Nov. 5, 1957 A. S. SCHMIDT ET AL 2,811,997

PROCESS OF SLICING ROLL CLUSTERS FOR PACKAGING

Original Filed May 2, 1952 6 Sheets-Sheet 1

FIG. 1.

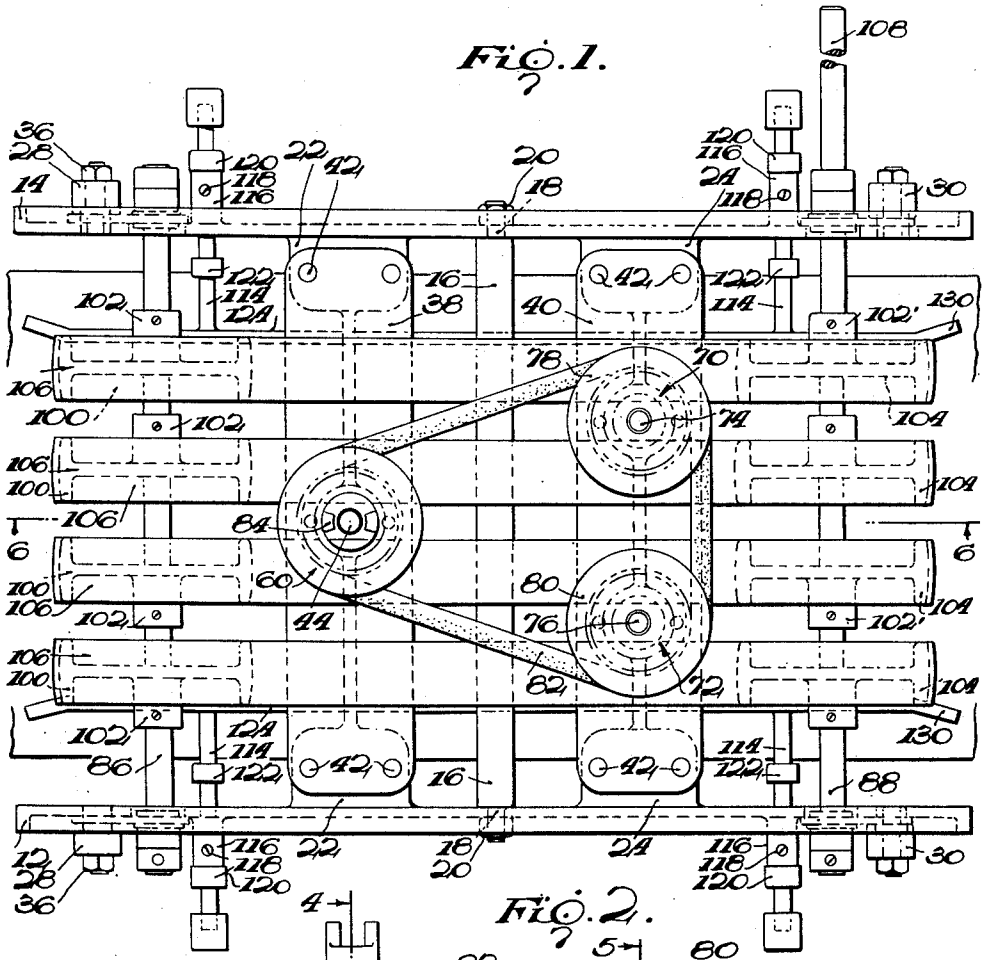

FIG. 2.

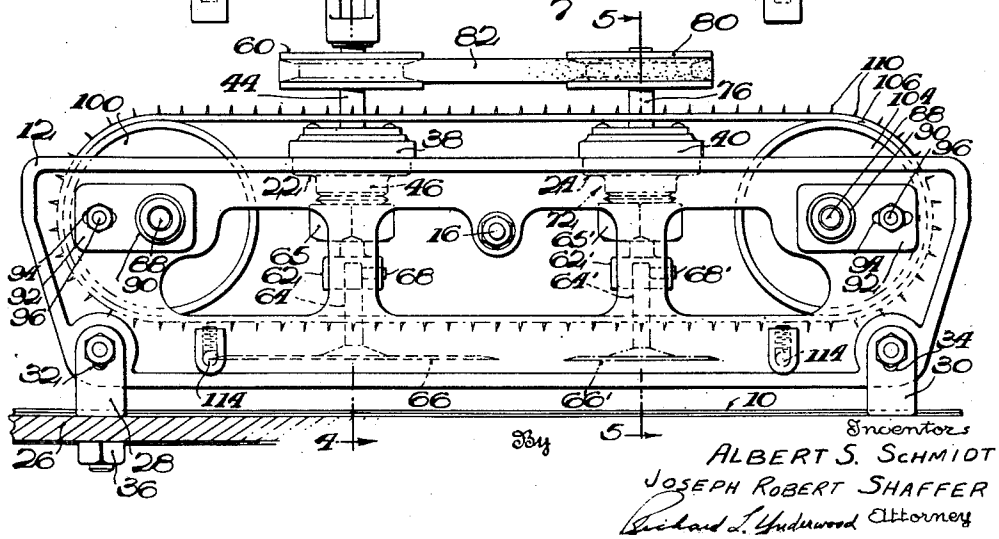

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FIG. 3.

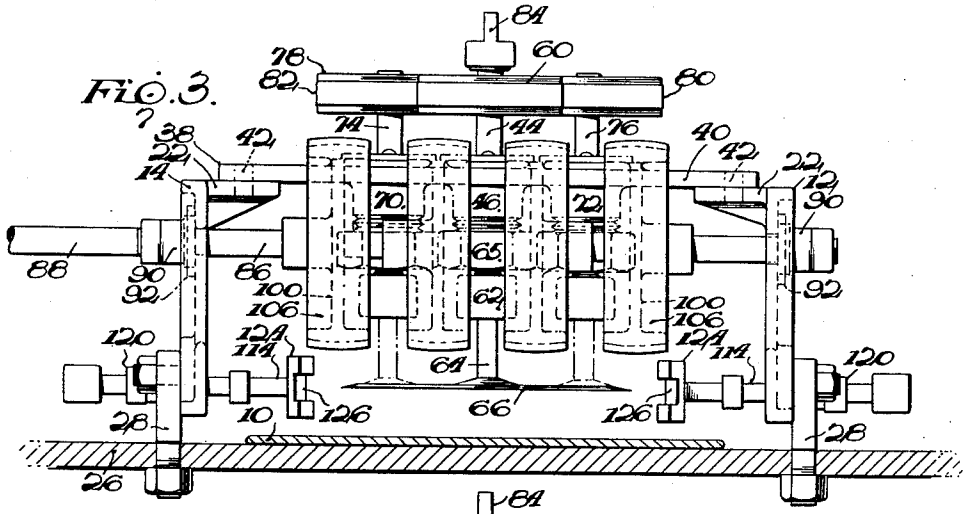


FIG. 4.

