Oct. 3, 1967 R. D. ANDERSON 3,344,581

APPARATUS FOR THE MANUFACTURE OF CELLULOSIC PRODUCT

Filed April 21, 1964 3 Sheets-Sheet 1

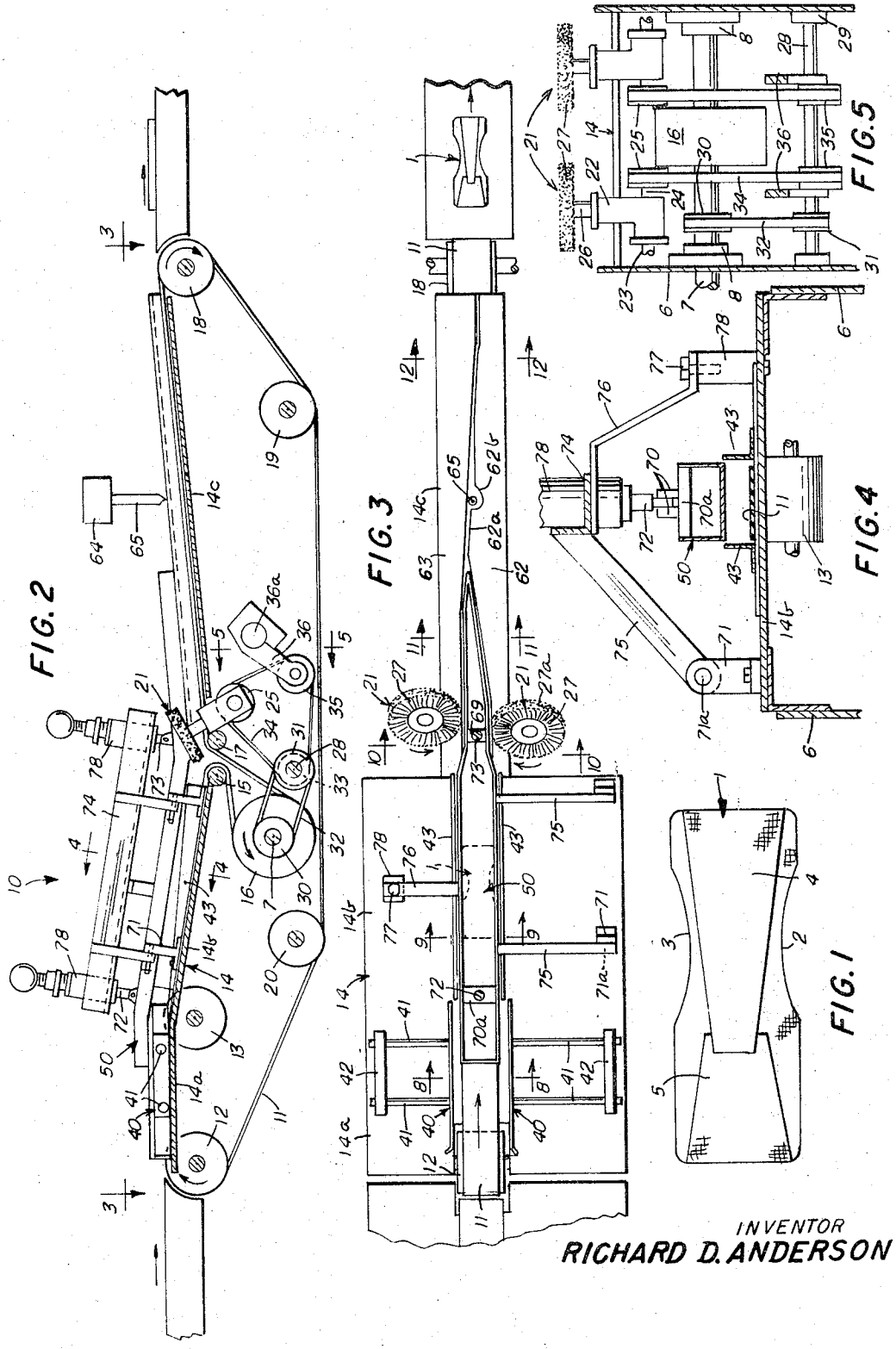


FIG. 2

FIG. 3

FIG. 5

FIG. 4

FIG. 1

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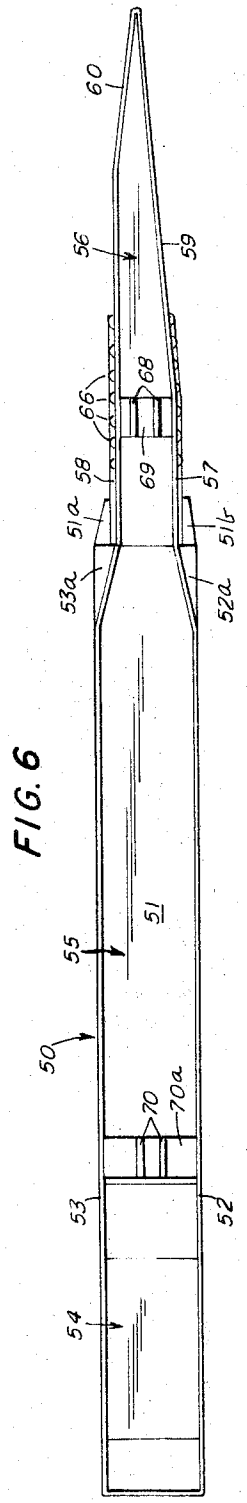


