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**Title:** ALLERGY BARRIER FOR BEDDING

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**ABSTRACT**

An allergy barrier for bedding comprised of a sheet adapted to fit a wide variety of mattress depths by enclosing a top, all sides, and a portion of the bottom of a mattress. A pull string inserted within an outer hem of the sheet where the pull string is adapted to secure the sheet to the mattress. The pull string terminates outside of the outer hem. The sheet is made of a material having a mean average pore size of less than ten (10) microns.
Fig. 3
ALLERGY BARRIER FOR BEDDING

RELATED CASES

[0001] This application claims the priority of the provisional application Ser. No. 60/855,833 filed Aug. 4, 2006.

FIELD OF THE INVENTION

[0002] The present invention provides an allergy barrier for bedding that is air permeable and comfortable. This allergy barrier fits a wide variety of mattresses, yet can be easily fitted over the mattress by one person. The allergy barrier prevents the passage of dust mites or their fecal particles from the mattress through the allergy barrier.

BACKGROUND OF THE INVENTION

[0003] The principal generator of indoor allergens are microscopic creatures. These creatures are called dust mites. A dust mite ranges from 100 to 300 microns in size and cannot be seen with the naked eye. Dust mite excrement, which is a key component that causes allergic reactions, is even smaller. Dust mite excrement ranges in size down to 10 microns. Therefore, in order to provide an effective barrier to dust, dust mites, and their allergy-causing particles, a fabric or material must be capable of limiting the transmission of 10 micron particles through its surface.

[0004] Fabrics having a beneficial pore structure are discussed in U.S. Pat. No. 4,582,747 and more recently fabrics with a consistent pore structure are discussed in U.S. Pat. No. 6,277,770.

[0005] The dust mites found in the home generally have high concentrations in the bedroom. This is due in part to the favorably conditions found in bedding. Dust mites prefer warm, moist surroundings such as a mattress with someone laying on it. An average mattress is capable of supporting a colony of 2 million dust mites. Pillows also provide an excellent habitat for dust mites. Ten percent of the weight of a year old pillow can be comprised of dust mites and their feces. Sofa cushions, chair cushions, carpets, and other foam or fiber filled articles also provide a suitable habitat for dust mites. In effect, every home contains many areas where dust mites can thrive.

[0006] The presence of allergens from dust mites is a problem that increases as mattresses become older. During its lifetime, a typical dust mite produces up to 200 times its own body weight in excrement. This excrement contains the allergen that triggers asthma attacks and allergic reactions, including congestion, red eyes, sneezing, and headaches. This problem is exacerbated by the fact that it is difficult to remove dust mites from the materials in which they thrive. Mattresses are usually never washed.

[0007] Protective covers which encapsulate the mattress or pillow have been suggested, see U.S. Pat. No. 5,321,861 and US Publication number 2002/0148047. These protective covers usually have two problems. First, they are difficult for one person to put on or take off a mattress alone. Second, they usually have an ineffective closure that may allow mites or their fecal particle through. For example, U.S. Pat. No. 5,321,861 advises covering the zipper attachment means with adhesive tape to block allergen pass-through.

[0008] There is a need for an improved mattress encasement which is an effective shield against dust mites and their fecal particulates, but it also needs to be easy to apply to a mattress by one person. The zippered encasement systems which have been offered so far are difficult to get on or off a mattress especially with larger and heavier mattress sizes. This might induce people to launder them less often or never, which lessens the effectiveness of the encasement.

SUMMARY OF THE INVENTION

[0009] An allergy barrier for bedding comprised of a sheet adapted to fit a wide variety of mattress depths by enclosing a top, all sides, and a portion of the bottom of a mattress. A pull string inserted within an outer hem of the sheet where the pull string is adapted to secure the sheet to the mattress. The pull string terminates outside of the outer hem. The sheet is made of a material having a mean average pore size of less than ten (10) microns.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The foregoing will become more readily apparent by referring to the following detailed description and the appended drawings in which:

[0011] FIG. 1 is a bottom view of the allergy barrier;
[0012] FIG. 2 is another bottom view of the allergy barrier showing the details of the hem;
[0013] FIG. 2A shows the detail of the outer hem, drawstring ends and locking device;
[0014] FIG. 2B shows the detail of the tack point;
[0015] FIG. 2C shows an exposed view of the drawstring within the outer hem and the tack point;
[0016] FIG. 3 is a bottom view of an alternative allergy barrier;
[0017] FIG. 4 is another bottom view of the alternative allergy barrier showing the details of the hem;
[0018] FIG. 4A shows the detail of the outer hem, drawstring ends and locking device;
[0019] FIG. 4B shows the detail of the tack point; and
[0020] FIG. 4C shows an exposed view of the drawstring within the outer hem and the tack point.

