Sept. 29, 1953 A. A. WAGNER ET AL 2,653,727

TAPING MACHINE

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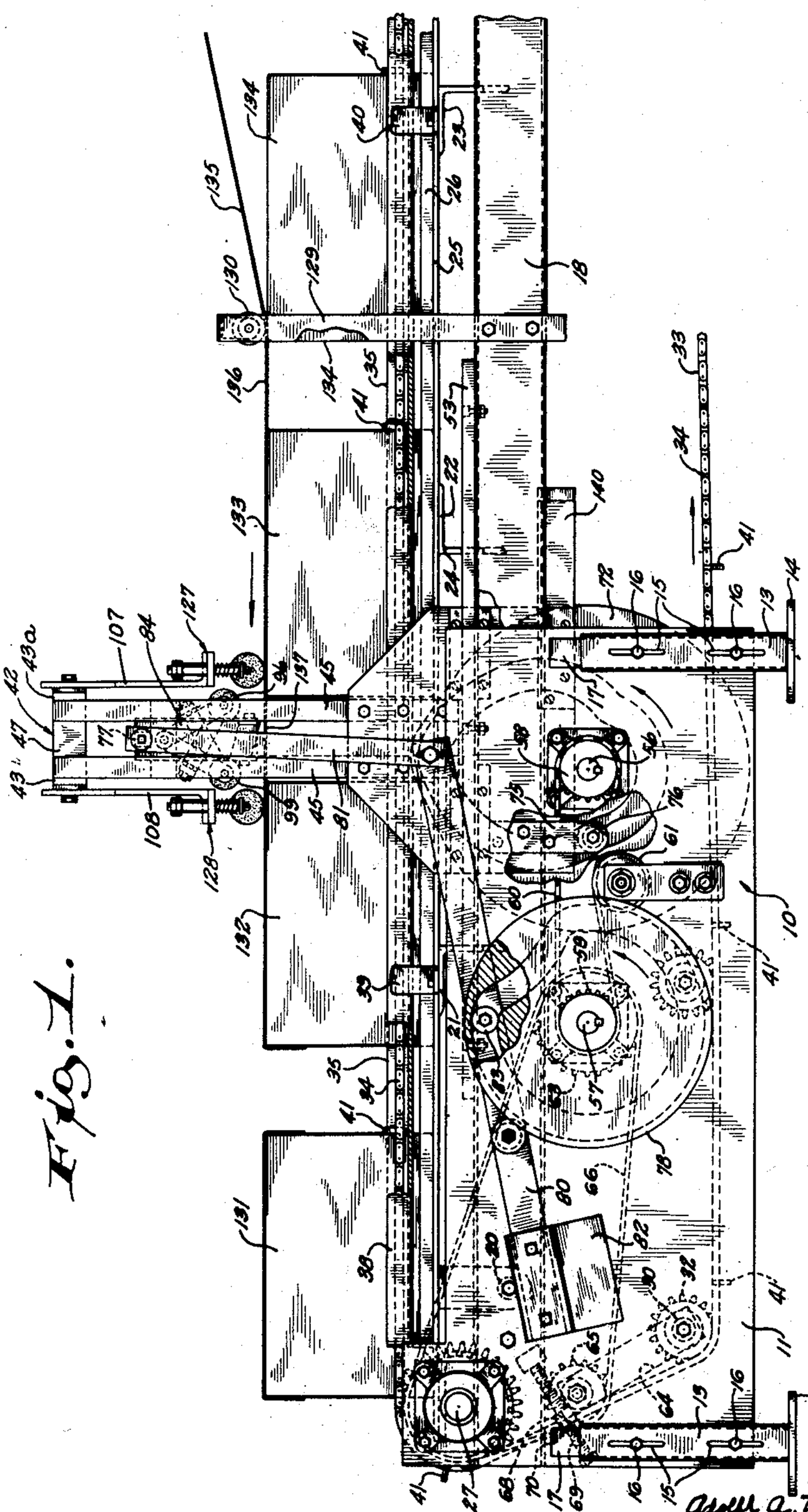

Fig. 1.

INVENTORS
Adolph J. Wagner,
Arnold J. Wagner &
William R. Ross
BY
Morsell & Morsell
ATTORNEYS.

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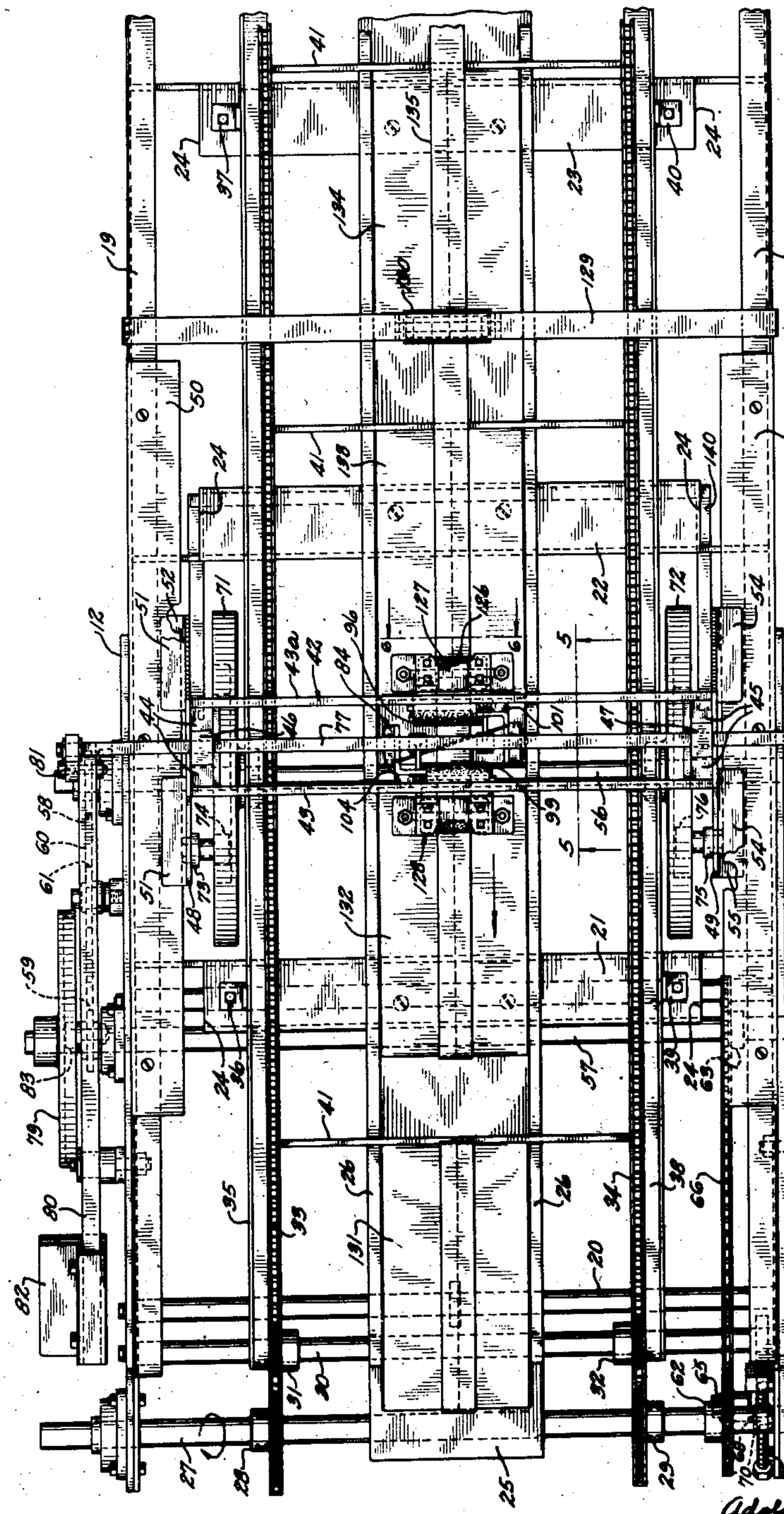
Fig. 2.