FIG. 6

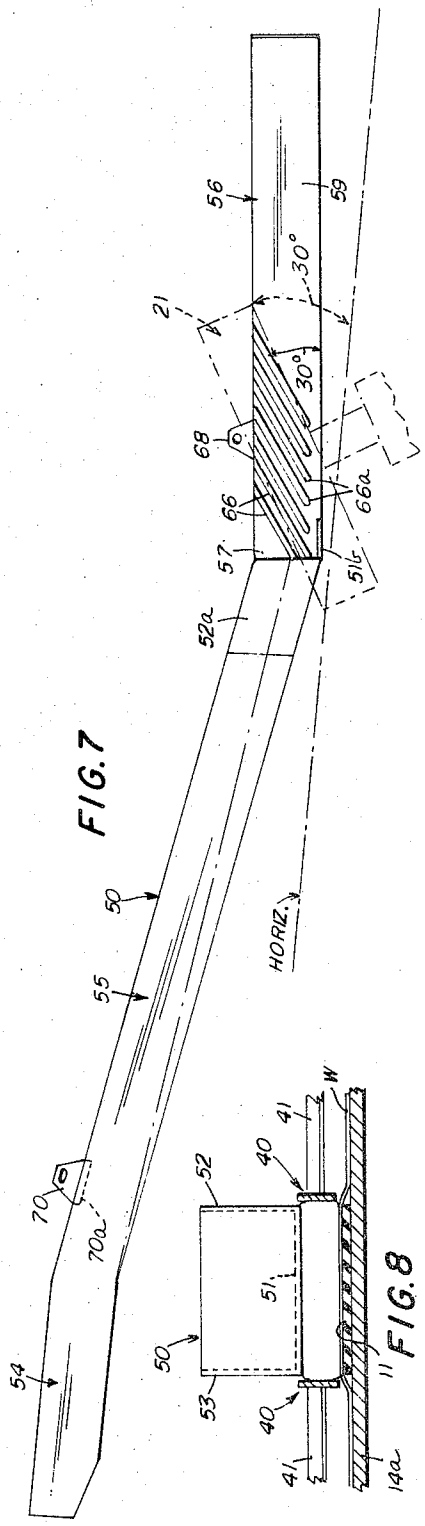


FIG. 7

FIG. 8

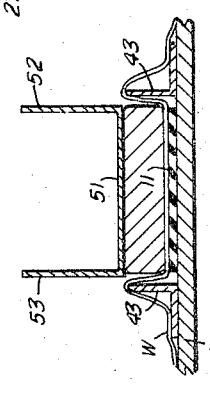


FIG. 9

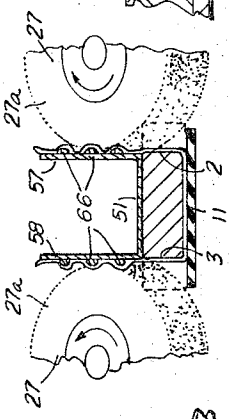


FIG. 10

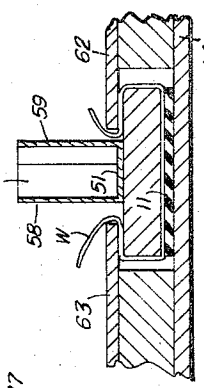


FIG. 11

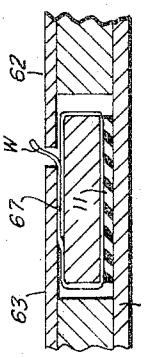


FIG. 12

APPARATUS FOR THE MANUFACTURE OF CELLULOSIC PRODUCT

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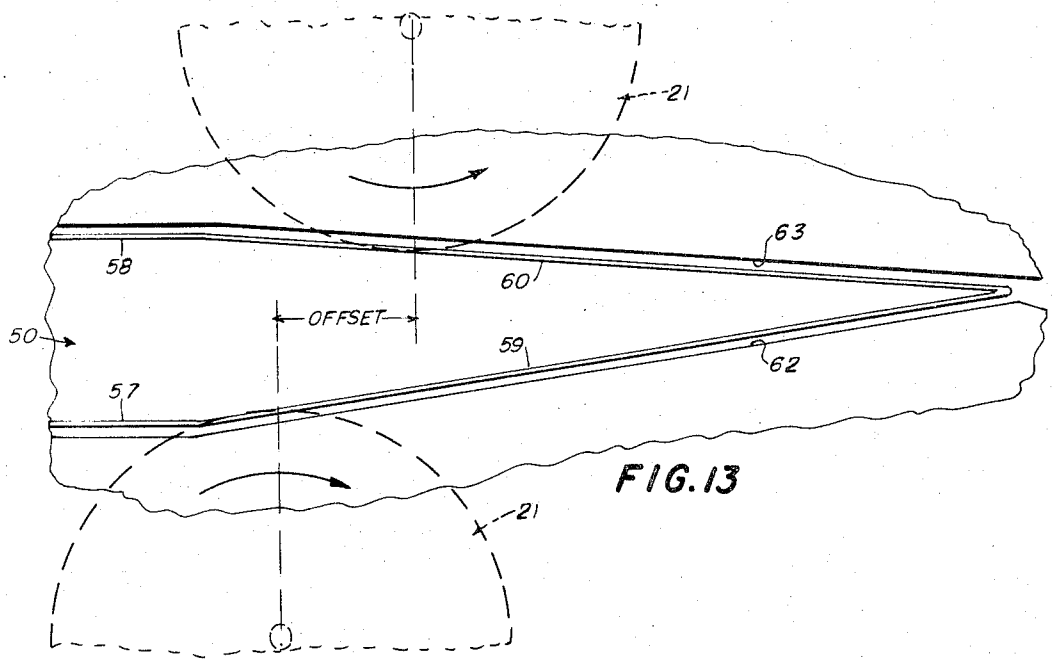


