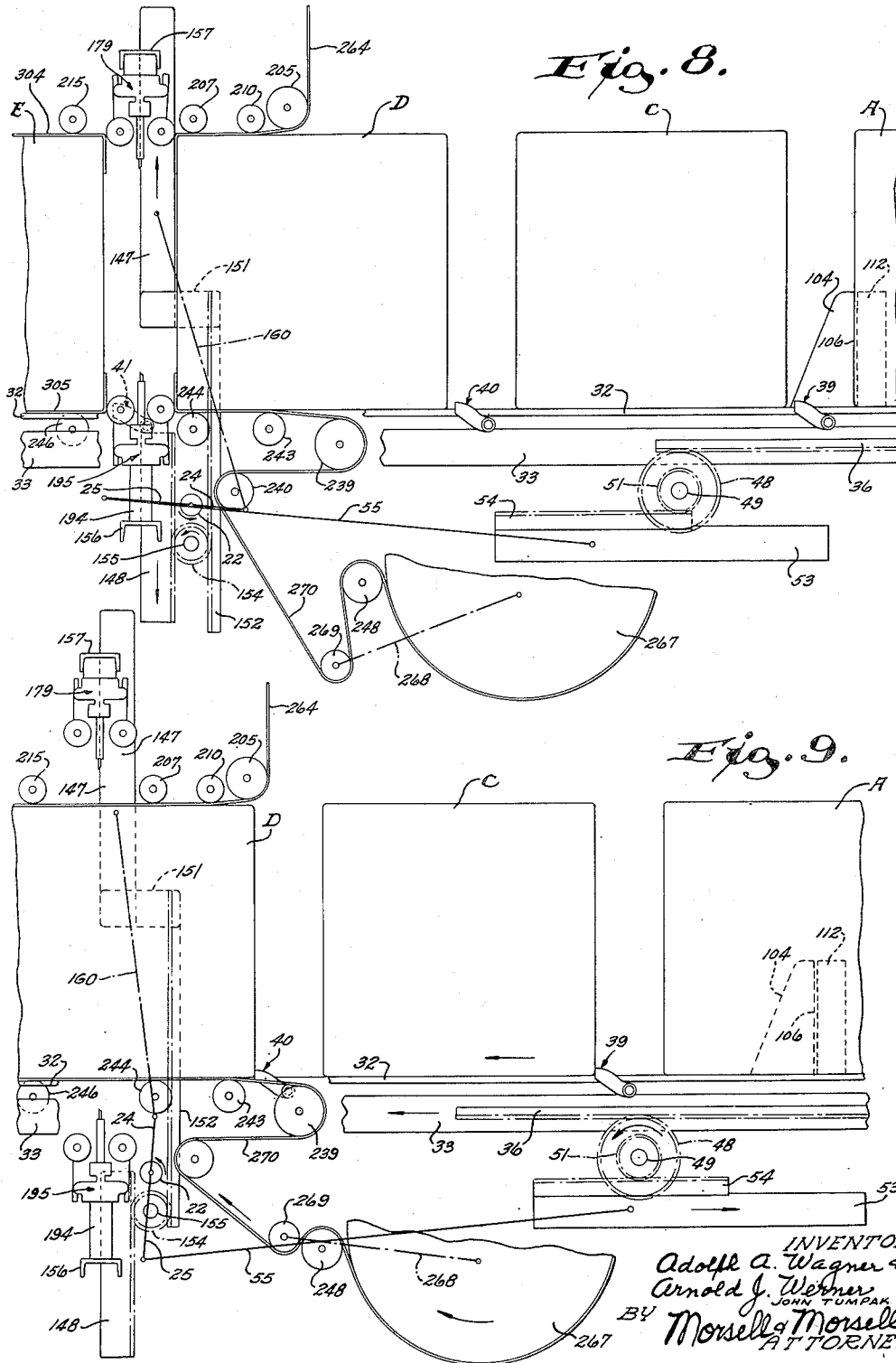
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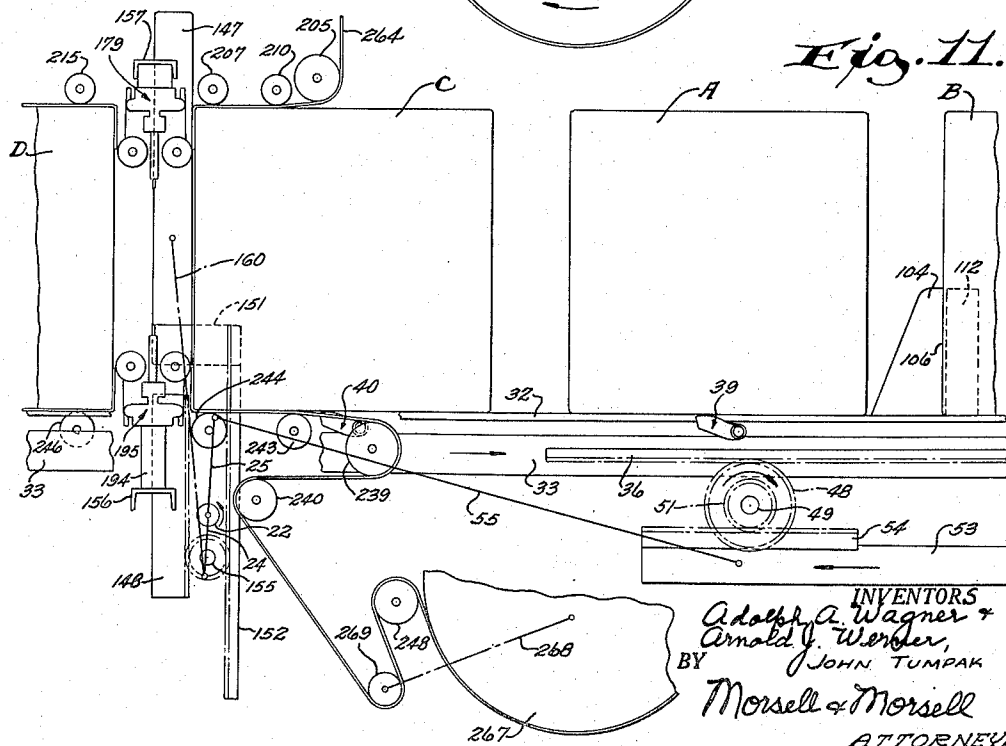
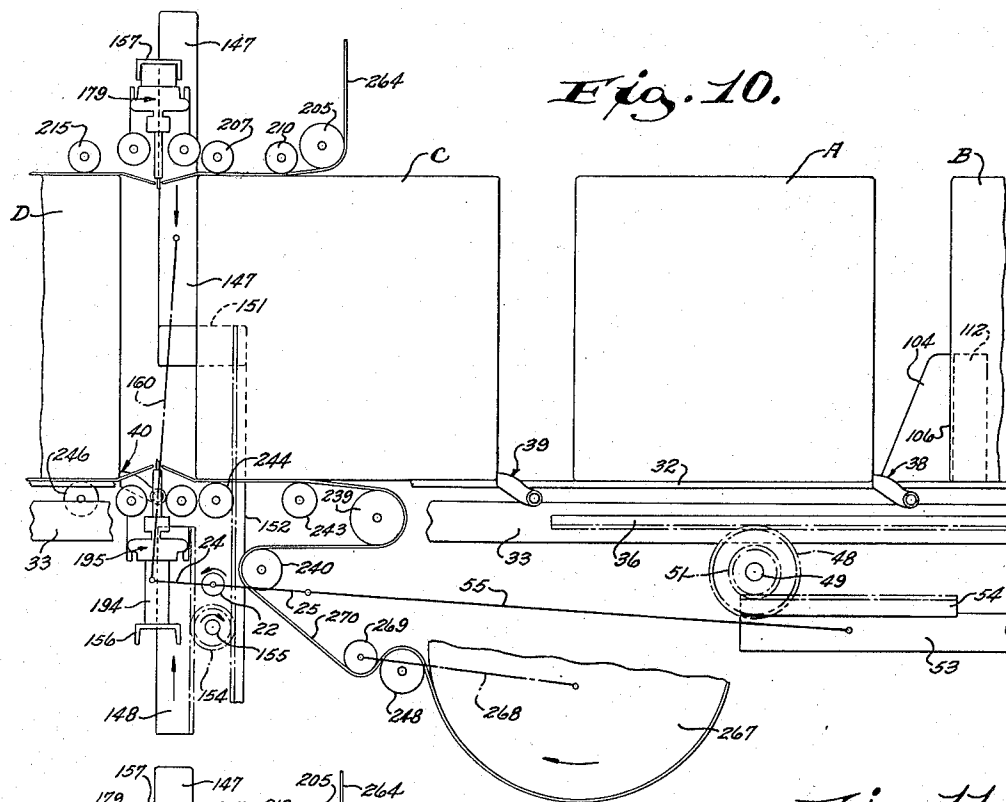
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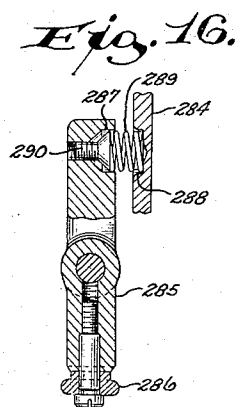
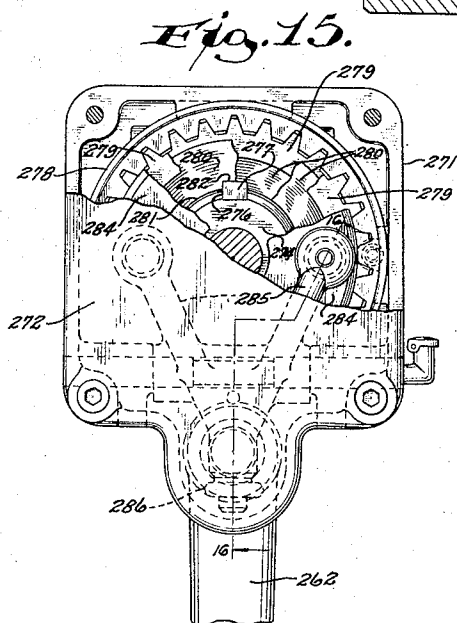
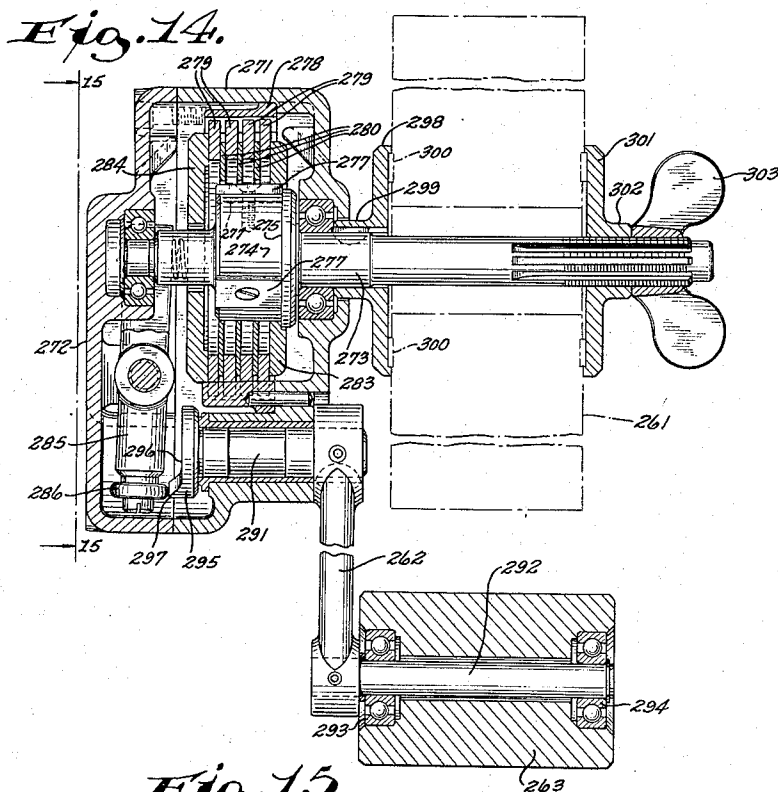
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TAPING MACHINE

