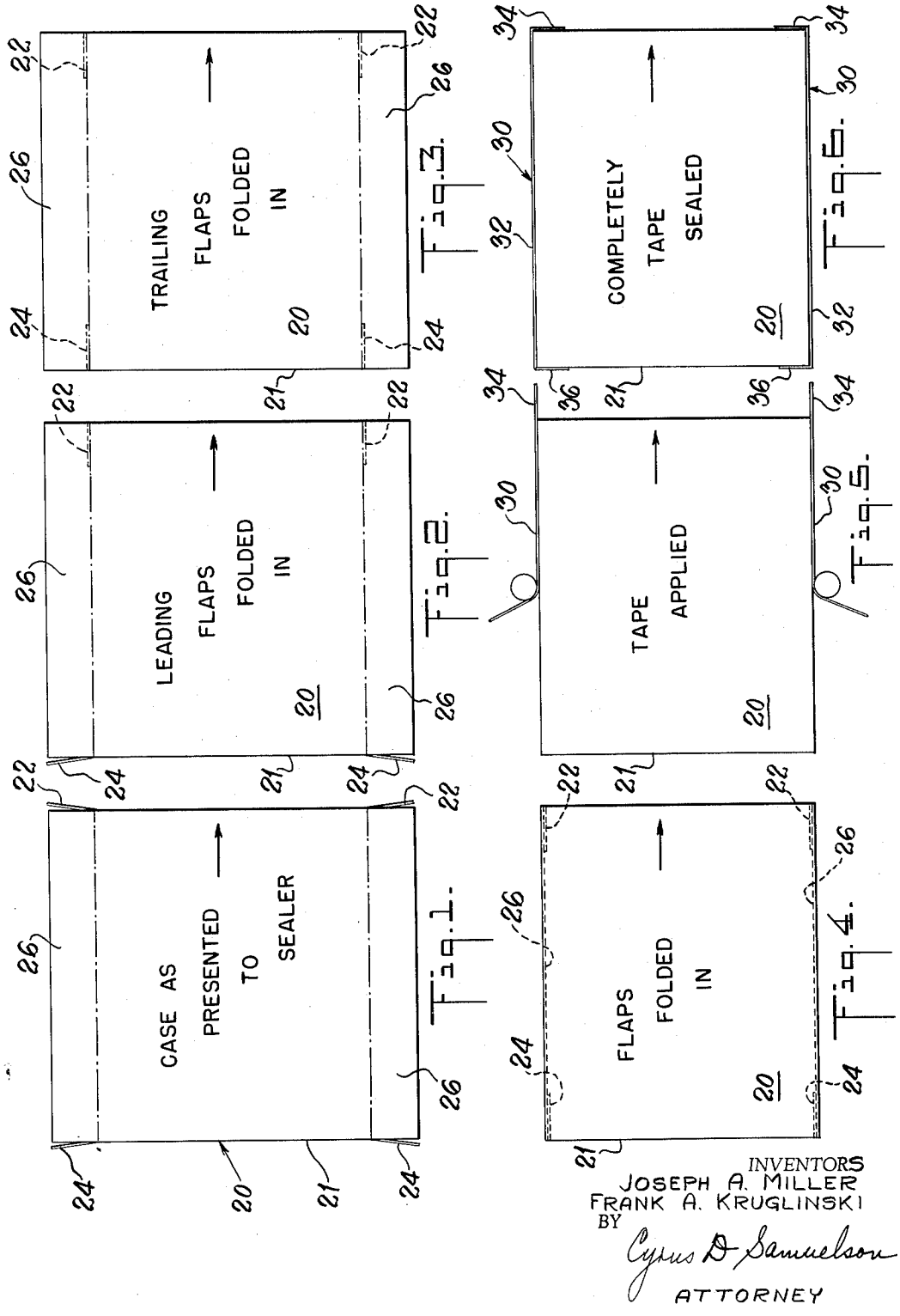
May 31, 1966 J. A. MILLER ETAL 3,253,383

CASE SEALER FOR HORIZONTALLY LOADED CASES

Filed April 19, 1963 7 Sheets-Sheet 1



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CASE SEALER FOR HORIZONTALLY LOADED CASES

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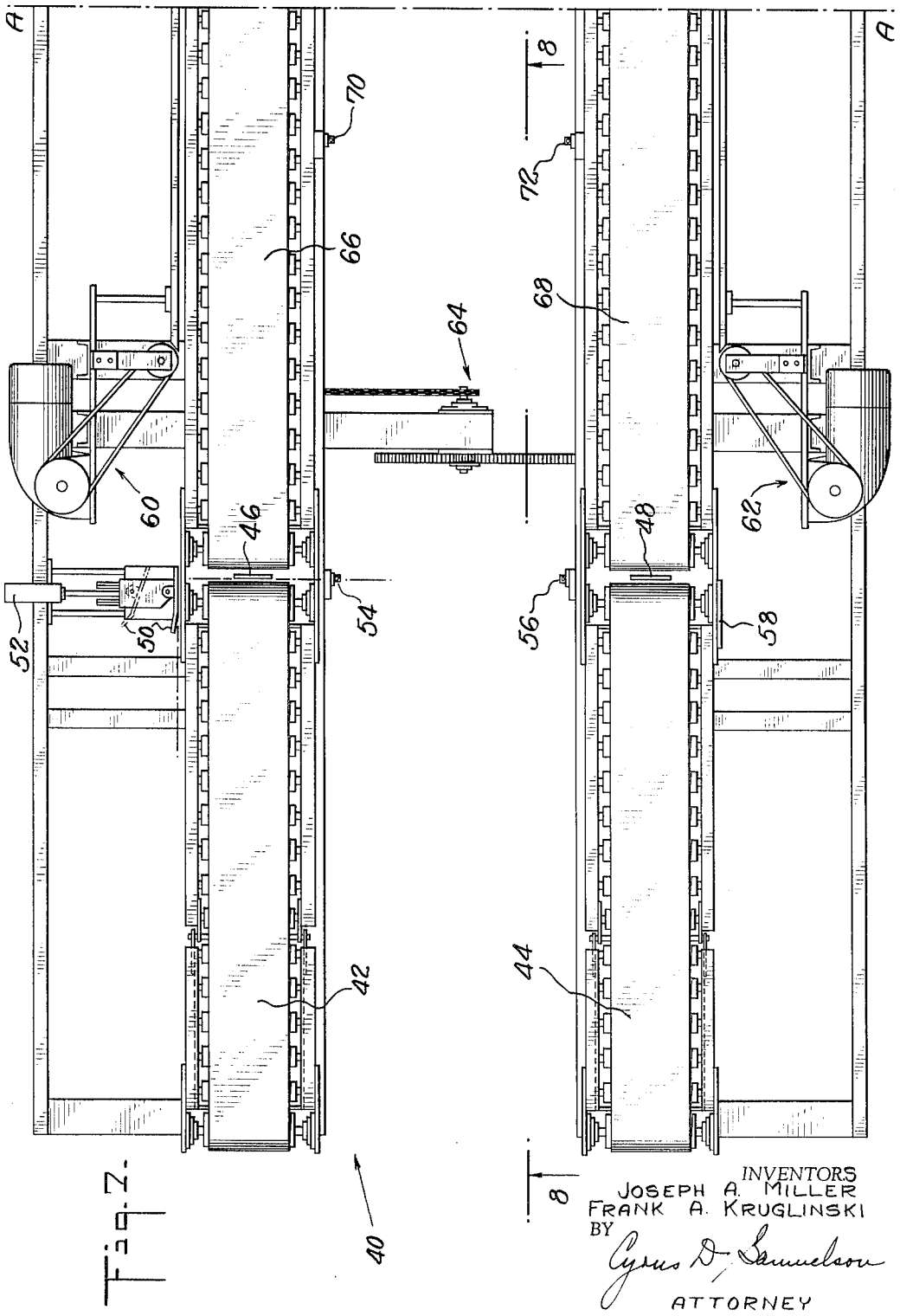


