Nov. 15, 1966 A. S. HUBIN 3,284,856

MANUFACTURE OF CELLULOSIC PRODUCTS

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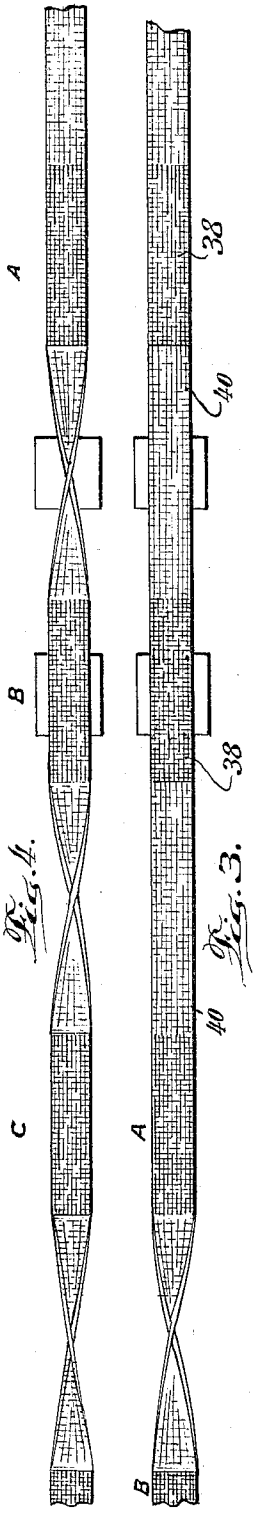


Fig. 4.

Fig. 3.

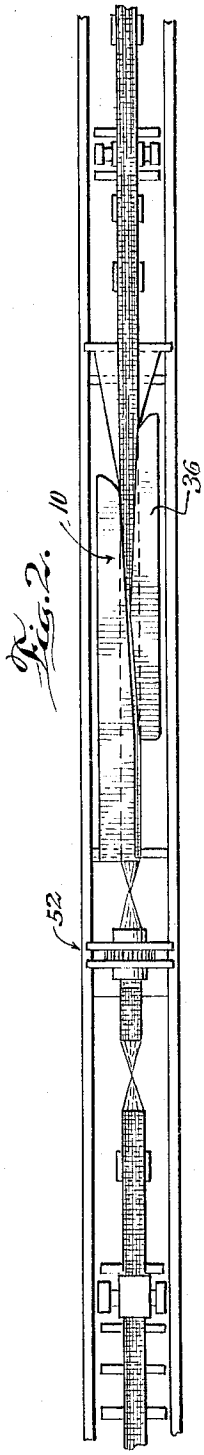


Fig. 2.

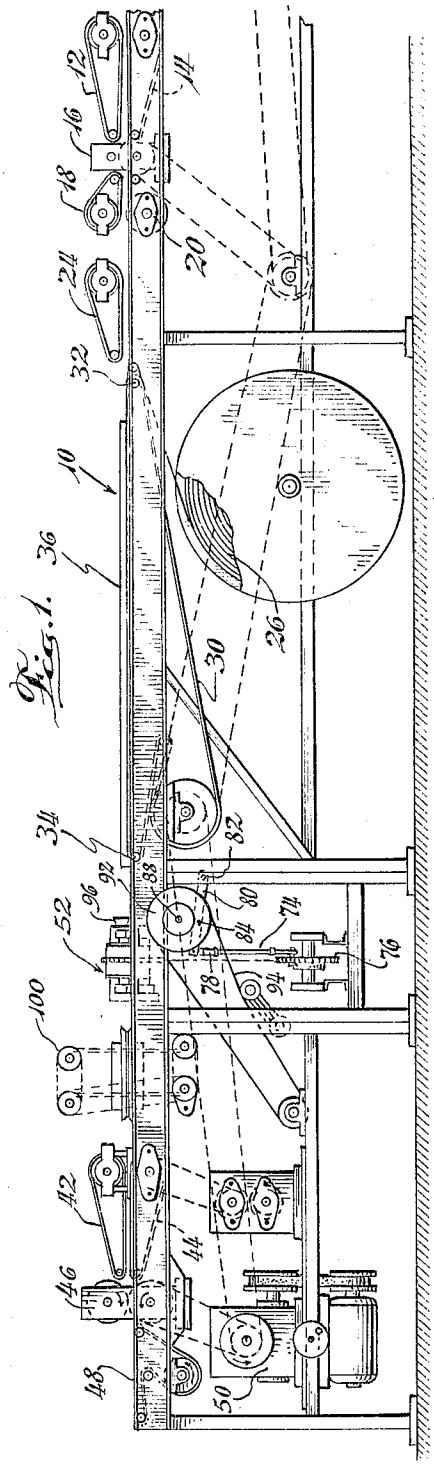


Fig. 1.