INVENTORS
Adolph A. Wagner,
Arnold J. Wehner &
William R. Ross

BY Morsell & Morsell
ATTORNEYS.

Sept. 29, 1953 A. A. WAGNER ET AL 2,653,727

TAPING MACHINE

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Fig. 3.

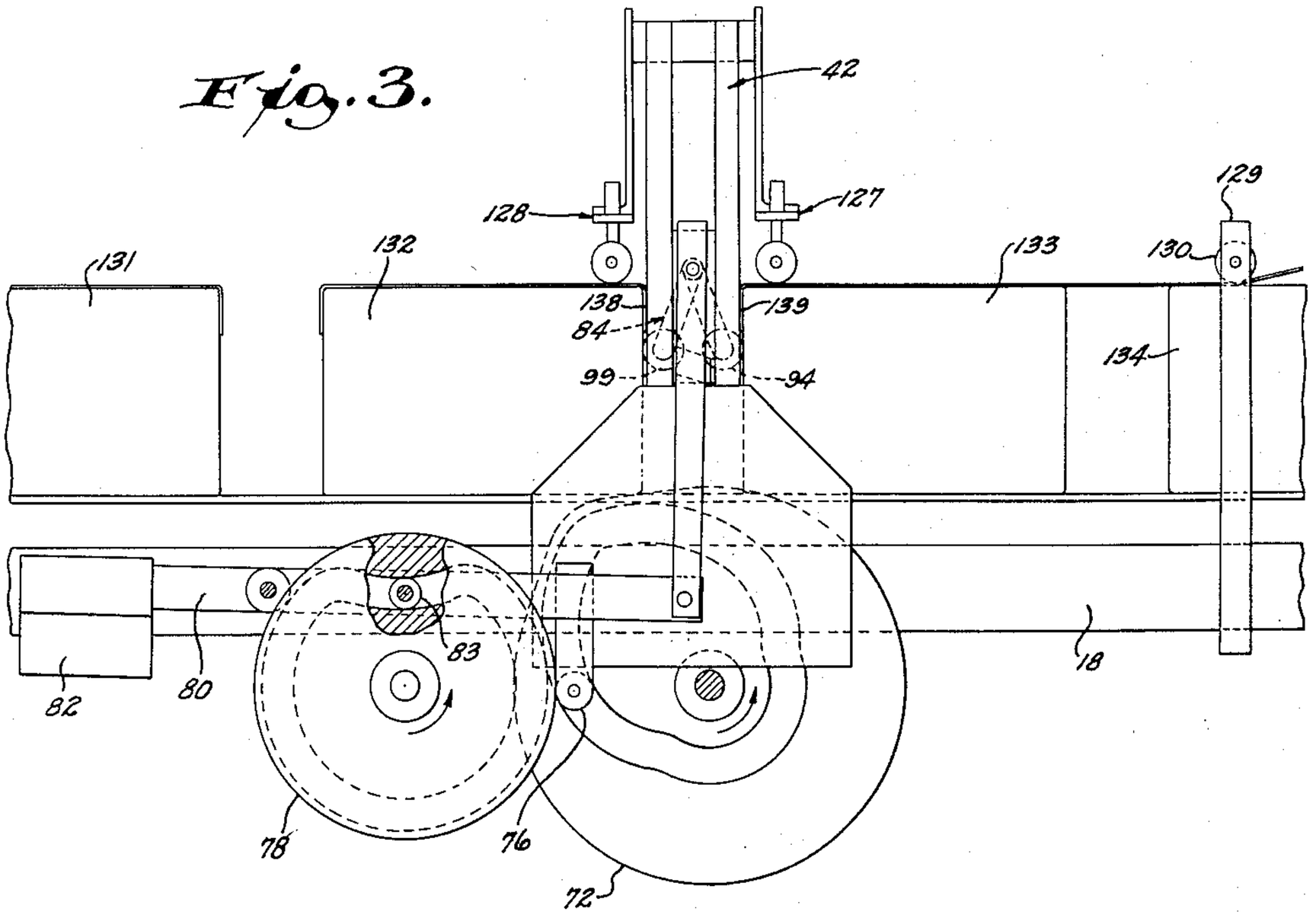
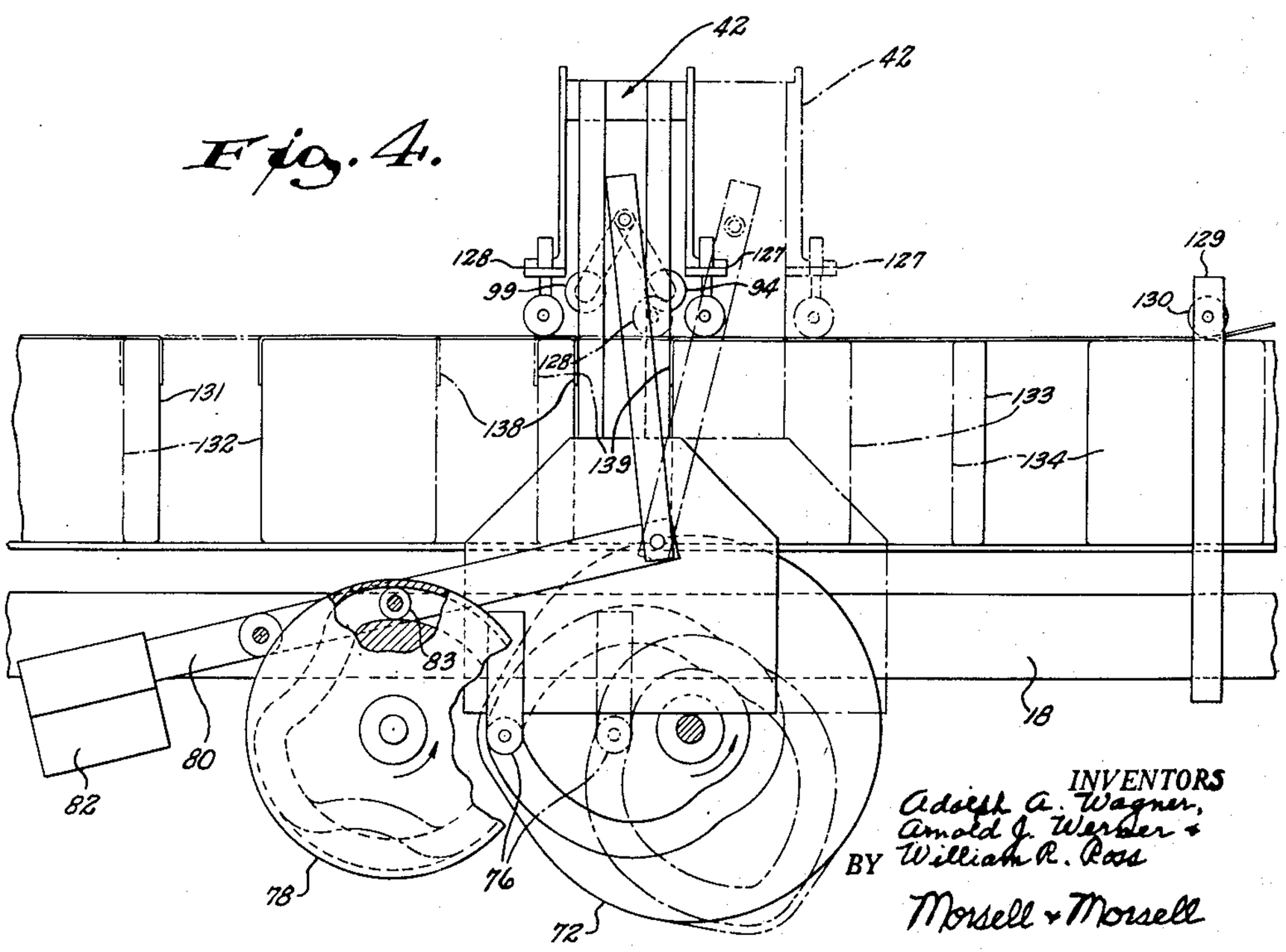


Fig. 4.