Fig. 7.

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CASE SEALER FOR HORIZONTALLY LOADED CASES

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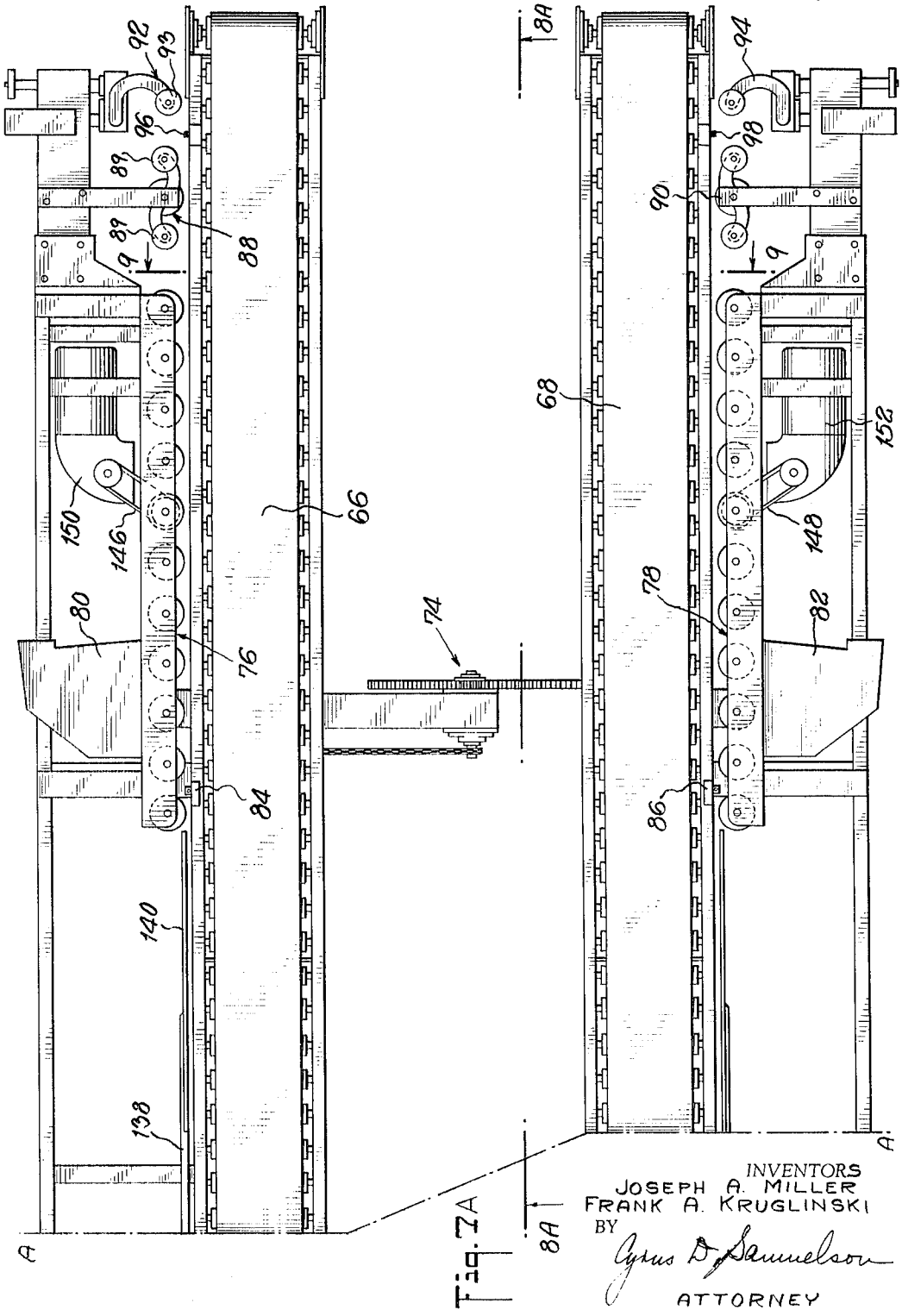