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UNITED STATES PATENT OFFICE

2,649,221

TAPING MACHINE

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Application August 30, 1951, Serial No. 244,444

5 Claims. (Cl. 216—22)

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This invention relates to improvements in taping machines, and more particularly to machines for applying tape to the tops and bottoms, or either, of cartons.

There are certain advantages to the tape sealing of conventional fiber board cartons as compared with sealing such cartons by means of gluing the flaps thereof together. Among these advantages is the fact that tape sealed cartons can not be pilfered by exterior opening without ready detection. The use of tape alone for sealing both the top and bottom flaps of fiber board cartons is, however, ordinarily limited to cartons having relatively light weight contents.

In the bottling industries, and specifically in the brewing industry, it has been found advantageous to tape seal the bottom flaps of bottle-carrying cartons in addition to gluing said flaps. Where the carton bottom flaps are tape sealed, the cardboard pad which is normally used in the bottom of each bottle carton can be eliminated, thereby substantially reducing the cost of the package. In addition to this economy feature, tape sealing of the bottom flaps of bottle cartons effectively maintains the carton in sealed condition, even if the bottom of the carton becomes moistened from liquid from a broken bottle or the like, because the tape adhering to the end walls of the carton keeps the carton bottom sealed, even though the glue on the bottom flaps is no longer effective because of its moistened condition.

With the above in mind, it is a general object of the present invention to provide an improved taping machine having means for tape sealing the bottoms of cartons as well as the tops thereof.

A further object of the invention is to provide an improved taping machine which is readily adjustable to accommodate boxes of any selected dimensions, there being adjustments for variations in height, width and length of the cartons to be tape sealed.

A further object of the invention is to provide a taping machine of the class described wherein the cartons to be taped are advanced intermittently therethrough in equally spaced, alined relationship, said machine having means for applying a continuous extent of tape to the tops and a like extent to the bottoms of said cartons during advancing movement of said cartons, said machine having means operative when the car-

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tons are at rest for severing the top and the bottom tapes between a pair of adjacent cartons and for applying the severed tape ends to the adjacent carton end walls.

5 A further object of the invention is to provide an improved taping machine of the class described wherein the cartons are advanced through the machine and are maintained in uniformly spaced relation by a longitudinally reciprocating carton advancing unit provided with ratchet type carton engaging pawls.

10 A further object of the invention is to provide an improved taping machine of the class described wherein the tape applied to the cartons is intermittently drawn from a pair of supply rolls during advancing movement of the cartons, said machine having brake mechanism associated with said supply rolls for stopping rotation of said rolls whenever the lengths of tape extending from the supply rolls to the tape applying mechanisms become slack, thereby preventing overrunning of the tape while the cartons are at rest.

15 A further object of the invention is to provide an improved carton taping machine wherein the reciprocating carton advancing unit is driven by a rotating crank arm and connecting rod mechanism, the effective length of the crank arm being adjustable to vary the length of travel of the reciprocating carton advancing unit; and the pawls of said unit being adjustably spaced, whereby the carton advancing unit can be readily adapted for use in advancing cartons of any selected length.

20 A further object of the invention is to provide an improved taping machine of the class described having a carton receiving station adapted to accommodate a single carton in a position for engagement by the carton advancing unit, there being novel indexing mechanism operable in timed relationship with the carton advancing unit for preventing advancing movement of a carton from said station except when said carton is advancingly engaged by the carton advancing unit; advancing movement of a carton from said station permitting entry of a succeeding carton into said station.

25 A further object of the invention is to provide an improved carton taping machine having upper and lower cutter head assemblies supported on upper and lower slides respectively, said slides

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having a predetermined fixed range of travel, the upper cutter head assembly being mounted on its supporting slides in a manner to permit ready vertical adjustment of said cutter head relative to its slides, to thereby adapt said head assembly for use in taping cartons of a selected height.

A further object of the invention is to provide an improved taping machine of the class described having carton flap closers and carton flap hold-down rollers carried by vertically adjustable frames, there being crank operated mechanism for simultaneously adjusting the vertical position of said frames to adapt said rollers and flap closers for use on cartons of a selected height.

A further object of the invention is to provide an improved taping machine of the class described having a carton end flap closing mechanism including an oscillating swingable arm which is adjustably positionable as to height to thereby adapt said mechanism for use on cartons of a selected height.

A further object of the invention is to provide an improved taping machine of the class described wherein the end flap closing mechanism and the carton indexing mechanism are longitudinally adjustably mounted to adapt said mechanisms for use on cartons of a selected length; said mechanisms each having a slidable splined driving connection with a common longitudinally extending drive shaft.

A further object of the invention is to provide an improved taping machine of the class described wherein the cartons to be taped travel through the machine on longitudinally extending spaced horizontal plates and between a pair of longitudinally extending side rails which engage the sides of said cartons, said side rails being laterally adjustably mounted in order to accommodate cartons of a selected width.

With the above and other objects in view, the invention consists of the improved taping machine and all of its parts and combinations as set forth in the claims and all equivalents thereof.