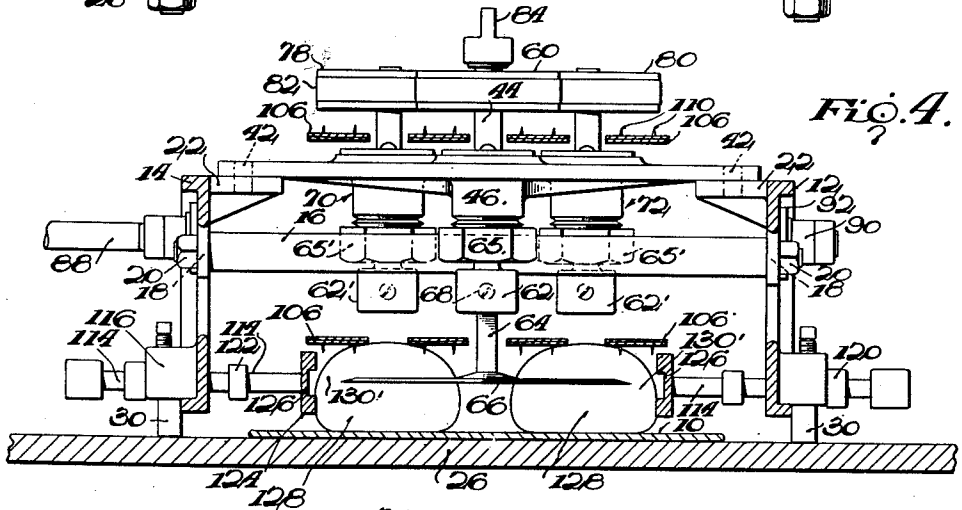
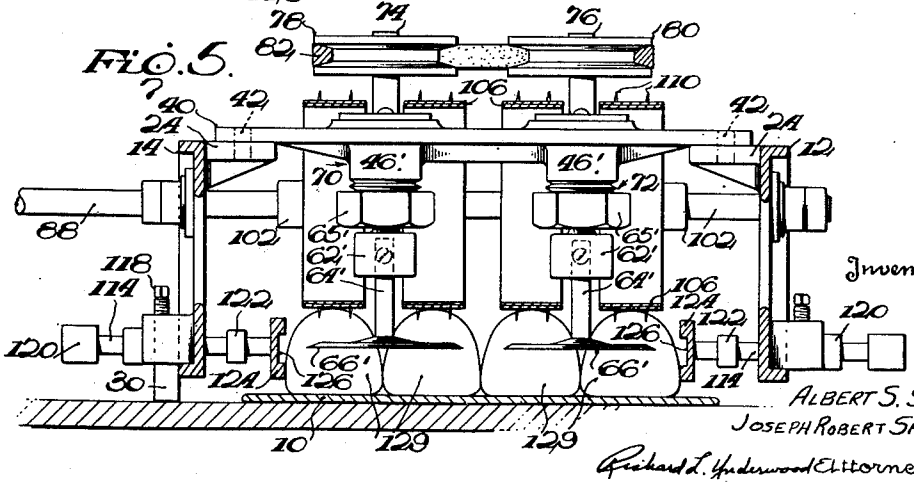


FIG. 5.



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PROCESS OF SLICING ROLL CLUSTERS FOR PACKAGING

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Fig. 6

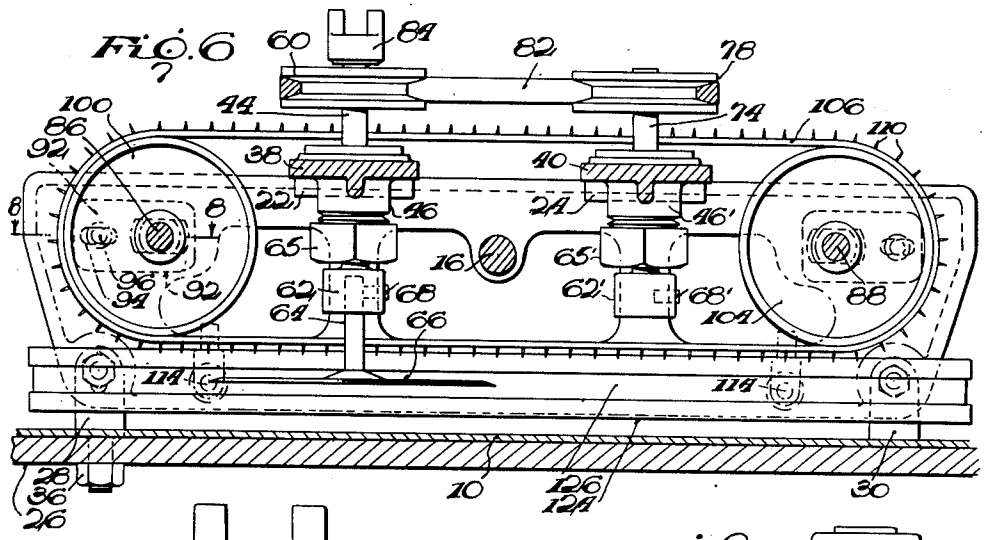


Fig. 8.

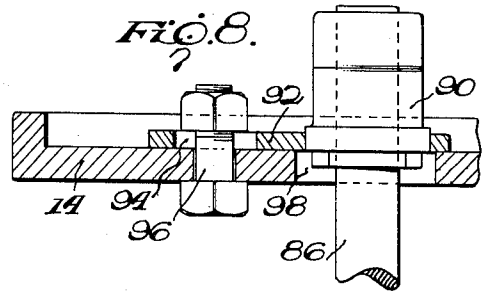


Fig. 9.

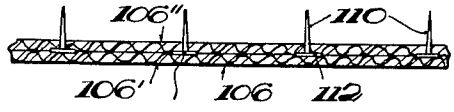
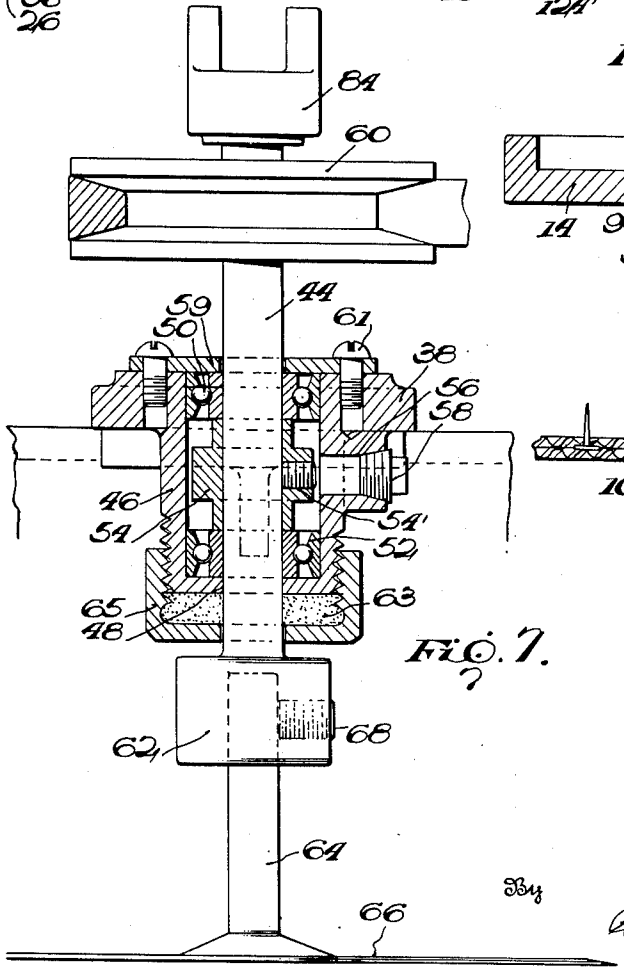


Fig. 7.