INVENTORS
Adolph A. Wagner,
Arnold J. Werber &
William R. Ross
BY Morsell & Morsell
ATTORNEYS.

Sept. 29, 1953 A. A. WAGNER ET AL 2,653,727

TAPING MACHINE

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Fig. 5.

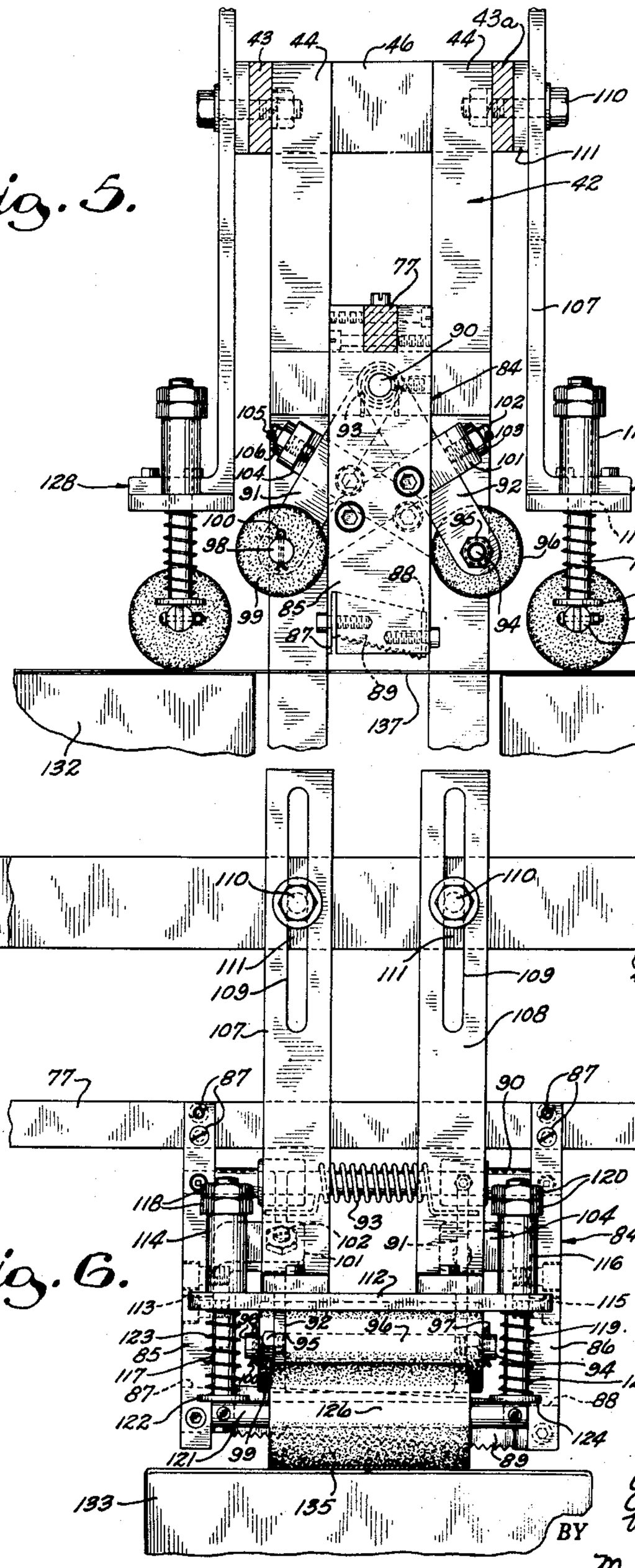

Fig. 6.

INVENTORS
Adolph A. Wagner,
Arnold J. Werber &
William R. Ross

BY

Morsell & Morsell

ATTORNEYS.

Sept. 29, 1953 A. A. WAGNER ET AL 2,653,727

TAPING MACHINE

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Fig. 7.

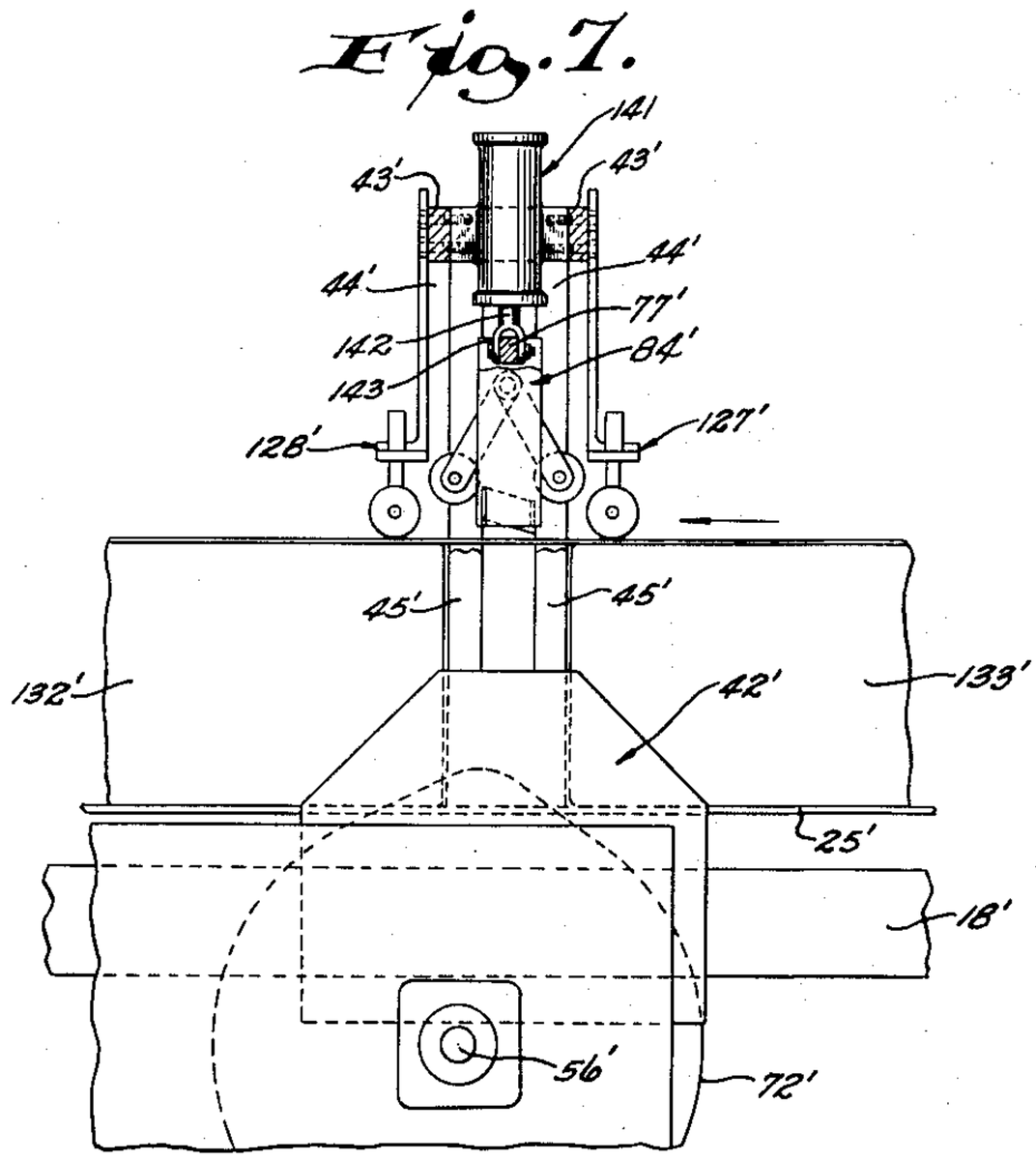
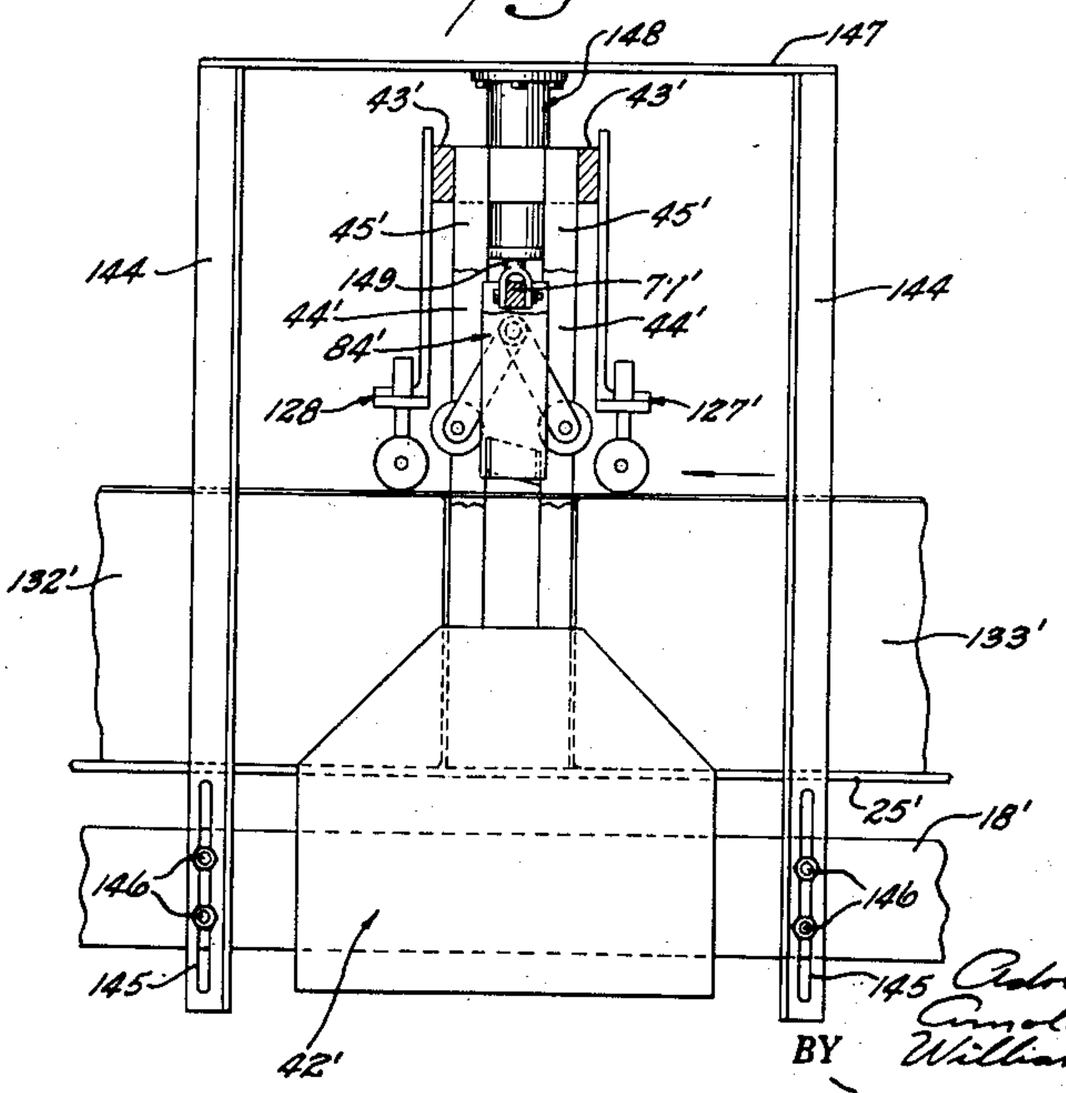