DETAILED DESCRIPTION OF THE INVENTION

[0021] An allergy barrier 10, FIG. 1, for bedding comprised of a sheet 20 adapted to fit a wide variety of mattress depths by enclosing a top, all sides, and a portion of the bottom of a mattress. A pull string 30, FIG. 2C, inserted within an outer hem 40 of the sheet where the pull string 30 is adapted to secure the sheet 20 to the mattress. The pull string 30 terminates outside of the outer hem 40 of the sheet 20, as shown in FIG. 2A. The sheet 20 is made of a material having a mean average pore size of less than ten (10) microns. This material is selected from the group of a microporous film, a tightly woven fabric, a nonwoven fabric, a non-porous fabric or a laminate of one or more of these types of fabrics.

[0022] This allergy barrier in one embodiment uses a sheet 20 having no exposed enclosure means on the top and all sides of the allergy barrier. The enclosure means consists of the group of: zippers, snaps, hook and loop type closure means, buttons, fasteners, connectors, latches, hooks or combinations thereof.

[0023] The allergy barrier in one embodiment has no elastic band fitted to the sheet 20, or in the outer hem 40.

[0024] The sheet 20, of the allergy barrier 10, comes in four basic types used for mattress encasings: plastic film, plastic laminates, nonwovens and tightly woven fabrics.
Each of these materials are capable of providing a barrier which has a mean pore size of less than 10 microns.

Plastic film sheets use a non-porous plastic film. Examples of such a film include but are not limited to vinyl, polyethylene, polypropylene, polybutylene, polyurethane, polyethylene terephthalate and combinations thereof. These are the oldest type, and one of the first things that come to mind when most people think of an allergy encasing. They are inexpensive, and effective, yet uncomfortable—stiff, noisy and they do not breathe. Vinyl is a film which is not porous, which has been used as a mattress cover. As a result, many people will remove these vinyl encasings after a few days of use.

Laminating sheets are the next generation of encasings. These are still widely used, and are the type generally available at places like allergy supply companies. When these laminates were first developed, they represented a great advance over the plastic film barriers. They are made by laminating (fusing) a plastic-type microporous membrane to a fabric. These microporous plastics are selected from the group of: polyurethane, polyethylene, polybutylene, polypropylene and combinations thereof. The membrane side is against the pillow or mattress, and the fabric side is exposed, beneath the bed linens. The person is therefore not sleeping on the plastic directly, making a laminate sheet slightly more comfortable than a plastic film barrier.

Laminates have several problems, however, that have prevented a broader acceptance. The first problem with laminates is that, although less rigid than vinyl, they do have some stiffness to them. This is especially noticeable on the pillow. Second, they are not only allergen-proof—they are airtight. Although some laminates have been advertised as being “breathable”, this refers only to the fact that in some of the better quality laminates a minute amount of water vapor can pass through the membrane. Although this represents an advance over vinyl, the fact is that no laminate is truly breathable; that is, none of them allow the passage of air. Once an encasing of this type is zipped closed around a pillow, the pillow becomes like a balloon, with air trapped in the encasing. And if you force the air out by pressing on the pillow, the air—and probably dust mite allergens along with it—escapes through the zipper.

The third and perhaps biggest problem with some of the older laminate encasings is that they often delaminate, that is, with repeated washing and drying a plastic membrane may separate from the fabric onto which it had been coated, making the encasing unusable.

Non-woven sheets are another type of encasing material. An older example of a non-woven fabric is felt. This is made by gluing short pieces of yarn to each other to form a mass. This material is in contrast to a woven fabric where the long warp and weft yarns are alternately woven above and below each other on a loom. Newer non-woven microfiber fabrics are effective and inexpensive allergen barriers, but some are not made to withstand machine washing, and generally they do not have the strength or durability of a tightly woven encasings.

Tightly woven materials made of synthetic or a combination of synthetic and natural fibers are found to be very effective as an allergy barrier. With the proper tight weave it is possible to produce a polyester fabric which has a mean pore size of less than 10 microns and in one embodiment even less than 8 micron mean pore size.

Microfiber woven sheets are a type of allergen-barrier encasing which belong to the group of tightly woven materials. They are constructed from microfiber fabrics: new high-tech fabrics made of fibers so thin and yarns so tightly woven that there is no space between the weave of the yarns large enough to allow the passage of allergen molecules. Since the microfiber fabric is itself acting as a filter that prevents allergen escape, encasings made from a true microfiber do not need the membrane. Without the membrane they are truly breathable, that is, both air and water vapor can pass freely through the fabric, even though allergen cannot. They are therefore extremely comfortable, actually imperceptible in use. The microfibers may be synthetic or a blend of synthetic and natural fibers. Through the use of microfibers it is possible to obtain a fabric with a mean pore size of less than 10 microns. In one embodiment it is possible to achieve a mean pore size of less than 6 microns and in another embodiment a mean pore size of less than 4 microns.

