Jan. 30, 1968 J. F. CHAMPAIGNE, JR 3,366,115

MANUFACTURE OF SANITARY PRODUCT

Filed June 26, 1964 2 Sheets-Sheet 1

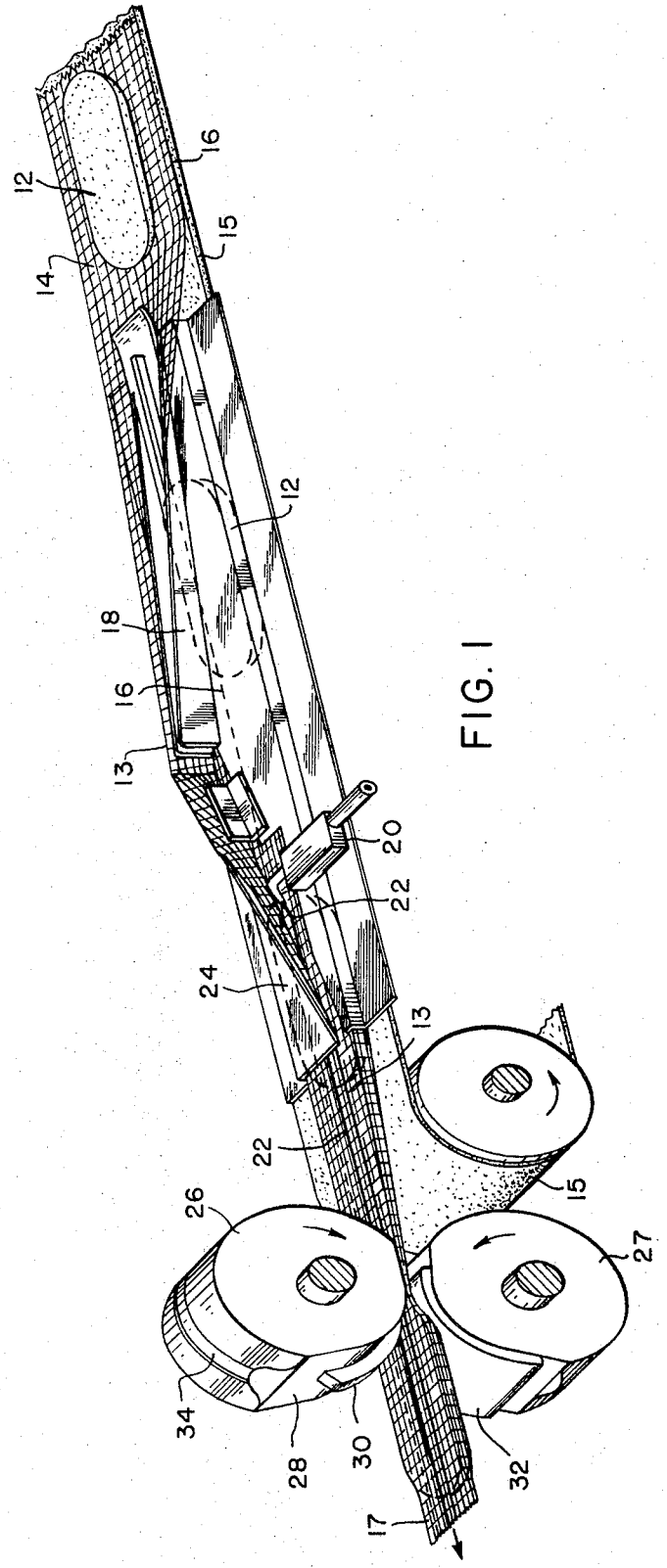

FIG. 1

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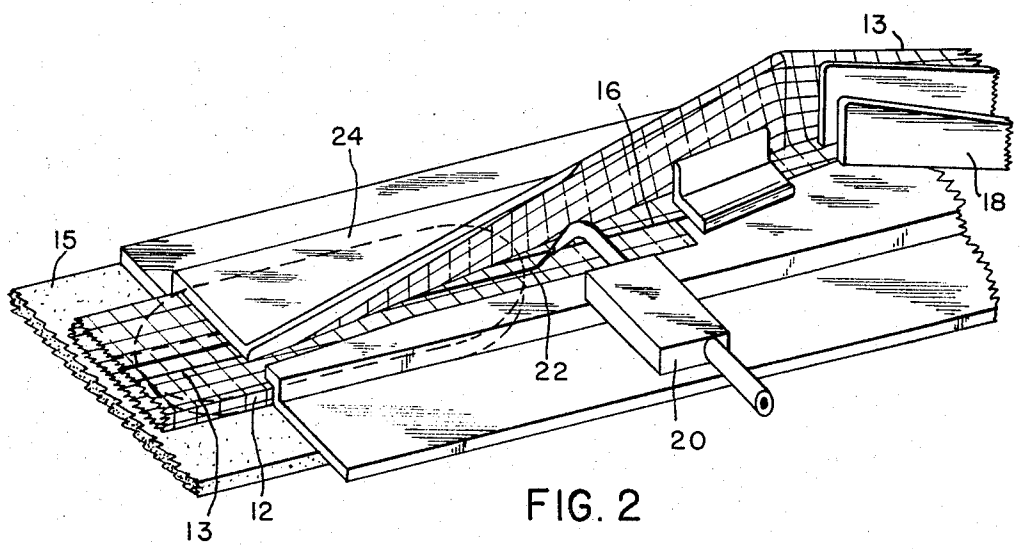

FIG. 2

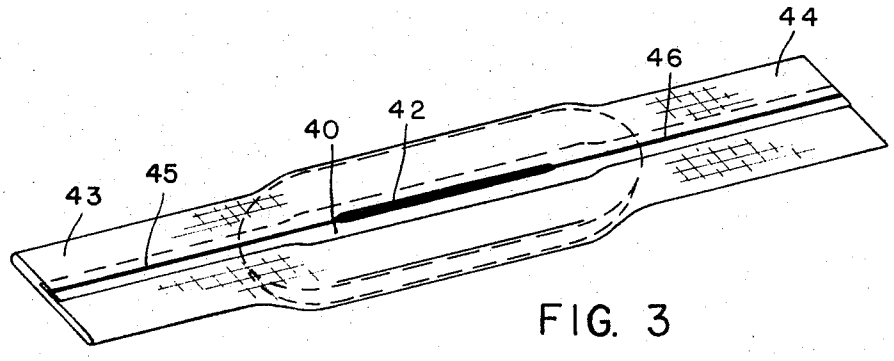

FIG. 3

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3,366,115

MANUFACTURE OF SANITARY PRODUCT

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ABSTRACT OF THE DISCLOSURE

A sanitary napkin construction and method in which the outer wrapper is secured together in an overlapped area by a flattened segment of a very light-weight filament of hot-melt adhesive. A fine filament of adhesive is extruded, allowed to set into a non-tacky condition, deposited between the wrapper overlap, reactivated by heat only in the central pad area, then flattened in that area to seal the overlap there, leaving the overlap in the tab ends which extend beyond the pad free of attachment.

This invention relates to sanitary napkins and more specifically to an improved method for securing together the overlapped edges of the fluid-pervious wrapper material which encloses the absorbent filler pad.

Various methods have been used in the past for sealing the overlap of sanitary napkin wrappers in order to reduce the amount of wrapper material required, yet maintain the filler pad securely within the wrapper during use. The principal advantage of sealing the overlap, other than retaining the pad therein, is that less wrapper material is required and the costs of manufacture are correspondingly reduced.

Prior art methods of securement have included stitching stapling, using adhesive spots, employing thread treated with thermoplastic or pressure-sensitive adhesive and disposing the thread either above or between the overlapped wrapper material, applying heated thermoplastic filaments over the lapped wrapper area, and spraying quick setting adhesive directly on the overlapped area.

The present invention is a further improvement over prior methods, and has several advantages including more positive selective attachment of the wrapper overlap, almost trouble-free operation, better control, and reduced cost for adhesive material. The resulting product also has an important advantage in that the improved construction facilitates removal of the filler pad after use for easy disposal, such as by flushing away in the toilet.