In the drawings accompanying and forming a part of this specification, wherein is shown one complete embodiment of the preferred form of the invention, and wherein like characters of reference indicate the same parts in all of the views:

Fig. 1 is a fragmentary side elevational view of the improved taping machine taken approximately along the line 1—1 of Fig. 2, parts being broken away and the side frame cover being removed, said figure also showing cartons positioned in the machine;

Fig. 2 is a fragmentary plan view of the improved taping machine on a slightly smaller scale, parts being broken away, and the cartons of Fig. 1 being indicated by dot and dash lines only;

Fig. 3 is an end elevational view of the improved taping machine taken approximately along the line 3—3 of Fig. 2, the path of the cartons in the machine inwardly of the indexing mechanism being shown in dot and dash lines;

Fig. 4 is an enlarged fragmentary vertical sectional view taken approximately along the line 4—4 of Fig. 2, parts being broken away;

Fig. 5 is an enlarged fragmentary sectional plan view taken approximately along the line 5—5 of Fig. 4;

Fig. 6 is a fragmentary plan view of the mechanism for simultaneously raising and lowering the frames for supporting the carton side flap closers and the carton flap hold-down rollers;

Fig. 7 is an enlarged fragmentary vertical sec-

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tional view taken approximately along the line 7—7 of Fig. 6;

Fig. 8 is a fragmentary diagrammatic side elevational view taken from the side of the improved taping machine opposite that from which Fig. 1 is taken and showing the arrangement of the various parts of the machine in relation to cartons in said machine, after the tapes extending between a pair of adjacent cartons have been severed and the severed ends applied to the adjacent end walls of said cartons;

Fig. 9 is a view similar to Fig. 8 and showing the cutter heads in retracted position as the cartons are being advanced by the reciprocating carton advancing unit;

Fig. 10 is a view similar to Figs. 8 and 9, showing the cartons at rest in advanced position and showing the cutter heads moving toward the tapes and severing the same between a pair of adjacent cartons;

Fig. 11 is a view similar to Fig. 10 showing the cutter heads in projected position between a pair of adjacent cartons after having applied the severed ends of the tapes to the carton end walls, this figure also showing the carton advancing unit moving in a retractile direction toward the positions shown in Fig. 8;

Fig. 12 is an enlarged fragmentary side elevational view of the adjustable crank arm, taken approximately along the line 12—12 of Fig. 2;

Fig. 13 is a transverse vertical sectional view taken approximately along the line 13—13 of Fig. 12;

Fig. 14 is an enlarged fragmentary vertical sectional view taken through one of the tape supply roll brake units;

Fig. 15 is a side elevational view taken approximately along the line 15—15 of Fig. 14 with a portion of the cover and some of the internal parts broken away; and

Fig. 16 is a vertical sectional view taken approximately along the line 16—16 of Fig. 15.

Referring more particularly to Figs. 1, 2 and 3 of the drawings, the numerals 15 and 16 indicate a pair of spaced, parallel, elongated hollow side frame members which are preferably rectangular in shape and which are rigidly connected together at their opposite ends by transverse end frames 17 and 18. Fixed to the inner surfaces of the side frames 15 and 16 intermediate the ends thereof are a pair of upstanding elongated frame members 19 and 20 which are connected together at their upper ends by a cross member 21.

Journalled in suitable bearings carried by the lower end portions of the upright frame members 19 and 20 is a main transverse drive shaft 22, the ends of which terminate within the hollow side frame members 15 and 16. Within the side frame 16 a sprocket 23 is keyed to the shaft 22, and keyed on the same shaft adjacent the sprocket 23 is a crank arm 24. A crank arm 25 is keyed to the opposite end of shaft 22 within the side frame member 15.

A pair of transverse motor supporting brackets 26 and 27 are connected at their opposite ends to the side frame members 15 and 16, and adjustably positioned on the members 26 and 27 is an electric motor 28. The motor 28 is preferably of the variable speed type and may have incorporated therein a gear reduction unit. The shaft of the motor 28 extends into the side frame member 16 and has keyed thereto a sprocket 29. An endless chain 30 extends around the sprockets

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29 and 23 for transmitting power from the motor 28 to the main drive shaft 22.

A pair of elongated, spaced, parallel, carton supporting plates 31 and 32 extend in a horizontal plane longitudinally of the machine, said plates being supported on the end frames 17 and 18 and being supported intermediate said end frames in a manner to be described hereinafter. An elongated bar 33 is positioned below the plate 31 and is mounted for longitudinal reciprocating movement parallel with the plate 31, said bar being supported in a pair of bearing brackets 34 and 35, which brackets also support intermediate portions of the plate 31.

Fixed to one side of the bar 33 is a rack 36 having teeth on its under side, as clearly shown in Fig. 1. The bar 33 is formed with a T-slot 37 which extends substantially the full length thereof and which opens through the side wall of the bar opposite the rack 36. Preferably, four spring loaded ratchet type pawl units 38, 39, 40 and 41 are mounted on the bar 33 in equally spaced relationship. Each of these units is connected to the bar 33 by means of suitable bolts having their heads positioned in the T-slot 37, so that the spacing between said units can be readily adjusted by loosening the nuts on said bolts.

The pawl units are preferably identical, and, as shown in Fig. 1 with respect to the unit 38, said units each include a pivotally mounted pawl or dog 42 which is urged upwardly against a suitable stop (not shown) by means of a coiled spring 43 acting through a cup shaped plunger 44. The normal position of the pawls 42 is as shown in Fig. 1 wherein the free end portions of said pawls project above the plane of the plate 32.

Extending transversely between the side frames 15 and 16 is a supporting beam 45 on which is mounted an upstanding bracket 46 which in turn carries a bearing 47 at its upper end. A gear 48 meshes with the rack 36 and is keyed to one end of a transverse shaft 49 which extends outwardly into the side frame member 15 through a suitable bearing 50 carried by the latter frame. Fixed to the outer end of shaft 49 is a pinion 51. Fixed to the outer surface of the inner side wall of the frame 15 is a horizontal rail 52 which extends longitudinally of said frame. A slide 53, which is preferably C-shaped in cross section, is longitudinally slidable on the rail 52 and is formed on its upper surface with a rack 54 which meshes with the pinion 51. Pivotally connected to the slide 54 is one end of a pitman arm 55 (see Figs. 2 and 3), the other end of said arm being pivotally connected to the crank arm 25.

Referring to Figures 12 and 13, the crank arm 25 has an elongated body portion 56 formed at one end with a bored boss 57 which extends substantially normal to the body 56. The body 56 is formed with a longitudinally extending T-slot 58 which opens through the outer side wall of said body, as well as through the end wall opposite the boss 57. The boss 57 is split, as shown, and is adapted to receive the shaft 22 in keyed relationship, there being a bolt 59 equipped with a nut 60 for securing the boss 57 on the shaft 22. A slide block 61 is T-shaped in cross section and is longitudinally slidable in the T-slot 58 of the body 56. The block 61 is formed with an outwardly extending pivot pin 62 which projects through the open side of the slot 58 and is pivotally connected to the pitman arm 55.

The block 61 is bored to threadedly receive an

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elongated adjustment bolt 63 which extends longitudinally within the slot 58 and has one end formed with a portion of reduced diameter 64 which is rotatably positioned in a suitable recess 65 formed in the inner end wall of the slot 58. The opposite end of the screw 63 may be squared, as at 66, for cooperation with a wrench, and inwardly of the portion 66, the screw 63 is formed with a portion of reduced diameter 67. A rectangular plate 68 is formed with a transverse slot 69 extending inwardly from one edge, said slot being of a size to accommodate the portion 67 of the screw 63. The slot 69 has a width smaller than the diameter of the major portion of the screw 63 and also smaller than the squared portion 66 of said screw so that axial movement of the screw relative to the plate is prevented. The plate 68 is fixed with the outer end of the body 56 as by screws 70.

It is apparent that by rotating the screw 63 by means of a wrench engaged with the portion 66, the block 61 and its pin 62 can be moved radially along the slot 58 and screw 63 to vary the distance between the axis of the pin 62 and the axis of the shaft 22. By means of this adjustment the effective length of the crank arm 25 is readily adjustable. This adjustment, in turn, varies the length of the stroke of the slide 53 as well as of the bar 33.

Referring to Fig. 2, there is a bevel gear 71 fixed to the main drive shaft 22 intermediate its length, and meshing with the gear 71 is a bevel gear 72 which is fixed to one end of a splined shaft 73 which extends longitudinally beneath the carton supporting plate 32. Fixed to the inner surface of the inner side wall of the side frame 16 is a longitudinally extending horizontal rail 74 on which are longitudinally adjustably mounted a carton end flap closing unit 75 and an indexing unit 76, each of which has a splined longitudinally slidable driving connection with the shaft 73.

