May 30, 1972 C. G. JOA 3,666,611

ABSORBENT PAD

Filed Aug. 15, 1969 4 Sheets-Sheet 1

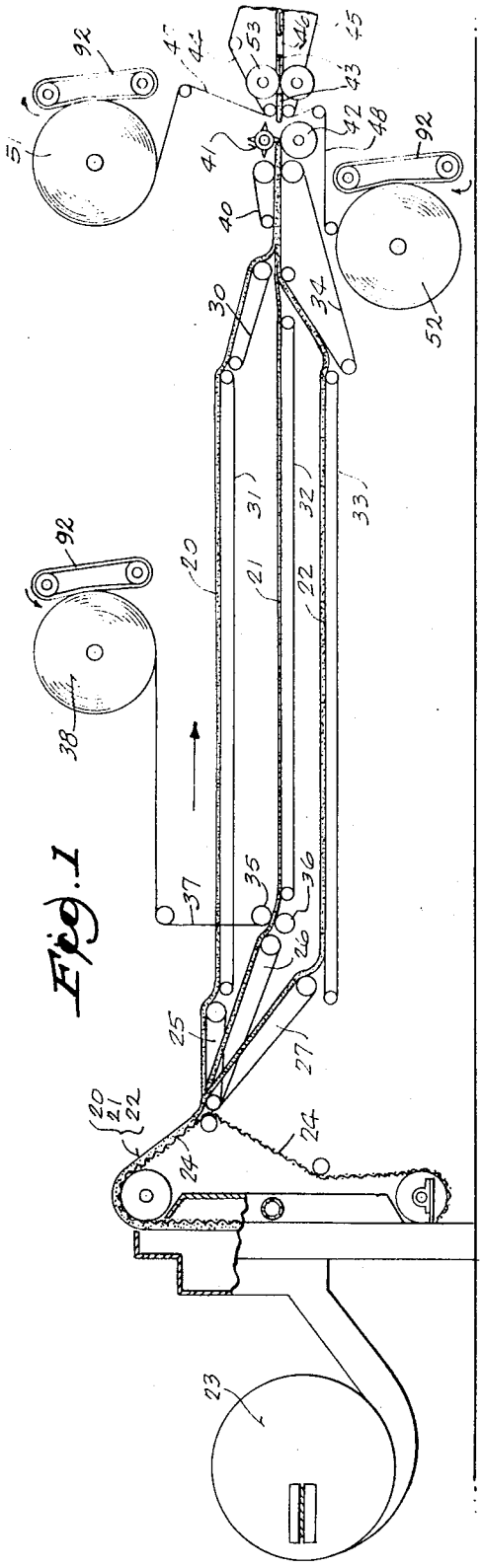


Fig. 1

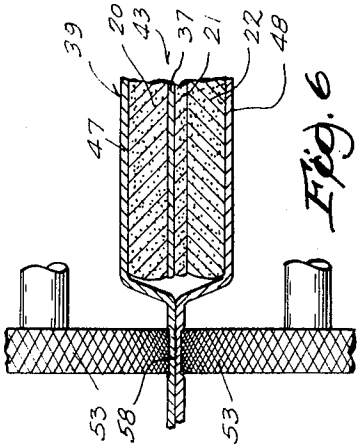


Fig. 6

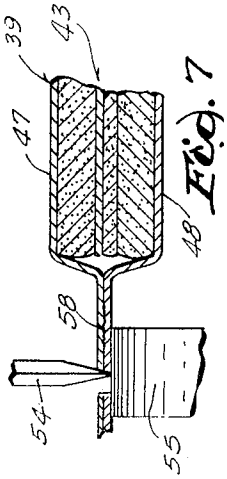


Fig. 7