Fig. 8.



INVENTORS
Adolph A. Wagner
Arnold J. Werner
William R. Ross
BY Mosell, Mosell
ATTORNEYS.

Patented Sept. 29, 1953

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UNITED STATES PATENT OFFICE

2,653,727

TAPING MACHINE

Adolph A. Wagner, Milwaukee, Arnold J. Werner, Elm Grove, and William R. Ross, Milwaukee, Wis.

Application April 8, 1950, Serial No. 154,782

2 Claims. (Cl. 216—22)

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This invention relates to improvements in taping machines, and more particularly, to machines for tape sealing cartons.

In recent years it has become increasingly popular to package commodities in cartons formed of fibrous material such as those materials commonly known as fiber-board, kraft, corrugated cardboard, or the like. Many forms of canned and bottled goods are now being shipped in this type of carton which will hereinafter be referred to broadly by the term "fiber-board", it being understood that this term is meant to cover any of the above-mentioned materials or any equivalent material.

The fiber-board cartons of the type referred to are usually rectangular in shape and have foldable cover flaps forming extensions of the side and end walls thereof. It has been standard practice heretofore, after the carton is filled, to fold the end flaps of the carton inwardly toward each other into a common plane and to then fold the side cover flaps inwardly toward each other and into contact with the upper surfaces of the folded end cover flaps. The package was sealed by gluing the previously folded side cover flaps to the end cover flaps.

In manually opening a fiber-board carton of the type having its cover flaps sealed with glue in the manner just described, it is usually impossible to avoid tearing or cutting the cover flaps, thereby rendering the carton unfit for reuse.

With the above in mind, it is a general object of the present invention to provide an improved device for sealing fiber-board cartons having foldable cover flaps, said device sealing said cartons in a manner so that the cover flaps can be easily opened without any substantial damage thereto, thereby making reuse of said cartons possible and entirely feasible.

A further object of the invention is to provide an improved device of the class described having a single pair of spring loaded pressure rollers which are mounted for reciprocating movement longitudinally of the path of movement of the cartons moving through the machine, said rollers being operable to maintain a downward pressure on the end portions of the taped carton tops for a sustained predetermined period during movement in the same direction as said cartons and at the same speed, and said rollers contacting the intermediate portions of the taped carton tops during movement in a direction counter to the direction of movement of the cartons.

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A further object of the invention is to provide an improved device of the class described which is constructed in a manner to be readily adjustable for tape sealing cartons of various sizes.

A further object of the invention is to provide an improved taping machine of the class described wherein tape from a single roll is applied to the tops of cartons as said cartons are moved through the machine in equally spaced and alined relationship, said device having novel means for severing the tape between the moving cartons and for applying the severed ends of the tape sections to the end walls of the cartons.

A further object of the invention is to provide an improved device of the class described having a vertically reciprocating knife for severing the tape between adjacent cartons on a conveyor, said knife being disposed at an angle to the plane of the tape to insure a proper cutting rather than a breaking action.

A further object of the invention is to provide an improved machine of the class described having a pair of spring loaded rollers mounted for swingable movement as well as for vertical reciprocatable movement with the severing knife, said rollers being operable to apply the severed tape ends to the adjacent end walls of the cartons.

A further object of the invention is to provide an improved taping machine wherein the vertically reciprocating tape severing mechanism is actuated by a vertically reciprocating plunger mounted thereabove.

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 are shown three forms of the invention, and wherein the same characters of reference indicate the same parts in all of the views:

Fig. 1 is a fragmentary side view of the improved taping machine showing cartons positioned therein, parts being broken away and in section for clarity;

Fig. 2 is a fragmentary plan view of the improved taping machine shown in Fig. 1, parts being broken away;

Fig. 3 is a semi-diagrammatic side view, with parts broken away and in section, showing the relationship of the parts and the positions of the cartons when the cutter-head assembly is in its lowermost position;

Fig. 4 is a semi-diagrammatic side view simi-

lar to Fig. 3 showing the relationship of the parts and the positions of the cartons at two other intervals in a cycle of operation, parts being broken away and in section;

Fig. 5 is an enlarged fragmentary vertical sectional view taken approximately along the line 5—5 of Fig. 2;

Fig. 6 is an enlarged fragmentary vertical sectional view taken approximately along the line 6—6 of Fig. 2;

Fig. 7 is a fragmentary side elevational view of a modified form of the invention wherein the cutter head is actuated by a plunger mechanism mounted on a movable carrier, parts being broken away; and

Fig. 8 is a fragmentary side elevational view of a modified form of the invention having a stationary carrier and having a cutter head assembly actuated by a fixedly mounted plunger mechanism.

