

July 28, 1959

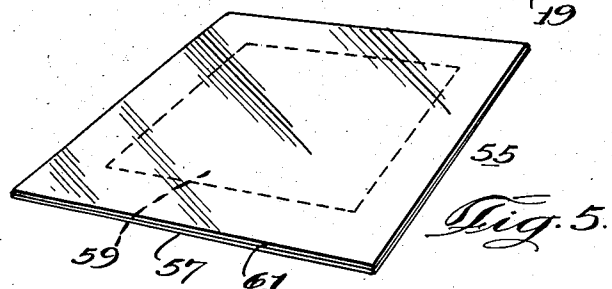
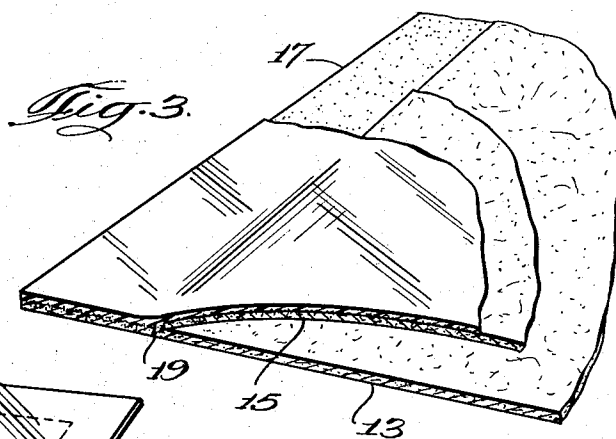
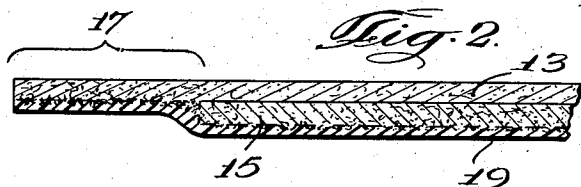
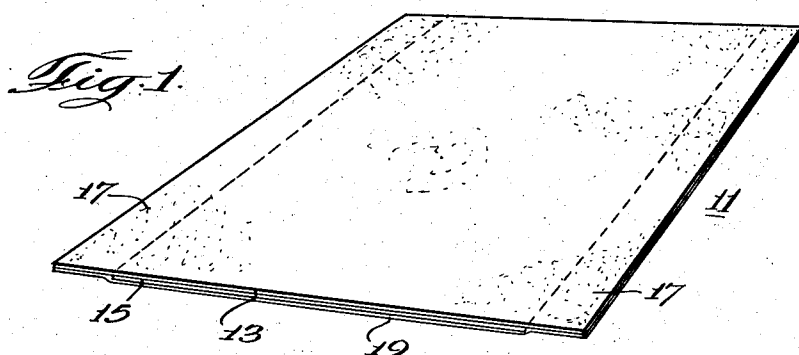
K. J. HARWOOD