FIG. 13

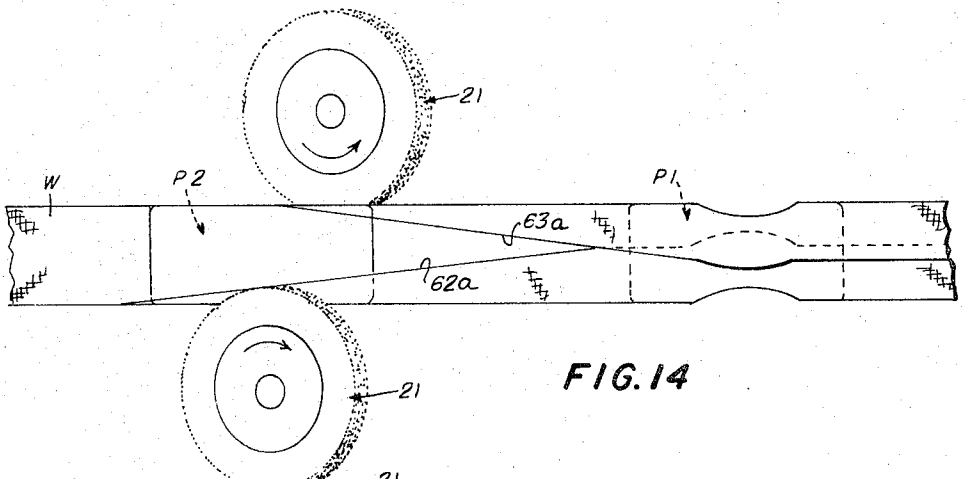


FIG. 14

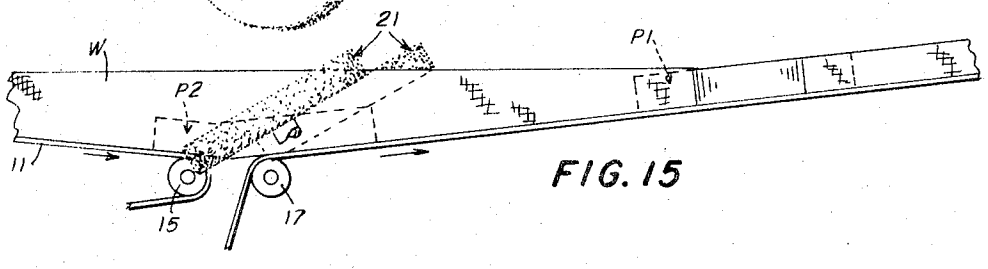


FIG. 15

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3,344,581

APPARATUS FOR THE MANUFACTURE OF CELLULOSIC PRODUCT

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Filed Apr. 21, 1964, Ser. No. 361,436
13 Claims. (Cl. 53—177)

This invention relates to improved apparatus and method for the continuous wrapping of elongated articles having a configuration which varies longitudinally thereof.

An object of the invention resides in an apparatus and method of applying an elongated sheet-like wrapper to a plurality of spaced articles thereon while the wrapper and articles thereon move through a predetermined path so that the articles are enclosed by the wrapper.

Another object of the invention is to provide an improved apparatus and method particularly adapted for the continuous wrapping of sanitary pads or the like, of irregular configuration with particular reference to pads having concavely contoured sidewall portions.

Still further objects and the entire scope of applicability of the present invention will become apparent from the detailed description given hereinafter. It should be understood, however, that the detailed description and specific example is given by way of illustration only and, while indicating preferred embodiment of the invention, is not given by way of limitation, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

For a more complete understanding of the nature and scope of the invention reference is had to the drawings in which:

FIG. 1 is a plan view of a completed sanitary pad of generally rectangular shape having concavely contoured side wall portions that fit the adjacent thigh portions of the wearer;

FIG. 2 is a side elevation in diagrammatic form of the wrapping apparatus for the pad of the shape shown in FIG. 1;

FIG. 3 is a top plan view of the apparatus in FIG. 1 along line 3—3;