Referring to Figs. 1 and 2 of the drawings, it will appear that the improved taping machine has a frame indicated by the numeral 10. The frame 10 comprises a pair of spaced parallel rectangular vertical plates 11 and 12. Vertically adjustably connected to each of the plates 11 and 12 adjacent each end thereof is a depending leg 13 having a base plate 14. The legs 13 are slotted as at 15 to receive bolts 16. The legs 13 are channel shaped in cross section and fit around vertically extending bar members 17 which are fixed, as by welding, to the side plates 11 and 12. The bolts 16 are threaded into suitable apertures in the bars 17 to adjustably position the legs 13 to suit requirements. Fixed to the inner surface of the side plates 11 and 12 are a pair of elongated horizontally extending parallel channel members 18 and 19. The channel members 18 and 19 are positioned with their flanges extending inwardly toward each other.

A horizontally extending tie rod 20 is connected at its opposite ends to the side plates 11 and 12 as well as to the channel members 18 and 19. Extending between the channel members 18 and 19 and fixed, as by welding, at their opposite ends to said channel members 18 and 19 are transversely extending angle members 21, 22 and 23. The angle members 21, 22 and 23 have horizontally extending co-planar upper surfaces. These angle members are formed with cut-out portions adjacent each end, as at 24, to permit the ends of said angle members to be connected to the web portion of the channels 18 and 19 while permitting a substantial portion of said angle members to extend upwardly above the uppermost flange of said channel members, as shown. Extending longitudinally of the machine substantially midway between the side plates 11 and 12 and positioned on the upper surfaces of the angled members 21, 22 and 23 is an elongated horizontal plate 25. Fixed to the upper surface of the plate 25 adjacent each edge thereof is an elongated bar 26.

Journaled in suitable bearings adjacent the upper front (lefthand in Fig. 1) corners of the side plates 11 and 12, is a rotatable transversely extending shaft 27. Fixed on the shaft 27 are a pair of spaced sprockets 28 and 29 which are disposed on opposite sides of the plate 25 and inwardly of the side plates 11 and 12, as shown in Fig. 2. A tie rod 30 is positioned below and slightly rearwardly of the shaft 27 and extends transversely between the side plates 11 and 12, being connected to said plates at its opposite ends. Rotatably mounted on the tie rod 30 and aligned

in the same vertical planes with the sprockets 28 and 29 respectively, are a pair of idler sprockets 31 and 32. An endless chain 33 extends around the sprockets 28 and 31 and has an upper horizontal stretch which extends rearwardly parallel with the plate 25 to a drive sprocket (not shown). An endless chain 34 extends around the sprockets 29 and 32 and has an upper stretch which extends horizontally rearwardly to a drive sprocket (not shown) which is fixed to the same drive shaft as the drive sprocket for the chain 33. A drive shaft (not shown) is, in turn, driven by a suitable prime mover (not shown).

An elongated angle member 35 extends longitudinally of the machine and has a horizontal flange extending under the chain 33, said angle member having a vertical flange outwardly adjacent the chain 33. The angle member 35 may be supported in spaced relation above the transverse angle members 21, 22 and 23 by suitable blackets, such as those shown at 36 and 37. The angle member 35 serves as a track in which the chain 33 can slidably travel in the event said chain becomes slack during use. An angle member 38 may be supported in spaced relation above the transverse angle members 21, 22 and 23 by suitable brackets 39 and 40 and is associated with the chain 34 in the same manner as the angle member 35 is associated with the chain 33.

Extending transversely between the endless chains 33 and 34 and connected at their opposite ends to said chains, are equally spaced conveyor flights 41. The flights 41 on the upper stretch of the chains 33 and 34 extend transversely above the plate 25 and the bars 26 thereon, as clearly shown in Fig. 1. The chains 33 and 34 are moved by their driving sprockets in a direction to cause the upper stretches to move from the rear forwardly (from right to left, as shown in Figs. 1 to 4).

The numeral 42 indicates a generally inverted U-shaped vertical carrier structure which extends transversely of the machine and is movable longitudinally thereof. The carrier 42 has a pair of spaced parallel transversely extending horizontal bars 43 and 43a which are fixed at one end to the upper ends of spaced parallel vertically extending bars 44. The bars 43 and 43a are connected at their opposite ends to the upper ends of a pair of spaced parallel vertically extending bars 45. The bars 44 are joined at their upper ends by a block 46, and the bars 45 are joined at their upper ends by a block 47 (see Fig. 2). At their lower ends, the bars 44 are fixed to a longitudinally extending vertical plate 48, and the bars 45 are fixed at their lower ends to a longitudinally extending vertical plate 49. Extending horizontally rearwardly from the plates 48 and 49 are the legs of U-shaped horizontally extending reinforcing member 140 which rigidly connects the plate 48 to the plate 49.

Fixed to the upper surface of the channel 19 is an elongated bar 50 which projects inwardly beyond the inner edge of the upper flange of the channel 19, as shown in Fig. 2. The plate 48 is spaced a predetermined distance inwardly of the bar 50, and fixed to the plate 48 are a pair of slide bearing blocks 51 which slidably support one end of the carrier 42 on the bar 50. A pair of slide bearing blocks 51 are fixed to the plate 49 and slidably engage the underside of the bar 52.

An elongated slide bar 53, similar to the bar 50, is fixed to the upper surface of the side channel 18, as shown. The vertical plate 49 is spaced a predetermined distance inwardly of the bar 53

and has fixed thereto a pair of bearing blocks 54 which slidably support the end of the carrier 42 adjacent the plate 49, on the slide bar 53. The blocks 54 are similar to the blocks 51, and a pair of slide blocks 55 are fixed to the plate 49 for slidable engagement with the underside of the bar 53. It is apparent that the slide blocks 51 to 54 and the bars 50 and 53 provide a slidably movable, yet firm, support for the carrier 42.

Journalled in suitable bearings on the plates 11 and 12, and intermediate the length of the slide bars 50 and 53, is a transverse rotatable shaft 56. Journalled in suitable bearings on the side plates 11 and 12 forwardly of the shaft 56 is a transverse rotatable shaft 57. Sprockets 58 and 58' are fixed to each of the outer ends of the shaft 56, and sprockets 59 and 59' are fixed to the shaft 57 outwardly of each of the plates 11 and 12. The sprockets 58 and 59 are connected by endless chains 60 which may have their lower stretches travelling over idler rollers 61 mounted on the outer surfaces of the plates 11 and 12, as shown in Figs. 1 and 2.

Fixed to the shaft 27 between the plate 11 and the sprocket 29 is a sprocket 62, and fixed to the shaft 57 in alinement with the sprocket 62 is a sprocket 63. Pivotally mounted at one end on the tie rod 30 between the plate 11 and the sprocket 32 is an arm 64 having rotatably mounted at its outer end a sprocket 65 which is in alinement with the sprockets 62 and 63. An endless chain 66 extends around the sprockets 62, 63 and 65 to provide a drive for the shafts 57 and 56.

Projecting inwardly from the plate 11 adjacent the sprocket 65 is a block 67, and fixed, as by welding, to the free end of the arm 64 is a nut 68. An adjustment bolt 69 is threaded through the nut 68 and has its end in abutment with the block 67. By tightening the bolt 69 the nut 68 may be urged away from the block 67 and the sprocket 65 can be thus moved in a chain tightening direction. A jamb nut 70 is provided on the bolt 69 adjacent the nut 68 to lock the bolt 69 in a desired position of adjustment.

Fixedly mounted on the shaft 56 inwardly of the plates 48 and 49 are a pair of cam members 71 and 72 which have cam grooves formed in their outer faces. Depending from the plate 48 adjacent the front end thereof is a bar 73 having rotatably mounted at its lower end a cam roller 74 which extends horizontally into the groove of the cam 71. A bar 75 depends from the forward end portion of the plate 49 and carries at its lower end a rotatable cam roller 76 which extends horizontally into the groove of the cam 72.