The carton end flap closing unit 75 includes a lower housing 77 on which is supported an upstanding column 78. Vertically adjustably mounted on the column 78 is an upper casing 79 which projects transversely inwardly over the carton supporting plate 32. Axially reciprocatably mounted at its opposite ends in suitable bearings carried by frames 77 and 79 is a vertical rack 80. A transverse horizontal shaft 81 is rotatably mounted in the upper casing 79 and has a pinion 82 fixed to one end thereof and positioned in mesh with the rack 80. The opposite end of the shaft 81 projects from the inner end of the casing 79 and has fixed thereto a head 83 to which a carton end flap closing arm 84 is adjustably fixed. The arm 84 is preferably J-shaped, and the elongated extent thereof is preferably formed with a slot 85 through which connecting bolts extend. The slot 85 permits adjustment of the effective radius of the arm 84.

The upper casing 79 has embodied therein suitable clamping means (not shown) for frictionally engaging the column 78. The clamping means is connected to an operating arm 86. Rotation of the arm 86 releases the clamping means and permits adjustment of the vertical position of the upper casing 79. It is apparent that adjustment of the vertical position of the upper casing 79, as well as adjustment of the effective length of the arm 84, renders the carton end flap closer unit 75 readily adaptable for use in closing cartons of any selected height.

Rotatably mounted within the lower casing 77 is a gear 87 having a longitudinally slidable

splined connection with the shaft 73. An idler gear 88 meshes with the gear 87 and is also rotatably mounted within the lower casing 77. A gear 89 meshes with the idler gear 88 and is fixed to one end of a short longitudinally extending shaft 90 which is rotatably mounted within the casing 77 and has its opposite end projecting from the casing 77. A crank arm 91 is fixed to the projecting end of the shaft 90. The crank arm 91 carries a roller 92, and said roller is positioned in a transversely extending channel member 93 which, in turn, is fixed to the lower end portion of the rack 80. It is apparent that rotation of the longitudinal shaft 73, through gears 87, 88 and 89, causes rotation of the shaft 90 and of crank arm 91, which, in turn, causes vertical reciprocation of the rack 89 and oscillatory swinging movement of the flap closing arm 84.

The indexing mechanism 76 includes a casing 94 which is positioned below the plate 32 and which is longitudinally adjustably fixed to the rail 14, as shown. The upper surface of the casing 94 is formed with a pair of spaced parallel transversely extending T-slots 95 and 96 (Figs. 1 and 2). Transversely adjustably mounted on top of the casing 94, as by bolts 97 having their heads positioned in the T-slot 95, is an upright bracket 98 for supporting a longitudinally extending channel member 99, the latter being formed with a longitudinal slot 100. Longitudinally adjustably positioned in the channel 99 is a guide bar 101, which may also take the form of a channel and which is provided with connecting bolts 102 extending through the slot 100. Similarly mounted on the upper surface of the casing 94 and having connecting bolts 103 with their heads positioned in the slot 96, is an upright bracket 104 having a face 105 extending in a transverse vertical plane. The bracket 104 is normally positioned so that the inner edge of the surface 105 is offset transversely inwardly from the inner surface of the guide rail 101, thereby providing a shoulder 106.

The upper surface of the casing 94 is formed with a transverse rectangular recess 107 (see Fig. 3) in which a slide member 108 is transversely slidably positioned. The upper surface of the slide 108 is formed with a T-slot 109, and transversely adjustably positioned on the slide 108 is a bracket 110 having an attaching bolt 111 with its head positioned in the T-slot 109. The bracket 110 is provided with a face 112 which extends in a longitudinal vertical plane, i. e., normal to the face 105 of the bracket 104.

Referring to Fig. 3, the underside of the slide 108 is formed with a downwardly projecting boss 113, at the lower end of which a roller 114 is carried by a screw 115, which screw extends vertically through the boss 113 and is threaded into the slide 108. The inner wall of the casing 94 is formed with an outwardly extending tubular boss 116 which is positioned in transverse alignment with the boss 113. A plug 117 is threaded into the inner end of the boss 116, and a helical compression spring 118 has one end positioned in the boss 116 in abutment with the plug 117 and has its opposite end in abutment with the boss 113. A transversely extending rod 119 has one end fixed to the boss 118, said rod extending coaxially within the spring 118 with its opposite end preferably extending into the outer end of the boss 116 and spaced a predetermined distance from the plug 117.

A beveled gear 120 is rotatably mounted within the casing 94 and has an axially slidable splined

connection with the longitudinal shaft 73. A transverse shaft 121 is rotatably mounted in the casing 94 and has a bevel gear 122 fixed to one end thereof and in mesh with the gear 120, as shown in Fig. 3. Keyed to the shaft 121 is a circular cam 123 having a cam surface 124 against which the roller 114 is urged by the spring 118. The cam surface 124 is substantially flat throughout its extent except for a high spot 125.

When the cam 123 is in the position shown in Fig. 3, the slide 108 and the bracket 110 are in a retracted position wherein the surface 112 of the bracket 110 is in substantially the same vertical longitudinal plane as the inner surface of the guide rail 101. When, however, the cam 123 is rotated to move the high spot 125 against the roller 114, the slide 108 and bracket 110 are moved laterally inwardly, against the force of the spring 118, to a position wherein the surface 112 of the bracket 110 is flush with the inner edge of the surface 105 of the bracket 104. It is apparent that the spring 118 returns the slide 108 and the bracket 110 to the normal retracted position shown as the high spot 125 is moved out of contact with the roller 114. It follows that continuous rotation of the shaft 73 causes continuous rotation of the cam 123 which, in turn, causes intermittent transverse reciprocating movement of the slide 108 and bracket 110 in the manner described.

Referring to Fig. 2, an elongated horizontal longitudinally extending guide bar 126 has its inner side-wall surface flush with the inner edge of the surface 105 of the bracket 104, and end of said bar is preferably fixed to the bracket 104. Adjacent the opposite end of the bar 126 is a bar or rod 127 which has an intermediate portion spaced from and parallel with the outer surface of the bar 126, the bar 127 having turned end portions which are bolted to the outer surface of the guide bar 126. A bar 128, which is preferably substantially identical with the bar 127, is bolted to the outer surface of an intermediate portion of the guide bar 126, as shown.

A transversely extending tubular socket 129 is bolted to the inner side-wall surface of the frame member 16, and axially slidably positioned within the socket 129 is a plunger 130 having its outer end formed with a transverse bore. The transverse bore of the plunger 130 slidably receives the rod 127 as shown, there being a set screw 131 for locking the rod 127 in a selected position in said transverse bore. The socket 129 is provided with suitable clamping means, controlled by a handle 132, for locking the plunger 130 in a selected axial position in said socket. A socket 133, which is preferably identical with the socket 129, is bolted to the inner surface of the side frame 16 adjacent the rod 128 as shown. The socket 133 is provided with a plunger (not shown) which is preferably identical with the plunger 130 and which is associated with the rod 128 in the same manner that the plunger 130 is associated with the rod 127.

It is apparent that by loosening the set screw 131 in the plunger 130, as well as the similar set screw in the plunger of the socket 133, the guide bar 126 can be moved longitudinally of the machine as the indexing unit 76 is so moved, the rods 127 and 128 being slidable in the transverse bores of the plungers in the sockets 129 and 133. It is also apparent that by releasing the clamping engagement of the sockets 129 and 133 on the plungers therein, the guide bar 126 can be moved transversely inwardly whenever it is desired to

move the bracket 104 transversely inwardly, such movement of the bracket 104 being permitted by a loosening of the bolts 103.

A horizontal guide bar 134, which may take the form of a channel shaped member, extends longitudinally of the machine spaced from and parallel with the guide bar 126. A pair of tubular sockets 135 and 136 are mounted on the inner wall surface of the side frame 15 and may be identical with the sockets 129 and 133. Mounted in the sockets 135 and 136 for slidable coaxial movement are plungers 137 and 138. At their inner ends the plungers 137 and 138 are connected to the guide bar 134, as by pins 139. It is apparent that the transverse position of the guide bar 134 can be readily varied by releasing the clamping engagement of the sockets 135 and 136 on the plungers 137 and 138 to permit axial movement of said plungers to the selected position.

Mounted on the guide bar 134 opposite the slide 108 of the indexing unit 76 is a frame 144 which is longitudinally adjustably mounted on the guide bar 134. A bell-crank lever 140 is mounted within the frame 144 for pivotal movement on a vertical axis. A spring 141 urges the bell-crank lever 140 in a clockwise direction as viewed in Fig. 2, so that one arm of said crank is urged inwardly of the guide bar 134 toward the position shown. The frame 144 may have a clamping engagement with the guide bar 134, which engagement may be controlled by wing nuts 145 to permit longitudinal adjustment of the position of the frame 144.