FIG. 4 is a sectional view along line 4—4 of FIG. 2 on an enlarged scale showing the conveyor belt carrying the pad, the wrap fence on each side and a top of pad press with sides to guide the wrap;

FIG. 5 is a vertical sectional view along line 5—5 of FIG. 1 on an enlarged scale showing the drive mechanism for the inclined brushes to sweep upwardly the upturned wrap at each side of the pad to conform to the side edge contour of the pad;

FIG. 6 is a top plan view on an enlarged scale of a sanitary pad press for positioning on top of the pads being wrapped in FIG. 1;

FIG. 7 is a side elevation of the pad press in FIG. 6 showing in long and short dash line the side lift locus of the wrap and in broken lines the outline of one of the rotating brushes;

FIG. 8 is a cross sectional view on an enlarged scale along line 8—8 of FIG. 3 showing the relative position of wrap and pad;

FIG. 9 is a cross sectional view on an enlarged scale similar to FIG. 8 further along the apparatus at line 9—9;

FIG. 10 is a cross sectional view on an enlarged scale similar to FIG. 8 still further along the wrapping apparatus showing the action of the rotating side brushes sweeping the U-shaped in cross section wrap into engagement with the concave side of the pad and the side of the pad press thereabove;

FIG. 11 is a view on an enlarged scale along line 11—11 of FIG. 2 showing the start of the folding over of wrap onto the top of the pad;

FIG. 12 is a view on an enlarged scale of the pad and wrap and folders along line 12—12 of FIG. 2;

FIG. 13 is a plan diagrammatic view showing the pad press in the area adjacent the rotating brushes with the brushes shown with one offset from the other;

FIG. 14 is a top plan view on a smaller scale than FIG. 13 showing the wrap of a completely wrapped pad and the trailing pad as being wrapped and the action of the rotating offset brushes; and

FIG. 15 is a front elevation of the wrap, pads and brushes in FIG. 14 and the position of the belt conveyor.