The primary object of this invention is to provide an improved method for selectively securing the overlapped edges of thin, fluid-pervious sanitary napkin wrappers in positive engagement.

A second object is to provide a method for fastening the overlapped wrappers by the employment of carefully controlled amounts of hot-melt adhesives.

Another important object is to provide a method for securely sealing the overlap of sanitary napkin wrappers along a thin line substantially limited to only the central portion of the overlap contiguous with the absorbent filler pad, said seal having strong resistance to transverse rupture to insure retention of the pad during use, yet being readily opened for disposal of the pad after use, by peeling the wrapper open along the line of seal.

In the drawings:

FIG. 1 is a perspective diagram schematically showing an arrangement for carrying out the improved method.

FIG. 2 is an enlarged view of the adhesive applying arrangement employed in FIG. 1.

FIG. 3 is a perspective view of a finished napkin resulting from the process.

Hot-melt adhesives per se are not new. Such adhesives

have been used particularly in the packaging industry, especially for sealing cartons and for laminating sheet materials together. However, prior to this invention, such adhesives have not been successfully employed in the manufacture of sanitary napkins because of several inherent disadvantages involved in applying the melted adhesive to a thin, pervious wrapper material, which the present method overcomes, as set forth hereinafter.

Hot-melt adhesives conventionally are supplied as dry, substantially tack-free materials in the form of small pieces, pellets, or continuous strands or rods. In preparing the adhesive for use, heat is employed to melt down the dry resin by various methods until the resin is in a molten state and of such viscosity as will operate in the equipment chosen to apply it. Depending upon the type of adhesive selected, the melting temperature for useful operation is in the neighborhood of between 250° to 400° F. The adhesive commonly is applied in its molten state on one of the surfaces to be bonded, with a second surface immediately applied thereto before the adhesive has a chance to set. Since the resin contains no solvents, cooling alone is enough to cause solidification of the resin while the surfaces are held together, thus forming a strong bond.

While it would appear that hot-melt adhesives could be readily employed to seal the overlap portions of fluid-pervious sanitary napkin wrappers by the simple expedient of extruding a narrow continuous line of soft adhesive either on top of, or between, the overlap, such has not proved to be the case in practice.

The principal problem encountered in such operations has been to develop a method by which a sufficiently small amount of adhesive could be applied to obtain positive attachment of the overlapped portions of the thin wrapper material and yet not detract from the smooth appearance and soft feel so necessary in sanitary napkin products. Merely extruding sufficient adhesive onto the overlapped wrapper material is not satisfactory in that inordinate amounts of adhesive are required to obtain anything close to satisfactory attachment strength. This is attributed to the lack of a suitable means to obtain firm contact of the adhesive with the soft, overlapped wrapper and its cushioning filler without adhesive transfer to equipment parts. The problem is not solved even when the adhesive is extruded between the overlapped portions of the wrapper, since the pervious wrapper permits the adhesive to penetrate too easily. Increasing the extrusion temperature improves adhesion but decreases uniformity and smoothness of the adhesive line, apparently because the adhesive becomes too fluid and will not maintain itselt in the form of a continuous line, thus leaving undesirable lumps and protrusions in its wake to cause harshness in the finished product when the adhesive sets. The extra soft condition of the adhesive during application, which results from such higher temperatures also tends to lengthen setting time and cause sticking of unset adhesive to machine parts, thus necessitating frequent shut-downs for cleaning. Increasing the feed rate of the adhesive also improves adhesion, but increases the bulkiness and concomitant stiffness and roughness of the adhesive line undesirably, as well as increasing adhesive costs.

It was found that the above difficulties could be overcome by extruding the adhesive directly onto the wrapper material at a temperature low enough to produce a very fine thread-like line of adhesive, which sets almost immediately into a smooth, continuous, substantially non-tacky filament, and then reactivating the adhesive by applying heat and pressure in a selected area. By applying the adhesive on the wrapper directly from an extruder, it is possible to supply the adhesive as an extremely light-

weight, non-tacky filament without causing the filament to break during handling. Presently prefabricated filaments of hot-melt adhesive are not satisfactory for the purposes of this invention since, in order for such filaments to be self-sustaining, they must be made much too heavy, resulting in a sealed line which is too harsh and stiff to meet the softness requirements of sanitary napkins.