FIG. 7A

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CASE SEALER FOR HORIZONTALLY LOADED CASES

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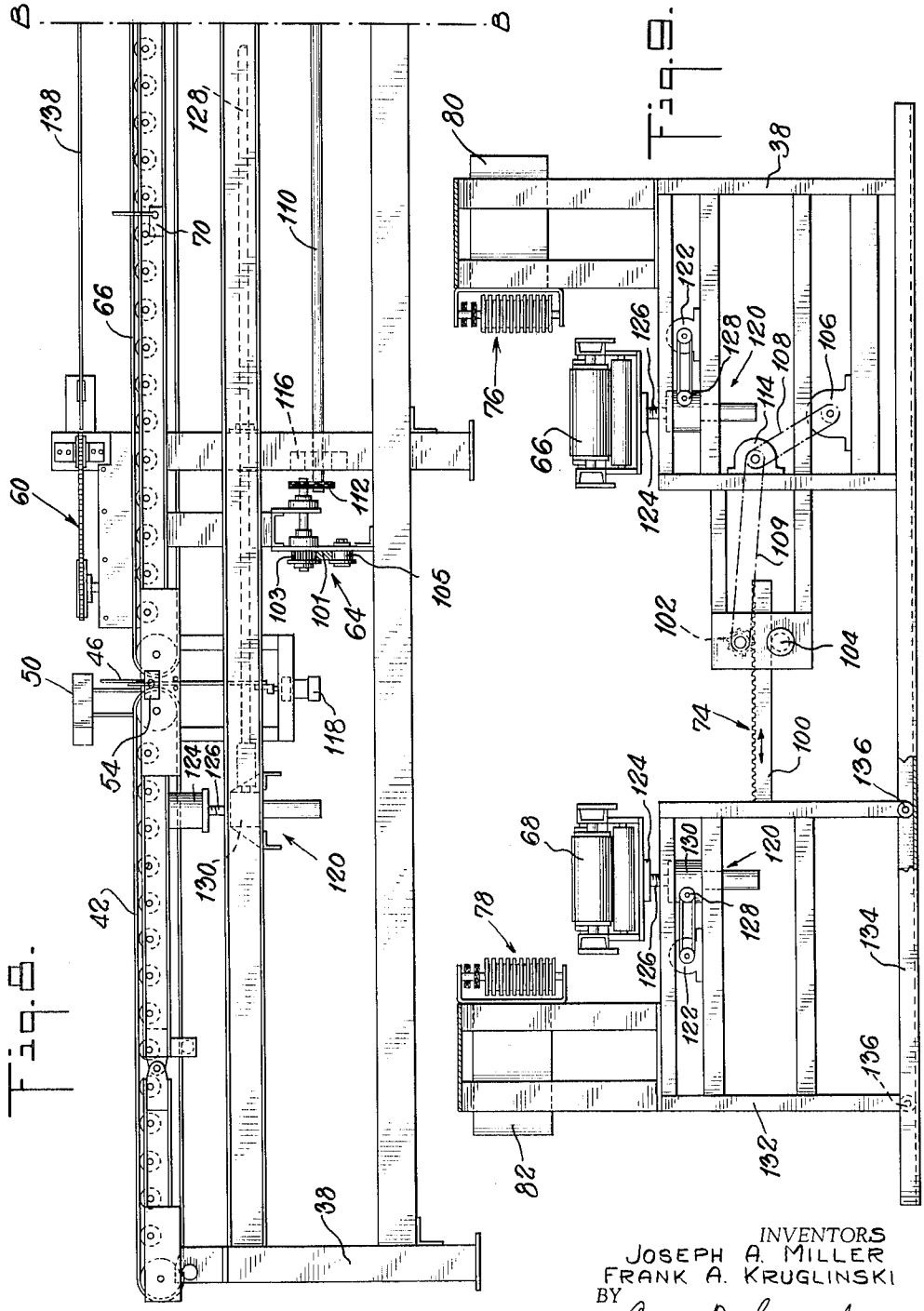


Fig. 8.

Fig. 9.

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CASE SEALER FOR HORIZONTALLY LOADED CASES

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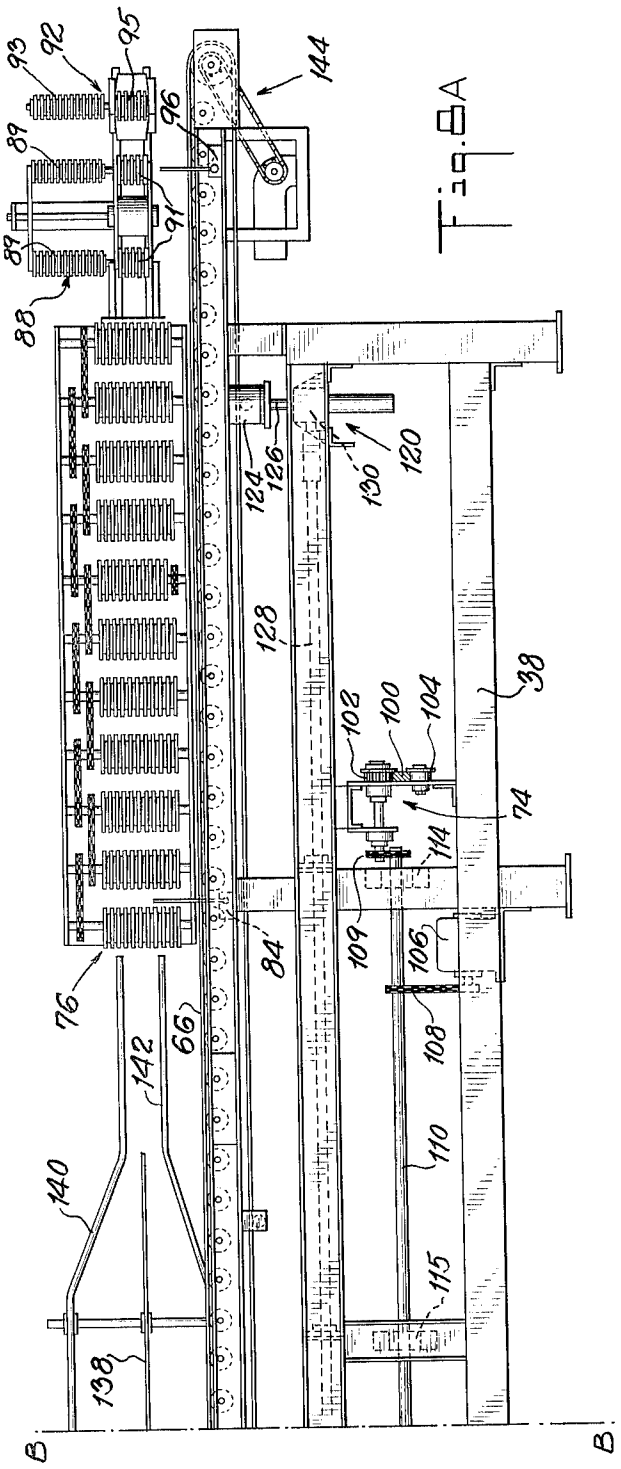