Throughout the description like reference numbers refer to similar parts.

A sanitary pad is indicated at 1 having a general rectangular outline with contoured concave sides 2 and 3 oppositely disposed intermediate the ends and with end tabs 4 and 5 made from the wrap enclosing the pad. The problem is to enclose such a contoured pad in a tubular wrap and smoothly shape the wrap about the sides and fold it properly over. The general outline of the pad is shown but all the fold lines are not illustrated.

A complete wrapping machine is indicated at 10 and in FIG. 5 the machine has a pair of spaced apart vertical frame plates 6—6, a drive shaft 7 mounted in suitable bearings 8—8 supported by the side plates 6. An endless belt 11 is shown in FIGS. 2 and 3 passing over an incoming end pulley 12, over a bed plate generally indicated at 14 having a horizontal run 14*a*, a downwardly inclined run 14*b* and an upwardly inclined run 14*c*, thus making a shallow V on its top run. Thence the belt 11 passes over pulley 13 which extends up through an aperture of the bed at the point of juncture between the horizontal run 14*a* of the bed and the downwardly inclined run 14*b*. The belt 11 then is led over an idler pulley 15 at a gap, then rearwardly and downwardly over drive pulley 16 mounted on the drive shaft 7 and thence over the pulley 17 spaced forward from the pulley 15 at the gap and forward up the upwardly inclined bed portion 14*c* to the forward end pulley 18 and from here rearwardly over the two bottom pulleys 19 and 20 and back to pulley 12. This is typically shown.

A pair of rotary brush assemblies are indicated at 21 each having a right angle gear box 22 and a pivot mounting 23 as shown in FIG. 5. The gear box 12 has an input shaft 24 with an input pulley 25 thereon and an output brush shaft 26 mounting the rotary brush 27 having bristles 27*a*.

The drive of the brushes is through a counter shaft 28 mounted in bearings 29—29 secured to the mounting plates 6. A pulley 30 on drive shaft 7 drives a pulley 31 on shaft 28 through a belt 32. A second pulley 33 on counter shaft 28, shown in FIG. 2 in broken lines behind pulley 31, drives a belt 34 which passes over pulley 25 to drive the brush, thence over an idler pulley 35 mounted on a pivotally mounted arm 36 pivoted at 36*a*. The counter shaft 28 likewise drives the opposite brush assembly 21 through a like drive, see FIG. 5.

These brush assemblies 21 may be tilted at an angle to the horizontal and in the position shown are at about a 30° angle above the horizontal. The brush assemblies are located so that the rotary brushes 27 rotate on each side of the belt 11 at the gap between the pulleys 15 and 17 over which the belt 11 is trained and as viewed in FIG. 3, the right hand brush 27 as viewed in the line of flow of pads rotates clockwise while the left hand brush rotates counterclockwise.

A pair of pad guides 40 are mounted at the incoming run of the belt 11 on each side thereof and are supported by a pair of spaced apart rods 41 slideably supported in

upstanding brackets **42** attached to the bed plate portion **14***a*.

A pair of fences **43** of right angle construction in cross section, see FIG. 4, are mounted on the bed plate portion **14***b* and as shown in FIG. 2 and some of the other cross sectional figures, to be described, have a gradually increasing height of fence as the fence progresses forwardly in the line of flow towards the gap between the pulleys **15** and **17**. It is over this fence that the oncoming wrap is draped and caused to take a U-shaped configuration as it is pulled through the folding apparatus.

A pad press is generally indicated at **50** and as shown is a unitary member for easy manipulation although it could be made as more than one member. The pad press follows the shallow V-shaped in elevation contour of the upper run of the conveyor belt **11**. The shallow V-shaped run of the belt is to provide for wrapping the pads without stretch of the wrapping.

