June 13, 1972 G. T. GORE 3,669,800

APPARATUS FOR FABRICATING SANITARY NAPKINS

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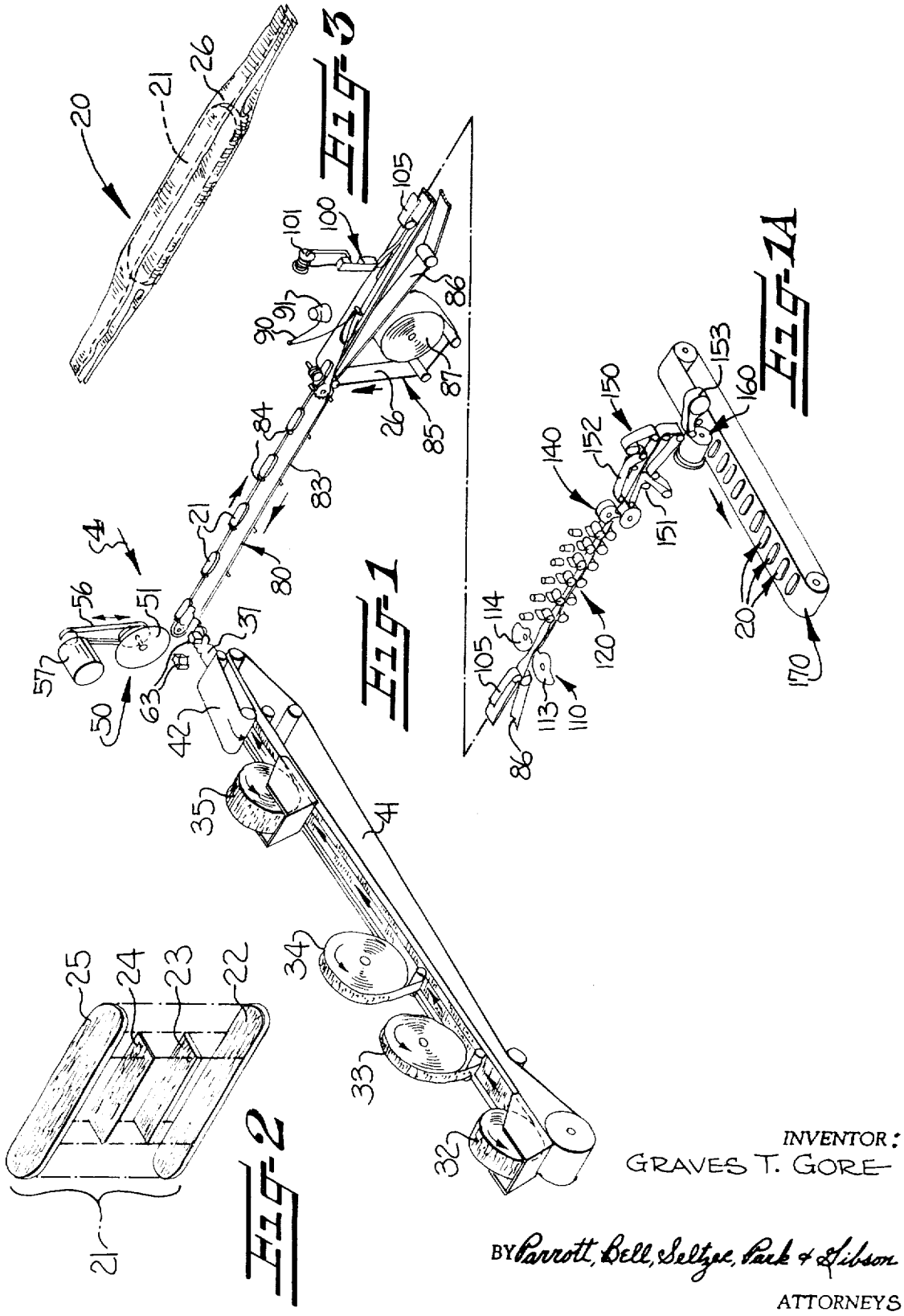

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APPARATUS FOR FABRICATING SANITARY NAPKINS

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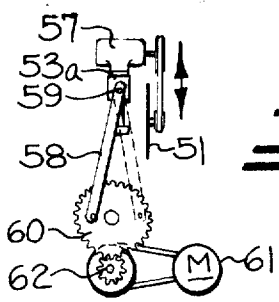

