

S P E C I F I C A T I O N

WEARING ARTICLE

TECHNICAL FIELD

[0001]

5 The present invention relates to wearing articles and more particularly to wearing articles such as pants, disposable diapers or incontinent briefs provided with a suction unit for suction of moisture such as urine.

RELATED ART

10 [0002]

 Conventionally, wearing articles such as pants provided on their side facing the wearer's body with a urine sensor are known, for example, from JP 2004-41697 A (PATENT DOCUMENT 1). According to the disclosure of PATENT DOCUMENT 1, a urine sensor
15 is sandwiched between a pair of diapers. The urine sensor includes a pair of electrodes extending in the longitudinal direction and, upon electrical connection of the paired electrodes via urine flowing between them, the urine sensor is turned on to detect occurrence of urination.

20 PRIOR ART DOCUMENT

PATENT DOCUMENT

[0003]

PATENT DOCUMENT 1: JP 2004-41697 A

DISCLOSURE OF THE INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0004]

The urine sensor disclosed in PATENT DOCUMENT 1 is designed
5 to be held between a pair of diapers and the urine sensor may
inevitably be displaced relatively to the diapers, for example,
in the course of putting the diapers on the wearer's body or
depending on the wearer's posture after the diapers have been
put on the wearer's body. Urination can be detected at a high
10 probability so far as the electrodes of the urine sensor are
aligned with the urination region of the wearer but the urination
detecting accuracy will be lowered if the urine sensor is displaced
and, in consequence, the urine sensor will be out of alignment
with the urination region of the wearer. However, even if the
15 urine sensor is displaced relatively to the urination region
of the wearer, it is impossible to check on the displacement
because the urine sensor is held between a pair of diapers.

[0005]

It is an object of the present invention on to provide the
20 wearing article allowing the accuracy of moisture detection by
a moisture detecting structure to be improved.

MEASURE TO SOLVE THE PROBLEM

[0006]

According to the present invention, there is provided a wearing article having a longitudinal direction and a transverse direction, comprising a side facing the wearer's body and a side facing the wearer's garment, a chassis having a front waist region, a rear waist region and a crotch region extending between the front and rear waist regions and a urine receiver adapted to receive bodily fluids discharged onto the chassis wherein the bodily fluids received by the urine receiver is sucked by a moisture sucking device out of the wearing article.

10 [0007]

The present invention is characterized in that the receiver is formed with an alignment check mark adapted to be visually recognized from the outside through the chassis.

[0008]

15 According to one embodiment of the present invention, the receiver has a longitudinal center line bisecting a length dimension in the transverse direction and the alignment check mark linearly extends in the longitudinal direction along the longitudinal center line.

20 [0009]

According to another embodiment of the present invention, the alignment check mark comprises a first segment linearly extending along the longitudinal center line and a second segment

having a length dimension in the transverse direction larger than that of the first segment.

[0010]

According to still another embodiment of the present
5 invention, at least in the crotch region, the receiver is visually
recognized through the chassis. At least in the crotch region,
the chassis is formed with windows through which the receiver
is exposed.

[0011]

10 According to yet another embodiment of the present invention,
at least in the crotch region, the chassis is formed with windows
through which the receiver is exposed.

[0012]

According to further another embodiment of the present
15 invention, the moisture detecting structure is formed so as to
extend along the longitudinal center line of the receiver.

EFFECT OF THE INVENTION

[0013]

According to the present invention, the alignment check
20 mark adapted to be visually recognized is formed on the side
of the receiver including the moisture detecting structure facing
the wearer's body. Such an arrangement makes it possible to
determine whether the receiver lies on a desired position or

not. If the receiver is determined to be displaced from the desired position, the receiver can be repositioned so that the moisture detecting structure may be aligned with the desired position and thereby the desired detection accuracy of the moisture
5 detecting structure may be assured.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

[FIG. 1] Fig. 1 is an overall diagram schematically illustrating the system according to a first embodiment of the
10 present invention.

[FIG. 2] Fig. 2 is a plan view of the urine receiver as viewed from its side facing the wearer's body.

[FIG. 3] Fig. 3 is a sectional view taken along line III-III in Fig. 2.