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Fig. 9.

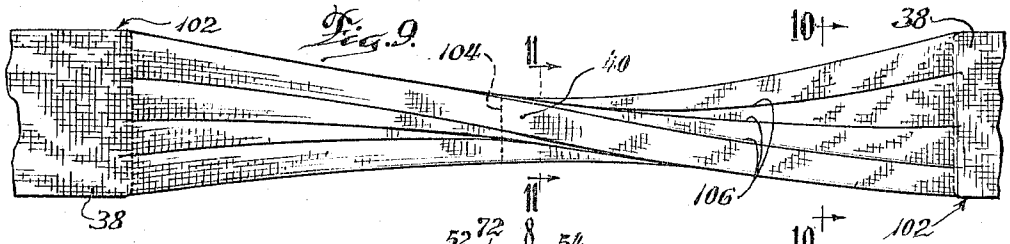


Fig. 5.

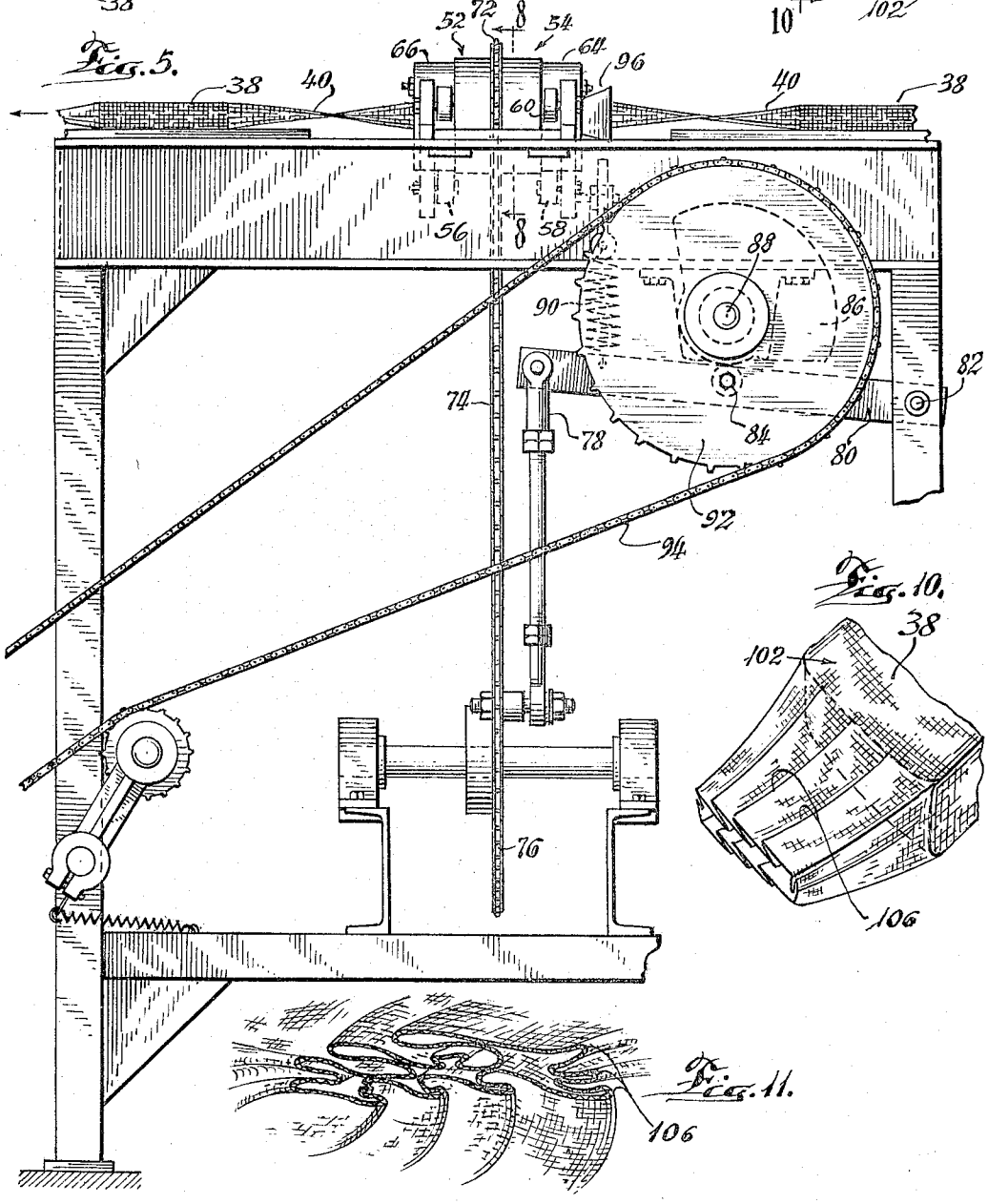


Fig. 10.