Fig. 8A

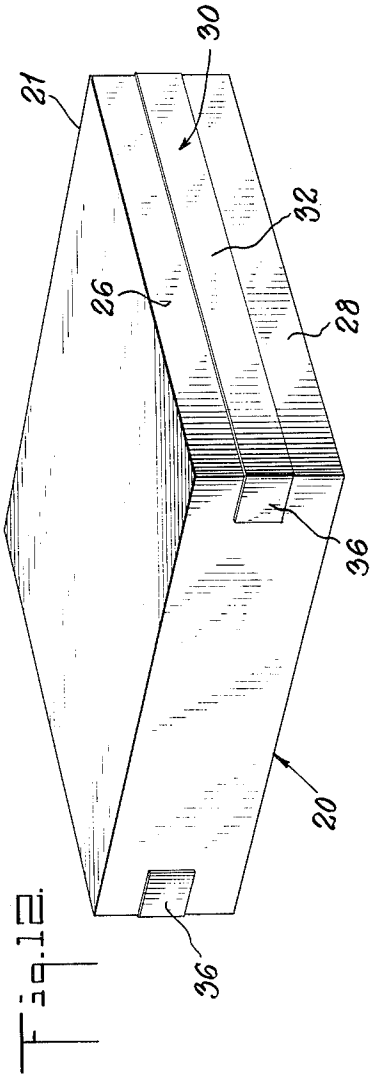


Fig. 12

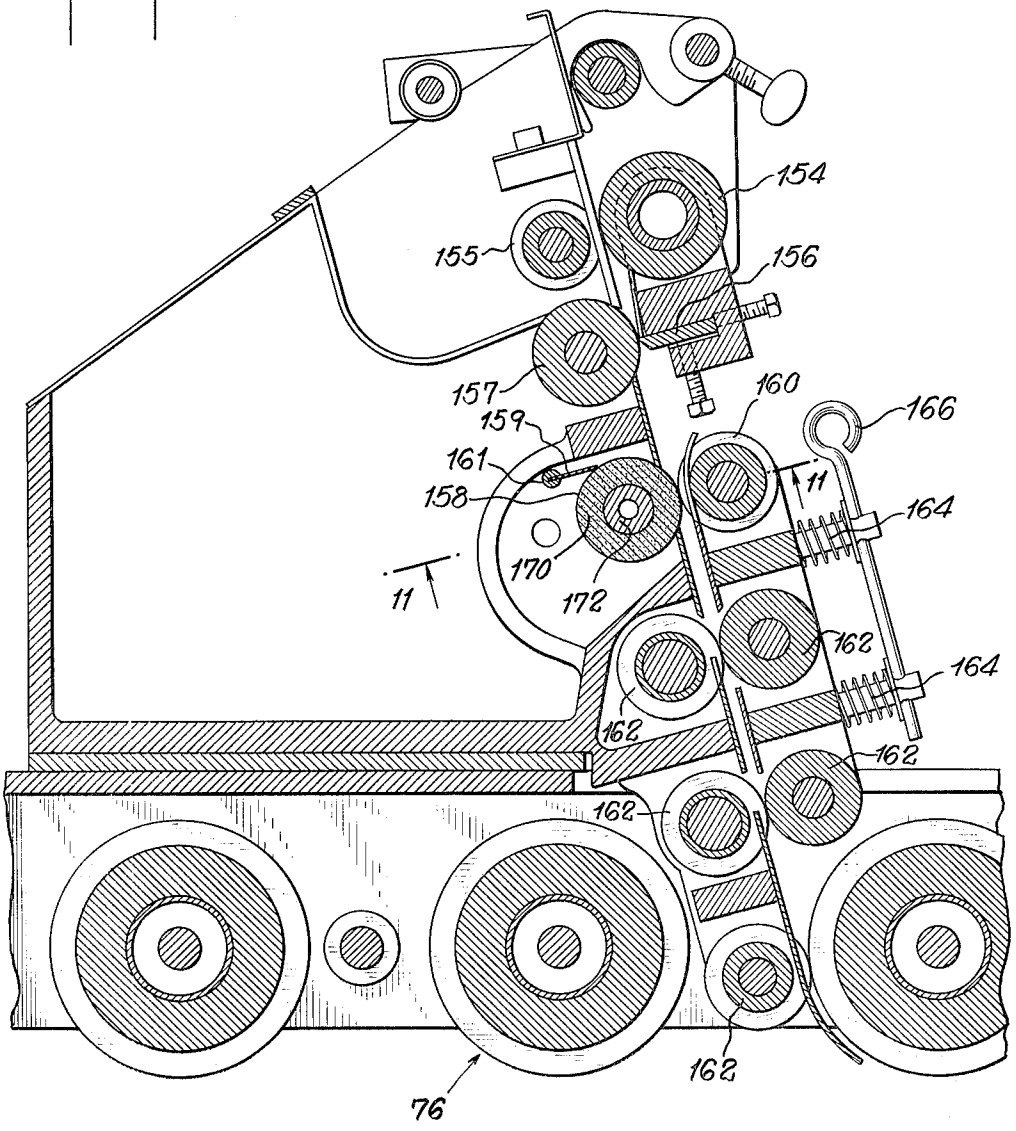
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CASE SEALER FOR HORIZONTALLY LOADED CASES

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Fig. 10.