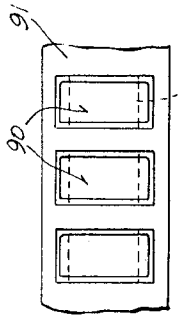


Fig. 13

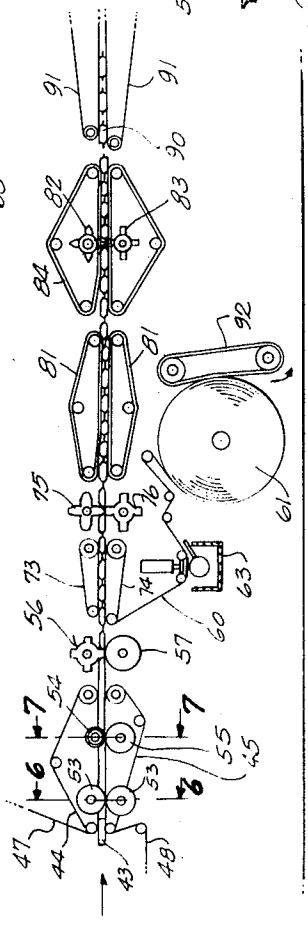


Fig. 2

INVENTOR
CURT G. JOA

BY Wheeler, Wheeler, House & Clemency
ATTORNEYS

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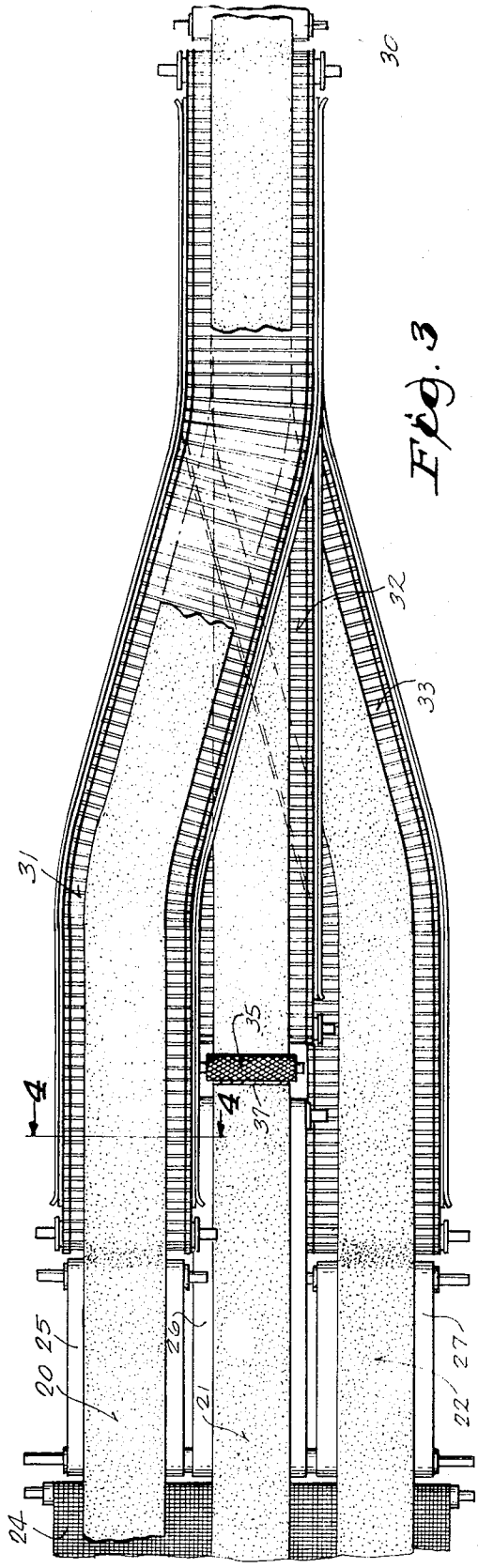


