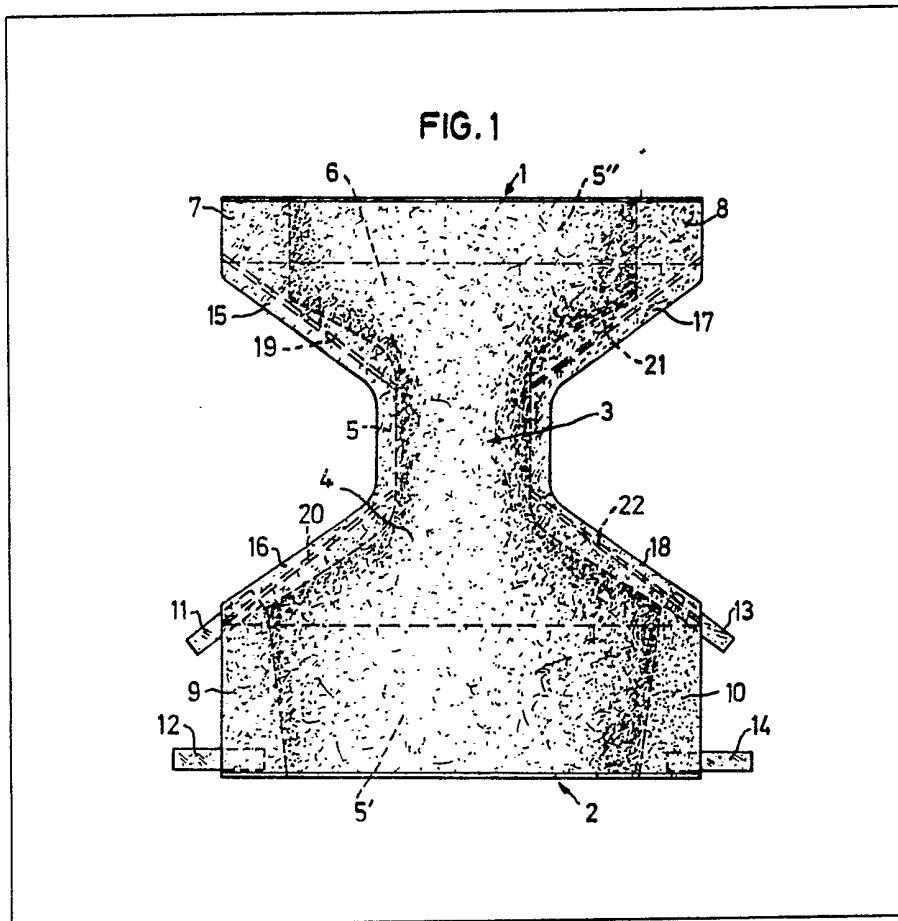


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(54) Disposable diaper

(57) A disposable diaper with two broad end portions (1, 2) and a narrower crotch portion (3) comprises an absorbent body (6) with an envelope (4, 5) extending along the sides of the diaper outside the absorbent body and forming fastening flaps (7-10) at the ends of the diaper on which flaps strips of tape (11-14) are fixed at one end (2) of the diaper. Elastic bands (19-22) are disposed in the envelope portions extending on either side of the absorbent body within the intermediate areas (15-18) between the end portions and the crotch portion. When the diaper is used, said bands hold the extending edges of the envelope in tight contact with the body of the user.