Fig-5

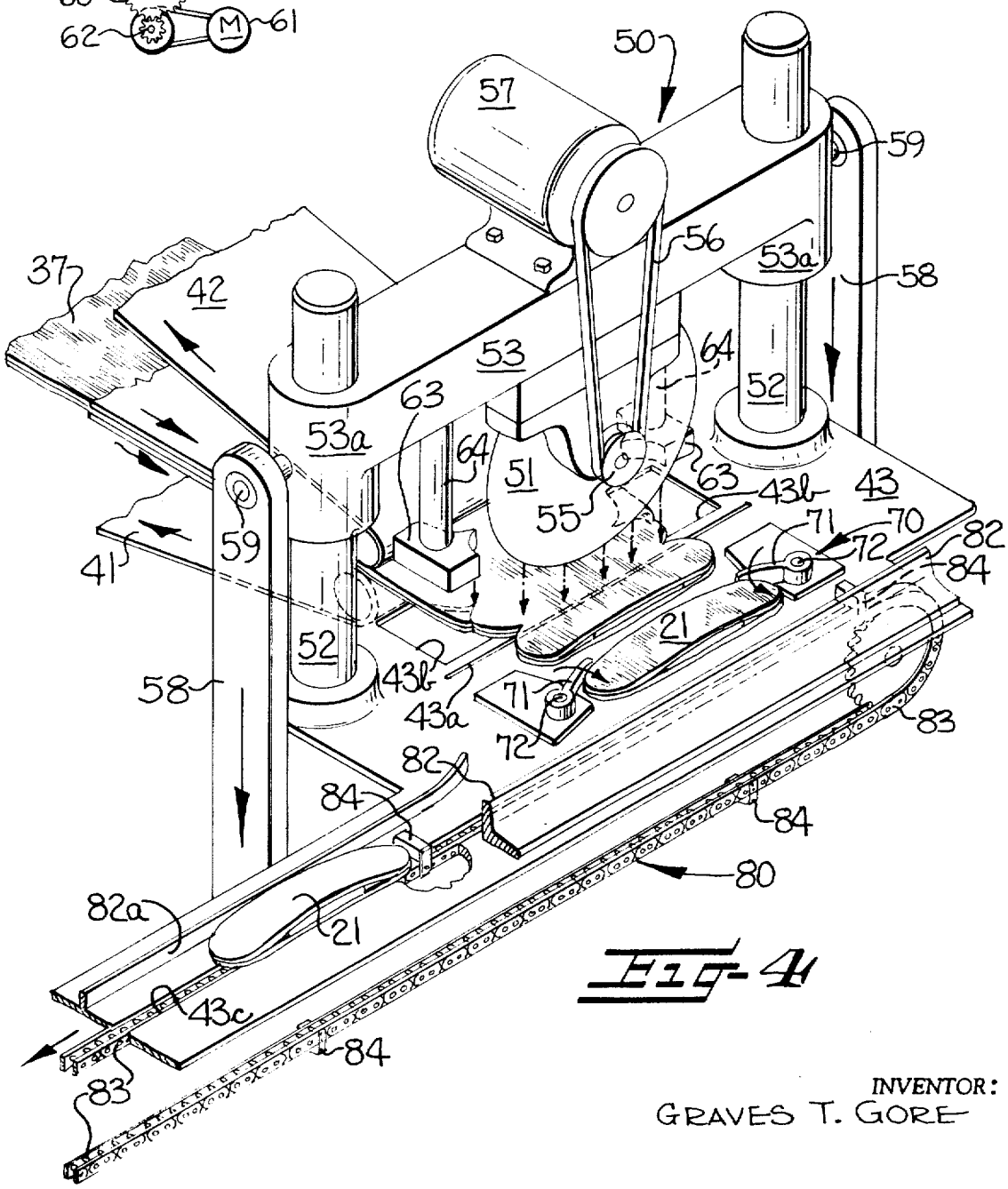

Fig-4

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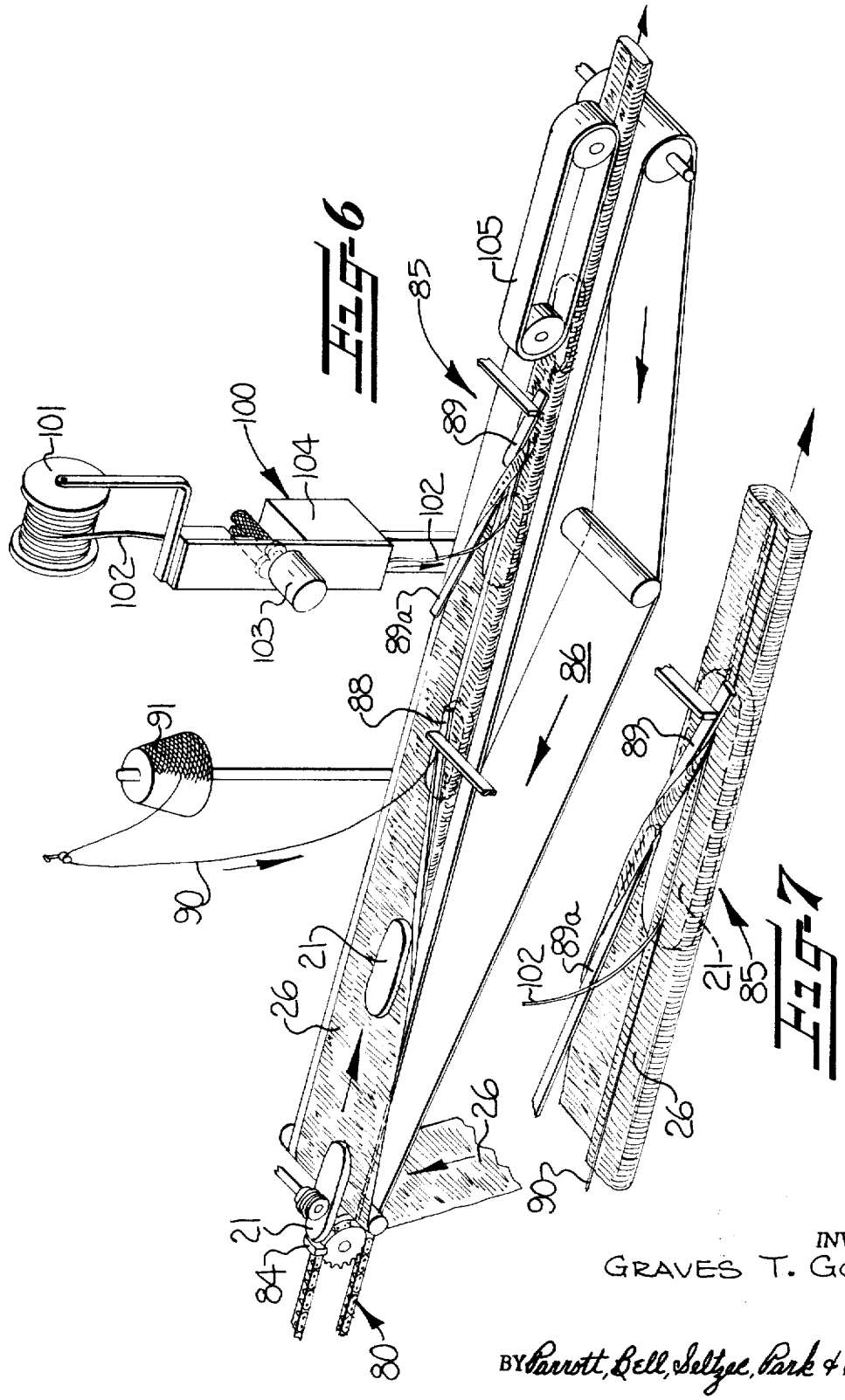

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APPARATUS FOR FABRICATING SANITARY NAPKINS

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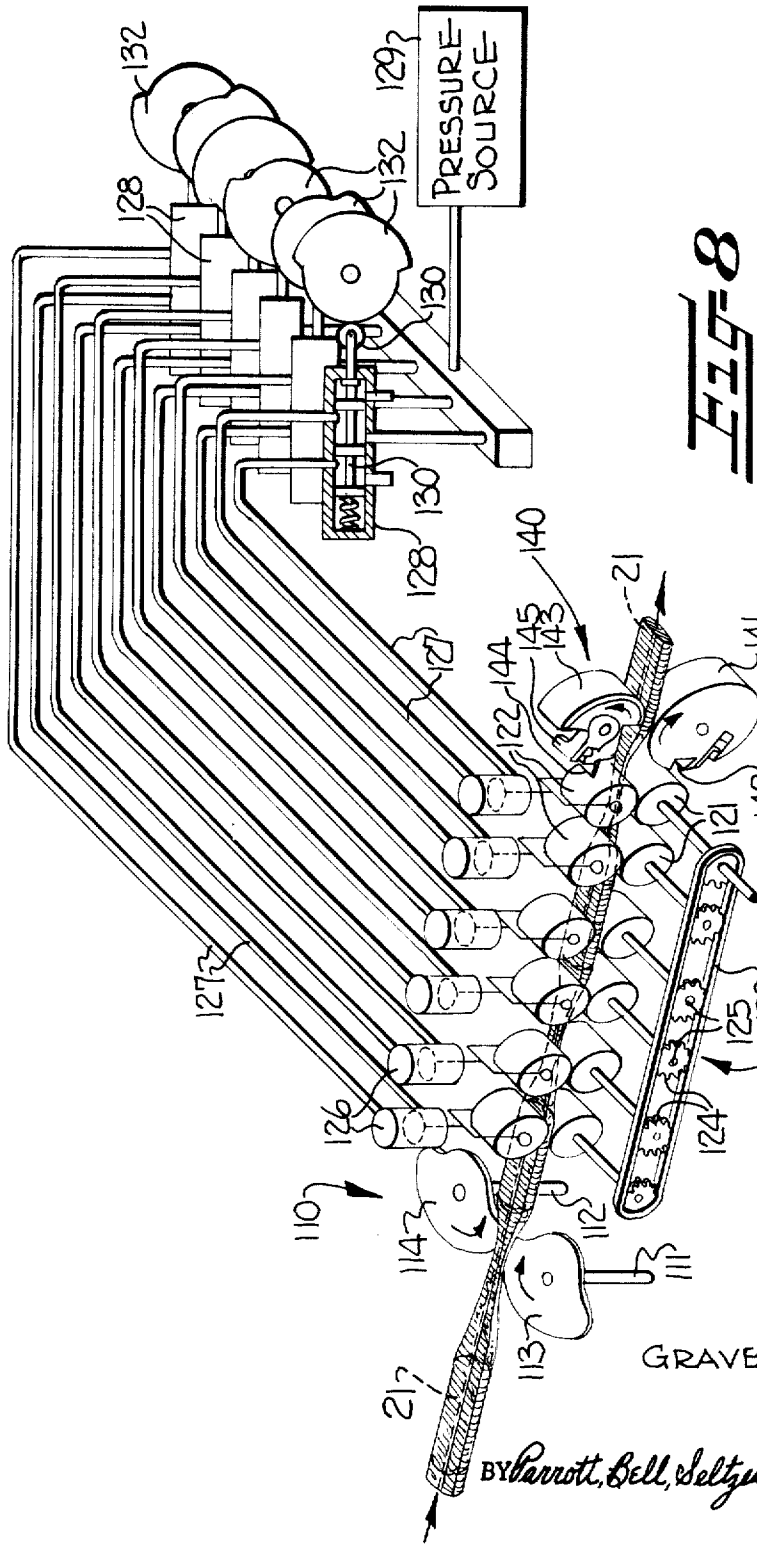