Fig. 3

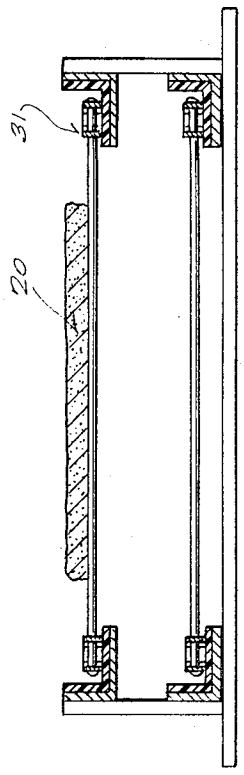


Fig. 4

INVENTOR
CURT G. JOA

BY Wheeler, Wheeler, House & Clarence
ATTORNEYS

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ABSORBENT PAD

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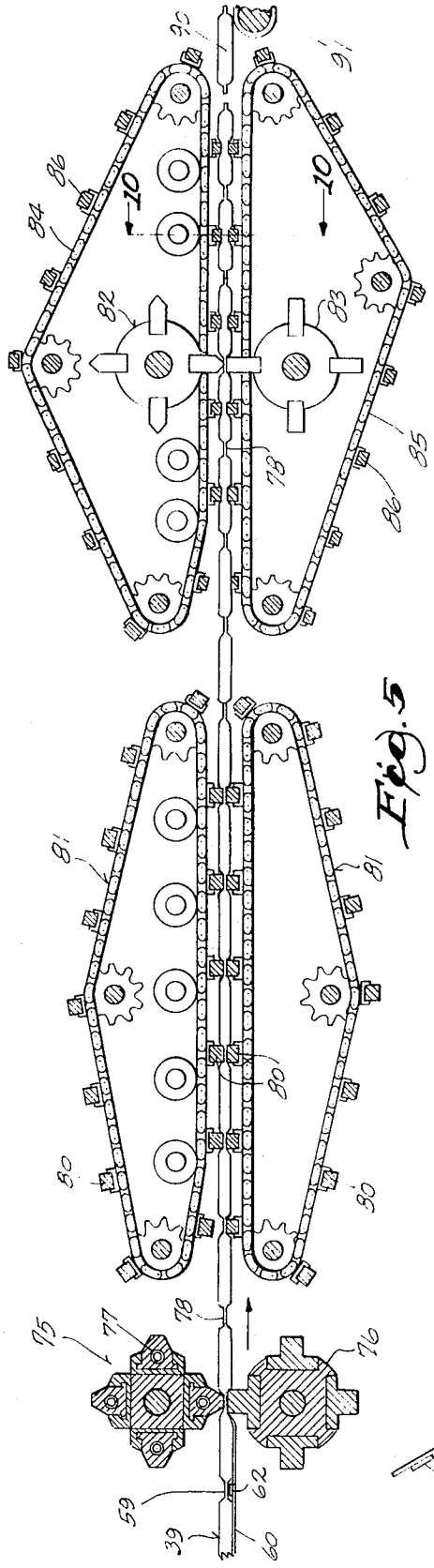