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FIG. 1

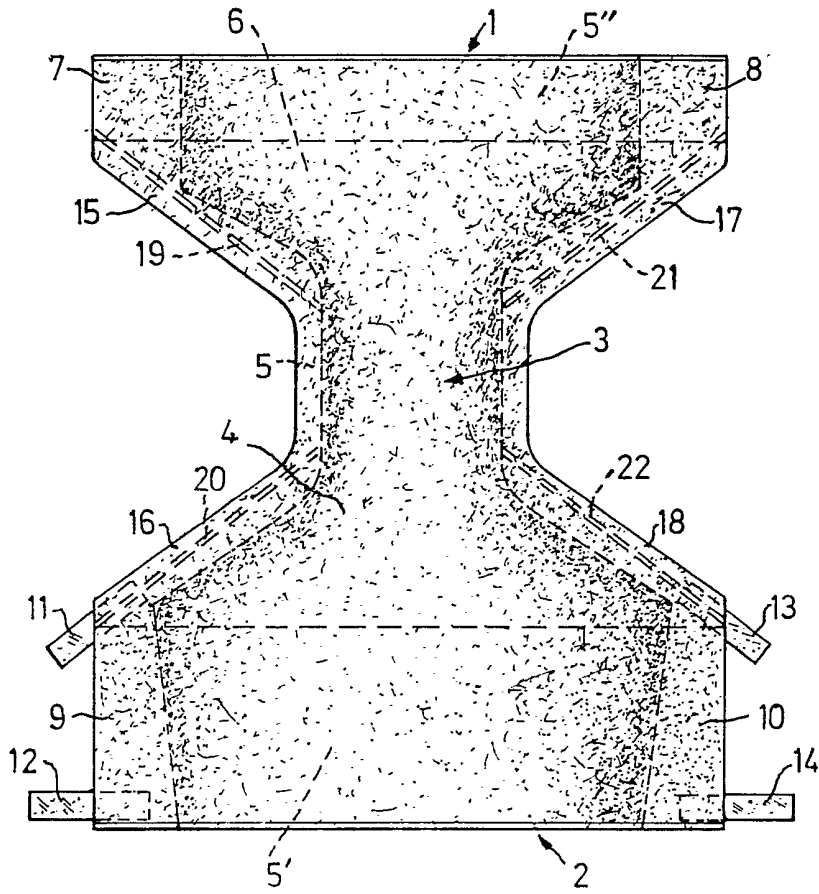


FIG. 2

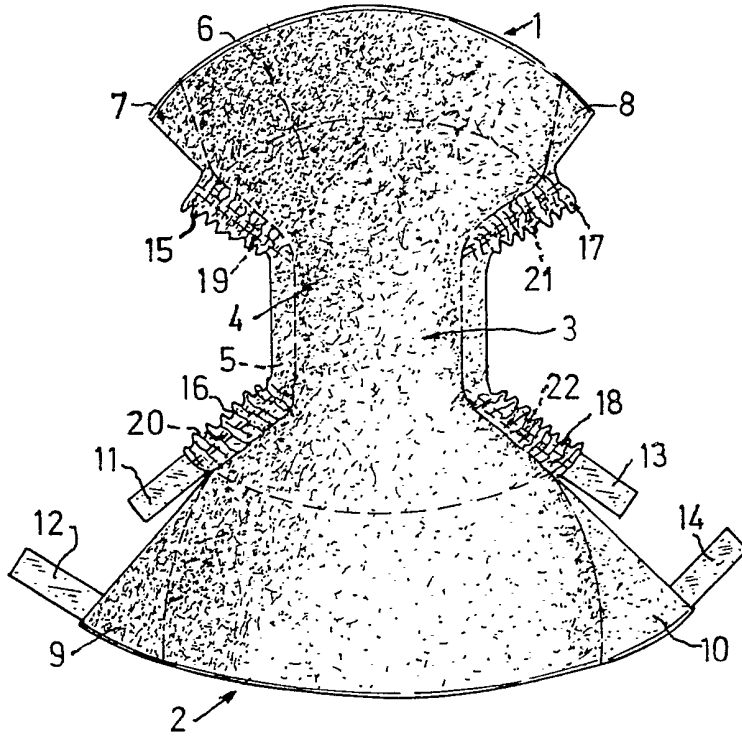
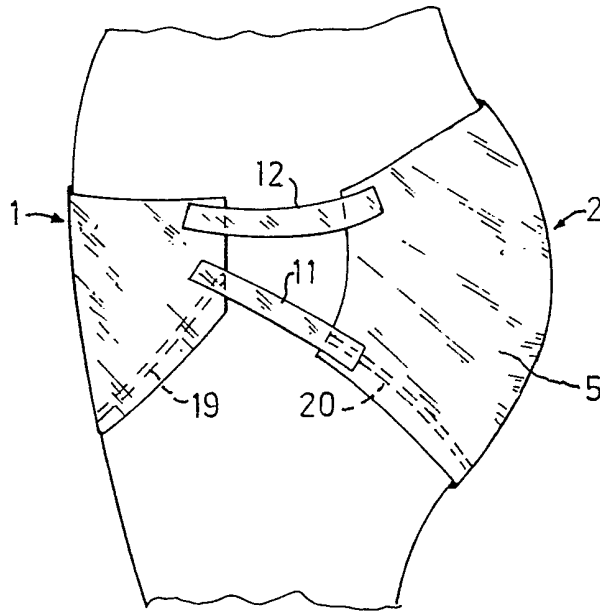