15 [FIG. 4] Fig. 4 is a sectional view taken along line IV-IV in Fig. 2.

[FIG. 5] Fig. 5 is a plan view of the urine receiver as viewed from its side facing the wearer's garment.

[FIG. 6] Fig. 6 is a perspective view of the urine receptacle.

20 [FIG. 7] Fig. 7 is a diagram similar to Fig. 1, schematically illustrating the system according to a second embodiment of the present invention.

IDENTIFICATION OF REFERENCE NUMERALS USED IN THE DRAWINGS

[0015]

- 601 wearing article
- 602 chassis
- 603 receiver
- 5 604 moisture sensor structure
- 605 urine receptacle (container)
- 606 mark
- 621 front waist region
- 622 rear waist region
- 10 623 crotch region
- 626 window
- 641 moisture sensor
- 661 first segment
- 662 second segment
- 15 600P suction pump

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016]

Details of the present invention will be more fully understood from the description exemplarily on the basis of pants
20 formed of a mesh sheet as a wearing article incorporated with the urine receiver.

[0017]

<First Embodiment>

Figs. 1 through 6 illustrate a first embodiment of the present invention.

Fig. 1 is an overall diagram schematically illustrating the wearing article 601 according to the present invention. According
5 to the present invention, a pants-type chassis 602 is formed therein with a urine receiver 603 to which a suction pump 600P as a suction unit via suction tube 631. The urine receiver 603 is electrically connected to the suction pump 600P which is adapted to be actuated by a control unit 600C when a moisture detecting
10 structure 604 incorporated in the urine receiver 603 detects occurrence of urination. Upon actuation of the suction pump 600P, the urine collected by the urine receiver 603 is sucked and then evacuated out from the chassis 602. In Fig. 1, the chassis 602 is indicated by imaginary lines.

15 [0018]

The chassis 602 comprises a front waist region 621, a rear waist region 622 and a crotch region 623 extending between these front and rear waist regions 621, 622 wherein these three regions are continuous in the longitudinal direction Y. The chassis 602
20 is formed of an elastic mesh sheet so that the chassis 602 may be elasticized in the longitudinal direction Y and in the transverse direction X which is orthogonal to the longitudinal direction Y. Particularly along peripheries of a waist-opening

624 and leg-openings 625, the elasticity is locally heightened to improve a fit of the chassis 602 to the wearer's waist and thighs, respectively.

In the chassis 602, the urine receiver 603 can be visually
5 recognized through the elastic mesh formed of elastic yarns.
[0019]

The receiver 603 extends in the longitudinal direction Y from the front waist region 621 to the rear waist region 622 and along a longitudinal center line A-A bisecting a dimension
10 in the transverse direction X. The receiver 603 is kept in close contact with the wearer's body under elastic force of the chassis 602 so that the receiver can be independently exchanged with the fresh one.

The receiver 603 includes the topsheet 632 lying on the
15 side facing the wearer's body and the backsheet 636 facing the wearer's garment wherein the backsheet 636 is formed with a linear alignment check mark 606 extending in the longitudinal direction Y.
[0020]

20 Fig. 2 is a plan view showing the receiver 603 in its developed state and as viewed from the side of the wearer's body. In Fig. 2, the receiver 603 is shown as partially cutaway and the chassis 602 is not shown for convenience of explanation. Fig. 3 is a sectional

view taken along line III-III in Fig. 2 and Fig. 4 is a sectional view taken along line IV-IV in Fig. 2. In Figs. 3 and 4, the respective sheets are shown as being spaced one from another for convenience of explanation but these sheets are normally joined together. Fig.

5 5 is a plan view showing the receiver 603 as viewed from the side of the wearer's garment.