The cam members 71 and 72 are provided with identical cam grooves, said grooves each having a portion of constant radius, a portion of increasing radius, and a portion of decreasing radius, as shown in Figs. 1, 3 and 4. It is apparent that rotation of the cams 71 and 72 in the direction indicated by the arrows in Figs. 1, 3 and 4 cause movement of the carrier 42 to the left as the followers 74 and 76 follow the portion of increasing radius of the cam grooves.

Upon reaching the portion of maximum radius of the cam grooves, the rollers 74 and 76 follow the portions of decreasing radius of the cam grooves, and the carrier is thereby moved back toward its original position. When the followers 74 and 76 leave the portions of decreasing radius of the cam grooves and enter the portions of the constant radius, the carrier 42 is held in the position shown in Fig. 1, until the followers 74 and 76 again move into the portions of increasing radius, at which time a new cycle of reciprocation is begun. The cam grooves are of such conformation that when the followers 74 and 76 are travelling in the portions of increasing radius thereof, the carrier 42 is moved in the same direction as the upper stretches of the chains 33 and 34, and for a predetermined distance is moved at substantially the same speed as said chains.

Extending transversely of the machine between the vertical rods 44 and the vertical rods 45, and projecting outwardly beyond the side plates 11 and 12, is a bar 77. The bar 77 is mounted in suitable slide blocks which are interposed between the bars 44 and between the bars 45, and which are in slidable contact with the opposed surfaces of said bars.

Mounted on the outer ends of the shaft 57 are a pair of cam members 78 and 79. The cam members 78 and 79 are each formed with a cam groove on its inner face, the major portion of each cam groove having a constant radius and the remaining portion of said cam groove having a shorter radius as is clearly shown in Fig. 1.

A pair of levers 80 are pivotally mounted intermediate their length on the outer surfaces of the side plates 11 and 12. The levers 80 are movable in a vertical plane inwardly of the cams 78 and 79 and have their rear ends pivotally connected to the outer ends of the transverse bar 77 through links 81. The transverse bar 77 carries intermediate its length a cutter head assembly 84 to be described hereinafter. Suitable counter weights 82 may be attached to the forward ends of the levers 80 to counter-balance the forces urging the opposite ends of said levers downwardly.

Carried by the levers 80 above the shaft 57 is a rotatable cam following roller 83 which extends horizontally into the groove of the cam 78, as is clearly shown in Fig. 1. It is apparent that rotation of the cams 78 and 79 in the direction indicated by the arrow in Fig. 1 causes a relatively rapid lowering of the rod 77 followed by an equally rapid raising of said rod to its original level. It is also apparent that the rod 77 will be thereafter held at its original level until the completion of one revolution of the cams 78 and 79.

Referring now to Figs. 5 and 6, the numeral 84 indicates a cutter head assembly which is carried by and depends from the transverse bar 77 at a point intermediate its length. The cutter head assembly 84 is comprised of a pair of spaced parallel vertical bars 85 and 86 which are rectangularly recessed at their upper ends to receive the bar 77 and which are fixed to the bar 77 by means of suitable screws 87 (see Fig. 6). Formed in the bottom surface of the bar 85 adjacent its forward end is a vertical blade-receiving slot 87, and formed in the lower surface of the bar 86 adjacent the rear end thereof is a vertical blade-receiving slot 88. A cutter blade 89, preferably having a serrated lower edge, is removably fixed at one end in the slot 87 and is removably fixed at its other end in the slot 88.

The end of the blade in the slot 87 is higher than the opposite end of said blade, thereby causing the lower edge of said blade to be disposed at an angle to horizontal as shown in Figs. 5 and 6. In addition, the slots 87 and 88 position the blade 89 so that it extends diagonally between the bars 85 and 86 rather than parallel with the bar 77.

Referring to Fig. 6, it will be noted that fixedly mounted in suitable apertures in the bars 85 and 86 and positioned adjacent and parallel with the bottom of the transverse bar 77, is a shaft 90.

Pivotally mounted on the shaft 90 are a pair of spaced arms 91 and 92. The arm 92 is positioned adjacent the bar 85 and the bar 91 is positioned adjacent the bar 86. A helical spring 93 is positioned around the shaft 90 and has one end extending through a suitable aperture in the arm 92. The opposite end of the spring 93 extends through a suitable aperture in the arm 91, and said spring urges the arms 91 and 92 in opposite directions away from each other.

The free end of the arm 92 is apertured to threadedly receive one end of a shaft 94 which extends substantially parallel with the shaft 90. A lock nut 95 locks the shaft 94 to the arm 92. Rotatably mounted on the shaft 94 is a cylindrical roller 96 of sponge rubber or other suitable material. The roller 96 is maintained on the shaft 94 by any suitable means such as a cotter key 97 extending through a suitable aperture in the end of said shaft.

The end of the arm 91 is apertured to threadedly receive a shaft 98 in the same manner as the shaft 94 is carried by the arm 92. A cylindrical roller 99, similar to the roller 96, is rotatably mounted on the shaft 98 and is held on said shaft by any suitable means such as the cotter key 100 which extends through a suitable aperture in the opposite end of said shaft. Fixed to the bar 85 is an angularly disposed L-shaped bracket 101 having a portion projecting over the arm 92. A set screw 102 is threaded through the bracket 101 and has one end in abutment with the arm 92, as shown, to limit the movement of said arm and of the roller 96. The adjustment screw 102 is provided with a lock nut 103.

Fixed to the bar 86 is an angularly disposed L-shaped bracket 104 having a portion projecting over the arm 91. A set screw 105 is threaded through the bracket 104 and has an end in abutment with the arm 91 to limit the movement of said arm and of the roller 99. The adjustment screw 105 is provided with a lock nut 106. It is apparent that the spring 93 urges the arms 91 and 92 into contact with the adjustment screws 105 and 102, respectively, and that when said arms are moved toward each other the spring 93 is subjected to deformation.

A pair of parallel L-shaped members 107 and 108 each having an elongated leg and a relatively short leg, are formed with elongated slots 109 adjacent the end of the elongated legs thereof. The members 107 and 108 are connected to and depend from a central portion of the rearward transverse bar 43 of the carrier 42. Bolts 110 project through the slots 109 and are threaded into the bar 43. A spacer block 111 spaces each of the members 107 and 108 from the bar 43, as shown, and the bolts 110 extend through said blocks. The members 107 and 108, because of their position substantially midway of the length of the bar 43, are rearwardly adjacent the cutter-head assembly 84.

Bolted to the undersides of the short arms of the members 107 and 108 is a transversely extending horizontal plate 112. The plate 112 is formed with an aperture 113 therethrough between the member 107 and the adjacent end of said plate. Preferably fixed to the upper surface of the plate 112 in registration with the aperture 113 is a vertically extending sleeve 114 having a bore of substantially the same diameter as that of the aperture 113. The plate 112 is formed with an aperture 115 therethrough positioned between the member 108 and the adjacent end of said plate. A vertically extending sleeve 116, having a bore diameter substantially equal to that of the aperture 115 is preferably fixed to the upper surface of the plate 112 in registration with the aperture 115.

A round shaft 117 is slidably positioned in the sleeve 114 and in the aperture 113 and projects downwardly below the plate 112. The upper end of the shaft 117 is threaded to receive a pair of nuts 118 which abut the upper end of the sleeve 114. A round shaft 119 is positioned in the sleeve 116 and in the aperture 115 and projects below the plate 112. The shaft 119 has its upper end threaded to receive a pair of nuts 120 which abut the upper end of the sleeve 116. Connected at its opposite ends to the lower ends of the shafts 117 and 119, is a transversely extending horizontal shaft 121. A washer 122 is positioned around the shaft 117 and rests on the shaft 121, as shown, and a helical compression spring 123 is positioned around the shaft 117 between the washer 122 and the plate 112. A washer 124 is positioned on the shaft 119 and rests on the shaft 121, as shown, and a helical compression spring 125 is positioned around the shaft 119 between the plate 112 and the washer 124. A cylindrical roller 126, of sponge rubber or other suitable material, is rotatably positioned on the shaft 121, as shown. It is apparent that the springs 123 and 125 urge the shafts 117, 119 and 121, along with the roller 126, downwardly to normally maintain the nuts 118 and 120 in abutment with the upper end of the sleeves 114 and 116 respectively.