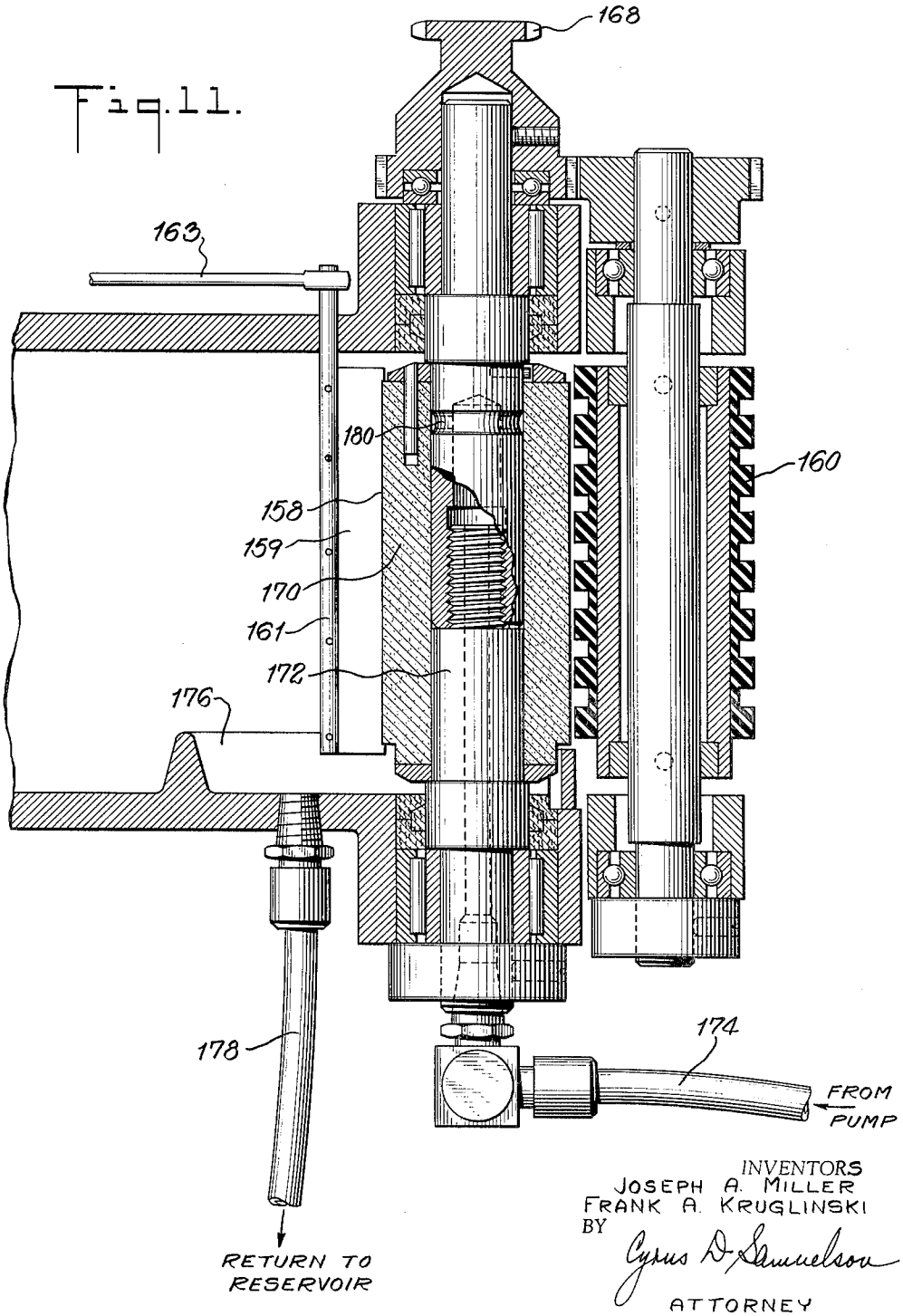
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Fig. 11.



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3,253,383

Patented May 31, 1966

3,253,383
CASE SEALER FOR HORIZONTALLY LOADED CASES

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Filed Apr. 19, 1963, Ser. No. 274,172
10 Claims. (Cl. 53—52)

The invention relates to case sealers for horizontally loaded cases. In particular, the invention is directed toward such case sealers which apply moistened, gummed tape. By gummed tape we mean an adhesive tape which is activated by applying water to the treated surface. Adhesion of the tape to the case surface is obtained when the tape, whose treated surface has been applied to the case, dries.

It is an important object of the invention to provide a case sealer for horizontally loaded cases which is efficient and economical.

It is a further object of the invention to provide an improved means for moistening the gummed tape which is used in sealing the cases.

It is a still further object of the invention to provide a case sealer for sealing cases of such awkward dimensions that the case must be conveyed in the horizontal position as opposed to the more usual vertical position.

It is a still further object of the invention to provide a case sealer that eliminates the need to right the case, either mechanically or manually, for conventional top and bottom sealing.

It is a still further object of the invention to provide means for adjusting the machine so that it may handle cases of different widths and heights.

It is a still further object of the invention to provide a case sealer for horizontally loaded cases which do not provide product support for the flap seam.

These and other objects, features, uses and advantages will be apparent during the course of the following discussion when taken in conjunction with the accompanying drawings, wherein:

FIGURES 1 through 6 are diagrammatic representations of the case as it proceeds through the various stages of the machine;

FIGURES 7 and 7A are joined on the lines A—A and together are a plan view of a preferred embodiment of the machine of the invention;

FIGURES 8 and 8A are joined on the lines B—B and together are a side elevational view of the machine of FIGURES 7 and 7A, viewed in the directions of the arrows 8—8 and 8A—8A of FIGURES 7 and 7A, respectively.

FIGURE 9 is an elevational view, viewed in the direction of the arrows 9—9 of FIGURE 7A;

FIGURE 10 is a horizontal sectional view of one of the taping mechanisms used in the machine of FIGURES 7 through 9;

FIGURE 11 is a vertical sectional view taken along the lines 11—11 of FIGURE 10, viewed in the direction of the arrows; and

FIGURE 12 is a perspective view of a horizontally loaded case sealed by the machine of the present invention.

In the drawings, wherein, for the purpose of illustration, is shown a preferred embodiment of the machine of the

invention, the numeral **20** designates the case being sealed by the machine. Case **20** is seen to comprise (FIGURES 1 through 6 and 12) body **21**, leading inner flaps **22**, trailing inner flaps **24**, top side flaps **26** and bottom side flaps **28**. Tape **30** is applied to the case seams so as to have body portion **32**, leading end portion **34** and trailing end portion **36**.

FIGURES 1 through 6 illustrate the steps through which a filled case proceeds to be sealed by the device of the invention.

The machine of the present invention may be used to apply moistened, gummed tape to the side surfaces of a case. This presents an inherent advantage over the prior art devices which either did not use water remoistenable tape or turned the cases so that the gummed tape was applied to the top and bottom of each case. The machine permits the moistening of gummed tape prior to applying it to the sides of the case. It should be noted that the machine of the present invention may be adapted to apply moistened, gummed tape to either or both sides of the case. Additionally, the rollers of the machine may be employed in this or similar machines to apply moistened, gummed tape to a surface consisting of flap seams that are not supported from the inside by product contained in the case. In prior art devices the pressure of the tape applicator to the unsupported flap seam cause the flaps to bend inward. This action spreads the seam with the result that the seam is inferior, unacceptable or faulty.

The case is first presented to the machine with all the flaps open and filled with the product. These end sealed cases are usually used for the packaging of products such as storm windows, window walls, mattresses and the like. These products can not be top loaded easily and economically so that it is necessary to end load them into the case and then seal one or both ends of the case. It can readily be seen that the cases can be sealed at one end prior to their being loaded and the machine of the present invention may be used to seal the opened end. The machine, as illustrated and described herein, is used to seal the ends of these cases with moistened, gummed tape.