[0021]

A pair of barrier cuffs 607, 607 against body waste is formed on the side of the topsheet 632 facing the wearer's body. The
10 barrier cuffs 607, 607 respectively include proximal edges 671, 671 lying on outer sides as viewed in the transverse direction X and free edges 672, 672 lying on the inner sides as viewed in the transverse direction X. The proximal edges 671, 671 extend outward in the transverse direction X beyond the topsheet 632
15 and joined to the backsheet 636. The free edges 672, 672 are adapted to be spaced upward from the topsheet 632 toward the wearer's body and provided with cuff elastic elements 673, 673 extending in the longitudinal direction Y and attached thereto under tension and in a contractible manner. Upon contraction
20 of the cuff elastic elements 673, 673, the free edges 672, 672 are spaced upward so as to stand on the topsheet 632 and thereby prevent urine from leaking outward in the transverse direction X. While the liquid-impervious barrier cuffs 607, 607 are

effective to prevent leakage of urine, it is possible to use, for example, a moisture-pervious fibrous nonwoven fabric from the viewpoint of permeability for moisture vapor.

[0022]

5 Between the top- and backsheets 632, 636, the moisture detecting structure 604 serving to detect occurrence of urination and the tray-shaped urine receptacle 605 lying on the side of the moisture detecting structure 604 facing the wearer's garment and adapted to receive discharged urine.

10 The moisture detecting structure 604 extends the front waist region 621 to the rear waist region 622 of the chassis 502. The moisture detecting structure 604 comprises a pair of moisture detecting sensors 641, a spacer 642 lying on the side of the moisture detecting sensors 641 facing the wearer's body, a filter
15 643 lying on the side of the spacer 642 facing the wearer's body and a cushion sheet 644 lying on the side of the moisture detecting sensors 641 facing the wearer's garment. Specifically, the moisture detecting sensors 641 is sandwiched between the spacer 642 and the cushion sheet 644 in the thickness direction and
20 thereby protected from any external shock.

[0023]

The moisture detecting sensors 641 are formed of a pair of electrodes 645, 645 spaced from each other in the transverse

direction X and these electrodes 645, 645 are obtained, for example,
by printing a thermoplastic synthetic film such as a polyethylene
film with conductive coating material. These electrodes 645,
645 extend in parallel to each other in the longitudinal direction
5 Y. The moisture detecting sensors 641 respectively have front
and rear ends 646, 647 extending in the transverse direction
X wherein the sensor's front end 646 extends through a slit 637
formed in the backsheet 636 to the side thereof facing the wearer's
garment. The slit 637 is formed on the side of the front waist
10 region 621. The sensor's front end 646 extending out through
the slit 637 is provided with a clip 648 via which the signal
from the moisture detecting sensors 641 is transmitted to the
control unit 600C.

More specifically, the moisture detecting sensors 641 are
15 turned on in response to electrical connection of the paired
electrodes 645, 645 effectuated by the present of urine
therebetween and the control unit 600C detects occurrence of
urination on the basis of this turned-on state.

[0024]

20 As a material for the spacer 642, a mesh sheet having high
air- and liquid-permeability and serves to keep the filter 643
and the moisture detecting sensors 641 spaced from each other
in the thickness direction. If the filter 643 in a wet condition

continues to be kept in contact with the moisture detecting sensors 641, the moisture detecting sensors 641 will be maintained in the turned-on state and may malfunction to detect urination even though no urination occurs. To prevent such malfunction, the filter 643 and the moisture detecting sensors 641 are kept spaced from each other. For the purpose of preventing such malfunction, use of the spacer is particularly effective since the spacer can effectively prevent these filter 643 and moisture detecting sensors 641 from being continuously kept in contact with each other.

[0025]

A dispersant sheet 649 and an air permeable-resistant sheet 650 are stacked on the side of the cushion sheet 644 facing the wearer's garment and the urine receptacle 605 is formed on the side of the air permeable-resistant sheet facing the wearer's garment. The air permeable-resistant sheet 650 and the urine receptacle 605 are joined together, for example, by adhesives.

The dispersant sheet 649 serves to disperse the discharged urine as quickly as possible and thereby to change the air permeable-resistant sheet 650 over a wide range thereof into a dry condition. As a material for the air permeable-resistant sheet 649, for example, a nonwoven fabric containing hydrophilic fibers such as rayon fibers may be used.

The air permeable-resistant sheet 650 is high in its liquid-permeability but low in its air permeability and, as a material for this sheet 650, for example, a nonwoven fabric modified to become hydrophilic may be used.