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DISPOSABLE ABSORBENT PAD

Filed May 11, 1953

2 Sheets-Sheet 1



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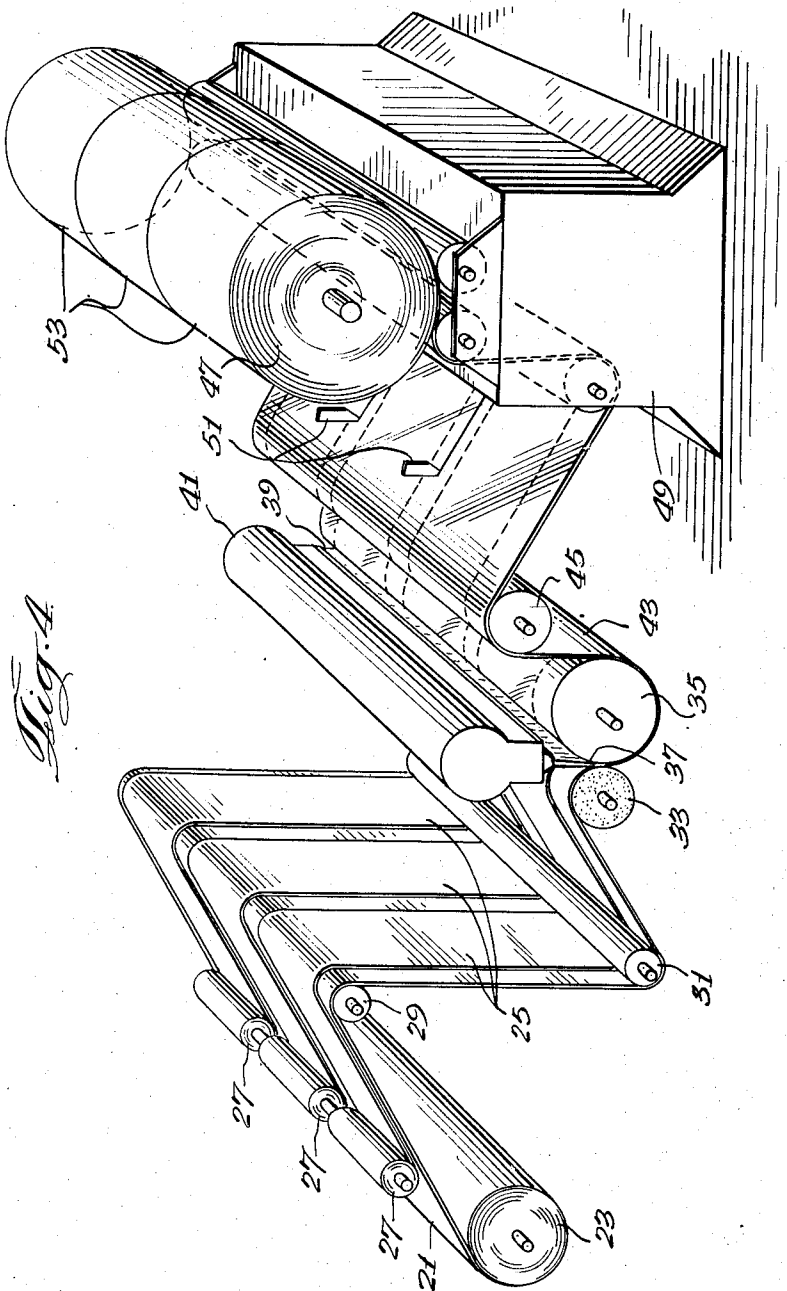
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2 Sheets-Sheet 2



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DISPOSABLE ABSORBENT PAD

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Application May 11, 1953, Serial No. 354,040

1 Claim. (Cl. 154—50)

The present invention relates generally to absorbent pads, and more particularly to disposable absorbent pads which are to be used once and then thrown away.

The main objects of the present invention are to provide a disposable absorbent pad which can be produced cheaply enough to permit its being discarded after a single use; to provide a disposable absorbent pad of light weight and small bulk which is possessed with a maximum absorbent capacity; to provide a disposable absorbent pad which includes a backing which is impervious to moisture; to provide a disposable absorbent pad which can be disposed of as by burning; to provide a disposable absorbent pad which is simple in construction and extremely efficient for its intended use; and to provide a novel method of forming a disposable absorbent pad of the type disclosed.

Although the present invention may be employed in the manufacture of various forms of disposable absorbent pads, such as diapers, incontinent pads, antiseptic bandages, etc., it is particularly suitable for use in the manufacture of a disposable handkerchief.

The medical profession has long been looking for a disposable handkerchief for tubercular patients which is capable of absorbing sputum and at the same time will not permit the sputum to pass through the handkerchief onto the hands of the user. A handkerchief of this type is desirable since the majority of persons who become tubercular gain their infection through inhalation of tubercle bacilli directly into the lungs. Bacilli may cling to dust, but probably most infection is caused by the inhalation of wet sputum coughed into the air, where it may float about in the form of globules for a considerable time and distance.