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PROCESS OF SLICING ROLL CLUSTERS FOR PACKAGING

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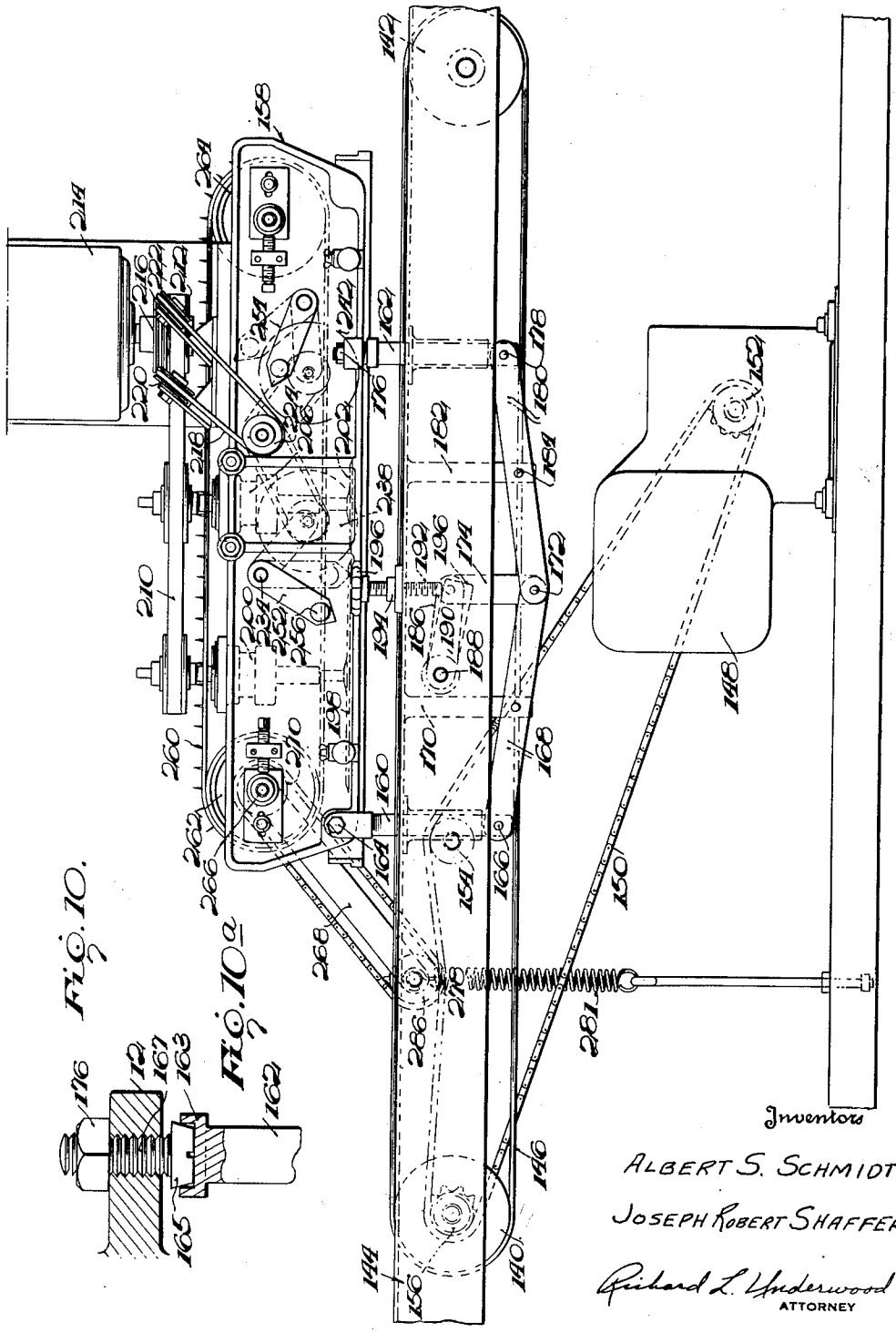

FIG. 10.

FIG. 10a

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PROCESS OF SLICING ROLL CLUSTERS FOR PACKAGING

Original Filed May 2, 1952 6 Sheets-Sheet 5

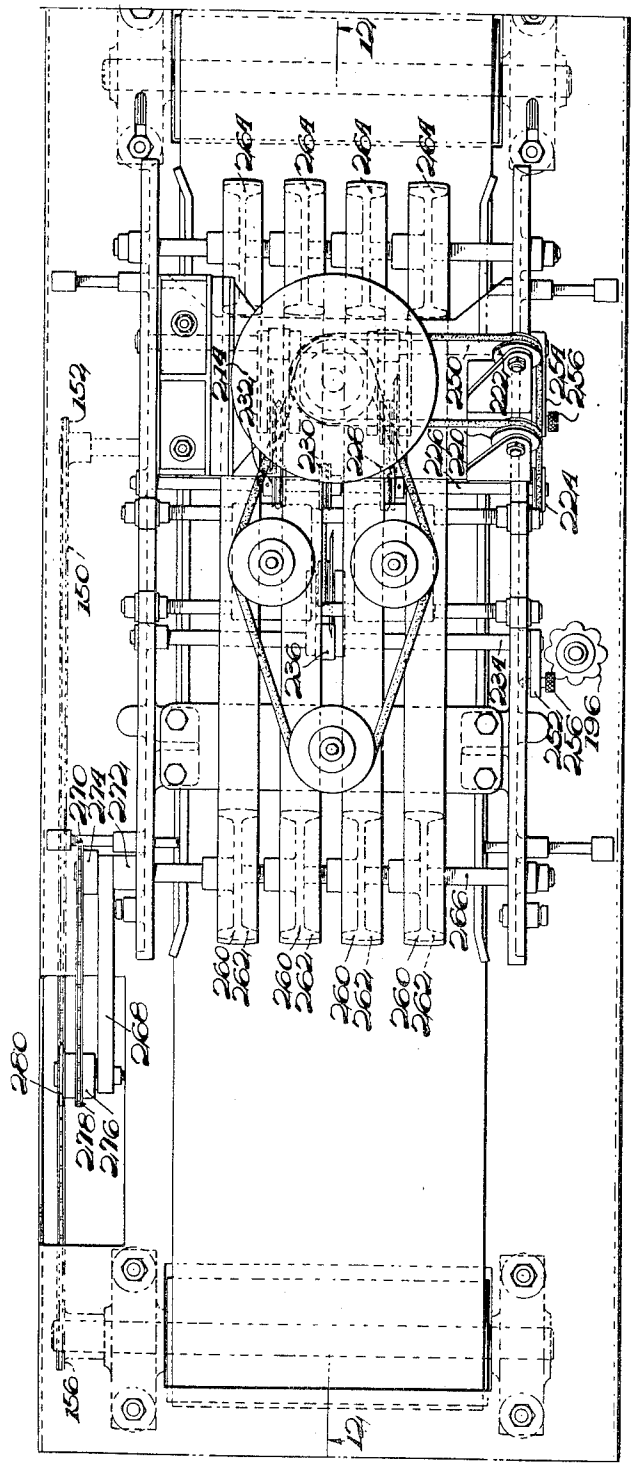

FIG. 11.