Fig. 8

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APPARATUS FOR FABRICATING SANITARY NAPKINS

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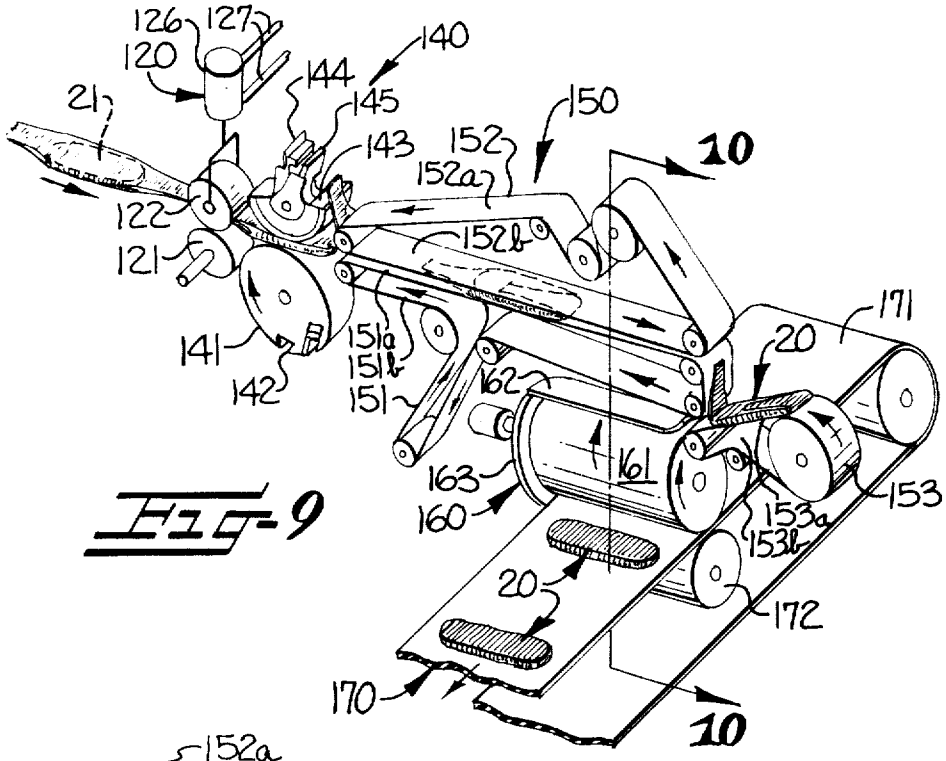

Fig-9

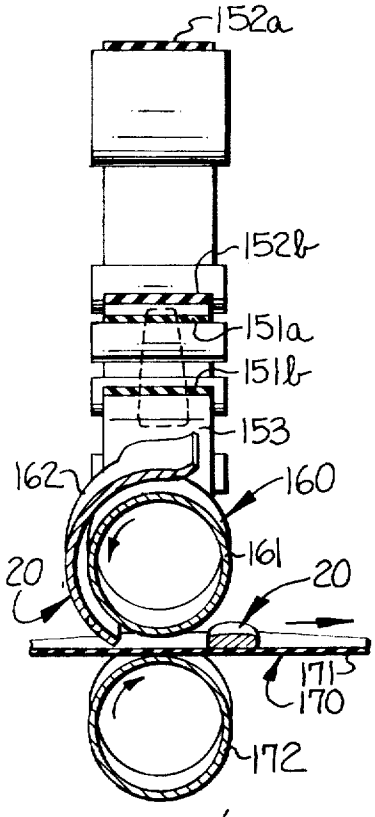

Fig-10

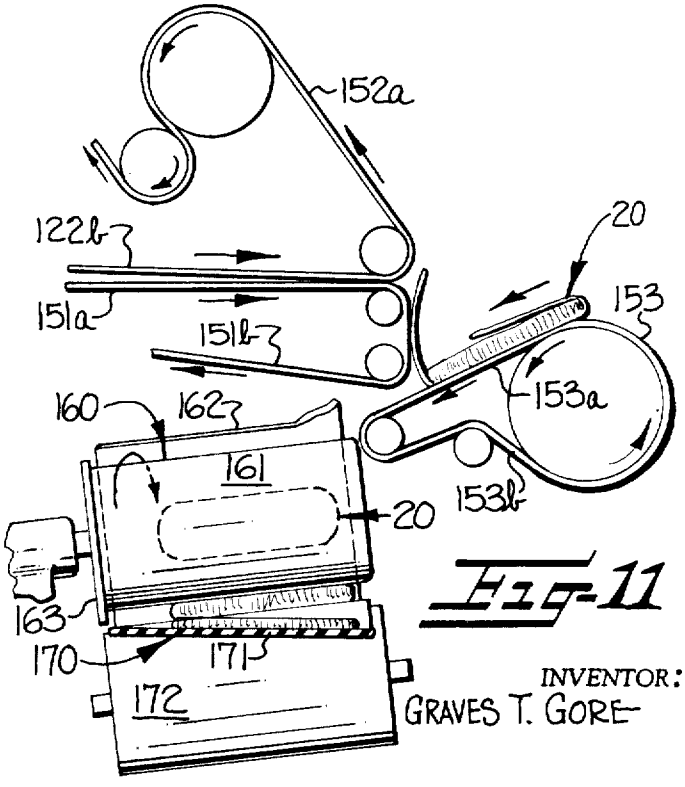

Fig-11

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3,669,800

APPARATUS FOR FABRICATING SANITARY NAPKINS

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U.S. Cl. 156—383 14 Claims

ABSTRACT OF THE DISCLOSURE

An apparatus for fabricating sanitary napkins having an elongate wrapper-enclosed pad and wrapper tabs extending longitudinally from opposed ends of the wrapper-enclosed pads including means for feeding a continuous web of pad material, means for cutting the pad material into individual pads, conveyor means for successively receiving, spacing and advancing the individual pads, means for feeding a continuous web of wrapper material and for successively receiving and positioning the pads on the wrapper material, means for folding opposite edge portions of the wrapper material in overlapping relation around the pads, means for applying adhesive between the overlapping portions of the wrapper material for securing the edge portions to each other, and cutting means for cutting the connecting wrapper tab portions intermediate successive wrapper-enclosed pads to complete the formation of the individual sanitary napkins.

This invention relates to an apparatus for automatically fabricating sanitary napkins having an elongate wrapper-enclosed pad and wrapper tabs extending longitudinally from opposed ends of the wrapper-enclosed pad.

Conventionally, in the manufacture of sanitary napkins of the type to which this invention relates, it has been necessary to carry out a series of separate steps, either manually or with separate machines. This necessarily involved a large number of personnel, time consumption, inefficiency and costliness. Another disadvantage of this type of manufacturing operation was the amount of space necessary to carry out these separate steps. Also, during these separate steps, human contact with the product was often made which is highly undesirable in the manufacture of sanitary napkins.

Thus, it is an object of this invention to provide an apparatus for automatically fabricating sanitary napkins which alleviates the shortcomings of the conventional techniques or heretofore known apparatus.