The filled, unsealed case is presented to the machine as shown in FIGURE 1. It next proceeds along the machine and the leading inner flaps **22** are folded in as shown in FIGURE 2. Next, the trailing inner flaps **24** are folded in as shown in FIGURE 3. Following this, the top side flaps **26** and the bottom side flaps **28** are folded in as shown in FIGURE 4. Now, moistened, gummed tape is applied to case **20** so as to have a leading end **34** as illustrated in FIGURE 5. Finally, the tape is made to adhere to each seam formed by the side flaps **26** and **28** so that the body portion **32** of the tape **30** overlays the seam and the ends **34** and **36** are wiped down against the sides of the case as shown in FIGURE 6. The case sealed by the machine of the present invention is illustrated in perspective in FIGURE 12.

In FIGURES 7 through 11 there is illustrated a preferred embodiment of a machine used to carry out the steps of sealing described above. The machine **40** comprises frame **38**, conveyor belts **42**, **44**, **66** and **68**. Conveyor belt **66** is a continuation of conveyor belt **42** and conveyor belt **68** is a continuation of conveyor belt **44**. A single set of conveyor belts may be used instead of the two pairs shown but it will be seen that the two pairs present certain advantages in the embodiment shown and described. When cases of small proportions are being sealed, it is practical to use a single set of

conveyor belts. If the contents of the case are such that they do not support the case or it is necessary to obtain a large range of adjustability or if the cases are of large proportions, it is advisable to use two or more sets of conveyor belts.

Belts **42** and **44** are each equipped with a surface which permits the case to slip to facilitate alignment. Belts **66** and **68** are each provided with surfaces designed to prevent slipping of the case. The reasons for these characteristics will be apparent as this description proceeds.

In order to handle cases of varying sizes, it is necessary to provide for adjustment of the machine transversely and in height. The transverse adjustment is accomplished by means of systems **64** (FIGURES 7 and 8) and **74** (FIGURES 7A, 8A and 9). The portion of the machine which is on the right as you face the entry end of the machine is designated as the right side and the other side is designated as the left side. In the machine illustrated in the figures, the left side is stationary and the right side moves with respect to it. Movable right frame **132** (FIGURE 9) is mounted on rollers **136** which move on track **134**. Motor **106** drives shaft **110** by means of chain **108** and shaft **110** drives pinion gears **102** and **103** which are meshed with racks **100** and **101**, respectively by means of chains **109** and **112** (FIGURES 8, 8A and 9). Guides **104** and **105** are provided to support racks **100** and **101**, respectively. Shaft **110** is held in position with respect to the frame by means of bearings **114**, **115** and **116**. Depending on the direction of rotation of motor **106**, frame **132** is moved toward or away from frame **38**.

In order to be certain that the gummed tape is applied equally to both halves of the end of the case, centered over the flap seam, it is necessary to adjust the height of the tape applying mechanism with respect to the conveyors. This may be done by using a system which moves the vertical position of the tape rollers or a system which adjusts the height of the conveyor belts. We prefer to adjust the height of the conveyor belts. This is accomplished by means of lifting mechanisms **120** which comprise motors **122** (FIGURE 9), shafts **128** rotated by motors **122**, plates **124**, screws **126** and gear boxes **130**. Shaft **128** is mounted in position in the bearings which are affixed to the frame as shown in the figures. Shaft **128** rotates gear boxes **130** which in turn raise and lower screws **126** and plates **124**. Plates **124** act on the conveyor belt frame to raise and lower them in accordance with the direction of rotation of motors **122**. It can thus be seen that the machine can be adjusted to accommodate cases of various widths and heights.

The filled, unsealed cases are delivered to the entry end of the machine **40** (left end of FIGURES 7 and 8) onto conveyors **42** and **44**. The conveyors are chain coupled to conveyors **66** and **68** in a manner well known in the art and are driven by motor drive system **144** (FIGURE 8A). There is one such drive system for each set of conveyor belts. The feed of the cases onto conveyor belts **42** and **44** is arranged to be more toward belt **42** than **44**. As the case travels along the conveyor belts it arrives at stops **46** and **48** which together halt the forward progress of the case. When the case contacts both switches **54** and **56** which are placed adjacent to stops **46** and **48** and which are connected in series, a circuit (details not shown) is closed so as to energize air cylinder **52** through a solenoid. When the solenoid is energized, it causes the piston rod of air cylinder **52** to move forward. This motion moves aligning bar **50** toward the case so that it pushes the case against fixed aligning bar **58** thereby straightening the case with respect to the conveyor belts. Aligning bar **58** is in fixed position while aligning bar **50** is spring loaded and pivots on its mounting. As a result, when aligning bar **50** contacts the case, it closes the front inner flap **22** on its side and as the case is pushed against aligning bar **58**, the opposite front inner flap **22** is also closed. When the piston rod moves to its extreme extended position, a switch (not shown) is energized causing air cylinders **118** with normally extended rods, which are attached to stops **46** and **48**, to retract. Only one of the air cylinders is shown in the drawings. As the rods are retracted, stops **46** and **48** are pulled down between conveyor belts **42** and **66** and **44** and **68**, respectively. As conveyor belts **42** and **44** have continued to run even though the case's forward movement was stopped by stops **46** and **48**, the case is now driven forward over the retracted stops onto conveyor belts **66** and **68**. After the case passes over the retracted stops they return to their up position to prepare to act on the next case.

The case proceeds along belts **66** and **68** until it hits switches **70** and **72**. These switches start the motors of trailing flap folders **60** and **62** respectively. The operation of these flap folders has been described in United States Patent 3,045,402. The trailing flaps are closed because the belts of the flap folders move faster than the conveyor belts and thereby force the flaps closed. As soon as the case passes over switches **70** and **72** the flap folders stop running. The case now comes in contact with flaps holding rods **138** (FIGURES 8 and 8A) which hold the leading and trailing flaps folded closed.

The case moves forward so that the top and bottom side flaps are folded in and held closed by means of folding rods **140** and **142** respectively (FIGURE 8A). Next, the case is held between vertical cylindrical roller assemblies **76** and **78** which are chain coupled as shown in FIGURE 8A and are respectively driven by motors **150** and **152** by means of chains **146** and **148**. The case next makes contact with switches **84** and **86** which actuate the tape feeding mechanisms in taping mechanisms **80** and **82**. The detailed operation of the taping mechanisms will be discussed later in this specification. As the case passes the vertical cylindrical roller assemblies, the moistened, gummed tape is applied to the flap seams of the case so as to leave a leading end and a trailing end of tape. After the case leaves contact with switches **84** and **86** the tape is cut in the taping mechanism, is moistened and is fed out in the correct length and placed in the proper location on the case.