5 [0026]

The urine receptacle 605 is flexible and may be formed, for example, by a liquid-impervious soft elastic material such as soft polyethylene or silicon rubber. Fig. 6 is a perspective view of the urine receptacle 605. The urine receptacle 605
10 comprises a bottom 651, a peripheral wall 652 rising from the bottom 651 toward the side of the wearer's body, and a flange 653 extending outward from a top peripheral edge of the peripheral wall 652. The flange 653 is put in contact with the air permeable-resistant sheet 650 to form a space 654 within the
15 urine receptacle 605. The urine receptacle 605 is formed with a suction unit 655 functioning to collect the urine flowing thereinto and to evacuate this out of the urine receptacle 605. The suction unit 655 has a cylindrical shape and extends along a generally transverse middle zone of the receptacle 605 in the
20 longitudinal direction. On both sides of the suction unit 655, a plurality of protuberances 656 extend upward from the bottom 651 toward the wearer's body. These protuberances 656 serve to prevent the air permeable-resistant sheet 650 which should be

held in contact with the flange 653 from sagging down into the space 654.

[0027]

5 The suction unit 655 has one end 657 opening into the urine receptacle 605 and the other end 658 opening to the outside of the urine receptacle 605. The suction tube 631 is attached to the other end 658 of the suction unit 655 with a joint 659 and the suction tube 631 is connected to the suction pump 600P.

[0028]

10 The backsheet 636 lies on the side of the urine receiver 605 facing the wearer's garment. The backsheet 636 may be formed, for example, of a liquid-impervious fibrous nonwoven fabric. On the side of the backsheet 636 facing the wearer's garment, the alignment check mark 606 is formed (See Figs. 1 and 5). The
15 alignment check mark 606 comprises a linear first segment 661 extending in the longitudinal direction Y and a second segment 662 having a dimension in the transverse direction X larger than that of the first segment 661. The first segment 661 is formed so as to extend along and on the longitudinal center line A-A
20 and the second segment 662 has a generally elliptical shape partially overlapping the first segment 661 and defined on the side of the front waist region 621 about a transverse center line B-B bisecting a dimension of the receiver 603 in the

longitudinal direction Y. Such alignment check mark 606 may be formed, for example, by printing the backsheet 636 with appropriate ink or the other coating material.

[0029]

5 Now the manner in which the aforementioned arrangement operates in response to occurrence of urination will be described. Upon occurrence of urination, the urine discharged infiltrates into the topsheet 532. The barrier cuffs 507, 507 formed along the side edges 533, 533 of the topsheet prevent the urine from
10 leaking outward in the transverse direction X.

 The urine having infiltrated into the topsheet 632 quickly come in contact with the moisture detecting sensors 641 through the spacer 642 and the filter 643. When urine comes in contact with the paired moisture detecting sensors 641 so as to connect
15 these sensors with each other, these moisture detecting sensors 641 are turned on and transmit signals to the control unit 600C. In response to this signal, the control unit 600C actuates the suction pump 600P. Upon actuation of the suction pump 600P, the space 654 of the urine receptacle 605 is subjected to a suction
20 effect via a suction unit 655.

[0030]

 The urine having reached the moisture detecting sensor 641 infiltrates into the dispersant sheet 649 through the cushion

sheet 644. The urine having dispersant sheet 649 over a wide range simultaneously infiltrates into the air permeable-resistant sheet 650 which covers the opening of the urine receptacle 605 to define the space 654 therein. When the
5 space 654 is subjected to the suction effect by the suction pump 600P and the opening is covered with the air permeable-resistant sheet 650 wetted with urine, a negative pressure is generated within the space 654. As a result, the urine having infiltrated in the air permeable-resistant sheet 650 is sucked into the space
10 654 and the urine sucked into the space 654 is sucked through the suction tube 655 from the urine receptacle 605. In this way, immediately after occurrence of urination, the discharged urine can be quickly evacuated out of the wearing article.