The pad press **50** has a generally rectangular cross section that may be made up of a U-shape with a bottom **51** of the trough-like press adjacent the top of the pads and parallel side legs **52** and **53** extending up transversely from the bottom **51** to provide guides against which the wrapper is guided as it comes up from under the pad and extends up against each of the outside faces of the legs **51** and **52**. The pad press has a uniform width through its horizontally disposed entrance portion **54** and its inclined downwardly extending portion **55**. At the juncture of the portion **54**, overlaying bed portion **14***a*, and portion **55**, overlaying bed portion **14***b*, the side lift of the wrap starts. The trace of the top of the side fences **43** is indicated by long and short broken lines in FIG. 7. At the lower end of portion **55** at the gap area above idler pulleys **15** and **17**, the pad press, as viewed in FIG. 7, narrows in width where the side brushes **21** act and inclines upwardly, see FIG. 2, in the exit portion **56** in conformity with and above the upwardly inclining run of conveyor belt **11** and the bed portion **14***c*.

The pad press **50** at the lower end of portion **55** has its sides **52** and **53** at **52***a* and **53***a* respectively, converging in towards each other, see FIG. 6, while its bottom **51** has side lip portions **51***a* and **51***b* in alignment with the bottom of the portion **56** to hold the pad down at its travel to the brush area which is adjacent the apex area of the conveyor and pad press.

In the portion **56** of the press, see FIG. 6, a leg **57** extends for a relatively short distance parallel to the opposite leg **58** and then converges towards the other leg in a gradual manner at **59**. These leg portions **57** and **59**, see FIG. 6, act with a right hand folder **62** positioned above the pad, the conveyor belt **11** and the bed portion **14***c*, to fold over of the right side of the wrap in the direction of flow in advance of the left hand side as seen in FIG. 11. The balance of the portion **56** along the side **58** ends in an exit or terminal portion **60** that converges toward the inclined leg **59**.

The leg portions **58** and **60** act with a left hand folder **63**, see FIGS. 11 and 12, to fold the left hand side of the wrap over the top of the right hand folded over portion wrap.

In FIG. 3, it will be noted that the folder **62** has its edge **62***a* from adjacent the end of leg **59** of the pad press gradually sloping so that the folder narrows. At **62***b*, a sharp recess is provided in the edge so that a nozzle **65** of an adhesive applier **64** positioned above the folder may apply a line of adhesive to the top of the under fold wrap. The continuing edge of the left hand folder **62** slopes in conformity with the edge **62***a* of the right hand folder and extends beyond the center line of the pad travel so as to fold over the left hand portion of the wrap as shown in FIG. 12.

The pad press **50** has half round spaced apart upwardly inclining rods **66** fixed to the leg **58** in the area of the brush **21**. So also similar half round spaced apart and upwardly inclined rods **66** are affixed to the opposite legs

57 and **59** of the pad press in the area of the opposite brush **21**. These rods inclined upwardly at about a 30° angle to the adjacent bottom of the pad press and serve to hold up the wrap, as moved up the sides by the brushes, in the valleys between the half round pieces **66**. The bottom ends **66***a* of the half round rods or ribs **66** are tapered smoothly down to the side members of the pad press on which they are mounted. In FIG. 7 it will be noted that the plane of the rotary brush **21** is inclined at about a 30° angle to the horizontal.

The pad press **50** is mounted to first be slid backwards to free the pad lips **51***a* and **51***b* and then swung clear of the tops of the pads to provide for servicing the apparatus. The pad press **50** has a forward pair of spaced ears **68** extending up from a cross plate **69** extending between the legs **57** and **58**. A rear pair of spaced ears **70** extend up from a cross plate **70***a* attached at its ends to the legs **52** and **53**.

Mounted on the inclined bed portion **14***b* is a pair of spaced apart upstanding brackets **71** having pintles **71***a* extending rearward therefrom and parallel to the top adjacent run of belt **11**. A fitting **72** is pivotally attached to the rear set of ears **70**, see FIG. 4, while a fitting **73** is attached to the ears **68**, see FIG. 2. These fittings **72** and **73** are connected by an elongated angle member **74**. The angle member **74** is supported by a pair of hinge members **75** which are apertured at their lower ends and pivotally and slidably received on the pintles **71***a*. In FIG. 4 a support member **76** is shown extending from the angle member **74** and it is secured by a removable cap screw **77** to a bracket **78** upstanding from bed portion **14***b*, to secure the pad press in pressing relation over the runs of the pads. A pair of suitable hand grasp upstanding members **78** are attached to the elongated angle member **74**. Thus, by removal of the cap screw **77**, the pad press is free, and it is initially slid backward on its pintles **71***a* to free the lips **51***a* and **51***b* and then pivoted about the pintles free of the pads below.