The pressure of the cylindrical rollers on the case causes the body portion of the tape to adhere firmly to the case flap seam. The case next comes into contact with trailing end wipers **88** and **90** which are slip clutch driven, rotate continuously when out of contact with a case, and push against the flap seam of the case until the rear of the case is opposite them. When the case contacts switches **96** and **98**, leading end wipers **92** and **94** are moved out so as to wipe down the leading ends of the tape against the leading end of the case. The operation of this mechanism is described in United States Patent 3,045,042. As the trailing end of the case arrives opposite wipers **88** and **90**, they wipe down the trailing ends of the tape against the trailing end of the case. Their operation and structure are similar to those described in United States Patents 2,999,342 and 3,045,402. The case is now discharged to existing plant conveyors, pallets or similar shipping equipment.

The wipers **88**, **90**, **92** and **94** are improvements of those described in the foregoing patents in that they may be used for sealing a flap seam which is not supported by product within the case. Wipers **88** and **90** are similar as are wipers **92** and **94**. The following detailed discussion of wipers **88** and **92** is also applicable to wipers **90** and **94**. Wiper **88** (FIGURE 8A) is seen to comprise a pair of outboard rollers **89** each of which is mounted on a common shaft with an inboard roller **91**. The diameters of the outboard rollers **89** are slightly smaller than those of the inboard rollers **91**.

When the rollers contact the case, the outboard rollers **89** are supported on the flap crease or corner of the case. Since inboard rollers **91** are of larger diameter than outboard rollers **89**, pressure is exerted on the gummed tape

at the flap seam. However, the fact that the outboard rollers 89 are supported on the flap crease or case corner prevents the pressure of the roller from collapsing the seam.

Wiper 92 is seen to comprise outboard roller 93 and inboard roller 95 mounted on a common shaft. The rollers are of such dimensions that outboard roller 93 is supported by the flap crease or the case corner and inboard roller 95 overlays the gummed tape. When wiper 92 makes contact with the case, roller 93 keeps roller 95 from pushing in too far so as to collapse the flap seam.

The taping mechanism is similar to that described in United States Patents 2,721,669 and 2,721,670. The principal difference is that the rollers in the patents are perpendicular to the position of the rollers in the present application. As a consequence, the moistening system described in the patents cannot be used in connection with the present machine. The tape feeds into the taping mechanism from the top of FIGURE 10 between driven roller 155 and idler roller 154. When the tape feeding mechanism is deenergized, roller 154 moves out of contact with roller 155 and cutter 156 is moved against the anvil 157 to sever the tape from the feed roll. The tape runs past porous stone roller 158 and is moistened. Then it is fed through rollers 162 and onto the case. The feed rollers 162 and rubber roller 160 are biased against the opposite adjacent rollers by means of springs 164 and holding pin 166. The tape feeding mechanisms are energized to permit the flow of tape when the case is in contact with switches 84 and 86 (FIGURE 7A).

Porous stone cylindrical roller 158 (FIGURE 11) is seen to comprise drive 168 which is chain coupled to the drive of either vertical roller assembly 76 or 78, porous stone outer shell 170 and hollow central shaft 172 which is provided with radial openings 180 near its top. To simplify construction the hollow central shaft which is preferably formed of non-rusting metal is threaded as shown in FIGURE 11. Liquid from the reservoir is pumped through pipe 174 into the bottom of the shaft of roller 158. Since the liquid is under pressure, it is forced up through the shaft and out through radial opening 180 which communicates between the inside of the shaft and the inner surface of the porous stone 170. The liquid continues to be pumped so that the porous stone becomes saturated and the excess liquid flows off the stone into pan 176 and then through pipe 178 to return to the liquid reservoir. In conjunction with this, doctor blade 159, which is pivotally mounted on rod 161 and whose tension is adjusted by means of control 163, meters the amount of water to be carried on the outer surface of porous stone 170. This regulates the amount of water to be applied to the gummed side of the tape as it passes through taping mechanism 80 or 82. The pumping continues as long as the machine is running so that the stone is always saturated and ready to moisten the gummed tape as it is fed past it. Roller 160 is formed of a resilient material such as rubber and is employed to force the tape against the porous stone roller to obtain even moistening of the gummed tape and not damage the porous stone roller.

While we have disclosed our invention in relation to a specific example and in a specific embodiment, we do not wish to be limited thereto, for obvious modifications will occur to those skilled in the art without departing from the spirit and scope of our invention.

Having thus described our invention, we claim:

1. A case sealer for horizontally loaded cases comprising:
- a frame;
- means for moving the loaded cases having unsealed flaps longitudinally along the frame comprising:
  - a pair of sets of parallel conveyor belts affixed to the frame;
  - means for moving one of the pair of sets of parallel conveyor belts transversely toward and away from the other set of conveyor belts;
  - means for aligning the case delivered to the frame transversely within the frame; and
  - means for adjusting the vertical position of the pair of sets of parallel conveyor belts;
- means affixed to the frame for folding the unsealed flaps to form a flap seam;
- means affixed to the frame for applying moistened gummed tape to the flap seam; and
- means affixed to the frame for wiping down the gummed tape applied to the flap seam.

2. A case sealer for horizontally loaded cases as described in claim 1 wherein said means for applying moistened, gummed tape to the flap seam comprises:
- a plurality of vertically disposed cylindrical rollers mounted in opposite pairs such that the gummed tape is guided therebetween;
- means for rotating the plurality of cylindrical rollers synchronously;
- a vertically disposed porous stone roller having a rigid, hollow central shaft driven in synchronism with the plurality of cylindrical rollers;
- means for feeding liquid into the hollow central shaft of the porous stone roller;
- the hollow, central shaft having at least one radial opening therein through which the liquid fed into the hollow central shaft is applied to the porous stone so as to saturate it; and
- a vertically disposed, resilient roller mounted opposite and adjacent to the porous stone roller such that the gummed tape is pushed into contact with the porous stone roller and is moistened thereby.

3. A case sealer for horizontally loaded cases as described in claim 1 wherein the means for aligning the cases delivered to the frame transversely within the frame comprises:
- a pair of vertically movable stops placed transverse to the longitudinal motion of the parallel conveyor belts, there being one such stop associated with each conveyor belt;
- an aligning bar actuated by the moving case and mounted adjacent to the outer edge of one of the parallel conveyor belts and movable transversely across the frame;
- a fixed aligning bar mounted adjacent to the outer edge of the other parallel conveyor belt and placed opposite the movable aligning bar; and
- a pair of switches mounted adjacent to the parallel conveyor belts connected in series such that the pressure of the case on both switches causes the movable aligning bar to move against the case to close the leading flap and align the case transversely on the conveyor belts.