Fig. 5

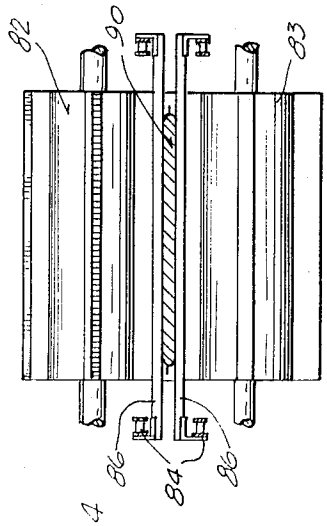


Fig. 10

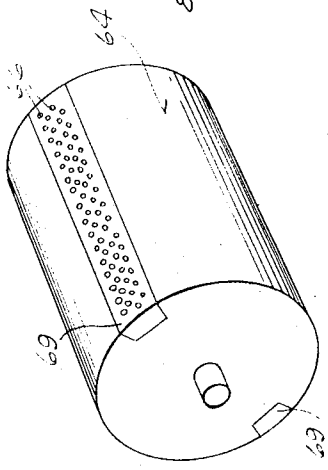


Fig. 9

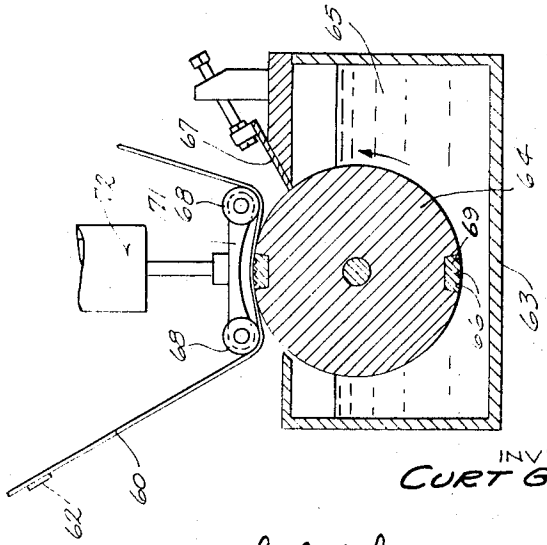


Fig. 8

INVENTOR
CURT G. JOA

BY Wheeler, Wheeler, House & Clemency
ATTORNEYS

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ABSORBENT PAD

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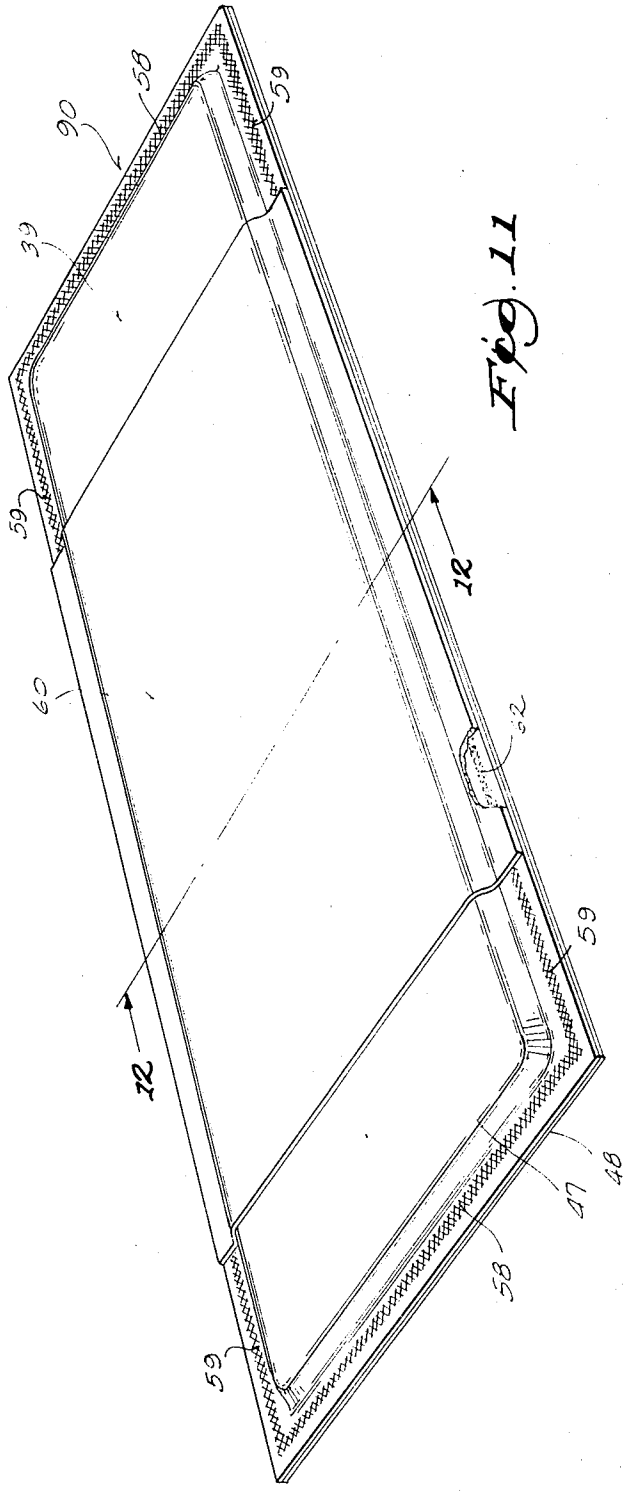