FIG. 3



## SPECIFICATION

**Disposable diaper**

5 The present invention relates to a disposable  
diaper of the type which comprises a first and  
a second end portion which are designed,  
when the diaper is used, to completely or  
partially envelop the trunk of the user, an  
10 intermediate crotch portion the width of which  
is substantially smaller than the width of the  
two end portions, a liquid-permeable first  
outer layer designed, when the diaper is used,  
to lie against the body of the user, a second  
15 outer layer of a liquid-impermeable material,  
and between these two outer layers a body of  
absorbent material, the two outer layers ex-  
tending somewhat outside the absorbent body  
along the lateral edges of the diaper and  
20 forming fastening flaps at the lateral edges of  
the end portion for fastening the diaper, with  
at least one strip of tape disposed on the  
respective fastening flap at at least one end  
portion of the diaper.

25 In such disposable diapers, the absorbent  
body is relatively stiff which up to now, in  
spite of the use of fastening tape, has made it  
difficult to make the diapers seal tightly  
around the user. As a result of the stiffness of  
30 the absorbent body, it is unavoidable that  
after a period of use of a diaper of this type, a  
gap is formed between the diaper and the  
waist of the user and/or between the diaper  
and the thighs of the user with subsequent  
35 risk of leakage.

Attempts have been made to eliminate  
these risks of leakage with the aid of elastic  
bands or the like, which are designed to hold  
the diaper in tightly sealing contact about the  
40 user. The elastic bands or the like have been  
applied along the crotch portions of the dia-  
pers. This is described in U.S. Patent Speci-  
fications 3 860 003 and in the European Patent  
Application 969.

45 The absorbent body in diapers made ac-  
cording to these two publications have how-  
ever considerably less width in the crotch area  
than in the rest of the diaper at the same time  
as it has the same thickness over the entire  
50 diaper. During use, this means that the absor-  
bent material in the crotch portion of the  
diaper will become rapidly wet, with the result  
being that the insufficient amount of absor-  
bent material in this area disintegrates and  
55 prevents liquid transfer to the unused portions  
of the absorbent body.

The known use of the elastic bands within  
the crotch area and spaced from the absor-  
bent body appears to reduce the risk of leak-  
60 age per se, but it has really significant disad-  
vantages of another type. The moisture which  
should be absorbed by the absorbent body is  
collected instead outside the same in a  
"bucket", which is formed by the two outer  
65 layers in the crotch portion of the diaper and

is limited laterally by the elastic bands. To  
prevent leakage of urine from the bucket, the  
elastic bands must be tensioned strongly  
against the skin of the user, which, especially  
70 since the skin is wet with urine, causes un-  
comfortable skin irritation at the point of con-  
tact of the bands, where there is also the risk  
of wearing through the bands. Because of the  
uncontrolled fluid collection in the "bucket",  
75 when the wearer of the diaper moves, for  
example changing his lying position, large  
amounts of fluid can quickly move from the  
crotch portion and easily be pressed out be-  
tween the diaper and the leg of the wearer  
80 and/or between the diaper and the waist of  
the wearer.