A pair of horizontal plates 142 and 143 are positioned respectively on the plates 31 and 32 and terminate a predetermined distance longitudinally outwardly from the shoulder 106. The plates 142 and 143 may be connected to suitable feed conveying means (not shown) which delivers onto said plates a continuous series of cartons to be taped. The spacing between the shoulder 106 and the ends of the plates 142 and 143 is adjusted so that one carton can be accommodated on the plates 31 and 32 between the shoulder 106 and the ends of the plates 142 and 143, as shown in dot and dash lines in Fig. 2, as well as in solid lines in Fig. 1.

Referring to Figs. 1 and 4, the upright frame member 20 is formed on its inner surface with a vertically extending groove 146 in which is mounted an upper slide member 147 and a lower slide member 148. The slide members 147 and 148 may be held in position in the groove 146 by retaining bars 149 and 150 which overlap said slide members. The lower end of the slide member 147 has connected thereto a longitudinally extending horizontal bar 151 to which is fixed one end of a rack 152 which extends vertically downwardly parallel with the slide members 147 and 148 within a suitable groove formed in the inner surface of the upright member 20. The edge of the lower slide member 148 facing the rack 152 is formed with gear teeth as at 153. A pinion 154 is rotatably mounted in a lower portion of the upright member 20 and meshes with the racks 152 and 153.

The opposite upright frame member 19 is formed similarly to the upright member 20 and has mounted therein upper and lower slide members, a rack and a rotatable pinion substantially identical and in transverse alignment with the corresponding members in the frame 20 just described. The pinion 154 is keyed to one end of a transverse shaft 155, and a corresponding pinion in the upright member 20 is keyed to the

opposite end of the shaft 155. Fixed, as by welding, to the lower slide member 148 and its corresponding slide member in the upright frame member 20 is a transverse channel member 156, shown most clearly in Fig. 1. A similar channel member 157 is connected to and extends between the upper slide member 147 and the corresponding upper slide member in the upright frame 19. The mounting of the channel 157 on the upper slides will be described hereinafter.

The upright frame 20 is formed with an elongated vertical slot 158 extending therethrough in axial alignment with the groove 146 and opening therein. The upper slide member 147 is formed with a pin 159 which extends transversely outwardly through the slot 158. A pitman arm 160 is pivotally connected at its upper end to the pin 159, and is pivotally connected at its lower end to a pin 161 which is carried by the crank arm 24. It is apparent that clockwise rotation of the shaft 22, as viewed in Fig. 1, causes the pitman arm 160 to move the upper slide 147 upwardly, pulling with it the rack 152. Upward movement of the rack 152 causes simultaneous clockwise rotation of the pinion 154 and shaft 155, which, in turn, causes downward movement of the lower slide member 148. Since the shaft 155 causes similar rotation of pinion 154 and its corresponding pinion in the upright frame 19, the upper and lower slides in the member 19 are given a movement identical to and simultaneous with the movement of the slides 147 and 148.

It is apparent, therefore, that the transverse channel members 156 and 157 remain parallel at all times because of the identical movement of the slide members to which their ends are connected. It is also apparent that as the crank arm 24 rotates in excess of 90 degrees from its position in Fig. 1, the pitman arm 160 begins moving the slide member 147 downwardly, and this movement, in turn, causes simultaneous upward movement of the lower slide member 148. Movement resulting from 360° rotating of the crank arm 24 will be described later.

Referring to Figs. 4 and 5 the upper slide member 147 is formed with a vertical T-slot 162 which opens centrally of the inner surface of said slide member. A generally rectangular block 163 is formed with an offset portion 164, and one end of the transverse channel member 157 is fixed, as by welding, to the block 163 and the portion 164 thereof. The block 163 is held in a selected vertical position by means of bolts 165 (see Fig. 5) having their heads positioned in the T-slot 162, said bolts being provided with cooperable handle equipped nuts 166. The bolts 165 and nuts 166, when tightened, clamp the block 163 to the slide member 147. A vertically extending rack 167 is fixed to the inner surface of the slide 147 adjacent the inner edge of the retaining bar 149. The block 163 is formed with a longitudinally extending recess 168 (see Fig. 4) for accommodating the rack 167 to permit relative vertical movement of the block 163 and slide member 147. The upper slide member in the frame 19, corresponding to the slide 147 is provided with a block 169 (see Fig. 3) similar to the block 163. The opposite end of the channel member 157 is fixed, as by welding, to the block 169. The block 169 is held in a selected vertical position by means of suitable locking bolts having cooperable handle equipped nuts 170.

The blocks 163 and 169 are formed with bearing bosses 171 and 172 in which are journaled the ends of a transversely extending shaft 173.

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Outwardly of the bosses 171 and 172 the blocks 169 and 163 are each recessed, as at 175 (see Fig. 5), to receive one of a pair of pinions 174 which are keyed to the ends of the shaft 173. As shown in Figs. 4 and 5, the pinion 174 within the block 163 meshes with the rack 167. The pinion on the opposite end of the shaft 173 meshes with the rack fixed to the slide in the frame 19 corresponding to the slide 147. A worm wheel 176 (see Fig. 3) is keyed to an intermediate portion of the shaft 173, and a worm gear 177 is rotatably mounted in the channel member 157 in mesh with the worm wheel 176. The worm gear 177 is provided with a suitable handle 178.

It is apparent that by loosening the nuts 166 and 170 on the blocks 163 and 169 and rotating the handle 178, rotation will be imparted to the transverse shaft 173, which, in turn, rotates the pinions 174 and causes said pinions to move vertically along the rack 167 and the corresponding oppositely disposed rack. The vertical movement of the pinions 174, of course, imparts identical movement to the blocks 163 and 169 as well as to the transverse channel member 157.

Fixed to the underside of the transverse channel 157 in substantially transversely centered position is an upper cutter head 179. The cutter head 179 includes a frame 180 (see Fig. 1) on opposite sides of which are pivotally mounted a pair of generally Y-shaped levers 181 and 182. Cylindrical rollers 183 and 184, which are preferably made of rubber or other suitable resilient material, are carried at the bifurcated lower end of said levers. The levers 181 and 182 are mounted for swingable movement on transverse horizontal axes and are urged outwardly away from each other by spring urged plungers 185 and 186 mounted in the frame 180. A pair of stop screws 187 and 188 carried by the levers 181 and 182 limit the outward swinging movement of the rollers 183 and 184. The frame 180 is formed with a downwardly projecting arm 189 in the lower end of which is removably fixed a transverse cutting blade 190. The blade 190 preferably has a serrated lower cutting edge which is slightly inclined from the horizontal.

Referring to Fig. 1, the lower transverse channel 156 is preferably provided with a depending bearing boss 191 which is in substantial vertical alignment with the upper cutter head 179. Coaxial with the boss 191 and fixed to the channel 156 is a clamping ring 192 which is preferably provided with a clamping bolt 193. The channel 156 is formed with an aperture coaxial with the bores of the boss 191 and ring 192, and positioned coaxially within the ring 192 and boss 191 is a vertical shaft 194. A lower cutter head 195, which is preferably identical with the upper cutter head 179, is fixed to the upper end of the shaft 194 in an inverted position with respect to the cutter head 179. The vertical position of the cutter head 195 relative to the channel 156 can be adjusted by loosening the collar nut 193 and sliding the shaft 194 vertically to the selected position, after which the bolt 193 may again be tightened.

The upright frame members 19 and 20 are formed in their transversely extending edge walls with vertical T-slots 196 (see Fig. 3). Mounted on corresponding edge walls of the upright frame members 19 and 20 are transverse frame members 197 and 198. The transverse frame member 198 is locked in a selected vertical position against the upright frame members 19 and 20

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by means of suitable locking bolts (not shown) having their heads positioned in the T-slots 196, said bolts being provided with handle equipped nuts 199. As shown most clearly in Fig. 2, a pair of spaced parallel arms 200 project longitudinally from the frame 198 and support a transverse bar 201 on which there are adjustably mounted a pair of divergent carton side flap closing members 202 and a carton end flap retaining runner 203.

Fixed to an intermediate portion of the transverse frame 198 are a pair of spaced longitudinally extending plates forming a roller supporting bracket 204. At one end of the bracket 204 a roller 205 is supported, while at its opposite end a bell crank lever 206 is pivotally mounted. One arm of the bell crank lever 206 rotatably supports a resilient roller 207, and the other arm is connected to a tension spring 208 which urges the roller 207 downwardly. Intermediate its length the bracket 204 supports a bell crank lever 209 which is similar to the bell crank lever 206 and is also equipped with a resilient roller 210. A tension spring (not shown) is connected to the bell crank lever 209 similarly to the manner in which the spring 208 is connected to the lever 206, and said spring urges the roller 210 downwardly. A pair of racks 211 are fixed to the frame 198 and depend vertically from each end thereof.