Fig. 11

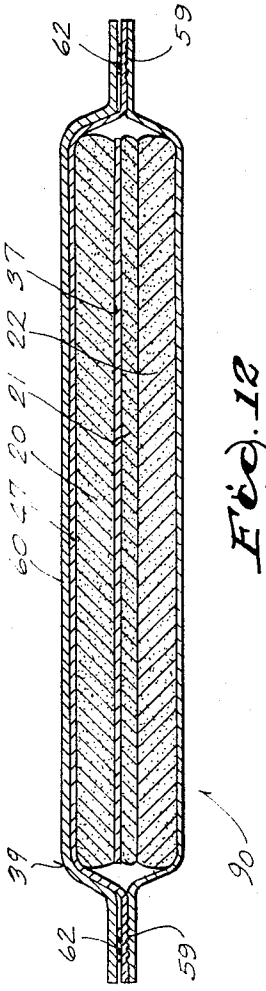


Fig. 12

INVENTOR
CURT G. JOA

BY Wheeler, Wheeler, House & Clemency
ATTORNEYS

United States Patent Office 3,666,611 Patented May 30, 1972

3,666,611

ABSORBENT PAD

Curt G. Joa, Ocean Ridge, Fla.
(Box 1121, Boynton Beach, Fla. 33435)

Filed Aug. 15, 1969, Ser. No. 850,482
Int. Cl. A61f 13/16, 13/20; A61l 15/00
U.S. Cl. 161—147 4 Claims

ABSTRACT OF THE DISCLOSURE

Absorbent pad having a pulp filler, wadding envelope, and body contacting cover outside the envelope which is shorter than the pad is long, thus to leave end margins of the pad uncovered. The apparatus and method for fabricating such a pad involves superimposing separate pulp mats, one of which is compressed before superimposition in order that the compressed mat functions as a flow distribution ply, subdividing the superimposed mats into discrete pad fillers with gaps therebetween, encasing the spaced pad fillers in a wadding envelope which is continuous across the gaps, cross sealing the envelope across the gaps to form a continuous wadding envelope tube with links interconnecting the spaced filler pads, and applying the body contacting cover sheet thereto.

SUMMARY OF THE INVENTION

In accordance with the present invention, an improved pad is produced which has a central compressed or embossed pulp layer which enhances longitudinal and lateral flow distribution and an external body contacting cover sheet which is made shorter than the pad is long in order to cover only the central part of the pad and leave end margins of the envelope exposed. The body contacting cover desirably comprises a smooth strip of non-woven fabric which is worn against the body and prevents pilling of the pulp and wadding.

In fabricating the pad, multiple lanes of pulp mat are stripped off of a forming screen onto the laterally adjacent ends of horizontally flexible conveyors. The opposite ends of these conveyors are brought into vertically overlapping relation by horizontally flexing intermediate portions of the conveyors. In the disclosed embodiment, three mats are superimposed. The top and bottom mats are left uncompressed. An intermediate pulp mat is compressed and densified by embossing rolls prior to combining it with the top and bottom layers. This technique reduces the thickness of the ultimate pad, thus to make it easier to bend and fold the pad to fit body contour. Moreover, the compressed layer has increased capillarity, thus to promote lateral distribution of fluids outwardly from the pad center and toward its edges, thus to promote uniform absorption throughout the pad body.