In carrying out this improved method, the fine, non-tacky filament is deposited directly from an extruder onto the surface of one edge portion of the wrapper which is first folded over the filler pad. The second edge of the wrapper is then folded over the first edge to enclose the filament located between the overlapped margins. The wrapped napkin with the thin filament between the overlapped wrapper is passed through a nip formed by heated drums in which moderate pressure is applied in preselected areas by a raised central rib portion on the top drum. This raised, rib-like portion heats and presses the filament only where overlap seal is most required, i.e., in the area of overlap centrally located with respect to the filler pad and coextensive with about one-half of the pad length. The temperature of the heated drum and the moderate pressure applied is sufficient to activate and to flatten slightly the fine filament of hot-melt adhesive and provide firm attachment between the wrapper layers along a narrow unobtrusive line. By employing a very fine filament and by limiting the area of heat and pressure application to a short section of the adhesive line centrally located with respect to the filler pad, it is possible to restrict selectively the wrapper attachment to the area where overlap seal is most needed to insure against the filler pad falling out during use. The slight flattening of the line, in addition to providing desirable softness, provides a positive seal which is surprisingly resistant to transverse rupture. An important advantage of providing overlap seal only in the pad area is that the used pad may be conveniently disposed of by the user by grasping the unsealed portions of the overlap at the tab ends to peel open the sealed area and release the pad filler. Because the wrapper remains unsealed at the tab ends, the tabs remain more flexible and retain their desirable soft feel for wearing comfort.

As diagrammatically shown in FIGS. 1 and 2, the sealing method is carried out by conventionally arranging absorbent pads **12** in spaced alignment centrally of a continuous web of fluid-pervious wrapper material or gauze **14**, carried on conveyor belt **15**. The near edge portion **16** of the wrapper is folded over the pad by the upstream section of a conventional folding board **18**. A heated extruder nozzle **20** then is employed to extrude a very fine continuous filament **22** of hot-melt adhesive in non-tacky condition on top of the first folded over portion **16** of the wrapper. For this purpose a nozzle having an 0.040" orifice was used, but the size may be varied within a reasonable range as desired. It was found that when extruded in an amount as small as 0.014 gram of adhesive per standard size pad, satisfactory adhesion could be obtained. Extrusion temperature for the hot-melt adhesive is readily adjustable to conform with the melt properties of the type of adhesive chosen so that the filament sets almost immediately into a substantially non-tacky stage before contacting the wrapper. For this purpose an extrusion temperature of between 335° and 350° F. was found suitable. In any event, the proper temperature for extrusion is readily determined. Upstream section **24** of the folding board then folds the remaining edge portion **13** of wrapper **14** over the extruded filament **22**. The enwrapped pad with the adhesive filament positioned centrally within the wrapper overlap then passes through heated pressing drums **26** and **27**. Upper drum **26** has a partially relieved circumferential section **28** substantially the length of the pad **12** except for a central rib **30** aligned with the center portion of the pad and the extruded filament. Lower drum **27** also has a relieved section **32** of similar length coacting with the upper drum.

The clearance between the relieved section **32** of the lower drum **27** and the central rib **30** of upper drum **26** is adjusted to be slightly smaller than the pad thickness, whereby moderate pressure is applied on the filament over the pad in the sealing area by central rib **30**. The two drums are synchronized so that the relieved portions operate on the spaced pads in timed relation. The central rib **30**, which preferably is of a length approximately one-half of the length of the pad being operated on, applies heat and pressure to the enwrapped pad and centrally disposed filament in a preselected span as the assembly passes through the nip formed by the relieved portions. The central rib **30** thus activates the hot-melt resin sufficiently to flatten the filament slightly to a smooth configuration only in a central portion of the pad area. Too much heat should be avoided to insure against over-softening the adhesive and avoid transfer to the drum. The overlapped edges of the wrapper accordingly are adhered together only in the central pad area along the narrow line formed by the slightly flattened filament. The unrelieved sections of the heated drums subsequently iron out the area of the wrapper between pads, as shown at **17**, in a known manner to provide smooth tab ends which are subsequently cut transversely between pads to divide the wrapped pads into individual units such as shown in FIG. 3.