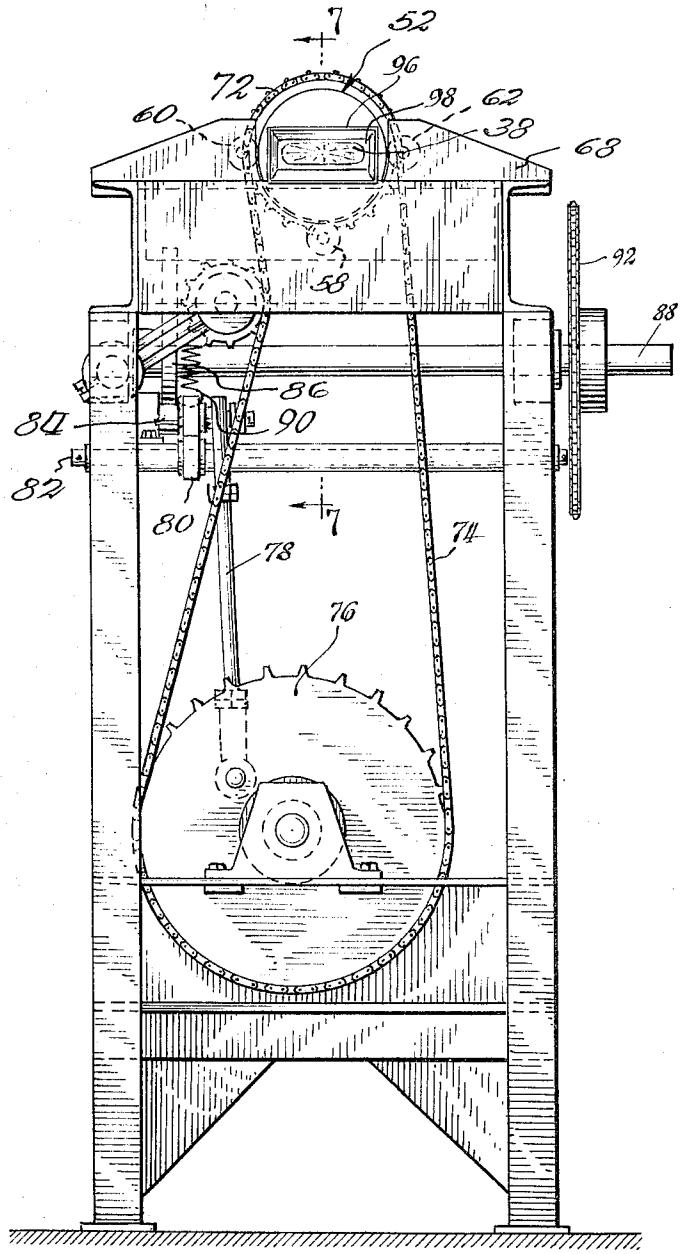
Fig. 11.

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Fig. 6.



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Fig. 7.