The present invention is distinguished from certain prior art pads in which a wadding envelope is made from a single strip folded about one edge of the pad. In such pads, the edge folding subjects the wadding to tension, with undesirable stretching of the wadding. In the present invention, the wadding envelope is formed from separate upper and lower wadding strips which are power fed to eliminate pulling tension which might otherwise deform the strips. The upper and lower wadding strips are laid flat against the upper and lower surfaces of the composite pad. The side and end margins of the strips which extend laterally beyond the pad filler are sealed in face relationship. This eliminates all edge folding and pulling stresses on the wadding.

The pad fillers are longitudinally spaced prior to encasement in the wadding envelope and the gaps between pad fillers are sealed with cross seals, thus to form a

continuous wadding tube with longitudinally spaced discrete wadding encased pad fillers connected by wadding links. The body contacting cover strip is then fed in face relation against one side of the continuously moving tube and has cross bands of hot melt adhesive printed thereon in registry with the links. The superimposed tube and body contacting cover strip pass between a hot melt adhesive activating roll set which activates the adhesive and bonds the cover strip to the links. Thereafter, the links are severed through the bond to produce discrete pads with the characteristics hereinbefore described.

The pad in various appropriate sizes may be used as a hospital underpad, diaper, sanitary napkin, etc.

Other objects, features, and advantages of the invention will appear from the following disclosure.

DESCRIPTION OF DRAWINGS

FIG. 1 is a somewhat diagrammatic side view showing transfer of the pulp mats from the forming screen onto the flexible conveyors and to a point in the fabrication of the pad slightly beyond where the wadding strips are introduced, this view being then broken off and continued in FIG. 2.

FIG. 2 is a continuation of FIG. 1 showing further progress of the ensleeved pads. This view shows how the body contacting cover is applied and the ensleeved pad fillers are severed into discrete pads.

FIG. 3 is an enlarged fragmentary plan view of a portion of FIG. 1 and showing the multiple pad mats stripped from the forming screen and overlapped by the horizontally flexible conveyors.

FIG. 4 is a cross section taken along the line **4—4** of FIG. 3.

FIG. 5 is a somewhat enlarged side view showing the apparatus for conveying the pad tube through the hot melt reactivating rolls and the pad severing knives.

FIG. 6 is an enlarged fragmentary cross section taken along the line **6—6** of FIG. 2.

FIG. 7 is an enlarged fragmentary cross section taken along the line **7—7** of FIG. 2.

FIG. 8 is an enlarged view, partly in cross section, of the hot melt printing apparatus for the body contacting cover strip.

FIG. 9 is a perspective view of the printing roll of FIG. 8.

FIG. 10 is a cross section taken along the line **10—10** of FIG. 5.

FIG. 11 is an inverted perspective view of a pad embodying the present invention.

FIG. 12 is a cross section taken along the line **12—12** of FIG. 11.

FIG. 13 is a diagrammatic plan view showing the orientation of the pads on the conveyor.

DESCRIPTION OF PREFERRED EMBODIMENT

Although the disclosure hereof is detailed and exact to enable those skilled in the art to practice the invention, the physical embodiments herein disclosed merely exemplify the invention which may be embodied in other specific structure. The scope of the invention is defined in the claims appended hereto.

In the embodiment illustrated, three pulp mats **20, 21, 22** are formed on a fiberizer **23** of the general construction shown in U.S. Pat. 3,268,954 and are removed from the fiberizer on a screen **24**. As best shown in FIG. 3, the respective mats **20, 21, 22** are stripped from the screen **24** onto belt conveyors **25, 26, 27**. These belt conveyors transfer the mats onto the intake ends of horizontally flexible conveyors **31, 32, 33**. These conveyors are illustrated only diagrammatically in this application. Any suitable form of flexible conveyor can be used. See, for

example, the flexible conveyors shown in U.S. Pats. 2,872,023, 3,225,898 and 3,439,795, the disclosures of which are incorporated herein by reference.

The flexible conveyor belts **31, 32, 33** are flexed horizontally as shown in FIG. 3 so that their discharge ends overlap vertically. Thus, the respective mat strips **20, 21, 22** are deposited one on top of the other on a takeoff conveyor **34**.