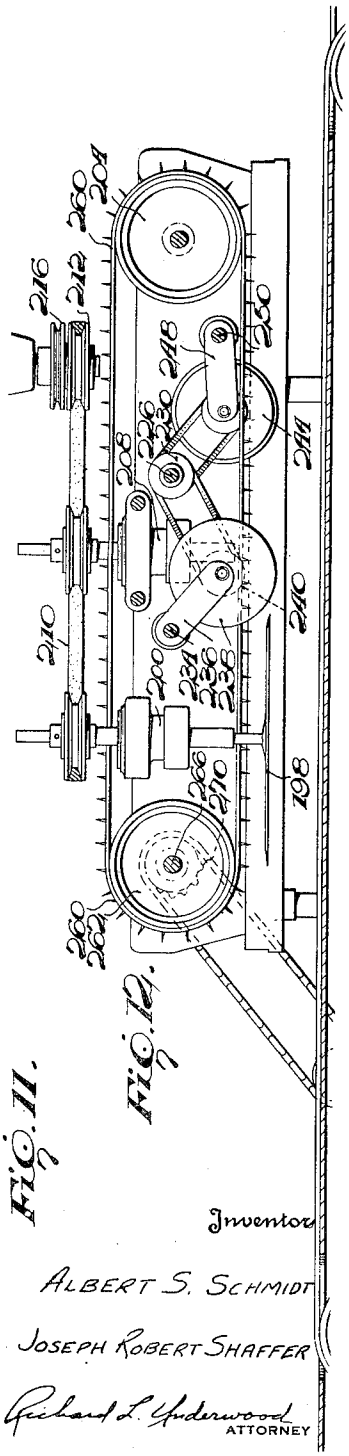

FIG. 12.

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PROCESS OF SLICING ROLL CLUSTERS FOR PACKAGING

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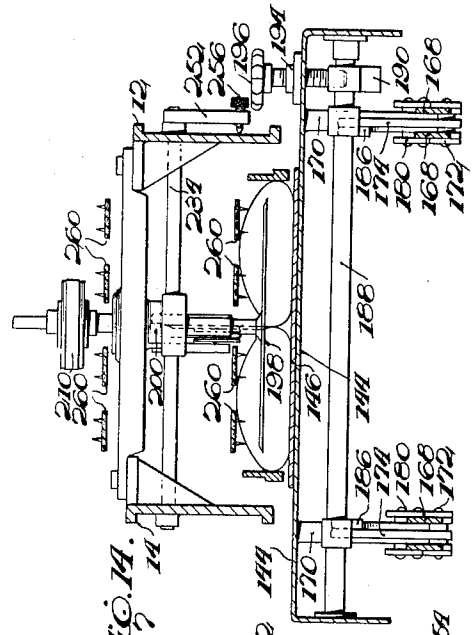

Fig. 14.

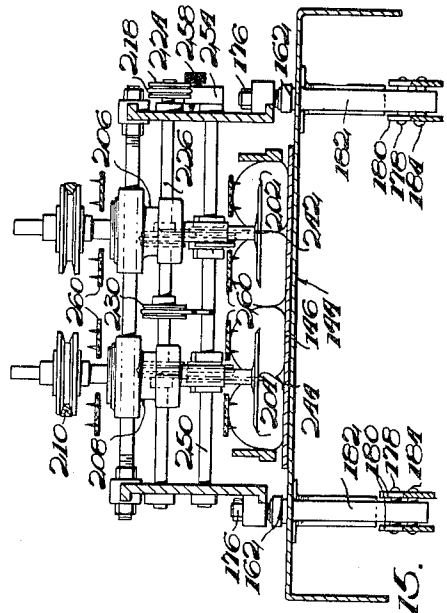

Fig. 15.

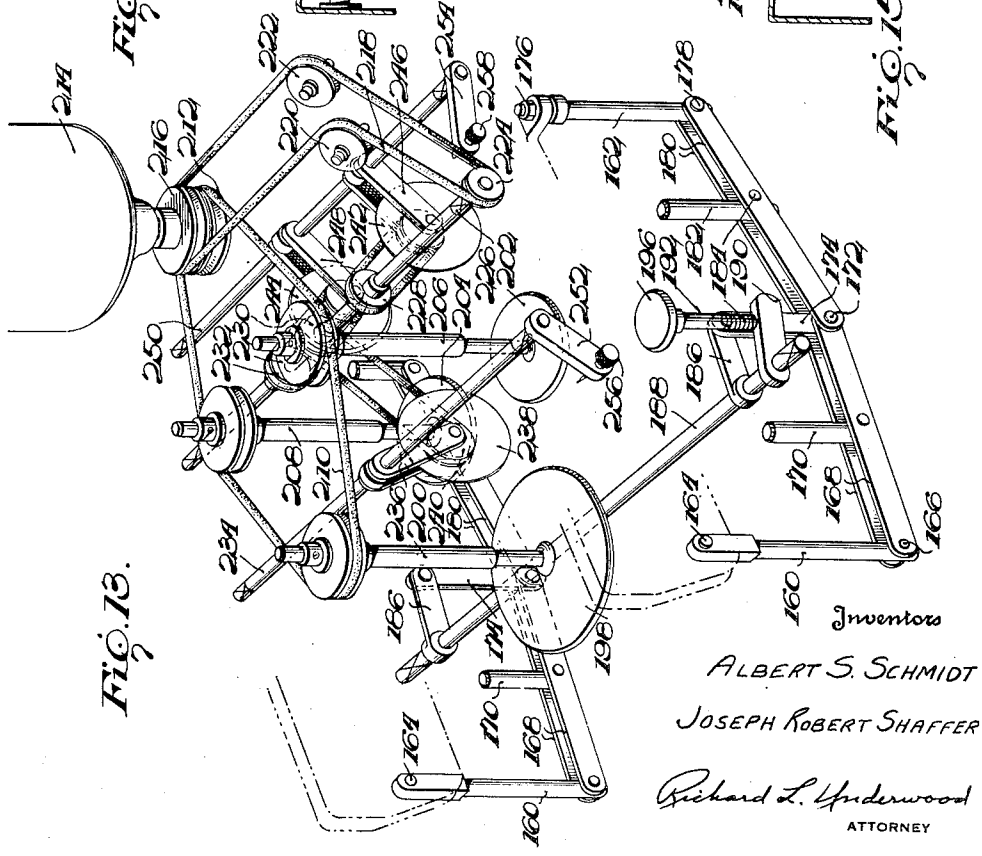

Fig. 13.