In accordance with this invention, an apparatus is provided for fabricating sanitary napkins having an elongate wrapper-enclosed pad and wrapper tabs extending longitudinally from opposed ends of the wrapper-enclosed pad. The apparatus includes means for feeding a continuous web of pad material along a substantially predetermined longitudinal path of travel. Cutting means are disposed adjacent the pad material feeding means for transversely cutting the continuous web of pad material into individual elongate pads of a predetermined width. The cut pads are transferred to conveyor means where the pads are equidistantly positioned in spaced apart lengthwise relation and advanced along a predetermined path of travel. A continuous web of wrapper material is fed along a predetermined longitudinal path of travel and successively receives the equidistantly spaced apart pads longitudinally of a median portion thereof in equidistantly spaced apart relation. Folding means fold opposite edge portions of the wrapper material in overlapping relation around the pads with the overlapping edge portions being adhesively sealed in overlapping relation

to form spaced apart wrapper-enclosed pads and connecting wrapper tab portions extending longitudinally between successive wrapper-enclosed pads. Cutting means then cut the connecting wrapper tab portions intermediate successive wrapper-enclosed pads to form the individual sanitary napkins.

The apparatus preferably includes transfer means cooperating with the pad material cutting means for successively transferring the individual pads from the cutting means to the conveyor means. The apparatus also preferably includes compressing means disposed adjacent the second folding means for compressing only the connecting wrapper tab portions extending between successive wrapper-enclosed pads and not the wrapper-enclosed pads to compact the connecting wrapper tab portions extending between successive wrapper-enclosed pads.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds, when taken in connection with the accompanying drawings, in which:

FIG. 1 and 1A when combined schematically illustrate an apparatus constructed in accordance with this invention;

FIG. 2 is an exploded perspective view of an individual elongate pad employed in the sanitary napkin fabricated by the apparatus of FIGS. 1 and 1A;

FIG. 3 is a perspective view of a sanitary napking having a wrapper-enclosed pad and wrapper tabs extending longitudinally from opposed ends thereof fabricated in accordance with the apparatus of FIGS. 1 and 1A;

FIG. 4 is an enlarged perspective view with portions broken away looking in the direction of arrow **4** of FIG. 1;

FIG. 5 is a reduced schematic side elevational view of a portion of the apparatus shown in FIG. 4 illustrating drive means therefor;

FIG. 6 is an enlarged perspective view illustrating folding means and adhesive applying means of the apparatus illustrated in FIGS. 1 and 1A;

FIG. 7 is an enlarged perspective view of a portion of the apparatus in FIG. 6 more clearly illustrating the folding of one of the opposite edge portions and the insertion of an adhesive between overlapping edge portions for securing the overlapping edge portions together;

FIG. 8 is an enlarged perspective view of the means for inwardly folding lateral edge portions of the connecting wrapper tap portions, the means for compressing the connecting wrapper tab portions, and the means for cutting the connecting wrapper tab portions intermediate successive wrapper-enclosed pads of the apparatus illustrated in FIGS. 1 and 1A;

FIG. 9 is an enlarged perspective view of the means for folding and handling the sanitary napkins after fabrication;

FIG. 10 is an enlarged sectional view taken substantially along the line **10—10** of FIG. 9; and

FIG. 11 is an enlarged front elevational view of a portion of the apparatus illustrated in FIG. 9.

Referring specifically to the drawings wherein like reference characters are employed to indicate like parts, an apparatus of the present invention is schematically illustrated in combined FIGS. 1 and 1A.

A sanitary napkin, generally indicated at **20**, that may be fabricated by the apparatus of the present invention is illustrated in FIG. 3 and comprises an elongate interior pad **21** of fibrous absorbent material adapated to absorb body fluids. This interior pad **21** may be layered, cut, folded or otherwise formed to provide this function.

In one commercially advantageous form and the form fabricated with the apparatus to be hereinafter described, the elongate interior pad **21** is of the multi-layer type and

includes a plurality of superimposed cut layers **22**, **23**, **24** and **25** as illustrated in FIG. 2. Preferably, the outer layers **22** and **25** are formed of fluffed fibrous wood pulp material with a ply of creped cellulosic sheet material on each side thereof. The inner layer **23** is formed of the same material as layers **22** and **25** and has substantially the same width as the outer layers **22** and **25** but is somewhat shorter in length. Layer **23** is superimposed intermediate opposed ends of the outer layers **22** and **25** and provides increased absorbency potential in the median portion of the pad **21**. Layer **24** is a conventional moisture barrier of identical size as layer **23** and may be formed of any suitable fluid impervious material. It will be readily apparent that the interior pad **21** is intended to be used with layer **22** against the skin of the wearer whereby layer **23** can function to provide increased fluid adsorbency potential and the fluid impervious layer **24** can prevent the passage of moisture through the pad **21** to the clothing of the wearer.

The sanitary napkin **20** further comprises a fluid permeable wrapper **26**, such as a creped cellulosic fibrous sheet material. The wrapper **26** is folded around the interior pad **21** to form a wrapper-enclosed pad and wrapper tabs extending longitudinally from opposed ends thereof which serve as attachment tabs for attachment to the normal belt or holding means when the sanitary napkin **20** is utilized by the wearer.

Having briefly described a sanitary napkin **20** that may be fabricated with the apparatus of the present invention, a detailed description of that apparatus will now be made. With reference to FIG. **1**, four supply rolls **32**, **33**, **34** and **35** are provided in series. The supply rolls **32**, **33**, **34** and **35** contain continuous strips of open width material corresponding to the layers **22**, **23**, **24** and **25**, respectively, of the elongate interior pad **21**. It will also be noted that the width of the strips correspond to the length of layers **22**, **23**, **24** and **25** of the elongate interior pad **21**.

The continuous strips of open width material are simultaneously fed from the supply rolls **32**, **33**, **34** and **35** by a pair of superimposed continuous conveyors **41** and **42** which are adapted to place the various strips in superimposed relation to form a continuous web of pad material **37** and advance the continuous web along a substantially predetermined longitudinal path of travel onto a horizontally disposed receiving plate **43**, as best shown in FIG. 4.

A cutting means generally indicated at **50** (FIGS. 1 and 4) is disposed adjacent the pair of superimposed conveyors **41** and **42** in cooperating relation therewith and above receiving plate **43** for shaping and transversely cutting the continuous web of pad material **37** into individual elongate pads **21** of a predetermined width. The cutting means **50** comprises a continuously rotated cutting blade **51** that is mounted above receiving plate **43** with the cutting blade disposed for rotation in a plane transverse to the path of the continuous web for transversely cutting the continuous web of pad material **37**. A pair of spaced apart vertical standards **52** are mounted on receiving plate **43** adjacent opposed sides of the web of pad material **37** being received thereon and support a horizontally extending member **53** therebetween which includes collar portions **53***a* slidably mounted on standards **52**. The rotary cutting blade **51** is carried by the horizontally extending member **53** as at **54** and includes a drive pulley **55** which is driven by belt **56** that is in turn continuously driven by drive motor **57**.

In order to enable the cutting blade **51** to cut the continuous web of pad material **37** into predetermined widths, horizontally extending member **53** is reciprocated vertically up and down on standards **52** in predetermined timed relationship to the feeding of the web of pad material **37**. In particular, a pair of crank arms **58** has one end thereof pivotally connected to collar portions **53***a* as at **59**. The other end of crank arms **58** (FIG. 5) is pivotally connected eccentric to the center of gears **60** (only one of which is shown in FIG. 5). A motor **61** is drivingly connected to each of the gears **60** through the output gear **62** of a gear reduction box. Thus, by driving gears **60** in predetermined timed relationship to the feeding of the web of pad material **37** onto receiving plate **43**, the continuously rotating cutting blade **51** will cut the web of pad material **37** into individual elongate pads **21** of a predetermined width.

In addition to cutting the web of pad material **37** into individual elongate pads **21**, the cutting means **50** stamps the edges of the continuous web of pad material **37** so that the individual elongate pads **21** being formed will have convex-shaped ends which has proven to be desirable as contrasted to pads having square-shaped ends. Cutting dies **63** for so stamping the opposed edges of the web of pad material **37** are suspended by support members **64** from horizontally extending member **53** and during the reciprocation of horizontally extending member **53** stamp out opposed edge portions of the web of pad material **37** prior to the transverse cutting.