U.S. Patent Specification 4 050 462 sug-  
gests a diaper with elastic bands in the crotch  
portion. Contrary to what is the case in dia-  
85 pers made according to the two previously  
mentioned publications, the elastic bands are  
fixed as close to the absorbent body as is  
practically possible. As a result of this, the  
elastic bands pull the absorbent body together  
90 within the crotch area so that its thickness  
and thus its bulk is increased at this location.

In order for the increase in thickness in the  
crotch portion of the diaper to be sufficient, it  
is necessary however that there be a consider-  
95 able tension in the elastic bands, and this in  
turn gives rise to increased risk of skin chafing  
in the crotch of the wearer. This is especially  
the case when the diaper wearer moves or  
changes position and his leg movements give  
100 rise to an increase in the tension in the elastic  
bands.

It is evident from the preceding that in spite  
of several attempts and considerable effort, no  
disposable diaper with elastic bands has been  
105 produced which functions satisfactorily in all  
respects. Thus no overwhelmingly positive ef-  
fect is achieved by, in accordance with previ-  
ously known proposals, placing elastic bands  
on either side of the absorbent body within  
110 the crotch area in a disposable diaper of this  
type.

Therefore the purpose of the invention is to  
provide a disposable diaper of the type de-  
scribed by way of introduction which, in spite  
115 of the fact that it is provided with edge-  
sealing elastic bands or the like, does not  
have the demonstrated disadvantages of the  
previously proposed diapers of this type.

A diaper made according to the invention,  
120 which has proved in practice to fulfill this  
purpose in all essential respects, is primarily  
characterized in that the lateral limiting line  
for both the absorbent body and the two outer  
layers in the intermediate areas between the  
125 crotch portion and the two end portions follow  
curves which form an angle of 30-90°, pref-  
erably 60°, with an imaginary line in the  
longitudinal direction of the diaper, and that  
the elastic means are disposed along two lines  
130 of action which cross each other in the crotch

portion of the diaper and extend essentially parallel to and inside the limiting lines of the outer layers but outside the absorbent body and over at least the intermediate areas between the crotch portion and the end portions, said elastic means extending means extending to the lateral limiting lines of the end flaps and being joined to at least one of the two outer layers from these limiting lines and along the intermediate areas, whereby the outer layer portions, affected by the elastic means, in the intermediate areas on either side of the diaper form, together with the lateral edges of the crotch portion, a seal about the size of the user.

By virtue of the fact that the elastic bands or means have been placed in the intermediate areas between the crotch portion of the diaper and its two end portions, several advantages are obtained with a disposable diaper made according to the invention. In addition to improved seal and freedom from chafing in the crotch of the user, there is also a better elastic effect than when the elastic means are placed only in the crotch portion, which is relatively short. A diaper according to the invention will thus be more extensible and can be made in a single size to fit differently sized diaper wearers.

The elastic means can either be two elastic bands or the like which cross each other in the crotch portion of the diaper, or they can be four such bands, such extending from the lateral limiting line of a fastening flap and over the adjacent intermediate areas thereof up to the lateral edge of the absorbent body in the crotch portion.

In order to increase the adaptability of a diaper according to the invention to various-sized diaper wearers, in an especially suitable embodiment two relatively long strips of elastic tape are fixed to each of the fastening flaps at one end of the diaper. It is advantageous then that the tape strips placed closest to the crotch portion be joined to the ends of the elastic means or bands, which extend to the respective fastening flap.

To improve fluid dispersion and increase the fluid-absorbing capacity of the absorbent body, the body can be made thicker in the crotch portion than in the rest of the diaper.