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United States Patent Office 2,811,997 Patented Nov. 5, 1957

2,811,997

PROCESS OF SLICING ROLL CLUSTERS FOR PACKAGING

Albert S. Schmidt and Joseph Robert Shaffer, Harrisburg, Pa.; said Shaffer assignor to said Schmidt

Original application May 2, 1952, Serial No. 285,746, now Patent No. 2,753,907, dated July 10, 1956. Divided and this application December 3, 1954, Serial No. 473,005

4 Claims. (Cl. 146—241)

This invention relates to a method of slicing bakery products, such as buns, rolls, etc. This application is a division of our co-pending application Serial No. 285,746, filed May 2, 1952, now Patent No. 2,753,907.

Frequently it is desirable to slice wide flat rolls and long thin rolls, which are sometimes designated hamburger rolls and frankfurter rolls, respectively, in such manner that the slice does not extend entirely through the roll, leaving a solid portion at one edge which functions as a hinge for the separated portions of the roll. At the same time it is often advantageous to slice the rolls entirely through their body portion, forming two separate and independent sections.

By the instant invention faulty slicing and tearing of the baked product are eliminated, thus insuring uniformity of the sliced product.

The process comprises the steps of simultaneously slicing adjacent rolls in a manner which does not require the prior spacing of the rolls one from another. The method of this invention of processing before packaging an integrated roll cluster involves the steps of causing relative longitudinal movement between the roll cluster and a horizontal rotating slicing disc secured to a vertical rotating shaft which is in the vertical longitudinal plane of the longitudinally extending joint between adjacent longitudinal rows of rolls in the integrated cluster. The cluster is firmly held during the relative movement and a horizontal slice is formed between the tops and bottoms of the rolls. To maintain the integrated character or integrity of the cluster the horizontal slice is extended partially through each roll transversely from said longitudinally extending joint to leave a hinge portion at the uncut side edge of each roll. Prior to accomplishing the horizontal slicing operation, it is most advantageous and preferable to cause relative movement between the roll cluster and a vertical rotating disc positioned in longitudinal alignment with the longitudinally extending joint of the cluster to form a vertical cut in the joint and thereby open a path for passage of the vertical shaft of the horizontal slicing disc. The cluster is firmly held during this operation.

Various other objects and meritorious features of the invention will be apparent from the following description taken in conjunction with the drawings, wherein like numerals refer to like parts throughout the several figures, and wherein:

Fig. 1 is a top plan view of our improved machine;

Fig. 2 is a side elevation;

Fig. 3 is an end elevation;

Fig. 4 is a section through **4**—**4** of Fig. 2;

Fig. 5 is a section through **5**—**5** of Fig. 2;

Fig. 6 is a longitudinal section through **6**—**6** of Fig. 1;

Fig. 7 is an enlarged detail section of one of the mountings for the cutter discs;

Fig. 8 is a detail section through **8**—**8** of Fig. 6;

Fig. 9 is an enlarged view of one important element of the machine;

Fig. 10 is a side elevation of a modified arrangement especially suited for handling roll clusters;

Fig. 10*a* is an enlarged section through one of its frame supporting legs;

Fig. 11 is a top plan view of Fig. 10;

Fig. 12 is a section along **12**—**12** of Fig. 11;

Fig. 13 is a schematic view in perspective of the slicing mechanism and actuating means therefor;

Fig. 14 is an end view of the mechanism as set for handling large rolls, and

Fig. 15 illustrates the mechanism as set for handling small rolls.

The machine is adapted to be superimposed over a traveling conveyor **10** on which rolls or other baked goods are fed to the slicing machine and subsequently withdrawn for packaging after the slicing operation has been performed. The machine itself embodies a frame including duplicate oppositely disposed side walls **12** and **14**. These walls are made of light metal and are preferably apertured as shown to reduce the weight of the elements as much as possible without sacrificing strength where necessary. The two side walls are secured together in spaced-apart relation by a central tie rod **16** having reduced portions **18** at opposite ends seated in openings in the walls and held therein by means of nuts **20**. Each side wall is provided at spaced points along its length and at the top margin with inwardly extending supporting flanges **22** and **24** which are adapted to support cross pieces to be described more particularly hereinafter.

The frame of the machine is pivotally secured at one end to a bed support **26** by hinge members **28** and the other end is supported by leg members **30** which rest upon the bed support. The hinge members and leg members are oppositely disposed at each end of the frame and are bolted to the lower corners of the side walls through slots **32** and **34**, respectively, in the hinge and leg members. Securement to these corner supports through the slots **32** and **34** permits vertical adjustment of the frame with reference to the bed support. The entire machine may be pivoted about hinge members **28**. This facilitates ready removal and substitution of parts in a manner and for a purpose to be described more in detail.

Cross braces **38** and **40** are secured, respectively, to oppositely disposed flanges **22** and **24** of the side walls as by means of bolts **42**. Centrally disposed on cross brace **38** is a bearing assembly (see Fig. 7) in which shaft **44** is vertically journaled. The assembly consists of a depending cup **46** formed integrally with cross brace **38** and externally threaded at its lower end, the bottom of the cup being provided with an opening **48** to receive the shaft **44**. Upper and lower bearings **50** and **52** are seated inside the cup with the aid of a spacing collar **54**, the central portion of which is enlarged and provided at one point in its circumference with a threaded opening **54'** adapted to receive a set screw, thereby permitting vertical adjustment of shaft **44** in the bearing assembly. An opening **56** in an enlarged portion of the cup wall is adapted to receive a standard pipe plug **58** which may be removed to provide access to the set screw when vertical adjustment of shaft **44** is desired. Bearing cap **59** is bolted as indicated at **61** to the cross brace **38** at the upper end of the bearing assembly. Packing material **63** surrounds shaft **24** below the cup **46** and is held securely in position by packing nut **65**. This prevents lubricant from falling upon articles passing through the machine.

Integral with shaft **44** adjacent its upper end is a pulley **60** and the lower end of the shaft is enlarged as indicated at **62** and provided with a cylindrical opening to receive the spindle **64** of a cutting disc **66**. The spindle may be secured in its seat at the lower end of the shaft by means

of a set screw 68, thus permitting substitution of cutting discs varying in diameter or other characteristics.

Cross brace 40 is provided with two bearing assemblies designated broadly by the numerals 70 and 72, which may be identical in every respect with the assembly heretofore described in detail, for journaling vertical shafts 74 and 76. These shafts are provided at their upper ends with pulleys 78 and 80. An endless belt 82 extending around the three pulleys permits all shafts to be driven simultaneously from a single drive connection 84 which may be associated with one of the shafts, here the shaft 44. Each of the shafts 74 and 76 is provided with means heretofore described in conjunction with shaft 44 for detachably securing the spindle of a cutting disc to its lower end.