To facilitate the operation of the cutting blade **51**, the receiving plate **43** includes a narrow elongate slot **43***a* disposed in receiving relation to cutting blade **51** as it cuts the web of pad material **37**. Similarly, the receiving plate **43** has another opening or slot **43***b* disposed therein in receiving relation to the cutting dies **63**. In each case, the receiving plate **43** provides support for the web of pad material and facilitates the cutting thereof into the individual elongate pads **21** to be used as the interior pad of the sanitary napkin being fabricated.

As the individual pads **21** are successively cut, transfer means, generally indicated at **70**, cooperates with the cutting means **50** for successively transferring the individually elongate pads of predetermined width therefrom. The transfer means **70** comprises a pair of spaced apart rotatably mounted transfer arms **71** which are mounted on receiving plate **43** adjacent the cutting means **50**. As the continuous web of pad material **37** is cut into individual elongate pads **21**, successive pads **21** are forced by the oncoming web of pad material **37** in between transfer arms **71**. Drive means (not shown) causes transfer arms arms **71** to continuously rotatate about axis **72** in timed relationship to the advancement of individual elongate pads **21** therebetween so that the transfer arms **71** will engage opposite end portions of successive elongate pads **21** and successively transfer them from adjacent the cutting means **50**.

Conveyor means, generally indicated at **80** (FIGS. 1 and 4), is positioned in receiving relation to transfer means **70** for successively receiving the individual elongate pads **21**, spacing the pads in equidistantly spaced apart lengthwise relation, and advancing the pads in equidistantly spaced apart relation along a substantially predetermined path of travel. The conveyor means **80** includes a portion of the receiving plate **43** which extends beyond transfer means **70** and receives the individual elongate pads **21** from the transfer means **70**. Another elongate slot **43***c* is disposed in receiving plate **43** and extends transverse to the path of the continuous web of pad material **37** in parallel relation to the individual elongate pads **21** cut by cutting means **50**. An aligning member **82** is mounted on receiving plate **43** adjacent the elongate slot **43***c* and extends transverse to the direction which the transfer means **70** advances the individual elongate pads **21** and cooperates with the receiving plate **43** for aligning successive elongate pads lengthwise in overlying relation to slot **43***c* as the individual elongate pads **21** are received from the transfer means **70**.

To successively remove the individual elongate pads **21** from overlying relation to slot **43***c*, a continuous conveyor chain **83** is disposed beneath the receiving plate **43** in alignment with elongate slot **43***c* and may be driven by any suitable means (not shown). The conveyor chain **83** includes pad engaging members **84** mounted

thereon at equidistantly spaced points which communicate with the slot **43***c* in receiving plate **43** for successively engaging and advancing individual elongate pads **21** as they are aligned in overlying relation to slot **43***c* whereby the pads will be equidistantly spaced apart lengthwise and advanced along a substantially predetermined path of travel as determined by the path of travel of conveyor chain **83**. It will be readily apparent that conveyor chain **83** must be driven in predetermined timed relationship to the pad material feeding means and transfer means **70** so that successive elongate pads **21** will be successively received thereby and equidistantly spaced apart lengthwise thereon. A guide bar **82***a* is also mounted on receiving plate **43** adjacent slot **43***c* in guiding relation to conveyor chain **83** and facilitates in maintaining the elongate pads **21** in overlying relation to slot **43***c* as they advanced along the predetermined path as determined by conveyor chain **83**.

With the individual elongate pads **21** now equidistantly spaced apart lengthwise relative to each other on conveyor chain **83**, as shown in FIGS. 1 and 6, the conveyor chain **83** communicates with means for feeding a continuous web of wrapper material **26** along a substantially predetermined longitudinal path of travel. The wrapper material feeding means is generally indicated at **85** and comprises a continuous rotating conveyor **86**. As shown in FIG. **1**, a supply roll **87** of wrapper material **26** is disposed beneath conveyor **86** and is continuously fed onto conveyor **86** where the conveyor chain **83** communicates therewith. Since the continuous web of wrapper material **26** is advancing in superimposed relation to conveyor **86** at the point of communication with conveyor chain **83**, the individual elongate pads **21** (FIG. 6) are successively received in equidistantly spaced apart relation on the continuous web of wrapper material **26** longitudinally of a median portion thereof. The wrapper material feeding means **85** thus, in addition to feeding the wrapper material **26**, also feeds the pads **21** along a predetermined path of travel through the remainder of the apparatus.

As the web of wrapper material **26** and elongate pads **21** advance along the predetermined path of travel, the outer edges thereof are engaged by a folding means comprising serially-arranged elongate folding rods **88** and **89**, which diverge in the manner illustrated in FIG. 6 to cause opposite edge portions of the wrapper material **26** to be folded in overlapping relation around the individual elongate pads **21**. It will be noted that a guide rod **89***a* cooperates with folding rod **89** to properly guide one of the opposite edges of the wrapper material **26** into folding relation with folding rod **89**. As the first folding rod **88** folds one of the edge portions of the wrapper material **26** around the individual elongate pads **21**, a reinforcing strip **90** is fed onto the top of the folded over portion and as shown in FIG. 6 is continuously drawn from a supply means **91**. The reinforcing strip is formed of a generally inextensible material such as a textile yarn, an extruded plastic filament or any other suitable material which will provide the desired inextensible and strength features to restrict the normal tendency of the wrapper material **26** to elongate during use of the sanitary napkin.

The inextensible strip **90** may be coated with an adhesive for securing the overlapping edges of the wrapper together. Any type of suitable adhesive may be employed, such as a hot melt glue or the like. However, in the present apparatus, separate means, generally indicated at **100**, are provided for applying an adhesive between the overlapping edge portions of the wrapper material for securing the edge portions to each other. More particularly, the adhesive applying means **100** is disposed in cooperating relation with elongate folding rod **89** and comprises a supply roll **101** of a suitable strip of adhesive **102** such as a hot melt glue which is continuously drawn from a supply roll **101** by any conventional feeding means **103** and is passed through a heating chamber **104** for activation of the strip of adhesive **102** and is then fed between the overlapping edge portions of the wrapper material **26** as the elongate folding rod **89** folds the second edge portion in overlying relation to the first edge portion. To insure that the overlapping edge portions are secured together, a continuous conveyor **105** is mounted in superimposed relation to conveyor **86** and compresses the overlapping edge portions against the pad **21**. Thus, the first folding means and adhesive applying means **100** cooperating therewith form spaced apart wrapper-enclosed pads **21** and connecting wrapper tab portions extending longitudinally between successive wrapper-enclosed pads.

Following the folding means and adhesive applying means **100**, the wrapper-enclosed pads and connecting wrapper tab portions are advanced to a second folding means, generally indicated at **110** (FIGS. 1A and 8), positioned for inwardly folding opposed lateral sides of the connecting wrapper tab portions extending between successive wrapper-enclosed pads. With reference to FIG. 8, the second folding means **110** comprises a pair of complementary drive shafts **111** and **112** and rigidly mounted eccentric discs or cams **113** and **114** mounted thereon, respectively, of identical shape and size. The drive shafts **111** and **112** are driven at substantially equal speeds in opposite directions by any conventional drive means (not shown) such that the eccentric discs **113** and **114** move in synchronism with each other so that identical portions are opposed at all times.

The shafts **111** and **112** are spaced such that the peripheral edges of the discs **113** and **114** penetrate into opposed lateral sides of the connecting wrapper tab portions extending between successive wrapper-enclosed pads for inwardly folding the opposed lateral sides as the wrapper-enclosed pads and connecting wrapper tab portions are advanced therebetween. It will be noted that the discs **113** and **114** are so shaped that they are out of contact with the wrapper-enclosed pads as they pass between the discs **113** and **114** and begin inwardly folding the connecting wrapper tab portions. The greatest amount of inward folding occurs substantially half-way between pads so as to form connecting wrapper tab portions which are tapered towards the center of the connecting wrapper tab portions.