The unrelieved portion of the upper drum **26** is preferably grooved at **34** centrally of its periphery to avoid activating or flattening the filament of hot-melt adhesive in the tab end areas, while these ends are being ironed flat. Several advantages result from providing the groove **34** in the top drum as shown. The groove **34** frees the tab-ironing portions of the drums from contact with the adhesive, to avoid activation of, or flattening of, the adhesive filament in the tab end areas where adhesive fastening is not desired or necessary, thus facilitating subsequent disposal of used pads. The groove **34** also avoids adherence of adhesive to the ironing drums and an attendant undesirable build-up of adhesive on the machine parts which otherwise might require frequent shutdowns for cleaning purposes.

The hot-melt adhesive selected for use may be any one of many which are capable of being extruded to provide a fine continuous filament in a substantially non-tacky condition. The most commonly used hot-melt adhesives suitable for such use are compounded from polyethylene, polypropylene, vinyl polymers and copolymers, and polyamides derived from dimerized fatty acids and diamines. Various waxes may also be compounded with the above materials as is known in the art. Such adhesives are all readily available on the market.

For the purpose of identifying the side of the pad which is to be worn away from the body, the adhesive may also be suitably colored to serve as a marker thread in the customary manner.

The finished napkin as shown in FIG. 3 has the overlap **40** of the thin fluid-pervious wrapper sealed securely against transverse rupture only in the central pad area as indicated by the slightly flattened line of adhesive **42**. Preferably, this central sealed area **42** is in the neighborhood of one-half the length of the filler pad, thus providing sufficient length to insure against transverse rupture and hold the pad securely in place when worn, yet being easily opened for convenient disposal of the used filler pad by grasping the unattached overlap at the pad ends to peel apart the sealed area. In the rest of the pad portion and in tab ends **43** and **44**, the line of adhesive remains in the form of a very fine non-tacky filament **45** and **46** and is essentially unattached to the wrapper, being retained therein only by frictional engagement with the overlapped wrapper portions.

What is claimed is:

1. An improved process for securing together the overlapped portions of sanitary napkin wrapper material which comprises depositing a series of absorbent filler pads in

spaced alignment centrally of a continuous fluid-pervious web, folding one edge portion of said web over said pads, extruding a continuous light-weight filament of hot-melt adhesive at such fineness and temperature to allow said filament to set into a non-tacky condition immediately after extrusion, continuously depositing said filament while in said non-tacky set condition onto the folded over portion of said web longitudinally thereof and medially of said pads, folding the second edge portion of said web over said filament, and lightly hot pressing the overlapped material and filament in a narrow limited area centrally located with respect to each of said pads, whereby said filament is activated, softened, and flattened to provide a narrow line of seal between the overlapped wrapper material only in the area overlying said pads, the unreacted portions of the filament lying between the portions of the overlapped wrapper material which spans the space between said pads remaining in the form of a very fine non-tacky filament unattached to the wrapper and being retained between the overlapped wrapper portions only by frictional engagement.

2. The method of claim 1 in which the area of hot pressing covers a line extending approximately one-half the length of said pad.

3. In a sanitary napkin construction wherein an elongate absorbent filler pad is enwrapped in a fluid-pervious wrapper having overlapped longitudinal edges and extended tab ends, improved attachment means for the overlapped wrapper wherein a light-weight filament of substantially non-tacky hot-melt adhesive is disposed between the wrapper overlap along the full length of said

wrapper, said filament being in a thin, flattened flexible condition in an area overlying and centrally disposed with respect to said filler pad and being in unflattened condition in the areas extending beyond said pad, the flattened portion of said filament providing a soft, flexible seal between the overlapped wrapper material only in said pad area, and the unflattened portion of said filament extending beyond said pad area and being held between the overlapped wrapper material in the tab ends only by frictional engagement.

4. The sanitary napkin of claim 3 in which the centrally disposed seal provided by said flattened filament extends approximately one-half the length of said pad, said seal being disposed at the approximate mid-point thereof.

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