Pulley supporting shafts 86 and 88 are journaled in the side frames adjacent opposite ends thereof in a manner clearly illustrated in Fig. 8 wherein the end of pulley shaft 86 is supported in a bearing member 90 which is positioned in bearing plate 92. The bearing plate is provided adjacent the opening in which the bearing 90 is received with an elongated slot 94 through which it is secured by bolt 96 to the side wall 14. By virtue of the elongated slot 94 in the bearing plate and an elongated opening 93 in side wall 14 through which pulley shaft 86 passes, the bearing plate may be moved horizontally to adjust the pulley shaft longitudinally of the frame for purposes more clearly to be described hereinafter.

A series of four pulleys 100 are fixedly secured in spaced relation to one another upon shaft 86 by means of laterally extending hubs 102 with which set screws are associated. A similar number of pulleys 104 are secured to pulley shaft 88 in the same manner and the pulleys of each series are longitudinally aligned with one another for the reception of endless belts 106.

Pulley shaft 88 is extended beyond side wall 14 as indicated at 108, the extended portion of the shaft being adapted for engagement or connection with a power source which may be governed so that the linear speed of the endless belts is such as to synchronize its movement with that of the surface of the conveyor moving under the slicing machine frame and between its side walls.

An important feature of the invention resides in the fact that the belt has associated with it means whereby the article being conveyed under the machine is positively engaged and held in position upon the conveyor surface as it is moved by the latter past the cutting discs. This insures a uniform cut or slice and precludes the spoilage which occurs if the article is permitted to move or change its position from a controlled path in which it is directed past the slicing mechanism. Preferably this gripping or engaging means consists of a series of spaced spikes or prongs 110 extending outwardly from the belt and normal to the plane of its surface. Such an arrangement may be in the form of a belt comprising laminations 106' and 106'', the heads 112 of the spikes or prongs being held firmly between the laminations as clearly shown in Fig. 9.

Guides extending linearly along the side margins of the traveling conveyor and lying in a plane above the same are adjustably positioned by the frame and serve to control the path of the articles being fed by the conveyor past the cutting discs of the slicing machine. In the form illustrated rods 114 are slidably received through openings in bosses 116 positioned near the base of each side wall at each end thereof, a set screw 118 serving to fixedly position each rod within its supporting boss at any position to which it is adjusted. Knobs 120 and 122 positioned on each rod 114 on opposite sides of its bearing in the boss serve to limit the sliding movement of each rod inwardly and outwardly with reference to the frame side wall.

Secured to the inner ends of the rods 114 associated with each side wall is a guide member 124, the inner face of each of which is grooved longitudinally along its median line as indicated at 126. Thus it will be seen that inward and outward sliding movement of the rods 114 on each respective side of the slicing machine serve to determine the width of the passage through which articles being conveyed under the machine by the conveyor is limited.

As has heretofore been stated, the machine is designed to slice articles of varying size and configuration, particular attention being directed to the flat hamburger type of roll and the long narrow frankfurter type of roll. The cutter disc drive shafts journaled, respectively, in the cross braces 38 and 40 are arranged in a particular configuration with reference to the belts 106 and their respective oppositely disposed pulleys 100 and 104. The drive shaft 44 extends between the two innermost belts 106 and shafts 74 and 76 pass, respectively, through the two outermost spaces between the four parallel belts. Thus the shafts 44, 74 and 76 form the apices of a triangle lying in a plane transverse to the axis of the shafts. The shaft 44 is designed to rotate a large cutting disc 66 and the two transversely aligned shafts 74 and 76 are designed to simultaneously rotate two smaller cutting discs such as 66'. As heretofore pointed out, all of the discs are detachably secured to the drive shafts and the shafts themselves are vertically adjustable in their respective journals.

When cutting the large flat type of roll commonly known as a hamburger roll, particular reference being made to Fig. 4, the two smaller cutting discs 66' are uncoupled from their respective drive shafts 74 and 76 and the large disc 66 secured to drive shaft 44 is used alone. The rolls or buns 128 as they move on the conveyor toward the slicing machine are forced inwardly by the flared end portions 130 of guides 124, which have been moved inwardly to provide the proper marginal guides, so that two columns of rolls will move under the two inner belts 106. As the rolls continue to move forward, the engaging means or prongs 110 on the outer face of these belts will move down into the respective rolls and, the belts 106 being driven in synchronism with the movement of the conveyor, the rolls will be held firmly upon the conveyor during their passage past the cutter disc 66. After passing through the machine the prongs move upward out of engagement with the sliced rolls, which are carried on by the conveyor to some other point for a subsequent operation.

In the operation illustrated by Fig. 4, the rolls are so positioned that the cutting disc slices only partially through each roll of each parallel column of rolls, leaving a hinge portion 130. If the roll is to be sliced entirely and no hinge portion provided, the guides 124 are set more closely together, forcing the rolls of each parallel column moving under the slicing machine inwardly so that the cutting disc 66 will slice through the entire body of each roll. The grooves 126 are in the same transverse plane as the cutting disc and the peripheral margin of the disc may enter the grooves during the cutting operation when the guides 124 are set for the complete slicing operation.

Where relatively long and narrow rolls, such as frankfurter rolls 129, are to be sliced, the cutting disc 66 is removed and the two smaller discs 66' are secured to drive shafts 74 and 76. This operation is illustrated in Fig. 5 and the guides 124 are so set that, as the conveyor moves the rolls under the slicing machine, each of the four pulley belts constituting the gripping or positioning means independently engages the rolls to form four columns. As explained with reference to Fig. 4, the guides 124 may be moved inwardly to compress the rolls of the four columns somewhat more when a full-slice operation is to be performed and the peripheral margins of the cutter discs 66' may penetrate into the grooves 126 of the oppositely disposed guides.

By virtue of the hinge mounting of the entire machine at one end on hinges **28**, the machine may be lifted at the other end for ready detachment and attachment of the desired cutting discs for each individual operation. The vertical adjustability of the frame with reference to the hinge supports **28** and the legs **30** permits bodily vertical adjustment of the entire machine and, of course, the vertical adjustability of each of the drive shafts for the cutter discs all combine to provide a wide range of adjustability for operating on articles of different sizes and contours. This range is greatly facilitated for lateral or transverse adjustments by the readily adjustable manner in which the guides **124** are mounted.

From the foregoing it will be seen also that all parts are readily accessible for replacement and repair and easy access is provided for cleaning purposes. The weight of the machine is kept to a minimum by virtue of the apertured side frames and the skeleton-like formation obtained by the two cross braces which provide the journals for the cutter disc drive shafts. The ready adjustability of the pulley shafts **86** and **88** in a longitudinal direction for tightening or loosening the belt **106** permits conforming the gripping surfaces of the belts in the most feasible manner with the articles being passed under and along with it by the conveyor belt.

Frequently rolls are baked in groups or clusters as distinguished from separate units. A cluster may comprise a double row of the larger or hamburger rolls or a quadruple row of the smaller or frankfurter rolls. Under such circumstances it is desirable to provide means in conjunction with the slicing mechanism heretofore described for severing or separating, partially or wholly, the units of these clusters prior to passing them through the horizontal slicing discs. The spindle of the horizontal slicing disc to which adjacent rolls of the cluster are next subjected passes through this line of severance.