[0031]

15 In the aforementioned wearing article, the receiver 603, eventually, the alignment check mark 606 formed on the receiver 603 can be visually recognized through the chassis 602. Therefore, it is possible for the care personnel to determine whether the receiver 603 is displaced or not on the basis of the position
20 of the alignment check mark 606 in the course of putting the wearing article 601 on the wearer's body. Occurrence of urination is detected by the moisture detecting sensor 641 when urine comes in contact with a pair of the electrodes 645, 645 so as to bridge

these paired electrodes 645, 645. In other words, the receiver 603 may be aligned with the intermediate position between the paired electrodes 645, 645 to achieve the highest detection accuracy.

5 [0032]

If the receiver 603 is displaced toward right or left side of the wearer, there is a possibility that the wearer's urine might be discharged outside the paired electrodes 645, 645. In this case, the paired electrodes 645, 645 are bridged by urine
10 only when the urine sufficiently increases to flow beyond one of the electrodes 645 to the other electrode 645. Consequently, it is impossible for a small quantity of urine to bridge the paired electrodes 645, 645 and to be detected. In contrast, if the wearer's urine is discharged just between the paired
15 electrodes 645, 645, it will be easy even for a small quantity of urine to bridge the paired electrodes 645, 645 and to turn them on so that such a small quantity of urine can be reliably detected. In this way, the highest detection accuracy is assured.

According to the present embodiment, the electrodes 645,
20 645 are formed on both sides of the longitudinal center line A-A and the alignment check mark 606 is formed along the longitudinal center line A-A. With such arrangement, the highest urine detection accuracy can be assured by putting the article

on the wearer's body so that the mark 606 may be aligned with the wearer's urethral region.

[0033]

The alignment check mark 606 comprises the first segment
5 661 and the second segment 662 so that the receiver 603 may be aligned with the wearer's urethral region particularly by using the second target as a guide. More specifically, the care personnel may place his or her finger on the second segment 662 and press the finger against the wearer's urethral region through the
10 receiver 603 to confirm the wearer's urethral region to align the second segment 662 of the mark 606 with the wearer's urethral region. The alignment check mark 606 is positioned between the paired electrodes 645, 645 and assures it to position the wearer's urethral region in alignment with the position just between the
15 paired electrodes 645, 645.

The first segment 661 of the mark 606 extends in the longitudinal direction Y and makes it possible to determine whether the receiver 603 is displaced or not over a wide range in the longitudinal direction Y. Considering that the urethral
20 region is generally located along the longitudinal center line of the wearer's body, for example, the first segment may be aligned with the navel in the front waist region 621 and may be aligned with the bottom cleavage in the rear waist region 622 to align

the intermediate region between the electrodes 645, 645 generally with the longitudinal center line of the wearer's body and thereby with the wearer's urethral region.

[0034]

5 As has previously been described, it is possible after the article has been put on the wearer's body to determine the relative position between the longitudinal center line A-A of the receiver 603 and the wearer's body. Therefore, it is possible to correct the displacement of the receiver 603, if it has been determined.

10 In this way, it is possible to avoid the problem that the moisture detecting sensor 641 of the moisture detecting structure 604 might be out of alignment with the wearer's urethral region and discharged urine could not be detected.

[0035]

15 While the wearer's article is provided with the moisture detecting sensor 641 serving for detection of urine according to the present embodiment, it is possible to incorporate, in addition to the moisture detecting sensor 641, a feces detecting sensor. While the mesh pants are used as the chassis 602 according

20 to the present embodiment, it is also possible to use widely used means such as disposable diapers or diaper covers as the chassis 602.

[0036]

While the alignment check mark 606 is formed only on the receiver 603 according to the present embodiment, it is possible to form the mark 606 on the chassis 602 also. In this case, the chassis 602 may be formed with the mark 606 extending in the longitudinal direction Y along the longitudinal center line of the chassis 602 and thereby the position of the chassis 602 can be adjusted so that the mark on the chassis 602 may be aligned with the mark on the receiver 603. Generally, the chassis 602 is scarcely displaced and the receiver 602 may be positioned in alignment with the mark of the chassis 602 to assure that the receiver 603 is positioned on the center line of the wearer's body.

[0037]

While the second segment 662 of the mark 606 is positioned on the side of the front waist region 621 relatively to the transverse center line B-B according to the present embodiment, it is not essential. For example, the position of the second segment 662 may be appropriately changed depending on various factors such as the size of the wearing article or the receiver 603 or gender of the wearer. It should be appreciated that the second segment is not essential to be formed and, in contrast, two or more second segments may be formed, if desired.