The transverse frame 197 is locked in a selected vertical position against the upright frames 19 and 20 by means of suitable locking screws having their heads positioned in the adjacent T-slots 196, said screws each having a cooperable handle equipped nut 212. The frame 197 supports a bracket 213 which, in turn, pivotally supports a bell-crank lever 214. One arm of the lever 214 carries a resilient roller 215, and the other arm of said lever is connected to a suitable tension spring 216 which urges the roller 215 downwardly. A pair of racks 217 are fixed to and depend vertically from the ends of the transverse frame 197.

Referring to Figs. 2, 6 and 7, a shaft 218 extends transversely below the plates 31 and 32 and has its opposite ends mounted in suitable bearings 219 and 220 which, in turn, are mounted on the inner surface of the upright frames 19 and 20. Keyed to the shaft 218 within the bearing 219 is a pinion 221 which meshes with the adjacent rack 217, and keyed to the opposite end of the shaft 218 within the bearing 220 is a pinion 222 which meshes with the rack 217 thereadjacent. A transverse shaft 223 extends below the plates 31 and 32 parallel with the shaft 218 and has its opposite ends rotatably mounted in suitable bearings 224 and 225, the latter being mounted on the inner wall surfaces of the side frames 15 and 16 respectively. A pinion 226 is keyed to the shaft 223 within the bearing 224, and said pinion meshes with the adjacent rack 211. A pinion 227 is keyed to the shaft 223 within the bearing 225 and meshes with the rack 211 thereadjacent.

The bearing 224 is formed with a transversely projecting ear 228, and the bearing 219 is formed with a similar ear 229. The ears 228 and 229 are formed with coaxial longitudinally extending bores in which the end portions of a longitudinally extending shaft 230 are journaled. The shaft 230 has a worm 231 keyed thereto adjacent the shaft 223, and adjacent the shaft 218 a worm 232 is keyed to said shaft. As shown in Fig. 7, a worm wheel 233 is keyed to the shaft 223 and

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meshes with the worm 231. The shaft 218 has keyed thereto a worm wheel 234 which meshes with the worm 232. One end of the shaft 230 projects beyond the bearing ear 228, and a crank 235 is fixed to said projecting shaft end. It is apparent that by loosening the handle equipped nuts 212 and 199 on frames 197 and 198, and by turning the crank 235, the mechanism shown in detail in Figs. 6 and 7 causes simultaneous identical vertical movement of the transverse frames 197 and 198, along with the equipment which is attached thereto.

Referring to Fig. 1, a pair of angle members 236 and 238 extend transversely between the side frames 15 and 16 below the carton supporting plates 31 and 32 and adjacent the upright frames 19 and 20. Fixed to the angle member 238 is a generally L-shaped bracket 237 which projects upwardly from the angle 238 and has horizontal extent which carries at its free end a roller 239 which is preferably in longitudinal alinement with the lower cutter head 195. The bracket 238 also rotatably supports a roller 240. Along the horizontal extent of the bracket 238 a pair of bell crank levers 241 and 242 are mounted for pivotal movement on transverse axes. The levers 241 and 242 rotatably support resilient pressure rollers 243 and 244 which are also in longitudinal alinement with the roller 239. The levers 241 and 242 are urged in a clockwise direction about their pivotal mounting by suitable tension springs (not shown) to urge the rollers 233 and 234 upwardly.

Mounted on a suitable bracket adjacent the opposite side of the cutter head 195 and below the plane of the carton supporting plates 31 and 32 is a bell crank lever 245. One arm of the lever 245 carries a resilient pressure roller 246, and a suitable tension spring (not shown) urges the lever 245 in a clockwise direction about its pivot to thereby urge the roller 246 upwardly. The roller 246 is in longitudinal alinement with the cutter head 195 and with the rollers 239, 243 and 244.

Depending from the transverse angle member 236 is a bracket 247 which carries a roller 248 at its lower end. Positioned on the transverse channels 236 and 237 is a rectangular tray 249, and mounted in the tray 249 are a pair of moistening brushes 250 which project angularly upwardly as shown in Fig. 1. The tray 249 is adapted to contain water, and by capillary action, water in the tray 249 keeps the brushes 250 moist. A similar tray 251 is positioned on the transverse member 21 connecting the upper ends of the side frame members 19 and 20. A pair of moistening brushes 252 project angularly upwardly from the tray 251 and are normally kept in moistened condition by water from the tray 251.

Also mounted on the transverse member 21 is an irregularly shaped bracket 253 which rotatably supports a roller 254 positioned over the tray 251 and which similarly supports rollers 255 and 256 adjacent one end of the tray 251. The bracket 253 also supports a roller 257 below the opposite end of the tray 251, as well as a roller 258 below a central portion of said tray. All of the rollers supported by the bracket 253 rotate on transverse horizontal axes and said rollers are in vertical alinement with the rollers 205, 210, 207 and 215.

Also fixed to the transverse frame member 21 is an elongated supporting arm 259, at the free end of which is mounted a tape tensioning unit

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260 which carries a supply roll of gummed tape 261. The tape tensioning unit 260 pivotally supports an elongated swingable arm 262 which carries at its free end a weighted roller 263. Tape 264 from the roll 261 extends as shown in Fig. 1 over and around the roller 257, around and under the weighted roller 263, over the roller 258, around the roller 256, around the roller 254, over the roller 255 and under the rollers 205, 210 and 207. As the tape 264 passes from the roller 256 to the roller 254 the gummed side of said tape is moistened by the brushes 252.

Mounted on the transverse beam 45 is a supporting arm 265 at the free end of which is mounted a tensioning unit 266 which, in turn, carries a supply roll of gummed tape 267. An elongated swingable arm 268 is pivotally carried by the tensioning unit 266, and the free end of said arm carries a weighted roller 269. Tape 270 from the supply roll 267 extends, as shown in Fig. 1, over the roller 248, under and around the weighted roller 269, around and over the roller 240, around the roller 239, and over the rollers 243 and 244. As the tape 270 passes from the roller 240 to the roller 239 the gummed side of said tape is moistened by the brushes 250. The tape tensioning units 260 and 266 are substantially identical.

Referring to Figs. 14 to 16 the tape tensioning units each include a generally rectangular housing 271 having a cover 272. Mounted for rotation in suitable bearings carried by the housing 271 and cover 272 is a spindle 273. The spindle 273 is formed with a portion of enlarged diameter 274 within the housing 271, said portion being formed with an outwardly directed annular flange 275 at one end. The portion 274 is preferably formed with three equally spaced axially extending peripheral keyways 276 in each of which is removably fixed a key 277. Fixedly mounted within the casing 271 coaxial with the spindle 273 is an anchoring ring or collar 278 which preferably takes the form of an internally toothed ring gear. Four spaced annular plates 279 are positioned coaxially within the collar 278 and are formed with external teeth which mesh with the internal teeth of said collar, as shown in Fig. 15.

Interposed between and coaxial with the annular plates 279 are three identical annular plates 280, each having an outer diameter smaller than the inner diameter of the anchoring collar 278. The plates 280 have central bores 281 with diameters approximating the diameter of the portion 274 of the spindle 273, and said plates are also formed with keyways 282 for receiving the keys 277. It is apparent that the plates 280 can move axially of the spindle 273 but cannot rotate relative thereto. An annular backing plate 283 has a central bore and keyways similar to those of the plates 280, and said backing plate is mounted on the portion 274 of the spindle in abutment with the annular flange 275 as shown in Fig. 14. A circular pressure plate 284 having an outer diameter not larger than the inner diameter of the collar 278 and having a central bore larger than the spindle 273 is positioned in abutment with the leftmost plate 279 as viewed in Fig. 14.

A generally Y-shaped lever 285 is pivotally mounted in the cover 272 for movement on an axis normal to the axis of the spindle 273. The lower end of the lever 285 carries a roller 286 and, as shown in Fig. 16, the upper arms of the lever 285 are formed with recesses 287 facing the plate 284. The plate 284 is formed with a pair of diametrically oppositely disposed recesses 288

which are in alinement with the recesses 287 of the lever 285, and positioned in each pair of matching recesses 287 and 288 is a coiled compression spring 289. The amount of compression of a spring 289 can be adjusted by means of a screw 290 threaded into a recess as 287, shown in Fig. 16.