From the second folding means **110**, the wrapper-enclosed pads and connecting wrapper tab portions are advanced to compressing means, generally indicated at **120**, disposed adjacent the second folding means **110** for compressing only the folded connected wrapper tab portion extending between successive wrapper-enclosed pads to compact the connecting wrapper tab portions. With reference to FIG. 8, the compressing means **120** comprises a plurality of pairs of spaced apart serially-arranged superimposed rotatable pressing rolls **121** and **122** for receiving the wrapper-enclosed pads and the connecting wrapper tab portions between each of the pairs of rolls. The lower roll **121** of each of the pairs of rolls is rotated in synchronism by a common drive chain **123** drivingly connected to each of the rolls **121** by identical gears **124** and drive shafts **125**. The drive chain **123** may be driven by any conventional drive means and is preferably driven at a speed so as to rotate the peripheral surface of the lower roll **121** of each of said pairs at a speed substantially equivalent to the rate at which the wrapper-enclosed pads and connecting wrapper tab portions are fed by the wrapper and pad feeding means **85**.

The upper roll **122** of each of the pairs is independently mounted for movement into and out of pressing engagement with the lower roll **121** of each of the pairs in timed relationship to the advancement of the wrapper-enclosed pads and connecting wrapper tab portions therebetween so that only the connecting wrapper tab portions will be compressed. More particularly, the upper roll **122** of each of

the pairs has a fluid operated, double-acting piston and cylinder assembly **126** drivingly connected thereto for moving the upper roll **122** into and out of pressing engagement with the lower roll **121**. Each of the double-acting piston and cylinder assemblies **126** is connected by conduits **127** to a four-way valve **128** for controlling the operation thereof and which is connected to a conventional fluid pressure source **129**.

Each of the valves **18** includes a spring biased core **130** which has a cam follower **131** disposed on one end thereof that follows a cooperating cam **132**. Cam **132** is driven in timed relationship with the advancement of the wrapper-enclosed pads and connecting wrapper tab portions between the rolls **121** and **122** of each of the pairs and are shaped to actuate the valve **128** to operate the piston and cylinder assemblies **126** to move the upper roll **122** of each of the pairs into and out of pressing engagement with the lower roll **121** in such a manner as to compress only the connecting wrapper tab portions.

Preferably, as illustrated in FIG. 8, at least two of the pairs of rolls are spaced apart a distance greater than the length of the wrapper-enclosed pads so that the rolls **121** and **122** of at least one of the pairs will be in pressing engagement with a connecting wrapper tab portion at all times and thus facilitate in the advancement of the wrapper-enclosed pads and connecting wrapper tab portions through the compressing means **120**.

As the wrapper-enclosed pads and connecting wrapper tab portions emerge from compressing means **120**, the connecting wrapper tab portions are cut between successive wrapper-enclosed pads by a second cutting means, generally indicated at **140** (FIGS. 1A, 8 and 9), to form individual sanitary napkins **20** including a wrapper-enclosed pad **21** and wrapper tabs extending longitudinally from opposed ends thereof. More particularly, the second cutting means **140** comprises a rotary cutting bed **141** disposed in series with the compressing means **120** over which the wrapper-enclosed pads and connecting wrapper tab portions are advanced. The rotary cutting bed **141** has a cutting blade **142** disposed in the periphery thereof and which extends parallel to the axis of rotation thereof for reasons to be hereinafter explained. The second cutting means further comprises a rotary cutter **143** superimposed in cooperation with cutting bed **141** and includes a cutting blade **144** disposed parallel to the axis of rotation thereof. The rotary cutting bed **141** and rotary cutter **143** are rotated in synchronism with each other and are spaced so that the cutting blade **144** contacts the cutting blade **142** of cutting bed **141** during each revolution. In addition, they are rotated in timed relationship to the advancement of the wrapper-enclosed pads and connecting wrapper tab portions such that as the wrapper-enclosed pads and connecting wrapper tab portions are received therebetween the connecting wrapper tab portions will be cut substantially half-way between successive wrapper-enclosed pads to form leading and trailing wrapper tabs for each wrapper-enclosed pad. Preferably, for reasons hereinafter to be explained, the rotary cutter **143** also includes a cam operated clamping device **145** training the cutting blade **144** or any other suitable means for holding the leading wrapper tab of successive wrapper-enclosed pads thereon as the rotary cutter **143** rotates.

It will be apparent that as the individual wrapper-enclosed pads and wrapper tabs extending longitudinally from opposed ends thereof emerge from second cutting means **140**, the formation of the sanitary napkin **20**, illustrated in FIG. 3, is complete. However, it is advantageous that the wrapper tabs be folded over against the wrapper-enclosed pad so that the sanitary napkins are rendered more compact to facilitate their subsequent handling and packaging. For this purpose, the apparatus of the present invention further includes means for folding the wrapper tabs over against the wrapper-enclosed pad, generally indicated at **150**, means for turning the wrapper-enclosed pads over so that the folded-over wrapper tabs will be held in place, generally indicated at **160**, and a continuous conveyor, generally indicated at **170**, for successively receiving the wrapper-enclosed pads from the turning means **160** and successively advancing them along a predetermined longitudinal path of travel to any suitable packaging apparatus (not shown).

With reference to FIG. 9, the means **150** for folding the wrapper tabs over against the wrapper-enclosed pad comprises a pair of superimposed continuous conveyors **151** and **152** horizontally disposed in series with cutting means **140**. Each of the conveyors **151** and **152** includes top runs **151***a* and **152***a* and bottom runs **151***b* and **152***b*, respectively, with the top run **151***a* of conveyor **151** running parallel with the bottom run **152***b* of conveyor **152** in spaced apart superimposed relation as illustrated in FIG. 9. As previously indicated, the leading wrapper tab of successive wrapper-enclosed pads is held by the clamp **145** on rotary cutter **143** and rotates therewith as the wrapper-enclosed portion passes between the rotary cutting bed **141** and rotary cutter **143**. Rather than the wrapper-enclosed pad following the contour of the rotary cutter **143**, its weight causes it to pass outwardly from between the cutting bed **141** and cutter **143** to be received between the superimposed conveyors **151** and **152**.

As the wrapper-enclosed pad advances between the superimposed conveyors **151** and **152**, the leading wrapper tab is released from clamping device **145** on the rotary cutter **143** to cause the leading tab of the wrapper-enclosed pad to be folded back over the wrapper-enclosed pad. Thus, the leading wrapper tab of successive wrapper-enclosed pads will be folded back over against the wrapper-enclosed pad as they are received between superimposed conveyors **151** and **152**.

Another continuous conveyor **153** is disposed adjacent superimposed conveyors **151** and **152** in receiving relation thereto. As illustrated in FIGS. 9 and 11, conveyor **153** includes a top run **153***a* and bottom run **153***b* with one end portion of the top run **153***a* extending beneath the bottom run **151***b* of the lower conveyor **151** in close proximity thereto while the other end portion is spaced from the superimposed conveyors **151** and **152** at a higher elevation than the one end portion. Continuous conveyor **153** is driven in a direction opposite to that of the lower conveyor **151** so that the top run **153***a* is traveling in the same direction as the bottom run of the lower conveyor **151**. As the successive wrapper-enclosed pads having the leading wrapper tab folded over against the wrapper-enclosed pad emerge from between the superimposed conveyors **151** and **152**, they will be successively dropped on the top run **153***a* of conveyor **153** with the unfolded trailing wrapper tab now leading and resting against the end of the lower conveyor **151** as illustrated in FIGS. 9 and 11. As the wrapper-enclosed pads pass under the bottom run **151***b* of the lower conveyor **151**, the unfolded wrapper tab will be folded over against the wrapper-enclosed pad.