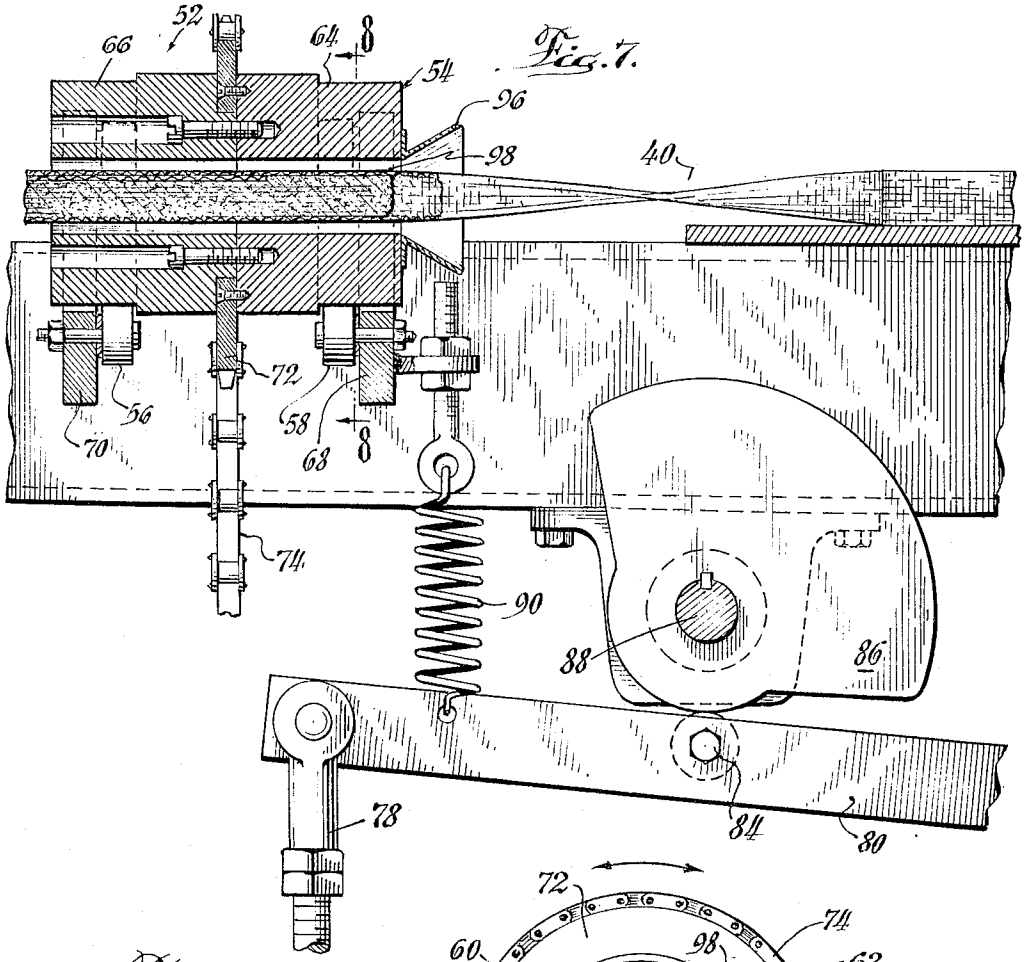
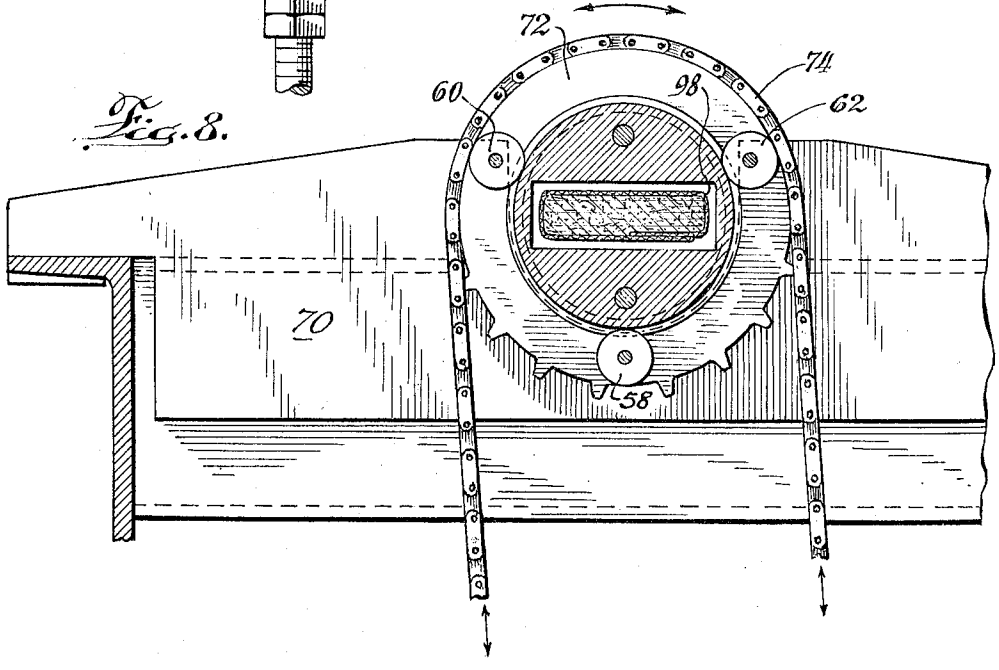


Fig. 8.