For the purposes of brevity, the roller assembly supported by the members 107 and 108 is designated generally as the pressure roller assembly 127. A pressure roller assembly 128 which is substantially identical to the pressure roller assembly 127 is connected to and depends from the forward surface of the forward transverse bar 43, as shown in Figs. 1, 2 and 5. The pressure roller assembly 128 is longitudinally alined with the cutter-head assembly 84 and with the pressure roller assembly 127.

Fixedly connected to the longitudinal frame channels 18 and 19 and extending transversely above and across the longitudinal plate 25 at a point spaced rearwardly of the reciprocatable carrier 42, is an inverted U-shaped frame 129. The frame 129 rotatably supports a horizontal roller 130 in a position in longitudinal alinement with the cutter-head assembly 84 and the pressure roller assemblies 127 and 128, the roller 130 being spaced a predetermined distance above the plate 25.

Operation

In operation, the improved taping machine is installed in a conveyor system wherein a feed conveyor (not shown) delivers cartons to be taped onto the rear end of the plate 25, in longitudinal alinement. The flights 41 on the chains 33 and 34 engage the rear ends of said cartons and move said cartons along the plate 25 through the machine in equally spaced longitudinally alined relation. At the forward end of the machine, the cartons are discharged onto a suitable delivery conveyor (not shown). For the purpose of explanation, the cartons shown in all of the views are designated by the numerals 131, 132, 133 and 134.

A roll of adhesive tape, (not shown), such as gummed paper tape, is mounted on the improved machine above and rearwardly of the roller 130. An extent of tape 135 is led from said roll and

under the roller 130, which applies said tape to the tops of the cartons as said cartons move thereunder along the plate 25. The tape 135 is suitably moistened before it reaches the roller 130.

The cartons of the type sealed by the improved machine, are preferably those having foldable side and end cover flaps, and before said cartons are delivered onto the plate 25, said cover flaps are folded inwardly, as shown in Fig. 6, by conventional flap folding mechanisms (not shown). The flap folding mechanisms first fold the end flaps inwardly and then fold the side flaps inwardly, the inner edges of said side flaps meeting substantially along the longitudinal center line of the carton. As the tape 135 is applied to the tops of the cartons, it too is positioned substantially along the longitudinal center line of said cartons, thereby covering the line of juncture of the folded side flaps and sealingly connecting said side flaps together. The adhesion of the tape 135 to the tops of the moving cartons causes said tape to be drawn from its roll at a substantially constant speed equal to the speed of advancement of the cartons.

Referring to Figs. 1 and 2, it will be noted that the tape 135, as applied to the cartons adjacent the roller 130, extends from the top of one carton horizontally to the top of the next adjacent carton as shown at 136 and 137. The cutter head assembly 84 is designed to sever the tape 135 between each pair of adjacent cartons and to apply the severed ends of the tape to the adjacent end walls of the cartons. The pressure roller assemblies 127 and 128 firmly press down the cover flaps of the cartons adjacent the cutter-head assembly 84 so that the application of the severed adhesive tape ends to the end walls of the cartons results in said tape ends holding the cover flaps in the desired downwardly folded position. In addition, the pressure roller assemblies 127 and 128 insure firm adhesion of the tape 135 to the tops of the cover flaps by a rolling pressure contact on said tape between severing operations, as will be further described in detail hereinafter.

Figs. 1, 2, 5 and 6 show the cutter-head assembly, the carrier 42, and the cartons in position to being a cycle of operation. It will be noted that when the parts are in position to being a cycle the cutter-head and the carrier are longitudinally positioned substantially midway between the cartons 132 and 133. The carton 131 is shown as completely taped, and the carton 132 is shown as having the top and the forward end thereof taped. As the cycle begins, the prime mover (not shown), through the chains 33 and 34 and the flights 41, moves the cartons forwardly along the plate 25 at substantially constant speed. As the chains 33 and 34 are so moved, the cams 78 and 72 are rotated in the direction indicated by the arrows by the interconnecting chain drive provided by the chains 66 and 60. It will be noted that the cutter-head assembly 84 is spaced above the tape 135 at the point 137 in Figs. 1, 5 and 6.

As the cartons move forwardly toward the positions thereof shown in Fig. 3, the cam 72 maintains the carrier 42 and the pressure roller assemblies 127 and 128, as well as the cutter-head assemblies 84, in the same relative longitudinal position with respect to the cartons 132 and 133 as said parts had at the beginning of the cycle. However, as the cam 78 rotates from the position of Fig. 1 to the position of Fig. 3, the

follower 83 moves to the portion of the groove of said cam having a reduced radius. This causes the lever 80 to pivot in a clockwise direction, as viewed in Figs. 1 and 3, and the cutter-head assembly is thereby drawn vertically downwardly relative to the carrier 42 to the position thereof shown in Fig. 3. As the cutter-head assembly 84 so moves, the blade 89 thereof severs the tape along a diagonal transverse line.

The angularity of the cutting edge of the blade 89 with respect to the horizontal plane of the tape 135 causes the blade 89 to begin the severance at one edge of the tape 135, said severance progressing transversely as the blade moves downwardly without any tendency to break the tape. Further downward movement of the cutterhead 84 causes the rollers 96 and 99 to engage the tape 135 at the upper forward corner of the carton 133 and at the upper rear corner of the carton 132, respectively. It should be noted at this point that the pressure roller assemblies 127 and 128 maintain a constant downward pressure on the upper surface of the tape 135 on top of the cover flaps at the rear end of the carton 132 and at the forward end of the carton 135 throughout the portion of the cycle so far described. Further downward movement of the cutter-head 84 causes the rollers 96 and 99 to be squeezed toward each other and to move into rolling contact with the end walls of the cartons 133 and 132 respectively. As the rollers 96 and 99 move into said rolling contact, they also roll the severed ends of the tape 135 into adhesive contact with the end walls of the cartons 133 and 132. Fig. 3 shows the cutter-head assembly 84 in its lowermost position after having severed the tape 135 and after having applied the severed ends 138 and 139 of said tape to the adjacent end walls of the cartons 132 and 133 respectively.

It will be noted by a comparison of Figs. 1 and 3 that during movement of the parts of the improved machine from the positions in Fig. 1 to their positions in Fig. 3, the cartons were moved forwardly by the flights 41. This is most clearly seen by reference to the position of the carton 134. In Fig. 1, the forward end wall of said carton is even with the forward edge of the bracket 129, whereas in Fig. 3 the forward end wall of said carton is spaced a substantial distance forwardly of the bracket 129.

Continued operation of the improved machine moves the carrier at the same speed and in the same direction that the cartons are moved. It is apparent, therefore, that the pressure roller assemblies 127 and 128 maintain a constant downward pressure on the tape 135 at the rear end of the cover of the carton 132 and at the forward end of the carton 133 during the entire period in which the cartons are moved from their positions shown in Fig. 1 to the positions thereof shown in solid lines in Fig. 4.

During this movement, the lever 80 is pivoted by the cams 78 and 79 and cam followers 83 in a counter-clockwise direction, thereby moving the cutter-head assembly 84 upwardly. As the cutter-head 84 so moves, the rollers 94 and 99, being urged against the cartons 133 and 132 by the spring 93, firmly roll the tape ends 138 and 139 against the ends of the cartons 132 and 133 to insure positive adhesion of said ends to said carton end walls. Since the end portions of the carton cover flaps are firmly held in downwardly folded position by the pressure roller assemblies 127 and 128 during the entire cycle of vertical movement of the cutter-head 84, firm adhesion

of the tape ends 138 and 139 is insured, and the cover flaps are thereafter firmly held in proper downwardly folded position by the tape. Application of the severed tape ends to the cartons while the cover flaps are so held avoids the possibility of said cover flaps springing upwardly and loosening said tape ends before the adhesive thereof becomes set. The carton 132, in Fig. 4, is completely tape sealed.