In FIGS. 9–15, the progress of applying and folding the wrap is illustrated at progressive stations along the apparatus.

In FIG. 13 the right hand brush is arranged within center line mounting behind the left hand brush and as generally shown in FIG. 3, the right hand brush is at about the start of the fold plate **61** and the transition between pad press legs **57** and **59**. The left hand brush **21** has its center line further on down the line of flow just after the start of the slope of leg **60** and the folder **63** cooperating therewith that starts the left hand fold later than the right hand fold.

In FIG. 9 the wrap has just entered over the fences **43** and is starting up the sides after passing the break between horizontal bed portion **14***a* and downwardly inclined bed portion **14***b*.

At station illustrated by FIG. 10 the pad and wrap have progressed to where the wrap is being pushed up the side of the leg **57** of the press by the right hand brush and the wrap is forced into smooth engagement with the right hand concave portion of the pad. The wider advanced end of the pad is shown in outline. Also in FIG. 10, the left hand brush that is further on down the line of flow is about to receive the concave other side and to sweep upwardly the void portion of wrap which is part of the tubular wrap and of the configuration in cross section to the wide end portions of the pad. It will be noted in FIG. 10 that the bristles **27***a* of the brushes **27** force the wrap into the valleys between the half round rods **66**.

In FIG. 11 the pad press **50** is narrowing and the wrap that has been pulled up smoothly along the sides of the pad is being folded over the top of the pad. The right hand side of the wrap is folded over first as is shown in FIG. 11.

At the station of the pad and wrap shown by FIG. 12, the adhesive line **67** has been applied by the adhesive

dispensing nozzle **65** and the left hand top wrap is being completed in its fold over the top of the right hand wrap.

In FIG. 13 the brushes, pad press and folders are shown while in FIG. 14 the brushes and the wrap tube in skeleton form and pads are shown with the right hand top wrap having been folded over first followed by the left hand top wrap which has been swept up by its brush on that side.

In FIG. 15 the position of the wrap W is shown as it is tight but without tension or in an unslack condition as it passes through the apex of the shallow V shape in side elevation path on the belt **11**. The relative relationship of the wrap height to the height of the pad is shown with the top of the pads indicated by broken line.

The linear speed of the brush rolls is equal to or greater than the speed of the wrap and pad travel in its flow path so that the wrap is smoothly brought up along the sides of the pad and pad press for subsequent folding.

In FIG. 14 the edge or margin of the right hand fold is shown at **62***a* and the edge of the left hand fold is shown at **63***a*. The pad is shown at **P1** which has just had the wrap completely folded thereover and the next rear pad in line of flow is shown at **P2** between the offset brushes **21**. The right hand brush is sweeping in the right hand concave thigh receiving recess and the opposite concave recess is approaching the offset ahead left hand rotary brush.

In the illustration rotary brushes have been shown, however, a rotating wheel member with a periphery having friction material that will sweep up the wrap without tearing it could be used. So also linear traveling sweeping members could be used.

An efficient apparatus and method have been herein provided for expeditiously coping with the problem of continuously applying a wrap in a smooth manner to elongated articles having a configuration which varies longitudinally thereof.

I claim as my invention:

1. Apparatus for wrapping and folding over the wrap of elongated pads having irregular side edges in their longitudinal direction comprising, in combination, a conveyor means having a top run with an entrance portion for receiving and carrying wrap in a flat condition with such pads thereon extending in the traveling direction of wrap, a gradually downwardly inclined run and a gradually upwardly inclined run at the exit end of said apparatus, a pad press having a bottom overlying the top of said pads and a pair of upstanding sides, said pad press being elongted and conforming with inclined portions to at least the downwardly inclined portion of the conveyor means run and a portion of the upwardly inclined run portion of the conveyor means, said pad press in its portion lying over said upwardly inclined conveyor means run having a narrowing bottom with the sides extending upwardly therefrom, said narrowing portion being of a width approximately equal to the narrowest width between the side edges of the pads, a folder means each side of said narrowing portions of the pad press and extending further up the inclined run portion of the conveyor means for cooperation with said sides to fold over the wrap, an elongated upstanding fence each side of the downwardly inclined run of the conveyor means, each said fence increasing gradually in height along the downwardly inclined run of the conveyor means for receiving the flat wrap thereover at minimum height end, raising the wrap up each side of the pads and along the upstanding sides of the press, said inclined portions of the conveyor means being inclined toward each other to maintain the upturned portions of the traveling wrap without tension therein, a pair of approximatey oppositely disposed moving friction creating means adjacent each side the narrowing portion of said pad press, said friction creating means moving in a direction upwardly inclined to said upwardly inclined pad press portion in the direction of movement of said conveyor means carrying said wrap and pads whereby the wrap extending up along each elongated side of the pad and the sides of the pad press is urged upwardly and smoothly against the elongated sides of the pad, said urged up wrap along the sides of the pad being folded over each other by said folding means.