United States Patent Office 3,284,856 Patented Nov. 15, 1966

3,284,856

MANUFACTURE OF CELLULOSIC PRODUCTS

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Filed Aug. 20, 1962, Ser. No. 217,923
2 Claims. (Cl. 19—145)

This invention relates to improved methods and apparatus for the fabrication of sanitary napkins and the like, and to a resultant product.

A major object of the invention is to provide an improved method for the continuous formation of tapered tab ends from wrapping material bridging spaced absorbent pads forming an assembly uniformly drawn in conventional manner at constant speed through a linear path during the fabrication of individual napkins.

Another object is to provide improved apparatus for the continuous production at low cost of sanitary napkins enclosed in a wrapper terminating at opposite ends thereof in tapered tab ends to facilitate attachment for use.

Another object is to provide a sanitary napkin with a tapered tab end of our improved pleated configuration.

Other objects and advantages are improved and simplified production apparatus and methods inherent therein for the low cost continuous production of sanitary napkins of simplified construction.

Other objects and advantages will become apparent to persons skilled in the art, as will various adaptations and modifications of the concepts as defined in the appended claims.

In the drawings, in which like parts are identified by the same reference numerals,

FIG. 1 shows in side elevation an apparatus involving the invention taught herein.

FIG. 2 illustrates in plan the apparatus shown in FIG. 1.

FIGS. 3 and 4 illustrate in plan certain process stages inherent in the apparatus of FIG. 1.

FIG. 5 shows in side elevation a portion of the apparatus of FIG. 1.

FIG. 6 is an end elevation view of the apparatus of FIG. 1.

FIG. 7 fragmentarily illustrates partially in vertical section a portion of the apparatus of FIG. 1.

FIG. 8 is a view, partially in cross-section, taken along line 8—8 of FIG. 7.

FIG. 9 shows in plan uncut tab ends formed on the apparatus herein taught.

FIG. 10 shows in perspective a tab end as viewed along line 10—10 of FIG. 9.

FIG. 11 is a view similar to FIG. 10 but taken along line 11—11 of FIG. 9 with wrapper folds somewhat expanded to best illustrate their configuration.

FIG. 1 illustrates in side elevation a machine generically designated **10**, which includes as component portions thereof apparatus incorporating the inventive concepts herein taught. The individual components comprising major portions of machine **10** are well-known in the art and form no part in the invention, hence detailed construction thereof is omitted.

The apparatus is particularly designed for fabrication of a sanitary napkin of very simple construction and consisting merely of a major absorbent element in the form of a fluff batt, an underlying fluid impervious element such as polyethylene sheet stock, if desired, a light weight web inner wrapper, and an enclosing wrapper which may be of relatively fluid pervious cross laid scrim provided with an appliqué of cotton fibers or of any other suitable wrapping material. For example, a pre-assembly line, not shown, may include a hammermill for fluff production and means for shaping the hammermill output into a continuous elongate batt while simultaneously positioning thereunder a strip of fluid impervious material such as polyethylene. The line also includes means for continuously enclosing the batt and polyethylene strip within a light weight elongate web, and continuously feeding the resulting assembly between continuous belt units **12**, **14** of machine **10** which operate at the output speed of the pre-assembly line to insure infeeding of the assembly in the desired configuration to a cutter device **16**. Device **16** may be of the reciprocating blade type operating at a frequency to insure severance of the infed assembly into individual batts of the desired length, machine **10** being operable in a downstream direction from right to left as shown.

Belt devices **18**, **20** are positioned immediately adjacent cutter **10** in a downstream direction and operate at the speed of devices **12**, **14** to insure proper movement of the assembly through the cutter. Devices **18**, **20** also transfer the resulting individual batts downstream along the uper machine surface to a belt device **24** driven at an accelerated speed in synchronism with associated machine components to increase the spacing between the batts to a desired amount as shown in FIGS. 3 and 4. Device **24** feeds each individual batt onto suitable wrapper material fed from a supply roll **26** onto a continuous conveyor belt **30** to be drawn in a linear path along the upper machine surface between spaced guide pulleys **32**, **34**.