Continued operation of the improved taping machine moves the parts from the solid line positions of Fig. 4 to the dot and dash line positions in said figure. During this movement, the followers 74 and 76 travel in the portions of decreasing radius of the grooves of said cams and the carrier 42 is thereby moved rearwardly to its position shown in Fig. 1. The lever 80 and the cutter-head assembly 84 are not moved vertically as a result of rotation of said cams.

During movement of the parts from the solid line position of Fig. 4 the cartons are moved forwardly (to the left) at their normal constant speed, and the carrier 42 is moved rearwardly. The pressure roller assemblies 127 and 128, during this movement, maintain their normal downward pressure on the tape applied to the folded cover flaps of the cartons and rollingly engage the intermediate portions of the same to insure firm adhesion of said portions of the tape to the folded cover flaps of the carton.

Continued operation of the improved taping machine causes the cams 78 and 79 and 71 and 72 to rotate to their positions shown in Fig. 1, at which time a new taping cycle is begun. No movement is imparted either to the carrier 42 or to the cutter-head assembly 84 as said cams rotate to complete the cycle.

During movement of the parts to the positions shown in Fig. 1, however, the cartons are moved forwardly at their normal constant speed, and the carton 133 is moved to the position of the carton 132 shown in Fig. 1. As the carton 133 is moved underneath the carrier 42 and the pressure rollers assemblies 128 and 127, the roller of each of said assemblies rollingly contacts, with a firm downward pressure, the entire length of tape 135 applied to the top of the carton 133. In addition, during this movement the roller of the assembly 127 rollingly contacts with a firm downward pressure, the tape applied to the forward end portion of the top of the folded cover flaps of the carton 134. The machine at this point is ready to begin a new cycle in which the tape 135 is severed between the cartons 133 and 134 and the severed ends are applied to the adjacent end walls of said cartons in the same manner as the portions 138 and 139 were applied to the adjacent end walls of the cartons 132 and 133.

The improved taping machine is adapted for use in taping cartons of different heights. For example, if cartons of smaller height than cartons 131 to 134 are to be taped, it is only necessary to loosen the nuts 110 and to slide the pressure roller assemblies 127 and 128 to a correspondingly lower position wherein they can apply the desired pressure to the tops of the smaller sized cartons. The nuts 110 are then, of course, tightened to secure the pressure roller assemblies in the desired lower position.

The improved taping machine provides a means for efficiently and positively tape sealing cartons. To open a carton sealed by the improved machine, it is only necessary to slit the tape longitudinally at the juncture of the cover flaps and transversely at the edges of said cover flaps at each end of the carton. The cover flaps may then be readily opened to provide access to the interior of the carton. A carton opened in this manner is not damaged in any way, and unless mistreated, can be reused several times. When the taped carton is used for beer, said carton, upon being returned to the brewery with empty bottles therein, may be refilled with full bottles and be again tape sealed for shipment.

Figs. 7 and 8 show modified forms of the invention having embodied therein a power plunger for actuating the vertically reciprocatable cutter head. It will be noted that the cam and lever mechanism embodied in the principal form of the invention to vertically reciprocate the cutter head is eliminated in the form of the invention shown in Fig. 7. In Figs. 7 and 8 the parts of the machine which are substantially identical with analogous parts of the principal form of the invention are indicated by the same reference characters primed.

In the form of the invention shown in Fig. 7 a power plunger mechanism 141, which is preferably a double-acting air pressure operated ram (but which may be any equivalent mechanism such as another form of fluid pressure operated ram, or a solenoid) is fixed to the transverse bars 43' above the cutter head 84'. The mechanism 141 is provided with an axially reciprocatable rod or plunger 142 and is positioned with the axis of the plunger 142 extending vertically. The free end of the plunger 142 may be bifurcated, as at 143, and said end is connected to the transverse bar 77' on which the cutter head 84' is mounted, as shown. Suitable fluid or electrical connections (not shown) as well as suitable switches and/or valves (also not shown) are provided to control the operation of the cutter head 84' and to synchronize the operation thereof with the movement of the cartons.

Fig. 8 discloses a form of the invention which is adapted for use with a conveyor system on which the cartons are moved relatively slowly. In the machine shown in Fig. 8 the carrier 42' is fixedly mounted on the frame members 18' and 19', and therefore, the cam mechanism for horizontally reciprocating the carrier 42 of the principal form is eliminated. A pair of spaced parallel upright structural members 144 are preferably slotted at their lower ends, as at 145, and are bolted through said slots to each of the main frame side members 13' and 19' as by bolts 146. At their upper ends, the members 144 support a transverse member 147 which may take the form of a plate.

A power plunger mechanism 148 is fixed at its upper end to the plate 147, as by bolting. The plunger mechanism 148 is similar to the power plunger mechanism 141, and is mounted with its axially movable plunger or rod 149 positioned for vertical movement. The plunger 149 is connected to the transverse bar 77' for vertically reciprocating said bar and the cutter head 84'. Suitable fluid or electrical connections (not shown), as well as suitable switches and/or valves are provided to control the operation of the power plunger mechanism 148 and of the cutter head 84'.

When it is desired to adjust the machine of Fig. 8 to adapt it for use on boxes of smaller or larger sizes, the vertical position of the ram mechanism 148 can be adjusted readily. All that need be done to accomplish this is to loosen the bolts 146 on each of the upright members 144, move said uprights to the desired position, and then

tighten the bolts 146. The pressure roller assemblies 127' and 128' may be vertically adjusted in the same manner as the assemblies 127 and 128 of the principal form of the invention.

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 we claim is:

1. In a taping machine having a conveyor for moving spaced, alined cartons longitudinally through said machine and having means for applying tape to the tops of said cartons as said cartons are moved forwardly through said machine; a carrier longitudinally reciprocatably mounted on said machine and including a head reciprocatable at right angles to the path of travel of the carriers; carrier actuating mechanism connected to said conveyor in timed relationship in a manner to move said carrier rearwardly to a predetermined position relative to a pair of successive cartons on said conveyor and to move said carrier forwardly with and at the same speed as said conveyor for a predetermined distance; pressure members mounted on said head to deflect and press the cut ends of tape against the ends of adjacent cartons; and additional spaced pressure members mounted on said carrier in positions to continuously engage tape applied to the tops of the adjacent end portions of said pair of successive cartons at all times that said carrier is in said predetermined position and throughout the forward movement of said carrier.

2. In a taping machine having a conveyor for moving spaced, alined cartons longitudinally through said machine and having means for applying tape to the tops of said cartons as said cartons are moved through said machine; a carrier disposed adjacent the course of travel of cartons on said conveyor; a movable cutting head including a tape severing knife and spaced end-sealing pressure members flanking said knife mounted on said carrier for movement thereon transversely to the course of travel of cartons on said conveyor; cutting head actuating mechanism connected to said conveyor in timed relation therewith operative to cause said cutting head to move between cartons to cut said tape and press the cut ends of said tape against the adjacent carton ends when said cutting head is alined with a space between adjacent cartons; additional spaced pressure members more widely spaced than said first mentioned pressure members disposed on said carrier on opposite sides of said knife; and mounting means engaging said additional pressure members for maintaining the longitudinal spacing between said additional pressure members and said knife constant and for supporting said additional pressure members in position to be engageable with and to apply downward pressure simultaneously against tape applied to the top of the rear-end portion of one carton and tape applied to the top of the forward end portion of the rearwardly adjacent carton when said carrier is in a position between said cartons.

ADOLPH A. WAGNER.
ARNOLD J. WERNER.
WILLIAM R. ROSS.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,052,903	Stagmeier	Sept. 1, 1936
2,083,257	Dyment	June 8, 1937
2,087,472	Dyment	July 20, 1937