Mounted in the casing 271 for axial rotation parallel with the spindle 273 is a relatively short shaft 291, one end of which projects exteriorly of the casing and has fixed thereto one end of the swingable arm 262 (in the case of the tape tensioning unit 260). The outer end of the arm 262 carries a transverse shaft 292 on which is mounted the weighted roller 263, which, in turn, is equipped with bearings 293 and 294. The opposite end of the shaft 291 carries a circular cam 295 which has a flat surface portion 297. When the arm 262 is in the lowered position shown in Fig. 1, the raised surface portion 297 engages the roller 286, as shown in Fig. 14, to pivot the lower end of the lever 285 outwardly and thereby swing the upper ends of said lever inwardly.

Inward movement of the upper ends of the lever 285, through springs 289, urges the pressure plate 284 against the adjacent annular plate 279. This causes the plates 279 and 280 to be squeezed together and frictionally engage each other sufficiently to prevent relative rotation thereof. Since the plates 279 are anchored to the anchoring collar 278, and since the plates 280 are keyed to the spindle 273, the spindle is locked against rotation whenever the arm 262 is in the lowered position shown in Fig. 1. A similar action occurs in the tape tensioning unit 266 when the arm 268 is in the lowered position shown in Fig. 1. When the raised portion 297 of the cam 295 moves away from the roller 286 upon upward swinging movement of the arm 262 (or of the arm 268 in the case of the tensioning unit 266), the roller 286 moves into contact with the flat surface portion 296 of the cam 295. This movement swings the upper ends of the lever 285 in a direction away from the pressure plate 284 and releases the frictional engagement between the plates 280 and 279, thereby permitting relative rotation of said plates and also permitting rotation of the spindle 273. The raised position of the arm 268 and roller 269 is shown diagrammatically in Figs. 9 and 10.

Operation

Operation of the motor 28 causes simultaneous rotation of the main transverse drive shaft 22 and of the longitudinal drive shaft 73. The shaft 22 is rotated in a clockwise direction as viewed in Figs. 1 and 2, and in a counterclockwise direction as viewed in Figs. 8 to 11. The crank arms 24 and 25 are offset approximately 180 degrees, and because of the fact that the slides 147 and 148 move in a vertical direction, whereas the slide 53 moves in a horizontal direction, the maximum speed rate of one of said mechanisms is attained while the speed of the other of said mechanisms is at or near zero.

Referring to Figs. 1 and 2, cartons are fed successively to the machine along the plates 142 and 143 by any suitable means. As a carton moves off the plates 142 and 143 onto the plates 31 and 32, being pushed from behind by the succeeding cartons, said carton moves along the plates 31 and 32 and into contact with the bell crank lever 140 mounted on the side rail 134. The lever 140 pushes the entering carton laterally against the opposite guide bar 99, so that the carton, as it

moves completely off of the plates 142 and 143, also moves laterally into abutment with the shoulder 106 on the bracket 104. In Figs. 1 and 2 the carton A is in said latter position, and it will be noted that the succeeding carton B abuts the carton A but is positioned on the plates 142 and 143 which hold the carton B raised and out of contact with the pawl 42 of the pawl unit 38.

At a predetermined interval the cam 125 of the indexing unit 76 moves the slide 108 and bracket 110 laterally inwardly to a position wherein the inner surface 112 of the bracket is substantially flush with the inner surface of the guide bar 126. This moves the carton A laterally, pivoting the bell-crank 140 outwardly, and moving the carton out of engagement with the shoulder 106 of the indexing mechanism. Substantially simultaneously with the lateral movement of the carton, the bar 33 begins moving in a carton advancing direction. The pawl 42 of the unit 38 thereupon engages the rear end wall of the carton A and moves said carton forwardly therewith a predetermined distance greater than the length of said carton. As the carton A is so advanced, the carton B is advanced along the plates 142 and 143 and onto plates 31 and 32 by its succeeding cartons until said carton B abuts the shoulder 106 in the same manner that carton A did. The carton A is moved forwardly by the unit 38 to the position of carton C in Fig. 1, and the bar 33 then reverses direction to move the unit 38 back to its Fig. 1 position. In the latter position the unit 38 is ready to engage the rear end wall of the carton B which by this time has moved to the position in which carton A is shown in Fig. 1.

More than one carton at a time is prevented from entering the machine, and each complete cycle of reciprocating movement of the bar 33 advances the cartons on the plates 31 and 32 to a position wherein they are engageable by the forwardly adjacent carton advancing pawl unit during the succeeding reciprocating cycle. It is apparent, therefore, that cartons are advanced through the machine intermittently and in equally spaced relationship by the carton advancing pawl units 33 to 41, which, in turn, are carried by the reciprocating bar 33. During retractile movement of the bar 33 the pawls 42 of each of the pawl units 33 to 41 pivot downwardly and slide under the cartons therebehind, each pawl pivoting upwardly as it clears the rear end of the carton under which it had moved.

As shown in Fig. 1, the cartons entering the improved taping machine have their bottom flaps folded inwardly whereas their top flaps are in upright position. As a carton approaches the end flap closing mechanism 75, the arm 84 swings toward the carton and folds the nearest top end flap of said carton downwardly and toward the other end flap. Before the arm 84 moves out of contact with the downwardly folded end flap, the runner 203 engages the upper surface of said end flap to hold the same in downwardly folded position. The arm 84 continues its outward swinging movement, and upon moving behind the trailing end flap of the carton, said arm begins a forward swinging movement to fold the trailing end flap downwardly and forwardly. The arm 84 remains in contact with the folded trailing end flap until the upstanding top side flaps come into contact with the divergent side flap closing arms 202. As the carton is advanced beneath the arms 202, the carton side flaps are folded inwardly with their inner edges meeting

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along a longitudinal center line, which line, in turn, is in longitudinal alinement with the upper cutter head 179.

Referring to Fig. 8, which is a diagrammatic view similar to Fig. 1 but taken from the opposite side of said machine, cartons A, C, D and E are shown in the same positions in which they are shown in Fig. 1. It will be noted that an extent of tape 304 is applied to the top of the carton E and is pressed thereagainst by the roller 215, with a portion of said tape being applied to the rear end wall of said carton. A similar extent of tape 305 is applied to the bottom of the carton E and is pressed thereagainst by the roller 246, with a portion of said extent also being applied to the rear end wall of said carton. It will also be noted that the end of the extent of tape 264 is applied to the forward end wall of the carton D and that a portion of said extent is also applied to the top of said carton, being pressed into contact therewith by the rollers 207 and 210. Similarly, the end of the extent of tape 270 is applied to the forward end wall of the carton D and a portion of said extent is also applied to the bottom flaps of said cartons, being pressed thereagainst by the rollers 243 and 244. It is understood, of course, that the tapes 264 and 270 are applied to the meeting edge portions of the folded top and bottom side cover flaps of the cartons. It is also noted from Fig. 8 that the upper cutter head 179 is moving upwardly and that the lower cutter head 195 is simultaneously moving downwardly, there being no substantial movement of the bar 33 and the pawl units 39 to 41 at this instant.

As the shaft 22 rotates in a counter-clockwise direction as viewed in Figs. 8 to 11, the crank arm 24 is swung upwardly to cause continued upward movement of the upper cutter head 179 and continued lowering movement of the lower cutter head 195. Simultaneously, the crank arm 25 is swung downwardly and outwardly, and through the pitman arm 55, begins to move the slide 53 outwardly. This causes advancing movement of the bar 33 and of the pawl units 39 to 41 mounted thereon, said units engaging the rear end walls of the cartons C, D and E to cause advancing movement thereof.

Fig. 9 shows the crank arm 24 near its uppermost position with the cutter heads 179 and 195 in their corresponding most retracted positions. The crank arm 25 is shown in Fig. 9 near its lowermost position, and slide 53 and bar 33 are shown in their corresponding positions which are approximately midway of their ranges of travel. The pawl units 38, 39 and 40 have advanced the cartons A, C and D to the positions shown, whereas the pawl unit 41 has moved the carton E to a discharge conveyor (not shown).

It will be noted that in Fig. 9 the extents of tape 264 and 270 have been applied to substantially the full length of the top and bottom of the carton D, the tape being applied as a result of the forward movement of said carton. During the forward movement of carton D it pulled on the extents 264 and 270, and the taut condition resulting lifted the weighted rollers 263 and 269 to swing the arms 262 and 268 upwardly, thereby releasing the braking action of the tensioning units 260 and 266. With the supply rolls 261 and 267 free to rotate, continued pulling on the extents 264 and 270 results in tape being unwound from the supply rolls. In Fig. 9 the weighted roller 269 and its arm 268 are shown

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in the raised brake releasing position as the tape is being drawn from the roll 267.