To produce a complete seal at the ends of the diaper and the smallest possible wet contact surface against the body of the wearer, in an especially advantageous embodiment of a diaper according to the invention the liquid-impermeable outer layer is folded over the ends of the diaper, with the folded-over portions extending in over the side of the diaper intended for contact with the body of the wearer, at least essentially up to the outer ends of the elastic means. It is especially advantageous if the folded-over portions of the liquid-impermeable outer layer extend at least over the greater portion of the two end

portions.

Because the tape strips for fastening the diaper can be made relatively long and be elastic, together with the relatively long elastic means or bands in the intermediate areas between the crotch and end portions of the diaper, the advantage is achieved that a single diaper size can be made for urine-incontinent adults, with one size fitting all adults.

The invention will be described in more detail below with reference to an example shown in the accompanying drawings.

*Figure 1* in the drawings shows a plane view of the inner side of a diaper made according to the invention when stretched out,

*Figure 2* shows this diaper when not stretched out, and

*Figure 3* shows schematically how the diaper is fastened about the body of a wearer.

As can be seen from the drawings, a diaper made according to the invention comprises a first and a second end portion 1, 2 and an intermediate crotch portion 3, the width of which is substantially less than the widths of the two end portions. One end portion 1 is smaller than the other end portion 2 and is intended to be placed on the front of the diaper wearer. Furthermore, the diaper has a liquid-permeable first outer layer 4, which is designed to lie against the body of the wearer, a second outer layer 5 of a liquid-impermeable material and an intermediate layer 6 of absorbent material, said intermediate layer constituting the fluid-absorbing core or absorbent or absorbent body of the diaper and being somewhat thicker in the crotch portion 3 than in the rest of the diaper.

The two outer layers 4, 5 extend laterally somewhat outside the absorbent body 6 both within the crotch portion of the diaper and at the end portions, thereby forming together flaps 7-10 for fastening the diaper, which is done with strips of tape 11, 12 and 13, 14 applied to the rear end portion 2 of the diaper. At the two ends 1, 2, the fluid-impermeable outer layer 5 on the outside of the diaper is folded over the ends of the absorbent body 6 with portions 5', 5'' which extend at least over the major portion of the two diaper ends thus assuring good end sealing of the diaper, at the same time as it greatly limits the extent of the wet surface in contact with the wearer. The fact that the liquid-impermeable outer layer is folded in over the ends of the absorbent body 6 also means that a diaper according to the invention can absorb significantly larger amounts of urine and also ensures better fluid diffusion within the end portions, thus using the fluid absorbent capacity of the absorbent body better.

As can be seen especially well in *Fig. 1*, the lateral limiting lines for both the absorbent body 6 and the two outer layers within the

intermediate areas 15-18 between the crotch portion 3 and the two end portions 1, 2 form an angle of 30-90°, preferably 60°, with an imaginary line in the longitudinal direction of the diaper. Elastic means in the form of bands 19-22 are disposed along the edge portions of the outer layers 4, 5 outside the absorbent body, within the intermediate areas. The strips of tape 11-14 are also relatively long and elastic, and the two strips of tape 11, 13, which are closest to the crotch portion 3, are joined to the end portions of the elastic bands 18, 20 in alignment therewith, thus forming an extension of the elastic means of the diaper. The folded-over portions 5', 5'' of the liquid-impermeable layer 5 extend to advantage at least essentially up to the outer ends of the elastic bands 19-22, thus making a more secure seal as well as strengthening the anchoring of the elastic bands.

Fig. 2 shows a diaper according to the invention when not stretched out. When the diaper is applied, it is placed with its somewhat smaller end portion 1 at the front and its somewhat larger end portion 2 at the back of the diaper wearer. The diaper is then stretched around the wearer and is fixed with the aid of the attachment flaps 7-10 and the two upper strips of tape 12, 14. The elastic bands 19, 20 and 21, 22 are then pulled about the thighs of the wearer and are connected by means of the attachment flaps and the lower strips of tape 11, 13, thus achieving the configuration shown in Fig. 3. The edge portions of the two outer layers in the intermediate areas between the crotch and end portions of the diaper will thus form, together with the edge portions in the crotch of the diaper an effective fluid seal about the thighs of the wearer.