Belt **30** continuouesly moves the wrapper sheet stock fed thereto and the batts deposited thereon in mutually spaced relation under a known type folding board assembly **36** for overlap of the wrapper material along upper surfaces of the spaced pads with the pad bridging portions of the wrapper material being maintained in tubular configuration by tension continuously applied at a downstream position by belts **42**, **44** operating at the linear speed of belt **30**.

FIG. 3 shows pads **38** as bridged by the wrapper material in areas **40**, and as each pad clears the left end of folding device **36**, as shown in FIGS. 1 and 2, the wrapper overlap has been completed to move toward a rotatably mounted tab forming device **52** operatively driven in accordance with the invention herein taught.

As will be understood, the tubular assembly of spaced pads **38** in the enclosing wrapper must be hand fed through the entire machine prior to start-up. Hence the operation will be described on the basis that a pad unit is being continuously fed through the machine. A cutter device **46** periodically severs pad bridging portions of the wrapper material between the pads with resulting individual napkins or bandages being thereafter deposited upon conveyor assembly **48** from which they are removed from the machine in any known manner. The major components above described are synchronously driven from a suitable power supply **50** such as a gear box through suitable power transmission units which may comprise both belt drives and chain drives, several of which are shown, or alternately may involve other suitable driving mechanisms. It is important only that a common power supply be suitably coupled to the various driven units to insure required synchronism between all units during the continuous operation above described.

The details of the component portions of machine **10** are best shown in FIGS. 5–8, with the positioning thereof in respect to the associated machine assemblies being also shown in FIGS. 1 and 2. A pad rotating unit, generically designated **52** is positioned in spaced relation to and downstream of the left end of folding device **36**. Unit **52** comprises generally a longitudinally channeled element **54** mounted for relative rotation about the machine direc-

tional axis of the moving pad and wrapper assembly as by two sets of planetary bearings, one bearing of each set being shown at **56**, **58**, FIG. 7, and one complete set shown in FIG. 8 wherein bearings **60**, **62** are positioned in 120° angularity to bearing **58**. Element **54** is provided at each end thereof with a reduced boss portion **64**, **66** providing an annular bearing surface freely rotatable in respect to machine supported brackets **68**, **70** for the support of the mounting bearings. Element **54** carries a sprocket **72** driven by chain **74** from sprocket **76** when the latter is oscillated by eccentric drive rod **78**. Rod **78** is oscillated through a sufficient arc to effect rotation of element **54** through an arc of one-half revolution, first in one direction, and then after a suitable time delay, in an opposite direction. As shown in FIG. 5, rod **78** is cam driven to reciprocate through a desired path by an associated pivot arm **80**. Arm **80**, pintle mounted at **82**, carries an extending cam follower **84** positioned for registered engagement with a segmental cam **86**, mounted for continuous rotation on a drive shaft **88**. Drive sprocket **92** is mounted on drive shaft **88** and driven through chain **94**, from power supply **50**, FIG. 1. Spring **90** biases arm **80** to insure positive engagement between cam **86** and cam follower **84**.

As shown in FIGS. 5–7, a funnel-like inlet guide member **96**, rectangular in cross-section, insures proper alignment of pads **38** with rectangular channel **98** of element **54**. Channel **98** is somewhat larger cross-sectionally than the pad configuration to permit free axial movement therethrough while constraining the moving pads against rotation within the element **54**. Element **54** is of course driven in synchronism with the movement of pads **38** and completes each half turn of revolution during the time period required for passage of a pad completely through channel **98**. Element **54** remains at rest as the next trailing pad passes through channel **98** but the element is driven through one-half revolution in the opposite direction in synchronism with a passage therethrough of a second trailing pad.

As element **54** rotates pad **38** during the passage thereof through channel **98**, the wrapper material is twisted at both ends of a pad passing through unit **52**. As shown in FIG. 4, twisting of the wrapper material into tab ends at each end of each pad is obtained by rotation of each alternate pad as it passes through channel **98**. Although the reverse twisting of pads as above described is preferred, the apparatus herein taught can be modified, if desired, to effect twisting of each alternate pad in the same direction, or alternately twisting of each successive pad end a half or full revolution in the same direction. In any even the same result is involved, namely that as each successive pad leaves unit **52** it has been rotated through a predetermined arc in respect to both a leading and a trailing pad within the assembly.