In this embodiment improved means are also provided for quickly and easily elevating the entire slicing head by manipulation of a single adjusting element which raises or lowers the four corner supports of the frame. In addition I have disclosed in conjunction with the arrangement illustrated in Figs. 10–15 means whereby the linear speed of the conveyor belt on which the rolls are carried through the slicing machine is conformed exactly to the linear speed of the endless belts which engage the top of the rolls to hold them firmly upon the conveyor support during such passage.

Referring now particularly to the arrangement illustrated in Figs. 10–15, rollers **140** and **142** are journaled at opposite ends of a bed support **144** and serve to carry an endless conveyor **146** upon which the roll clusters are moved through the slicing machine as heretofore described. The conveyor is driven by motor **148** through a roller chain **150** which passes over sprocket wheel **152** of the motor, an idler sprocket **154**, and sprocket **156** secured to the end of the shaft upon which roller **140** is mounted.

The slicing head broadly indicated by the numeral **158** comprises a frame in all material respects like that heretofore described in conjunction with the structure illustrated in Figs. 1–10. The head is supported by forward leg members **160** and rear leg members **162** which are secured in suitable fashion to the side walls of the frame of the slicing head. The upper ends of legs **160** are pivotally secured to the side walls of the frame as indicated at **164** and the lower end of each leg is pivoted at **166** between the ends of a pair of levers **168**. These levers **168** are pivoted at their midpoints to a hanger **170** secured to the bed frame **144** and depending therebelow, the opposite ends of said levers being pivoted by means of a pin as indicated at **172** to the lower extremity of a link **174**.

Concaved seats **163** are formed at the upper ends of rear legs **162** for receiving enlarged heads **165** on the lower ends of posts **167** which are threaded through

flanges on the side walls of the frame. Posts **167** are held in adjusted position by nuts **176** and the lower ends of legs **162** are pivoted as indicated at **178** between a pair of levers **180**. Levers **180** are pivoted at their midpoints to the lower extremity of hangers **182** as indicated at **184** and the opposite ends of said levers are pivoted by means of pin **172** to the lower extremity of link **174**.

To the upper end of link **174** is pivoted one end of a link **186**, the other end of this link being secured to a shaft **188** in such manner that the link and the shaft rotate as a unit. The linkage arrangement at the opposite end of shaft **188**, which lies outside the opposite side wall of the frame of the slicing head, is precisely the same as has been described above, this construction being clearly illustrated in the schematic view afforded by Fig. 13.

Secured to shaft **188** at one end for rotation therewith is an actuating link **190** and the end of a threaded adjusting screw **192** is adapted to bear upon the upper edge of this link. The adjusting screw is threaded through a collar **194** secured to the bed frame **144** and may be actuated by a knurled hand wheel **196**.

From the foregoing description the means for elevating and dropping the slicing head will be apparent. Upon rotation of the hand wheel **196**, the end of threaded member **192** will move downwardly forcing with it the actuating link **190** and thus rotating the shaft **188**. Rotation of shaft **188** on downward movement of actuating link **190** rocks levers **168** and **180** about their fulcrums at the lower ends of hangers **170** and **182**, forcing the outer ends of said levers upwardly and with them the legs **160** and **162** which support the head.

On rotation of the hand wheel **196** in the opposite direction the weight of the head will force the outer ends of levers **168** and **180** downwardly as the head drops, actuating link **190** being held in engagement with the end of adjusting screw **192** as the same moves upwardly during rotation of hand wheel **196**.

To compensate for the slight arc traveled by the outer and inner ends of levers **168** and **180** during their pivotal movement about hangers **170** and **182**, these levers may be slotted to provide lost motion at their pivotal engagements with pins **166** and **178** and at their pivotal engagement with pin **172** through which they are connected to link **174**. This elevation adjustment enables the head to be positioned so that the discs are correctly located for properly slicing rolls of varying height or thickness. Threaded posts **167** provide for fine adjustment of elevation at the rear of the slicing head and, by virtue of the gravity support thereof on legs **162**, the entire head may be moved upwardly about pivots **164** to provide ready access to the slicing discs and the driving mechanism therefor which lie inside the walls of the slicing head frame.

As described in conjunction with the arrangement illustrated in Figs. 1–9, the spindle of a large horizontal cutting disc **198** is journaled in a bearing **200** positioned centrally of the head in a transverse direction and the spindles of two smaller horizontally positioned slicing discs **202** and **204** are journaled in bearings **206** and **208** located in transverse alignment adjacent one another rearwardly of the larger disc bearing **200**. The spindles of discs **198**, **202** and **204** are removable from their respective bearings and also adjustable as to height, as heretofore described. They are driven by a V-belt **210** which passes around pulleys at the upper end of shafts likewise journaled in bearings **200**, **206** and **208** and which engage the spindles of the horizontal discs. The V-belt is driven from a pulley **212** on the shaft of motor **214**, all in a manner heretofore described in detail.

On the shaft of motor **214** is another pulley **216** which drives a belt **218** passing over vertically offset guide pulleys **220** and **222** to drive pulley **224** which is mounted on drive shaft **226** journaled transversely of the slicing head in the side walls of its frame.

Three drive pulleys **228**, **230** and **232** are fixedly secured to shaft **226** for rotation therewith. These drive pulleys are spaced from one another in a manner to be described for a purpose which will be elaborated upon hereafter. A shaft **234** is rotatably journaled in the side walls of the frame of the slicing machine and a bifurcated arm **236** is secured to said shaft centrally thereof for rotation therewith. Rotatably journaled between the free ends of the arms of the bifurcation is a vertical slicing disc **238** with which is integrally associated a drive pulley **240**. The drive pulley of this vertical slicing disc **238** is rotated by a belt passing around the pulley **240** and the central pulley **230** on shaft **226**.

Transversely spaced vertical slicing discs **242** and **244** having pulleys integrally associated therewith as heretobefore described are rotatably journaled between bifurcated arms **246** and **248**, the ends of these arms being secured to shaft **250** for rotation therewith. Shaft **250** is rotatably journaled in the side walls of the frame of the slicing machine and these two vertical discs are driven by belts from pulleys **228** and **232** lying on opposite sides of pulley **230** and, like it, being secured to shaft **226** for rotation therewith.

Thus it will be seen that the vertical discs **238**, **242** and **244** are all driven from the shaft of motor **214**, as are the horizontally disposed discs **198**, **202** and **204**.

The vertically disposed discs may be elevated to any adjusted position or to inoperative position when not in use by means of crank arms **252** and **254**, the former being secured to the end of shaft **234** which carries disc **238** and arm **254** being secured to the end of shaft **250** which carries the other two vertically disposed slicing discs. The free ends of crank arms **252** and **254**, respectively, are provided with threaded pins **256** and **258** which are movable inwardly and outwardly from the adjacent side walls of the slicing machine frame to position the shafts **234** and **250** so that the slicing discs carried thereby may be held in any desired elevated position, usually in such position that the cluster is severed between each adjacent roll of a transverse row to a depth corresponding to the point where each roll is to be sliced subsequently by a horizontal disc. Under these circumstances rolls remain integrated in cluster form after slicing.