Tubercular persons are generally directed by their doctors to use multiple, disposable type, tissue sheets when coughing or sneezing in order to minimize the dissemination of air-borne tubercle bacilli and thereby reduce the probability of infection of others. The use of multiple tissue sheets is not entirely satisfactory because such sheets are generally difficult to handle, often permit sputum to run through the sheets onto the hands of the user, and generally split apart when subjected to large pressures.

There have been many attempts to develop a satisfactory tissue-type disposable handkerchief having a moisture impervious backing which would be suitable for use by tubercular persons, but without success. Such disposable handkerchiefs as have been made have been either too weak, too harsh, or non-absorbent. Also, the impervious backings of such handkerchiefs have been either papery, stiff, bulky, or uneconomical.

Further objects of the present invention are to provide a disposable absorbent handkerchief which is suitable for use by tubercular persons; to provide a disposable absorbent handkerchief which is soft and pliable so as to be conformable to the face of the user; to provide a disposable absorbent handkerchief which is simple in construction and extremely efficient for its in-

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tended use; and to provide a novel method for forming a disposable absorbent handkerchief having a moisture impervious backing for use in sanitoriums and hospitals.

Other objects and advantages of the invention will be understood by reference to the following specification and accompanying drawings which illustrate various aspects of the present invention.

In the drawings:

Figure 1 is a perspective view of one form of disposable absorbent pad formed in accordance with the present invention;

Figure 2 is an enlarged, end elevational view of a portion of the absorbent pad shown in Figure 1;

Figure 3 is an expanded perspective view of a portion of the absorbent pad shown in Figure 1;

Figure 4 is a diagrammatic illustration of apparatus which may be used for manufacturing the improved absorbent pad shown in Figures 1 to 3; and

Figure 5 is a perspective view of another form of absorbent pad made in accordance with the present invention.

A disposable absorbent pad formed in accordance with the present invention includes a plurality of superposed tissue sheets of progressively larger areas arranged in stepped fashion, symmetrically one above the other, whereby marginal areas of successive tissue sheets extend beyond opposite edges of the next smaller tissue sheet. A continuous moisture impervious plastic film co-extensive in area with the largest tissue sheet extends across and in contact with the outwardly facing surface of the smallest tissue sheet and the successive marginal areas of the larger tissue sheets, and is bonded at least at selected areas to each of the contacted tissue sheets.

Figures 1, 2 and 3 illustrate one form of disposable handkerchief 11 which is formed in accordance with the present invention. The disposable handkerchief 11 includes a pair of superposed, generally rectangular, absorbent tissue sheets 13 and 15. The lengths of the tissue sheets 13 and 15 are the same; however, the width of the tissue sheet 13 is somewhat greater than that of the tissue sheet 15. As shown in Figure 1, the tissue sheet 15 is symmetrically positioned on the tissue sheet 13 so that marginal side portions 17 of the tissue sheet 13 extend beyond the marginal side edges of the tissue sheet 15. The outwardly facing surface of the tissue sheet 15 and the similarly facing marginal surface areas 17 of the tissue sheet 13 have a film or coating 19 of moisture impervious plastic material thereon. The coating 19 on the marginal portions 17 of the tissue sheet 13 integrally connects with the coating on the surface of the tissue sheet 15, thus forming a continuous film of plastic material over one of the surfaces of the disposable handkerchief 11. Because of the continuity of the plastic coating 19, the tissue sheets 13 and 15 are maintained in fixed relationship relative to each other.

The tissue sheets 13 and 15 are generally formed from porous water formed webs of cellulose fibers. It should be understood, however, that these sheets may comprise any porous web material formed from either textile or nontextile fibers by weaving, knitting, carding, garnetting, cross-laying, air-laying, etc.

The coating 19 of moisture impervious plastic material should consist of a material capable of being temporarily softened, as by heating, or by the addition of a solvent and hardened, as by cooling or drying. The coating may be a polyethylene, polyvinylidene chloride (polymer or copolymer), polyvinyl alcohol, polyvinyl acetate, polyvinyl chloride acetate, polymeric amide, polyesters, cellulose acetate, or rubber hydrochloride coating. When the coating 19 is applied to the tissue sheets 13 and 15 in accordance with the present invention, individual fibers of the sheets 13 and 15 become

embedded in the plastic film 19 with the fibers extending into but not through the plastic film.