Continued rotation of the shaft 22 swings the crank arm 24 forwardly and downwardly to thereby cause downward movement of the upper cutter head 179 and corresponding upward movement of the lower cutter head 195. Simultaneously, the crank arm 25 is swung upwardly and outwardly to cause continued outward movement of the slide 53 and advancing movement of the bar 33 and pawl units 38 to 40. By the time the crank arms 24 and 25 reach the substantially horizontal position shown in Fig. 10 the cartons C and D will have been advanced to the position shown in the latter figure, wherein the spacing between said cartons is in vertical alignment with the upper and lower cutter heads 179 and 195. The extents of tape 264 and 270 extend between cartons C and D, and said extents respectively have a portion applied to the top and bottom of the carton C as well as to the top and bottom of carton D. In Fig. 10 the bar 33 and the pawl units 38 to 40 are shown in their most advanced positions, whereas the cutter heads 179 and 195, being in an intermediate position, are moving toward the tapes 264 and 270, the cutting blades of said heads having severed said tapes substantially midway between the cartons C and D.

Continued rotation of the shaft 22 swings the crank arm 24 downwardly and outwardly to cause continued downward movement of the cutter head 179 and upward movement of the cutter head 195. As the cutter heads move toward each other the pressure rollers carried thereby deflect the severed ends of the tape toward the adjacent carton end walls and apply said severed ends to said end walls with a pressure rolling contact. The arms 181 and 182 of the cutter heads are swung inwardly against the plungers 185 and 186 as the rollers 183 and 184 move between the cartons. In Fig. 11 the crank arm 24 is in approximately its lowermost position and the cutter heads 179 and 195 are in their most projected positions, said cutter heads having applied the severed tape ends to the carton end walls, as shown.

As the crank arm 25 swings upwardly and forwardly from its position in Fig. 10 toward its uppermost position shown in Fig. 11, it pulls the slide 53 forwardly and thereby simultaneously retracts the bar 33 and pawl units 38 to 41. The pawls of the pawl units pivot downwardly during this retractile movement and slide under the cartons as shown in Fig. 11. During the retractile movement of the units 38 to 41 the cartons are at rest on the plates 31 and 32.

When the cartons come to rest in the positions of Figs. 10 and 11, the momentum of the rotating supply rolls 261 and 267 tends to keep said rolls rotating even though no tape is being pulled therefrom by the advancing cartons. This results in a slackening in the extents of tape 264 and 270, and when slackened, the tapes are unable to support the weight of the rollers 263 and 269. As a result, the arms 262 and 268 swing downwardly and set the braking action of the tensioning units 260 and 266 to immediately stop rotation of the supply rolls 261 and 267 respectively. This prevents overrunning of the tape. In Figs. 9 and 11 the arm 268 is shown in down swung position.

As the shaft 22 continues to rotate, the crank arm 24 swings outwardly and upwardly toward its position in Fig. 8, to cause upward movement

of the cutter head 179 and simultaneous downward movement of the cutter head 195. Simultaneously, the crank arm 25 swings forwardly and downwardly to continue the forward movement of the slide 53 and the corresponding retractile movement of the bar 33 and pawl units 38 to 41. As the parts reach the positions shown in Fig. 8, the cycle is completed, and the pawl units are again ready to advance the cartons. As the new cycle begins, however, the pawl unit 39 engages the rear end of the carton A, and the pawl unit 40 engages the rear end of the carton C, while at the same time the pawl unit 41 engages the rear end wall of the completely taped carton D which is now ready for discharge. It will also be noted that, as shown in Figs. 10 and 11, the carton B has moved forwardly into contact with the shoulder 106 during the cycle just described.

Various changes and modifications may be made without departing from the spirit of the invention, and all of such changes are contemplated as may come within the scope of the claims.

What is claimed as the invention is:

1. In a taping machine: an elongated fixed horizontal support adapted to have a plurality of spaced cartons slidably positioned thereon; a plurality of spaced carton advancing pawls longitudinally reciprocatably mounted adjacent said support in positions to advancingly engage said cartons; means for applying a longitudinal extent of tape to the tops of said cartons as they are moved along said support; a cutter head vertically reciprocatably mounted above said support, said cutter head being movable downwardly to sever the tape extending between the tops of a pair of adjacent cartons on said support and to apply the severed ends thereof to the adjacent end walls of said cartons; a source of power; mechanism drivingly connecting said source of power to said reciprocating carton advancing pawls to cause alternate advancing and retracting movement of said pawls; and mechanism drivingly connecting said source of power to said vertically reciprocating cutter head in a manner to move said cutter head downwardly into tape severing and applying position between a pair of adjacent cartons during retractile movement of said carton advancing pawls.

2. In a taping machine: an elongated fixed horizontal support having an opening therein, said support being adapted to have a plurality of spaced cartons slidably positioned thereon; a plurality of spaced carton advancing pawls longitudinally reciprocatably mounted adjacent said support in positions to advancingly engage said cartons; means for applying tape to the bottoms of said cartons as they are moved along said support; a cutter head vertically reciprocatably mounted below said support, said cutter head being movable upwardly through said support opening to sever the tape extending between the bottoms of a pair of adjacent cartons and to apply the severed ends thereof to the adjacent end walls of said cartons; a source of power; mechanism drivingly connecting said source of power to said reciprocating carton advancing pawls to cause alternate advancing and retracting movement of said pawls; and mechanism drivingly connecting said source of power to said vertically reciprocating cutter head in a manner to move said cutter head upwardly into tape severing and applying position between a pair of

adjacent cartons during retractile movement of said carton advancing pawls.

3. In a taping machine: an elongated fixed horizontal support having an opening therein, said support being adapted to have a plurality of spaced cartons slidably positioned thereon; a plurality of spaced carton advancing pawls longitudinally reciprocatably mounted adjacent said support in positions to advancingly engage longitudinally spaced cartons on said support; means for applying tape to the tops and bottoms of cartons moved along said support; a cutter head vertically reciprocatably mounted below said support, said cutter head being movable upwardly through said support opening to sever the tape extending between the bottoms of a pair of adjacent cartons on said support and apply the severed ends thereof to the adjacent end walls of said cartons; a cutter head vertically reciprocatably mounted above said support, said cutter head being movable downwardly to sever the tape extending between the tops of a pair of adjacent cartons on said support and apply the severed ends thereof to the adjacent end walls of said cartons; a source of power; mechanism drivingly connecting said source of power to said reciprocating carton advancing pawls to cause alternate advancing and retracting movement of said pawls; and mechanism drivingly connecting said source of power to said vertically reciprocating cutter heads in a manner to move said heads simultaneously into tape severing and applying position between a pair of adjacent cartons during retractile movement of said carton advancing pawls.

4. In a taping machine adapted to have a plurality of cartons advanced therethrough: a pair of frame members positioned on opposite sides of said machine; a slide member vertically reciprocatably mounted in each of said frame members; means for causing simultaneous identical vertical reciprocating movement of said slide members within predetermined limits; a sealing head supporting member extending between said slide members and positioned adjacent the path of movement of cartons through said machine; a sealing head carried by said supporting member; a pinion rotatably mounted on each end of said supporting member; a vertical rack fixed to each of said slide members and in mesh with the adjacent pinion; and manually operated mechanism connected to said pinions for selectively causing simultaneous identical rotation of said pinions to move said pinions and the supporting member vertically relative to said slide members, whereby the range of vertical travel of said sealing head can be selectively shifted vertically to adapt said sealing head for use with cartons of various heights.

5. In a taping machine; a pair of frame members positioned on opposite sides of said machine, an upper and a lower slide member vertically reciprocatably mounted in each of said frame members; a pinion rotatably mounted in each of said frame members; each of said slide members being provided with a rack meshing with the adjacent pinion in a manner to cause simultaneous, opposite vertical reciprocating movement of the slide members connected to each of said pinions; an upper sealing head supporting member connected to and extending between the upper slide members; an upper sealing head carried by said supporting member; a lower sealing head supporting member connecting to and extending between said lower slide members;

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a lower sealing head carried by said lower supporting member; and means connected to at least one of said slide members for causing vertical reciprocating movement thereof, whereby said upper and lower sealing heads are reciprocated in opposite vertical directions toward and away from each other simultaneously and at the same speed.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date	
1,573,842	Manning	Feb. 23, 1926	15

22

Number
1,751,390
2,011,839
2,052,903
2,087,472
2,354,688
2,399,616
2,456,059
2,512,579
2,532,900
2,540,694
2,541,737
2,547,828
2,578,772

Name	Date
Brust	Mar. 18, 1930
Anderson	Aug. 20, 1935
Stagmeier	Sept. 1, 1936
Dyment	July 20, 1937
Kimball et al.	Aug. 1, 1944
Bailey	May 7, 1946
Grupe	Dec. 14, 1948
Long	June 20, 1950
Enkur et al.	Dec. 5, 1950
Sieg	Feb. 6, 1951
Bardsley et al.	Feb. 13, 1951
Maussnest	Apr. 3, 1951
Ames	Dec. 18, 1951