Following the folding over of the wrapper tabs against the wrapper-enclosed pad, the sanitary napkins are turned by turning means **160**. More particularly, the turning means **160** comprises a rotary cylindrical member **161** horizontally disposed adjacent the one end of conveyor **153** for receiving the sanitary napkins from conveyor **153** thereon with the longitudinal axis of the sanitary napkin extending parallel to the axis of rotation of the cylindrical member **161** with the folded over wrapper tabs facing away from the cylindrical member **161**. Cylindrical member **161** may be rotated by any conventional means (not shown). The turning means **160** also includes an arcuate guard **162** (FIGS. 9, 10 and 11) concentrically disposed about cylindrical member **161** and extending from where the cylindrical member **161** receives the sanitary napkins substantially half-way around the circumference in the direction of rotation of cylindrical member **161**. The space between the cylindrical member **161** and guard **162** defines a path for the sanitary napkins as they are being turned. In addition, a stop plate **163** is disposed at the end of the cylindrical member **161** furthermost from conveyor **153** and

has a diameter slightly greater than the cylindrical member **161** and prevents a sanitary napkin being received from conveyor **153** from passing out of the path defined between the cylindrical member **161** and arcuate guard **162**.

A continuous conveyor **170** including a conveyor belt **171** is disposed in receiving relation to turning means **160** and successively receives the sanitary napkins as they emerge from the path defined by the cylindrical member **161** and arcuate guard **162** with the folded over wrapper tabs facing downwardly against the conveyor belt **171** of conveyor **170** so that they will be held in their folded over position. A support roll **172** is mounted for rotation beneath conveyor belt **171** in contact therewith and in alignment with cylindrical member **161** to provide support for conveyor belt **171** as the sanitary napkins are received thereon. The conveyor **170** advances the sanitary napkins along a predetermined path of travel to any suitable collection means such as a packaging apparatus (not shown).

In the drawings and specification, there has been set forth a preferred embodiment of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes limitation.

What is claimed is:

1. Apparatus for automatically fabricating sanitary napkins having an elongate wrapper-enclosed pad and wrapper tabs extending longitudinally from opposed ends of the wrapper-enclosed pad, said apparatus comprising

means for feeding a continuous web of pad material along a substantially predetermined longitudinal path of travel,

cutting means disposed adjacent said pad material feeding means and cooperating therewith for transversely cutting the continuous web of pad material into individual elongate pads of a predetermined width,

transfer means cooperating with said cutting means for successively transferring the individual elongate pads of a predetermined width from said cutting means,

conveyor means positioned in receiving relation with said transfer means for successively receiving the individual elongate pads, spacing the pads in equidistantly spaced-apart lengthwise relation, and advancing the pads in the spaced-apart relation along a substantially predetermined path of travel,

means for feeding a continuous web of wrapper material along a substantially predetermined longitudinal path of travel and communicating with said conveyor means for successively receiving the equidistantly spaced-apart pads and positioning the pads on the web of wrapper material longitudinally of a median portion thereof in equidistantly spaced-apart relation and for feeding of the wrapper material and pads along a predetermined path of travel through said apparatus,

folding means cooperating with the wrapper material and pad feeding means for folding opposite edge portions of the wrapper material in overlapping relation around the pads,

means cooperating with said folding means for applying adhesive between the overlapping edge portions of the wrapper material for securing the edge portions to each other to form spaced-apart wrapper-enclosed pads and connecting wrapper tab portions extending longitudinally between successive wrapper-enclosed pads, and

cutting means disposed adjacent said wrapper material and pad feeding means for cutting said connecting wrapper tab portions intermediate successive wrapper-enclosed pads to form individual sanitary napkins, said tab portion cutting means comprising a rotary cutter bed over which the wrapped-enclosed pads and connecting wrapper tab portions are advanced and a rotary cutter cooperating with said rotary cutter beds for cutting the connecting wrapper tab portions between successive wrapper-enclosed pads to form leading and trailing wrapper tabs for each wrapper-enclosed pad, said rotary cutter having means for holding the leading tab of successive wrapper-enclosed pads as the wrapper-enclosed pads are advanced between said cutter bed and said cutter.

2. Apparatus for automatically fabricating sanitary napkins having an elongate wrapper-enclosed pad and wrapper tabs extending longitudinally from opposed ends of the wrapper-enclosed pad, said apparatus comprising

means for feeding a continuous web of pad material along a substantially predetermined longitudinal path of travel,

cutting means disposed adjacent said pad material feeding means and cooperating therewith for transversely cutting the continuous web of pad material into individual elongate pads of a predetermined width,

conveyor means positioned in receiving relation with said pad cutting means for successively receiving the individual elongate pads from said pad cutting means, spacing the pads in equidistantly spaced apart lengthwise relation, and advancing the pads in the spaced apart relation along a substantially predetermined path of travel,

means for feeding a continuous web of wrapper material along a substantially predetermined longitudinal path of travel and communicating with said conveyor means for successively receiving the equidistantly spaced apart pads and positioning the pads on the web of wrapper material longitudinally of a median portion of the web of wrapper material in equidistantly spaced apart relation and for feeding of the wrapper material and the pads along a predetermined path of travel through said apparatus,

first folding means cooperating with said wrapper material and pad feeding means for folding opposite edge portions of the wrapper material in overlapping relation around the pads,

means cooperating with said first folding means for applying adhesive between the overlapping edge portion of the wrapper material for securing the edge portions to each other to form spaced apart wrapper-enclosed pads and connecting wrapper tab portions extending longitudinally between successive wrapper-enclosed pads.

second folding means positioned for inwardly folding opposed lateral sides of the connecting wrapper tab portion extending between successive wrapper-enclosed pads,

compressing means disposed adjacent said second folding means for compressing only the connecting wrapper tab portions extending between succesive wrapper-enclosed pads and not the wrapper-enclosed pads to compact the connecting wrapper tab portions extending between successive wrapper-enclosed pads, and

cutting means disposed adjacent said compressing means for cutting the connecting wrapper tab portion intermediate successive wrapper-enclosed pads to form individual sanitary napkins.

3. The apparatus as set forth in claim **2** wherein said compressing means comprises

at least one pair of superimposed cooperating rotatable pressing rolls for receving the wrapper-enclosed pads and connecting wrapper tab portions therebetween,

means for rotating at least one of said rolls, and

means for moving the other of said rolls into and out of pressing relationship to the advancement of the wrapper-enclosed pads and connecting wrapper tab portions so that only the connecting wrapper tab portions will be compressed.

4. The apparatus as set forth in claim **3** wherein said means for moving said other roll comprises

a fluid operated, double-acting piston and cylinder assembly operatively connected to said other roll for

moving said other roll into and out of pressing relationship with said one roll,

valve means connected to said piston and cylinder assembly for controlling the operation thereof, and

cam means rotating in timed relationship with the advancement of said wrapper-enclosed pads and connecting wrapper tab portions operatively associated with said valve means for actuating said valve means to operate said piston and cylinder assembly to move said other roll into and out of pressing engagement with said one roll in such a manner as to compress only the connecting wrapper tab portions.

5. The apparatus as set forth in claim **2** wherein said compressing means comprises

a plurality of pairs of spaced apart serially-arranged superimposed cooperating rotatable pressing rolls for receiving the wrapper-enclosed pads and the connecting wrapper tab portions between each of said pairs of rolls,

means for rotating at least one roll of each of said pairs in synchronism, and

means for independently moving the other roll of each of said pairs into and out of pressing engagement with said one roll of each of said pairs in timed relationship to the advancement of the wrapper-enclosed pads and connecting wrapper tab portions so that only the connecting wrapper tab portions will be compressed.