The twisted wrapper material is heat sealed near the downstream end of unit **52** by sealing unit **100**, FIG. 1, in the manner described in aplicant's co-pending concurrently filed application, Serial No. 217,924, now Patent No. 3,195,286, issued July 20, 1965. From sealing unit **100** the assembly is drawn downstream by conveyor belts **42**, **44** to be fed through cutter unit **46** for severance of the sealed wrapper material at the desired inter-pad position.

FIG. 9 illustrates pad bridging wrapper portions between sanitary napkins **102** fabricated by the method and apparatus herein taught. Tapered tab ends are formed by twisting the absorbent pad **38** of napkin **102** as above described, and then heat sealing the twisted wrapper portion **40** intermediate pads **38** prior to cutting the wrapper portion along dotted line **104** to form individual napkins.

Since sanitary napkins are generally provided with tab ends of unequal length, line **104** may be nonsymmetrically positioned between successive pads. As shown in FIGS 9 and 10, a plurality of spaced pleats **106**, formed by twisting the wrapper material, converge from the ends of pads **38** toward the central wrapper portion **40**. FIG. 10, best illustrates the patterned configuration of pleats **106** adjacent the end of pad **38**. Pleats **106** are of a substantially uniform width and as viewed they overlap in a counterclockwise direction, that direction of course depending upon the direction in which pad **38** initially was twisted. FIG. 11 illustrates in a somewhat blown up manner the configuration of pleats such as **106** adjacent the end of each resulting sanitary napkin **102** following cutting of the wrapper along line **104**. The larger pleats assume a random configuration and a plurality of intermediate smaller pleats also result from the necking down of the wrapper material near the center portion of the twisted wrapper area.

The method and apparatus above described results in the formation of a tab end pleat pattern which, while not positively controlled and therefore left somewhat to chance, nevertheless assumes a fairly uniform configuration. While the number of major pleats defined in the above manner will vary with cross-sectional pad size, it has been found that the tab ends of conventional size sanitary napkins formed as herein taught contain between eight and ten major pleats. Since the major pleats start closely adjacent the pad ends, and reach their major width somewhat outwardly of those ends, while also converging, one upon the other, overpleating of the wrapper material progressively increases outwardly of the pad ends to reach a maximum at the narrowest portion of the X-configuration assumed by the pad bridging wrapper material. It is thus evident that while the wrapper strength remains fairly constant, the symmetrical concentration of overlapped wrapper material progressing outwardly from the pad ends results in maximum pin strength while facilitating ease of attachment to the fixtures of sanitary belts and the like. Heat sealing of the twisted wrapper portion **40** irons in the pleats **106** to provide bonds which fix the pleats to insure retention of the desired configuration after cutting of the wrapper material. Sealing may be effected in any known manner, including the employment of thermoplastic adhesives, while alternately thermoplastic fibers may be mixed with nonthermoplastic fibers during formation of the wrapper material to add the required heat sealing characteristics thereto.

What is claimed is:

1. Apparatus for the continuous fabrication of sanitary napkins or the like including in combination, means for forming an assembly of spaced absorbent pads enclosed in an elongate wrapper, means for continuously drawing said pad assembly through a linear path, means positioned within said path for rotating individual wrapper enclosed pads, said pad rotating means comprising a rotatably mounted member provided with an aperture generally complementing the cross-sectional configuration of the pads of said assembly, and positioned for the passage of said assembly therethrough, and drive means synchronized with said pad assembly drawing means for rotating said member through a half revolution during passage of a wrapper enclosed pad therethrough and for rotating said member in a reverse direction through a half revolution during passage therethrough of the second trailing pad of said assembly.

2. Apparatus for the continuous fabrication of sanitary napkins or the like including in combination means for forming an assembly of spaced absorbent pads enclosed in an elongate wrapper, means for continuously drawing said pad assembly through a linear path, means positioned within said path for rotating individual wrapper enclosed pads, said pad rotating means comprising a rotatably mounted member provided with an aperture generally complementing the cross-sectional configuration of the pads of said assembly and positioned for the passage of said assembly therethrough, and a drive means which is synchronized with said pad assembly drawing means for

rotating said member through an angle equal to an integer multiplied by 180° during passage of at least each alternate pad through said member so as to twist the portions of said wrapper bridging adjacent pads into X-configuration.

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