It is an important feature of the present invention that the intermediate pulp mat **21** is passed between compression or embossing rolls **35, 36**, thus to compress the intermediate mat **21** to less than about one-third of its normal thickness, thus densifying the intermediate mat to produce in the ultimate product an intermediate densified layer which promotes distribution of fluids laterally in the pad. Moreover, the compression of the intermediate pulp mat **21** reduces the over-all thickness of the pad, thus to facilitate bending and folding the pad to fit body contours. While in the disclosed embodiment compressed mat ply **21** is substantially coextensive in area with the uncompressed pulp plies **20, 22**, it may be made smaller in one or both its length and width dimensions.

In corporated immediately on top of the intermediate compressed mat **21** is a strip of wadding **37** taken from a parent roll **38**. The wadding strip **37** is fed beneath the compression roller **35** and occupies a position in the pad as shown in FIG. 12.

Top mat **20** is led down by belt conveyor **30**, and bottom mat **22** is led up by conveyor **34** to their intersection where all mats join and are fed beneath cooperating overlying conveyor **40** to a pulp filler cutoff roller **41** and its underlying platen roller **42**. Rollers **41, 42** cut the mats into discrete pulp pad fillers **43** which continue on into the apparatus best shown in FIG. 2.

The discrete pulp fillers **43** are conveyed between an upper conveyor belt **44** and a lower conveyor belt **45**. Belts **44, 45** run at a slightly faster speed than the belts **34, 40**, thus to produce gaps **46** between successive fillers. The pulp fillers are further enclosed within a wadding tube or envelope **39** comprising an upper wadding strip **47** and a lower wadding strip **48** which respectively unwind from parent rolls **51, 52**.

Strips **47, 48** are slightly wider than the pulp filler **43**. Thus, their side margins are crimped together at **58** by the crimping rolls **53** shown in FIG. 6. Edge waste is cutoff by the combination of a knife roll **54** and a platen roll **55**, as shown in FIG. 7. In this manner the fillers **43** are entubed in a generally flat wadding envelope **39** which consists of two strips of wadding laminated in face relation at the edges of the tube.

Beyond the belts **44, 45** the respective fillers **43** are sealed in the envelope **39** crossways by the cross crimping roller **56** which cooperates with its platen roller **57**, thus to produce cross sealed bands **59** sealing each pad filler **43** within the tube **39**.

The tube **39** then passes through conveyor belts **73, 74**, where a body contacting cover strip **60** is assembled in face relation to the underside of the envelope. Strip **60** desirably consists of smooth, soft, non-woven fabric unwound from a parent roll **61**. The strip **60** has periodically printed upon it a cross band or stripe **62** (FIG. 8) of hot melt adhesive, applied thereto by printing roll **64** in the hot melt adhesive tank **63**. Printing roll **64** is immersed in a molten adhesive bath **65**. The printing roll **64** has embedded in its periphery intaglio printing bars **69** which have dimpled surfaces **66** to retain adhesive picked up in the bath **65**. A doctor blade **67** scrapes from the periphery of the roll **64** all of the hot adhesive, except such as is retained beneath its surface in the dimples **66**.

The cover strip **60** is narrower than the envelope **39** (FIG. 11) and is fed at a lineal speed equal to the peripheral speed of the printing roll **64** and across the roller guides **68** mounted on a carriage **71** on the retractable piston and cylinder assembly **72**. The cover strip **60** is fed at the same speed as feed belts **73, 74**. The printing bars **69** on roller **64** are spaced peripherally a distance exactly equaling the intergap spaces in tube **39**. Thus, the printed cross stripes or bands **62** register with the tube gaps.