The fibers in the tissue sheets 13 and 15 are preferably in a substantially discontinuous phase so that in the areas which are coated, the fibers may be individually embedded in the plastic film 19. This provides a film or coating 19 having maximum flexibility while at the same time having increased body so that it has the handleability and usefulness of a substantially thicker film. It is important that the fibers of the tissue sheets 13 and 15 be embedded in the plastic film 19 without extending therethrough. In the latter connection, if the fibers extend through the film 19, the continuity of the film is broken and many of its desirable characteristics such as strength and moisture resistance are impaired.

For the purposes of this invention, the plastic film 19 is preferably between .15 and 1.5 mils in thickness. Films which are less than .15 mil in thickness lose their handleability and strength whereas films which are greater than 1.5 mils in thickness are generally too bulky and expensive for commercial application. For most commercially satisfactory embodiments, the film will be from .33 to .75 mil in thickness.

When the fibers are embedded in the plastic film 19, a firm bond is effected between the fibers and the film. Thus, the fibers are locked in and become an integral part of the film 19.

The sheets 13 and 15 used in a disposable absorbent pad such as a handkerchief preferably have a weight between about 2 and about 12 pounds per 3,000 square feet. It is often of advantage to use creped sheets 13 and 15 in order to present a maximum number of fibers for embedding in the plastic film 19. The crepe ratio of the sheets, i.e., the ratio of the length of the sheets prior to creping to the length of the sheets after creping is important in order to obtain the most effective embedding of the fibers into the film 19. This ratio should be between 1.05 and 2.3, and the creped sheets 13 and 15 preferably should have a drier basis weight (weight before creping) between about 4 and 11 pounds per 3,000 square feet. It should be understood that, for any given drier basis weight, the weight of the sheet after creping will vary directly with the crepe ratio and that this weight should not exceed about 12 pounds per 3,000 square feet for the best results when used as a disposable handkerchief.

The superposed tissue sheets 13 and 15 of the sanitary handkerchief 11 are unbonded, as shown in Figure 3, thereby providing maximum absorbency for the disposable handkerchief 11.

The sanitary disposable handkerchief 11 meets the strict requirements demanded by the medical profession. The handkerchief 11 is combustible and therefore may be easily disposed of by burning. The handkerchief 11 is soft and pliable and therefore readily conforms to the contour of a person's face. The plastic coating 19 on the rearward side of the handkerchief 11 lends considerable strength to the handkerchief and is impervious to moisture. The coating 19 does not materially increase the bulk of the product and serves to spread out any heavy fluid discharge of sputum over a large area of the handkerchief 11.

Disposable pads of the type illustrated in Figures 1, 2, and 3 may be formed by superposing a narrow strip of tissue centrally along the surface of a wider strip of tissue, pressing the entire upper surface of the superposed tissue strips, which surface includes the outwardly facing surface of the narrower tissue strip, into one face of a thin, viscous film of plastic material while simultaneously hardening the opposite face of the plastic film, and then cutting the coated superposed tissue strips at spaced intervals so as to form the individual disposable pads. As a result of the establishment of the differential viscosity characteristics between the faces of the plastic film, the fibers of the tissue strips may be embedded in

the viscous face of the film under a relatively high pressure without penetrating the opposite face of the plastic film. With some types of plastic materials, for example, polyvinylidene chloride polymers or co-polymers, the plastic film may be hardened after the attachment of the tissue strips.

Instead of superposing a single strip of tissue along the surface of a wider strip of tissue, a series of tissue strips may be superposed longitudinally along the surface of a very wide strip of tissue. The narrower tissue strips are laid parallel to the longitudinal axis of the wider strip of tissue and spaced apart from each other so as to provide side margins comprising portions of the wider tissue strip on either side of the narrower tissue strips. After the superposed tissue strips are coated with the plastic film the coated web structure is cut longitudinally between the narrower tissue strips so as to form coated product strips which may be cut transversely at spaced intervals to form the desired disposable pads.