It will be apparent that, when large rolls are being partially severed and sliced, as illustrated in Fig. 14, only the large horizontally disposed disc **198** and the vertically disposed disc **238** will be in operation. At this time the spindles of the smaller horizontal discs **202** and **204** will have been removed from their bearings and vertical discs **242** and **244** will have been elevated by manipulating arm **254** so that they will not come in contact with the large rolls passing along on the conveyor **146** through the slicing head. The vertical disc **238** will first partially sever each pair of the cluster as it travels through the machine and subsequently the horizontal disc **198** will slice them as desired, either fully or partially to provide a hinge at one side, all as described in detail in conjunction with the embodiment disclosed in Figs. 1–9.

When operating on smaller rolls such as the frankfurter type, as illustrated in Fig. 15, the large horizontal disc **198** will have been removed from its bearing **200** and the single vertical disc on shaft **234** will have been elevated to preclude its engagement with the rolls passing through the machine. Vertical discs **242** and **244** are in position to sever, partially or wholly, each of the pairs of rolls forming the cluster being fed through the machine. After the severing operation the two horizontally disposed discs **202** and **204** will slice each roll of each pair precisely as described in conjunction with the embodiment of Figs. 1–9.

The belts by which the vertical knives are driven from shaft **226** are of the cylindrical rubber type, thus eliminating any need for disengaging the belts from the pulleys on which they are mounted when moving the vertical discs to elevated or lowered position. Under such circumstances the vertical discs are driven at all times regardless of the type of roll being severed and sliced, although of course only the large horizontal discs **194** or the pair of small horizontal discs **202** and **204** are mounted in operative position at one time.

As illustrated in conjunction with the earlier described embodiment, studded endless belts **260**, of which there are four, are mounted on rollers **262** and **264** at each end of the frame, the forward set of rollers **262** being secured to drive shaft **266** which is rotatably journaled on the shaft and a sprocket wheel **270** secured for rotation therewith. The arm **268** may be spaced from the side wall of the frame by spacer **272** and separated from the sprocket wheel by a spacing member **274**. Rotatably journaled in the outer or free end of arm **268** is a hub **276** integral with which are two sprocket wheels **278** and **280**. Sprocket wheel **280** engages that portion of roller chain **150** lying between the idler sprocket **154** and the conveyor drive sprocket **156**, being tensioned thereagainst by spring **281** with sufficient force to engage the chain and insure rotation of sprocket **280** with movement of chain **150** and consequent rotation of sprocket **278** which in turn actuates sprocket **270** to drive shaft **266** and the endless belt roller supports. Inasmuch as the diameters of conveyor sprocket **156** and sprockets **280**, **278** and **270** are identical, as are the diameters of conveyor rollers **140** and **142** and the endless belt supporting rollers **262** and **264**, the speed of rotation of all the sprockets and the driven rollers will be the same and consequently the linear speed of the endless conveyor **146** will be identical with the linear speed of the studded endless belts **260** which engage and penetrate the upper surface of the rolls supported by the endless conveyor as it moves through the slicing machine.

Furthermore, by reason of this arrangement the slicing head **158** may be elevated about pivots **164** without in any way interfering with the driving arrangement of either the conveyor **146** or the endless belts **260**, thus facilitating rapid and facile mounting and dismounting of the horizontally disposed knives for handling rolls of different types.

While we have described a preferred embodiment of the process and arrangement for obtaining the improved results herein outlined, various modifications may be apparent to those skilled in the art and for that reason we wish to limit ourselves only within the scope of the appended claims.

We claim:

1. A method of processing before packaging an integrated roll cluster having a longitudinally extending joint between adjacent longitudinal rows of rolls and a transverse joint between adjacent rolls in each row, comprising moving said roll cluster longitudinally forward past a vertical rotating cutting disc positioned in longitudinal alignment with said longitudinally extending joint, holding firmly said cluster in predetermined longitudinal alignment during movement, forming a vertical cut in the cluster at said longitudinally extending joint to open a path as the firmly held cluster is moved past said vertical rotating cutting disc, moving the vertically cut and firmly held cluster longitudinally forward past a horizontal rotating slicing disc secured to a vertical rotating shaft in a manner such that said shaft passes through said path to prevent tearing of the rolls, and forming a horizontal slice in the cluster between the tops and bottoms of the rolls as the firmly held cluster is moved past said horizontal rotating slicing disc.

2. A method of processing before packaging integrated roll clusters each having longitudinally extending joints between adjacent longitudinal rows of rolls and transverse joints between adjacent rolls in each row, comprising moving said roll clusters longitudinally forward past spaced vertical rotating cutting discs positioned in longitudinal alignment with said longitudinally extending joints, holding firmly said clusters in predetermined longitudinal

alignment during movement, forming vertical cuts in the clusters at said longitudinally extending joints to open paths as the firmly held clusters are moved past said vertical rotating cutting discs, moving the vertically cut and firmly held clusters longitudinally forward past spaced horizontal rotating slicing discs secured to vertical rotating shafts in a manner such that said shafts pass through said paths to prevent tearing of the rolls, and forming horizontal slices in the clusters between the tops and bottoms of the rolls as the firmly held clusters are moved past said horizontal slicing discs.

3. A method of processing before packaging an integrated roll cluster having a longitudinally extending joint between adjacent longitudinal rows of rolls, comprising the steps of causing relative longitudinal movement between said roll cluster and a vertical rotating cutting disc positioned in longitudinal alignment with said longitudinally extending joint, holding firmly said cluster in predetermined longitudinal alignment during relative longitudinal movement, forming a vertical cut in the cluster at said longitudinally extending joint to open a path during said relative longitudinal movement, causing further relative longitudinal movement between said vertically cut and firmly held cluster and a horizontal rotating slicing disc secured to a vertical rotating shaft in a manner such that the shaft passes through said path to prevent tearing of the rolls, and forming a horizontal slice in the cluster between the tops and bottoms of the rolls during said further relative longitudinal movement.

4. A method of processing before packaging an integrated roll cluster having a longitudinally extending joint between adjacent longitudinal rows of rolls and a transverse joint between adjacent rolls in each row, comprising moving said roll cluster longitudinally forward past a vertical rotating cutting disc positioned in longitudinal alignment with said longitudinally extending joint, holding firmly said cluster in predetermined longitudinal alignment during movement, forming a vertical cut in said cluster partially through said longitudinally extending joint to open a path as the firmly held cluster is moved past said vertical rotating cutting disc, moving the vertically cut and firmly held cluster longitudinally forward past a horizontal rotating slicing disc secured to the free end of a vertical rotating shaft in a manner such that the shaft passes through said path to prevent tearing of the rolls, and forming a horizontal slice in the cluster between the tops and bottoms of the rolls as the cluster is moved past said horizontal rotating slicing disc, said horizontal slice being formed to extend partially through each roll transversely from said longitudinally extending joint to leave an unsliced hinge portion whereby the vertically and horizontally cut cluster retains its integrated character.

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