2. Apparatus according to claim **1** wherein said moving friction creating means are rotary wheels having friction means on their peripheries.

3. Apparatus according to claim **2** wherein the rotary wheels are rotary brushes having bristles extending on their peripheries.

4. Apparatus according to claim **1** wherein the top run of the conveying means has the gradually downwardly inclined run portion at its lower end spaced from the lower end of the upwardly inclined run portion whereby a gap is left therebetween, said spacing creating the gap being adjacent the start of the narrowing portion of said pad press.

5. Apparatus according to claim **4** wherein said moving friction creating means are rotary wheels having friction means on their peripheries, said friction wheels being positioned on each side of the start of the narrowing portion of the pad press and having the lower portion of the rotary wheels extending into said gap and said wheels lying in planes inclined gradually upwardly from said gap and inclining upwardly with respect to the upwardly inclined pad press portion in the direction of the upwardly inclined portion of said conveying means.

6. Apparatus according to claim **5** wherein said rotating wheels are rotated to have a peripheral speed at least equal to the speed of travel of said conveying means for the wrap and pads.

7. Apparatus according to claim **5** wherein one side of the narrowing portion of the upwardly inclined pad press portion and said cooperating folder on said side start an incline towards the central longitudinal axis of the conveyor means in advance of the opposite side of the pad press and its cooperating folding means on that side, one of said rotary wheels is positioned at approximately the start of said first inclined side of the pad press and its folding means, the other rotary wheel being positioned offset, from said one rotary wheel in the direction of top run of said conveyor means and approximately adjacent the start of said opposite side of pad press incline and the incline of its folding means.

8. Apparatus according to claim **7** wherein said rotating wheels are rotating brushes having bristles extending from their peripheries.

9. Apparatus according to claim **8** wherein said pad press has means mounting it for movement into and out of position above said conveying means.

10. Apparatus according to claim **8** wherein said narrowing portion of the upwardly inclined portion of the pad press has spaced rib means on the outside of each of its sides and extending inclined upwardly with respect to the upwardly inclined portion of the pad press at a position adjacent said rotary brushes whereby to assist in holding upwardly said wrap swept up thereover and in the valleys formed between the spaced rib means.

11. Apparatus according to claim **10** wherein the pad press has bottom lip means thereon adjacent the juncture of said downwardly and upwardly inclined portions to hold down said pads passing thereunder.

12. Apparatus for continuously wrapping a plurality of elongated articles having a configuration which varies longitudinally thereof, comprising means carrying a wrap with pads thereon through a predetermined path linear in one plane and of shallow V configuration in a plane disposed normal thereto, there being an apex area at the bottom of said predetermined linear path, means comprising driven counter-rotating members having friction creating means on their peripheries rotated about axes parallel to said linear plane and obliquely disposed in

respect to the general paths of movement of said wrap for frictional engagement and partial encirclement of elongated marginal portions of said wrap about said elongated articles during the movement of said wrap through the apex area of said path, folding means for completing the enclosure of said wrap about said articles with marginal portions thereof in overlapped relation, article press means extending over said articles and the means carrying the wrap and articles and having upstanding sides in general alignment with the elongated sides of said articles and fence means along the entrance portion of said pad press means for raising the wrap up against the outsides of said upstanding sides of the pad press means.

13. Apparatus according to claim **12** wherein said folding means has adhesive applying means adjacent thereto whereby to apply adhesive to the top of the under folded over wrap in advance of the fold over of the overlapped wrap to adhere together said folded over wrap adjacent said applied adhesive.

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