6. The apparatus as set forth in claim **5** wherein at least two of said pairs of rolls are spaced apart a distance greater than the length of said wrapper-enclosed pads so that the rolls of at least one of said pairs will be in pressing engagement with a connecting wrapper tab portion at all times to facilitate in the advancement of said wrapper-enclosed pads and connecting wrapper tab portions.

7. The apparatus as set forth in claim **2** wherein said conveyor means comprises

receiving plate means positioned in receiving relation to said first cutting means for successively receiving the elongate pads, said plate having an elongate slot disposed therein,

aligning means cooperating with said plate for successively aligning the elongate pads lenthwise in overlying relation to said slot,

a continuous conveyor chain disposed beneath said plate in alignment with said elongate slot, said conveyor chain having pad engaging members mounted thereon at equidistantly spaced points, said pad engaging members communicating with said slot for successively engaging and advancing the cut pads as they are aligned in overlying relation to said slot whereby the pads will be equidistantly spaced apart lengthwise and advanced along a substantially predetermined path of travel.

8. The apparatus as set forth in claim **2** including transfer means cooperating with said pad material cutting means for successively transferring the individual elongate pads of a predetermined width from said first cutting means to said conveyor means.

9. The apparatus as set forth in claim **8** wherein said transfer means comprises a pair of spaced apart transfer arms disposed adjacent said first pad material cutting means and adapted to successively engage opposite end portions of the individual elongate pads and successively transfer the individual elongate pads from said first cutting means to said conveyor means.

10. The apparatus as set forth in claim **2** wherein said tab portion cutting means comprises

a rotary cutter bed disposed in series with said compressing mean over which the wrapper-enclosed pads and connecting wrapper tab portions are advanced,

a rotary cutter cooperating with said rotary cutter bed for cutting the connecting wrapped tab portions between successive wrapper-enclosed pads to form leading and trailing wrapper tabs for each wrapper-enclosed pad,

said rotary cutter having means for holding the leading tab of successive wrapper-enclosed pads as the wrapper-enclosed pads are advanced between said cutter bed and cutter.

11. The apparaus as set forth in claim **10** further comprising means disposed in cooperation with said tab portion cutting means for successively receiving and folding the leading and trailing wrapper tabs of each wrapper-enclosed pad over against the wrapper-enclosed pad.

12. The apparatus as set forth in claim **11** wherein said means for folding the leading and trailing wrapper tabs of each wrapper-enclosed pad over against the wrapper-enclosed pad comprises

a pair of superimposed cooperating upper and lower continuous conveyors, each of said conveyors having a top run and bottom run, said conveyors being horizontally disposed in series with said rotary cutter bed and rotary cutter for successively receiving the wrapper-enclosed pads between said superimposed conveyors, said superimposed conveyors stripping the leading wrapper tab of successive wrapper-enclosed pads from said rotary cutter and folding the leading wrapper tab of successive wrapper-enclosed pads back over against the wrapper-enclosed pad, and

another continuous conveyor having a top run and bottom run disposed adjacent the lower of said superimposed conveyors, the top run of said last named conveyor having one end portion disposed beneath the bottom run of the lower of said superimposed conveyors in close proximity thereto and having the other end portion thereof spaced from said superimposed conveyors at a higher elevation than said one end, said last named conveyor being driven in a direction opposite to that of the lower of said superimposed conveyors whereby successive wrapper-enclosed pads will be received by the top run thereof and the trailing wrapper tab of successive wrapper-encloed pads will be folded over against the wrapper-enclosed pad as the wrapper-enclosed pads are successively advanced along the top run of said last named conveyor and the bottom run of the lower of said superimposed conveyors.

13. Apparatus as set forth in claim **12** including means cooperating with said last named conveyor for turning over the wrapper-enclosed pads and folded over wrapper tabs comprising

a rotary cylindrical member disposed adjacent said last named conveyor for successively receiving the wrapper-enclosed pads and folded over wrapper tabs thereon with the longitudinal axis thereof parallel to the axis of rotation of said cylindrical member with the folded over wrapper tabs facing away from said cylindrical member,

an arcuate guard concentrically disposed in spaced relation about said cylindrical member and extending from where said cylindrical member receives the wrapper-enclosed pads substantially half-way around said cylindrical member, the space between said cylindrical member and guard defining a path for the wrapper-enclosed pads and folded over wrapper tabs, said cylindrical member being rotated in the direction to advance the wrapper-enclosed pads and folded over wrapper tabs along said path, and

means communicating with said cylindrical member and arcuate guard for successively receiving the turned wrapper-enclosed pads and folded over wrapper tabs therefrom.

14. Apparatus for automatically fabricating sanitary napkins having an elongate wrapper-enclosed pad and wrapper tabs extending longitudinally from opposed ends of the wrapper-enclosed pads, said apparatus comprising

means for feeding a continuous web of pad material along a substantial predetermined longitudinal path of travel,

cutting means disposed adjacent said pad material feeding means and cooperating therewith for transversely cutting the continuous web of pad material into individual elongate pads of a predetermined width,

a pair of spaced apart transfer arms disposed adjacent said first cutting means and adapted to successively engage oppoosite end portions of the individual elongate pad and successively transfer the individual elongate pads from said first cutting means,

receiving plate means positioned in receiving relation to said pair of transfer arms for sucessively receiving the elongate pads, said plate having an elongate slot disposed therein,

aligning means cooperating with said plate for successively aligning said elongate pads lengthwise in overlying relation to said slot.

a continuous conveyor chain disposed beneath said plate in alignment with said elongate slot, said conveyor chain having pad engaging members mounted thereon at equidistantly spaced points, said pad engaging members communicating with said slot for successively engaging and advancing the cut pads as they are aligned in overlying relation to said slot whereby the pads will be equidistantly spaced apart lengthwise and advanced along a substantially predetermined path of travel,

means for feeding a continuous web of wrapper material along a substantially predetermined longitudinal path of travel and communicating with said conveyor chain for successively receiving the equidistantly spaced apart pads and positioning the pads on the web of wrapper material longitudinally of a median portion of a web of wrapper material in equidistantly spaced apart relation for feeding of the wrapper material along a predetermined path of travel through said apparatus,

first folding means cooperating with said wrapper material and pad feeding means for folding opposite edge portions of the wrapper material in overlapping relation around the pads,

means cooperating with said first folding means for applying adhesive between the overlapping edge portion of the wrapper material for securing the edge portions to each other to form spaced apart wrapper-enclosed pads and connecting wrapper tab portions extending longitudinally between successive wrapper-enclosed pads,

second folding means positioned for inwardly folding opposed lateral sides of the connecting wrapper tab portions extending between successive wrapper-enclosed pads,

a plurality of pairs of spaced apart serially arranged superimposed cooperating rotatable pressing rolls for receiving the wrapper-enclosed pads and the connecting wrapper tab portions between the rolls of each of said pairs.

means for rotating at least one roll of each of said pairs in synchronism.

means for independently moving the other roll of each of said pairs into and out of pressing engagement with said one roll of each of said pairs in timed relationship to the advancement of the wrapper-enclosed pads and connecting wrapper tab portions so that only the connecting wrapper tab portions will be compressed, and

cutting means disposed adjacent said plurality of pairs of pressing rolls for cutting the connecting wrapper tab portions intermediate successive wrapper-enclosed pads to form individual sanitary napkins.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,669,800 Dated June 13, 1972

Inventor(s) Graves T. Gore

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 47, "tap" should be --tab--;
Column 5, line 17, after "they" insert --are--;
Column 7, line 9, "18" should be --128--;
line 11, second occurrence of "Cam" should be --Cams--;
line 58, "training" should be --trailing--;
Column 9, line 72, "wrapped-enclosed" should be --wrapper-enclosed--; and
Column 11, line 7, after "portions" insert --and--.

Signed and sealed this 26th day of September 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

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