[0038]

<Second Embodiment>

Fig. 7 is a diagram illustrating a second embodiment of the present invention. As will be seen in Fig. 7, the chassis 602 is formed in the crotch region 623 with a window 626 in which
5 the receiver 603 is exposed. The window 626 allows the alignment check mark 606 formed on the receiver 603 to be visually recognized even if the chassis 602 is made of material having no see-through properties.

[0039]

10 It is also possible to form the chassis 602 as a whole by material having no see-through properties and to form the crotch region 623 only by materials having see-through properties. For example, the chassis 602 may be formed of an opaque nonwoven fabric made of thermoplastic synthetic resin and a desired region
15 of this nonwoven fabric may be heated under pressure to make it filmy and see-through. Alternatively, the chassis 602 may be formed of an opaque film made of thermoplastic synthetic resin containing inorganic fillers and a desired region of this film may be heated under pressure to smooth such region, to reduce
20 optical diffuse reflection and thereby to make the region see-through. In this case, this film may be laminated together with the nonwoven fabric to reinforce this film or to provide the outer surface with a fabric-like touch.

[0040]

Whatever the case may be, displacement of the receiver 603 relative to the wearer's urethral region can be checked and thereby it is assured that occurrence of urination can be detected.

C L A I M S

1 A wearing article having a longitudinal direction and a
transverse direction, comprising a side facing the wearer's body
5 and a side facing the wearer's garment, a chassis having a front
waist region, a rear waist region and a crotch region extending
between said front and rear waist regions in said longitudinal
direction and a receiver adapted to receive bodily fluids
discharged onto said chassis wherein said receiver includes a
10 moisture detecting structure serving to detect moisture, said
wearing article being characterized in that:

said receiver includes a topsheet lying on said side facing
the wearer's body and a backsheet lying on said side facing the
wearer's garment,

15 said moisture detecting structure is defined between said
topsheet and said backsheet and includes a pair of electrodes
which are formed on both sides of a longitudinal center line
bisecting a dimension in said transverse direction,

a front end of said pair of electrodes extends through
20 a slit formed in said backsheet to said side thereof facing the
wearer's garment,

said receiver is formed with an alignment check mark defined
between said pair of electrodes and adapted to be visually

recognized from the outside through said chassis.

2. The wearing article according to claim 1 wherein said alignment check mark is formed on said side of said backsheet
5 facing the wearer's garment.

3. The wearing article according to claim 1 or 2 wherein said alignment check mark linearly extends in said longitudinal direction along said longitudinal center line.

10

4. The wearing article according to any one of claims 1 through 3 wherein said alignment check mark comprises a first segment linearly extending along said longitudinal center line and a second segment having a length dimension in said transverse
15 direction larger than that of said first segment.

5. The wearing article according to any one of claims 1 through 4 wherein at least in said crotch region, said receiver is visually recognized through the chassis.

20

6. The wearing article according to any one of claims 1 through 5 wherein at least in said crotch region, said chassis is formed with windows through which said receiver is exposed.

7. The wearing article according to any one of claims 1 through 6 wherein said moisture detecting structure is formed so as to extend along said longitudinal center line of said receiver.

5 8. The wearing article according to any one of claims 1 through 7 wherein said receiver includes a urine receptacle formed between said topsheet and said backsheet, and said moisture detecting structure is lying between said topsheet and said urine receptacle.

10

9. The wearing article according to claim 8 wherein a rear end of said alignment check mark overlaps with a rear end of said urine receptacle in a thickness direction of said receiver.

15 10. The wearing article according to claim 8 or 9 wherein said alignment check mark comprises a first segment linearly extending along said longitudinal center line and a second segment having a length dimension in said transverse direction larger than that of said first segment, and

20 said second segment is formed on a position which does not overlap with said urine receptacle in a thickness direction of said receiver.

11. The wearing article according to claim 3 or 10 wherein said second segment is defined on a side of said front waist region about a transverse center line bisecting a dimension of said receiver in said longitudinal direction Y.