A suitable apparatus for forming disposable handkerchiefs in accordance with the method outlined above is diagrammatically illustrated in Figure 4 of the drawings. As shown therein, a relatively wide strip of web or tissue 21 is drawn from a roll 23. Additional narrower strips of tissue 25 are drawn from rolls 27 so as to lie longitudinally on the upper surface of the tissue strip 21. The tissue strips 25 are spaced apart from each other as illustrated in Figure 4. The superposed tissue strips 21 and 25 pass over the stretch rolls 29 and 31 to a soft rubber roll 33. The soft rubber roll 33 is pressed against a smooth, chrome-surfaced roll 35 which is at a substantially lower temperature than the rubber roll 33, and these rolls 33 and 35 provide a nip 37 through which the superposed tissue strips 21 and 25 are drawn.

A film of plastic material 39 is provided by an extruder mechanism 41. The plastic film 39 enters the nip 37 between the rolls 33 and 35 in a viscous condition. In the nip 37, the upper face of the web structure formed by the superposed tissue strips 21 and 25 is forced into one face of the viscous plastic film 39 so as to form a coated web structure 43. During the passage of the tissue strips 21 and 25 between the rolls 33 and 35, the fibers of the tissue strips 21 and 25 which engage the plastic film 39 become partially embedded in the film, and, simultaneously, the other face of the plastic film 39 is cooled by the chrome roll 35 so as to prevent the fibers from extending through or penetrating this face.

The coated web structure 43 passes from the chrome roll 35 around a guide roll 45 to a series of take-up reels 47 carried on a conventional, two-drum type winder 49. Between the guide roll 45 and the take-up reels 47 are a series of spaced knives 51 whose cutting edges engage the coated web structure 43 between the tissue strips 25, thereby dividing the coated web structure 43 into a series of similar product strips 53 which are then each individually wound on a separate take-up reel 47. The individual product strips 51 may be formed into individual absorbent pads such as is disclosed in Figures 1 through 3 by cutting the product strips 53 laterally at spaced intervals.

Although the apparatus illustrated in Figure 4 shows the product strip 53 being drawn to and wound upon the take-up reels 47, it should be understood that the apparatus might alternatively be formed with a means for cutting the product strips laterally at spaced intervals. The cutting means which may be a reciprocating knife, a rotating cutter, etc. would be positioned beyond the knives 51 and would replace the winder 49 and take-up reels 47.

In satisfactory operation of the illustrated apparatus with polyethylene films of one and one-half mils or less in thickness, the rubber roll 33 is pressed against the chrome roll 35 so as to establish a maximum pressure in the nip 37 of between about 75 and 200 pounds per square inch and the chrome-surfaced roll 35 is maintained

at a temperature between about 50° F. to 140° F. to provide satisfactory hardening of the film surface and to take up the heat from the film product prior to its being removed from this roll, thereby preventing the film from sticking to the roll 35. The rubber roll 33 is operated at a temperature which is about 100° F. above that of the chrome roll 35.

The film 39 leaving the extruder mechanism 41 may be of the desired thickness or it may be stretched to the desired thickness while unsupported between the extruder mechanism 41 and nip 37 if the extruder mechanism provides a film 39 which is too thick.

As a specific example of a disposable absorbent pad 11 made on the above apparatus, the webs 21 and 25 each comprised a loose creped web of cellulosic tissue of basis weight on a bone-dry basis, of 10.3 pounds per ream of 3,000 square feet after creping. The webs had a crepe ratio of about 1.12 when passed over the rubber roll 33 and had an average thickness of about 2.5 mils. The plastic film 39, when applied to the surface of the superposed tissue strips, had a thickness of .60 mil and the coated web structure 43, when leaving the nip 37, had an average thickness of about 2.8 mils. The thickness of the webs 21 and 25 and of the coated web structure 43 measured by a standard Cady bulk tester.