4. A case sealer for horizontally loaded cases as described in claim 3 including a circuit actuated by the return of the movable aligning bar to cause the vertical stops to drop and thereby permit the case to move along the conveyors.

5. A case sealer for horizontally loaded cases as described in claim 2 wherein the means for aligning the cases delivered to the frame transversely within the frame comprises:
- a pair of vertically movable stops placed transverse to the longitudinal motion of the parallel conveyor belts, there being one such stop associated with each conveyor belt;
- an aligning bar actuated by the moving case and mounted adjacent to the outer edge of one of the parallel conveyor belts and movable transversely across the frame;
- a fixed aligning bar mounted adjacent to the outer edge of the other parallel conveyor belt and placed opposite the movable aligning bar; and
- a pair of switches mounted adjacent to the parallel

conveyor belts connected in series such that the pressure of the case on both switches causes the movable aligning bar to move against the case to close the leading flap and align the case transversely on the conveyor belts.

6. A case sealer for horizontally loaded cases as described in claim 5 including a circuit actuated by the return of the movable aligning bar to cause the vertical stops to drop and thereby permit the case to move along the conveyors.

7. A device for applying moistened, gummed tape to the folded flaps of a horizontally loaded case comprising:

a plurality of vertically disposed, cylindrical rollers mounted in opposite pairs such that the gummed tape is guided therebetween;

means for rotating the plurality of cylindrical rollers synchronously;

a vertically disposed, porous stone roller having a rigid, hollow, central shaft driven in synchronism with the plurality of cylindrical rollers;

the hollow, central shaft having at least one radial opening near the top thereof communicating between the inside of the hollow, central shaft and the inner surface of the porous stone;

means for feeding liquid from the lower extremity of the hollow, central shaft to the top thereof so that the liquid flows through the radial opening to the porous stone to saturate the same;

a pan placed below the porous stone roller to receive any excess liquid therefrom; and

a vertically disposed, resilient roller mounted opposite and adjacent to the porous stone roller such that the gummed tape is pushed into contact with the porous stone roller and is moistened thereby.

8. A case sealer for horizontally loaded cases comprising:

a frame;

a pair of sets of parallel conveyor belts adapted to move the filled cases longitudinally along the frame;

means for adjusting the transverse spacing between the pair of sets of parallel conveyor belts;

means for adjusting the vertical position of the parallel conveyor belts within the frame;

a pair of vertically movable stops placed transverse to the longitudinal motion of the parallel conveyor belts, there being one such stop associated with each conveyor belt;

an aligning bar actuated by the moving case and mounted adjacent to the outer edge of one of the sets of parallel conveyor belts and movable transversely across the frame;

a fixed aligning bar mounted adjacent to the outer edge of the other parallel conveyor belt and placed opposite the movable aligning bar;

a first pair of switches mounted adjacent the parallel conveyor belts connected in series such that the pressure of the case on both switches causes the movable aligning bar to move against the case to close the leading flaps and align the case transversely on the conveyor belts;

a circuit actuated by the return of the movable aligning bar to cause the vertical stops to drop and thereby permit the case to move along the conveyor;

a pair of motor-driven belts positioned above and along the outer edges of the conveyor belts adapted to close the trailing flaps of the case;

a second pair of switches mounted adjacent to the conveyor belts adapted to start the motor-driven belts when contacted by the case;

a pair of rods mounted so that there is one such rod above the outer edge of each of the conveyor belts adapted to hold the folded leading and trailing flaps folded closed;

two pairs of rods, one pair on each side of the frame, mounted and canted to close the top and bottom side flaps of the case;

a pair of first pluralities of vertically disposed, synchronously driven cylindrical rollers mounted on the frame, one plurality on each side thereof;

a pair of second pluralities of vertically disposed, synchronously driven, cylindrical rollers mounted on each side of the frame in opposite pairs such that the gummed tape is guided therebetween;

a cutter associated with each of the pair of second pluralities of vertically disposed rollers adapted to stop the tape feed and cut the tape;

a third pair of switches mounted adjacent to the conveyor belts and adapted to release the cutter and cause the tape to feed;

a pair of vertically disposed, porous stone cylindrical rollers having a rigid, hollow, central shaft, there being one such porous stone cylindrical roller associated with each of the second pluralities of vertically disposed rollers and driven in synchronism therewith;

each hollow, central shaft having at least one radial opening near the top thereof communicating between the inside of the hollow central shaft and the inner surface of the porous stone;

means associated with each porous stone cylindrical roller for feeding liquid from the lower extremity of the hollow central shaft to the top thereof so that the liquid flows through the radial opening to the porous stone to saturate the same;

a pan placed below each porous stone roller to receive any excess liquid therefrom;

two vertically disposed, resilient rollers, one associated with each porous stone roller mounted opposite and adjacent to the porous stone roller such that the gummed tape is pushed into contact with the porous stone roller and is moistened thereby;

two wipers for wiping down the leading edge of the case mounted on the frame, one at the outer edge of each conveyor belt;

a fourth pair of switches mounted adjacent to the conveyor belts and adapted to actuate the wipers when contacted by the leading edge of the case; and

two continuously rotating wipers for wiping down the sides and the trailing edge of the case mounted on the frame, one at the outer edge of each conveyor belt.

9. A continuously rotating wiper for use in a case sealer for horizontally loaded cases comprising:

a rotating vertical shaft;

means for rotating the rotating vertical shaft;

a pair of vertical shafts spaced from each other and the rotating vertical shaft;

means joining the pair of vertical shafts to the rotating vertical shaft whereby they rotate around the rotating vertical shaft as an axis when the rotating vertical shaft rotates; and

a cylindrical wiper assembly mounted on each of the pair of vertical shafts, the diameter of the cylindrical wiper assembly making contact with the flap seam of the case being greater than that making contact with the flap crease or the case corner.

10. A wiper for use in a case sealer for horizontally loaded cases and adapted to be moved into position in front of the leading end of the case by the action of the case on a control means comprising:

a vertical shaft;

means for moving the vertical shaft into and out of position in front of the leading end of the case and in contact therewith; and

a cylindrical wiper assembly mounted on the vertical shaft, the diameter of the cylindrical wiper assembly making contact with the flap seam of the case being

greater than that making contact with the flap crease or the case corner.

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