The fastening flaps 7-10 of the outer layers need not overlap when the diaper is in place. Rather, they can have a space between them as shown in Fig. 3.

By allowing a space between the fastening flaps and as a result of the elasticity of the strips of tape, a diaper of a certain size can be adapted to many different-sized wearers.

In this connection it should also be pointed out that adults, regardless of body size, normally discharge essentially the same amounts of urine, and therefore it is very advantageous that diapers for urine-incontinent adults can be manufactured in one size which fits essentially all adults.

The invention is not limited to the example described here and shown in the drawings. Rather, it can be modified in many ways within the scope of the claims.

Thus, for example, the elastic bands 19, 22 and 20, 21 in the example shown can be portions of the same band which extend unbroken over the diaper and cross each other in the crotch portion.

The lateral limiting lines for the outer layers

and the absorbent body at the intermediate areas between the crotch and end portions of the diaper need not form an angle of 60° with the longitudinal direction of the diaper, since good sealing characteristics are obtained if said angle is within the range 30-90°.

#### CLAIMS

1. Disposable diaper comprising a first and a second end portion which are intended, when the diaper is used, together to completely or partially envelop the trunk of the user, an intermediate crotch portion the width of which is substantially less than the widths of the two end portions, a liquid-permeable first outer layer designed, when the diaper is used, to lie against the body of the user, a second outer layer of a liquid-impermeable layer and a body of absorbent material placed between these two outer layers, the two outer layers extending somewhat outside the absorbent layer along the lateral edges of the diaper and forming fastening flaps at the lateral edges of the end portions for fastening the diaper with at least one strip of tape applied to the respective fastening flap at least at one end portion of the diaper, characterized in that the lateral limiting lines for both the absorbent body and the two outer layers in the intermediate areas between the crotch portion and the two end portions follow curves which form an angle of 30-90°, preferably 60°, with an imaginary line in the longitudinal direction of the diaper, and that elastic means are disposed along two lines of action which cross each other in the crotch portion of the diaper and extend essentially parallel to and inside the limiting lines of the outer layers but outside the absorbent body and over at least the intermediate areas between the crotch portion and the end portions, said elastic means extending to the lateral limiting lines of the end flaps and being joined to at least one of the two outer layers from these limiting lines and along the intermediate areas, whereby the outer layer portions affected by the elastic means, in the intermediate areas on either side of the diaper form, together with the lateral edges of the crotch portion, a seal about the thighs of the user.

2. Diaper according to claim 1, characterized in that the elastic means are two elastic bands or the like which cross each in the crotch portion of the diaper.

3. Diaper according to claim 1, characterized in that the elastic means are four elastic bands or the like, each extending from the lateral limiting line of a fastening flap and over its adjacent intermediate area up to the lateral edge of the absorbent body within the crotch portion.

4. Diaper according to claim 1, 2 or 3, characterized in that on each of the fastening flaps at one end portion of the diaper, two

relatively long, elastic strips of tape are fastened, whereby diapers of one size can be used by different-sized users.

5 Diaper according to claim 4, characterized in that the strips of tape closest to the crotch portion are joined to the ends of the elastic means which extend to the respective fastening flaps.

10 Diaper according to any one or more of the preceding claims, characterized in that the absorbent body is thicker within the crotch portion than in the rest of the diaper.

15 Diaper according to any one or more of the preceding claims, characterized in that the liquid-impermeable outer layer is folded over the ends of the absorbent body and extends with its folded-over portions in over the side of the diaper intended for contact with the body of the user at least essentially up to the  
20 outer ends of the elastic means.

25 Diaper according to claim 7, characterized in that the folded-over portions of the liquid-impermeable outer layer extend at least over the major portion of the two end portions.

9. Diaper substantially as hereinbefore described with reference to and as shown in the accompanying drawings.