Obviously, the disposable pad 11 can be modified in various ways without departing from the scope of the present invention. For example, the product may be sealed on all four edges. This sealing may be accomplished in various ways, such as by embossing or applying an adhesive to the open edges of the disposable pad 11. Either the narrow tissue sheet 15 or the wide tissue sheet 13 may consist of a multi-ply web (not shown) for increasing the absorbent capacity of the disposable pad. The disposable pad might also be modified by having an insert element (not shown) positioned between the wide and narrow tissue sheets which form the usual disposable pad. The insert element may be either a single absorbent sheet or a multi-ply absorbent web of a width less than the narrower width tissue sheet.

The disposable pad 11 may also be modified by bonding the plastic film 19 only at selected areas (not shown) to the surfaces of the superposed tissue sheets 13 and 15. For example, the plastic film 19 of the disposable pad 11 may be bonded primarily to the side marginal areas of the tissue sheets 13 and 15. Such selected bonding may be accomplished with apparatus such as that illustrated in Figure 4 by forming the rubber roll 33 with portions of reduced diameter so that the tissue webs 13 and 15 will be pressed into the film 19 primarily at the areas where the tissue webs 13 and 15 are contacted by the larger diameter portions of the rubber roll 33.

Still another form of disposable pad or handkerchief 55, made in accordance with the present invention, is illustrated in Figure 5. The pad 55 is formed of a pair of superposed tissue sheets 57 and 59, the sheet 59 being slightly smaller in each dimension than the sheet 57. The upwardly facing surface of the sheet 59 and the similarly facing portions of the sheet 57 which extend outwardly of the edges of the sheet 59 are coated with a suitable plastic film 61. The resultant handkerchief 55 is similar to the disposable handkerchief 11; however, it is sealed on all four edges. A handkerchief of this type could also be modified by having the sheets 57 and/or 59 of multi-ply web, by having an insert element between the sheets 57 and 59, or by bonding the film 61 only to selected areas of the tissue sheets 57 and 59.

A disposable absorbent pad may also be formed in accordance with the present invention with more than two superposed tissue sheets of different areas (not shown). The tissue sheets in such a pad are arranged

in stepped fashion symmetrically one above the other, whereby marginal areas of successive tissue sheets extend beyond opposite edges of the next smaller tissue sheet. The moisture impervious plastic film extends across and is bonded to the outwardly facing surface of the smallest tissue sheet and the successive marginal areas of the larger tissue sheets. This form of pad may embody the various modifications discussed above in connection with the absorbent pads 11 and 55.

Vinyl resin and polyester sheets are now available on the market in thicknesses under 1.5 mils. Such sheets might be heat-sealed (if the sheets are relatively thick, i.e., .75 mil) or adhesively attached to either the entire upper surface of or to selected portions of the upper surface of the superposed tissue strips so as to form disposable pads in accordance with the present invention.

I have described various forms of a novel disposable absorbent pad having a moisture impervious backing which is of light weight and small bulk and yet possessed of a large absorbent capacity. The pad is simple in construction, economical to manufacture, and easily disposable by means such as burning.

Various modifications of the structures of the disclosed disposable pads as well as variations in the disclosed method of forming a sanitary handkerchief may be resorted to without departing from the spirit or scope of the invention. Various features of the invention which are believed to be new are set forth in the appended claim.

I claim:

A disposable sanitary handkerchief comprising at least two superposed sheets of creped, absorbent, cellulosic tissue, said tissue having a basis weight in the range of from about 4 to 11 pounds per 3000 square feet (uncreped) and having a crepe ratio of from about 1.05 to 2.3, one of said sheets being of generally rectangular shape, the other of said sheets being similarly shaped and being symmetrically positioned on said one sheet, said other sheet being of a length coextensive with that of said one sheet and having a width somewhat greater than said one sheet, whereby said other sheet has marginal side areas which extend beyond the marginal side edges of said one sheet, and the outwardly facing surface of said one sheet and the similarly facing marginal side areas only of said other sheet being bonded throughout substantially their entire area to a continuous film of moisture-impervious, flexible thermoplastic material, said thermoplastic material being between about 0.15 and 1.5 mils in thickness, said bond being effected by fibers of said tissue sheets which are partially embedded in but do not extend through said thermoplastic material.

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