The hot melt adhesive cross bands **62** cool and solidify in the course of traveling through the apparatus until they reach an adhesive activating roll set consisting of a heated roll **75** and a platen roll **76**. There are a series of heating bars **77** on the roll **75**. Bars **77** coact with the tube **39** in the gaps between successive pads so as to activate the bands **62** and cause the body contacting cover strip **60** to adhere to the previously crimped cross bands on the tube. As the tube leaves the cross band activator **75**, the links **78** between successive pads in the tube **39** will be gripped by the gripping bars **80** on the upper and lower chain feeders **81** (FIG. 5). The bars **80** cool and set the activated adhesive bands **62**. Feeders **81** transfer the tube **39** to the final cutoff station which includes knife roll **82** and platen roll **83**. The rolls **82, 83** are intermediate the ends of conveyor chains **84, 85** which have pad gripping bars **86**. Bars **86** are so positioned as to grip the pads, as shown in FIG. 5, thus leaving the links **78** between the pads exposed to be cut off as they pass between the knife roller **82** and platen roller **83**. The final severed pad product **90** is then removed on a conveyor **91**. FIG. 13 illustrates the fact that the pads **90** are formed with their longest dimension transverse to the direction of advance of tube **39** through the machine.

The final pad product is shown in FIGS. 11 and 12 (inverted as compared to previous views). As is clear from FIG. 11, the body contacting cover strip **60** is not as long as the pad, thus to leave the end margins of the pad uncovered. Moreover, the strip **60** is applied to only one face of the pad. This construction is particularly advantageous where the pad **90** is used as a diaper and the diaper is folded about the baby. Accordingly, the body contacting cover **60** is located only over the central portion of the diaper which becomes soiled and wet, thus to prevent pilling of the pulp and wadding in that affected area. A substantial saving is thus made in the amount of cover material needed for each pad.

An important feature of the present invention is the method and apparatus by which undue stresses on the wadding strips **37, 47, 48** are avoided. In the first place, the wadding strips are not folded around the edges of the pads as in some prior art pads. Such folding produces tension in the wadding, thus tending to stretch the wadding and possibly pull it out of shape or tear it. In the present apparatus and method, the wadding strips are simply laid in parallel superimposed relation. The edge margins of strips **47, 48** are overlapped and crimped, as shown in FIG. 6. This avoids any necessity for stretching or imposing pressure on the wadding as would otherwise be required if it were folded or pulled around the edges of the pad.

Moreover, each wadding strip is relieved of the necessity for pulling it from the parent rolls **38, 51, 52**. This is accomplished by providing each parent roll with a powered belt driver **92**. The belt drivers **92** drive the parent rolls so as to unwind the strips under power, and relieve the strips of tension which would otherwise be induced in the strips. Accordingly, for this additional reason, the wadding strips are not stretched or otherwise distorted in the course of formation of the tube in which the pad fillers are encased.

The completed pad, as shown in FIGS. 11 and 12, contains a mid layer **21** of compressed pulp and outside layers **20, 22** of uncompressed pulp. The compressed layer **21** promotes rapid lateral flow of fluids, thus to promote uniform absorption of fluid in all of the pulp material in the pad.

I claim:

1. In an absorptive pad having a pulp filler, an absorbent wadding envelope and an absorbent body contacting

cover outside the envelope, the improvement in which said body contacting cover is at one side of the pad only, is shorter than the pad is long, and is disposed at the center of said one side of the pad to leave absorbent end margins of the pad uncovered, said wadding envelope comprising two wadding plies having peripheral margins in face relation, said body contacting cover having side margins attached in face relation to portions of the peripheral margins of the wadding plies.

2. The pad of claim 1 in which the side margins of the body contacting cover are attached to portions of the peripheral margins of one of the wadding plies by stripes of hot melt adhesive.

3. The pad of claim 1 in which the pulp filler includes at least one layer of substantially uncompressed pulp mat and another layer of compressed pulp mat.

4. The pad of claim 1 in which the peripheral margins of the wadding envelope are held together by crimps.

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WILLIAM A. POWELL, Primary Examiner

U.S. Cl. X.R.

128—290, 296; 156—213, 290, 291, 383; 161—149