The allergy barrier of the invention is adapted to easily be applied or removed by a single person. It is surprising that one cover for each of the mattress sizes can be easily handled by a single person. With the advent of pillow top mattresses and overstuffed mattresses it is often difficult for a single person to put a fitted sheet on these types of mattresses. The standard mattress sizes are usually referred to as: twin, long twin, double, full, queen, king, and California king. The problem with most mattress encasements currently being offered is that they are difficult to be handled by a single person, and therefore they tend not to be laundered regularly. If the mattress encasements are not laundered at regular intervals dust might colonies can grow on the surface of the mattress encasement.

The allergy barrier in another embodiment may further comprise a locking device 50 for the pull string, as shown in FIG. 2A. The locking device may be a spring loaded catch.

The allergy barrier in one of the embodiments of the invention has an outer hem 40 of the sheet 20 that forms substantially a rectangle on the under side of the mattress. It will be noted that because the invention uses fabric that the sides of the rectangle may not be straight or the corners formed at right angles, in fact the corners will probably appear rounded, FIG. 2, but here we are speaking of the shape in general. The rectangle has four corners and four sides and further has eight pull string ends, two in each corner, FIG. 2A. The two pull string ends 35 in each corner are adapted for securely gathering material of the sheet in each corner, where pull string ends terminate outside said outer hem.

The allergy barrier 10 in one embodiment has two pull string ends 35, FIG. 2A. In another embodiment the allergy barrier 10 has two pull string ends 35 in each corner FIG. 2, In one embodiment a locking device 50 for each pair of pull string ends 35, FIG. 2, is provided. The locking device 50 may be a spring loaded catch of conventional design. The allergy barrier having two pull string ends in each corner may further comprising a tack point 60, FIG. 2B, located about center of each side of said outer hem. The tack point keeps the pull string 30 in a predetermined position, FIG. 2, so that it cannot be pulled completely through the channel of the outer hem 40.

In one embodiment of the invention the allergy barrier 100, FIG. 3, is further fitted with a reinforced orifice
adapted to journal the pull string ends 35 as shown in greater detail in FIG. 4A. The reinforced orifice can be plastic, metal, fiber stitched reinforcing or a combination thereof. With metal reinforcement it is important to choose a metal which will not rust or oxidize when subjected to repeated launderings. It is possible to use a metal which is coated to avoid this problem. If stitched it is possible to use multiple stitches for strength or a higher strength thread or yarn. In this embodiment it is also possible to include a tack point 60, FIGS. 4B and 4C, on the outer hem 40, to keep the pull string 30 in place. In addition a locking device 50, FIG. 4A can also be fitted to the pull string ends 35, so that the pull string can be cinched without tying.

[0037] In another embodiment of the invention the allergy barrier 10, FIG. 1, for bedding comprised of a sheet 20 adapted to fit a wide variety of mattress depths by enclosing a top, all sides, and a portion of the bottom of a mattress. A pull string 30 inserted within an outer hem 40, FIG. 2C, of the sheet where the pull string 30 is adapted to secure the sheet 20 to the mattress. The pull string 30 terminates outside of the outer hem 40 of the sheet 20, FIG. 2A. The sheet 20 is made of a non-porous material. This non-porous material is a plastic film made of either polyethylene, polypropylene or co polymers thereof or vinyl.

[0038] This allergy barrier of the non-porous material in one embodiment uses a sheet 20 having no exposed enclosure means on the top and all sides of the allergy barrier. The enclosure means consists of the group of: zippers, snaps, hook and loop type closure means, buttons, fasteners, connectors, latches, hooks or combinations thereof.

What is claimed is:

1. An allergy barrier for bedding comprising:
   a sheet adapted to fit a wide variety of mattress depths by enclosing a top, all sides, and a portion of the bottom of a mattress;
   a pull string inserted within an outer hem of said sheet;
   said pull string being adapted to secure said sheet to said mattress;
   said pull string terminating outside of said outer hem; and
   said sheet being made of a material having a mean average pore size of less than ten (10) microns.

2. The allergy barrier of claim 1 where said sheet having no exposed enclosure means on said top and all sides.

3. The allergy barrier of claim 1 where enclosure means consists of the group of zippers, snaps, hook and loop type closure means, buttons, fasteners, connectors, latches, hooks or combinations thereof.

4. The allergy barrier of claim 1 where said sheet being adapted to easily be applied or removed by a single person.

5. The allergy barrier of claim 1 further comprising a locking device for said pull string.

6. The allergy barrier of claim 1 where said outer hem of said sheet forms substantially a rectangle on the under side of said mattress, said rectangle having four corners, and four sides and further comprising eight pull string ends, two in each corner adapted for securely gathering material of said sheet in each corner, where pull string ends terminate outside said outer hem.

7. The allergy barrier of claim 6 further comprising a locking device for each pair of pull string ends.

8. The allergy barrier of claim 6 further comprising a tack point located about center of each side of said outer hem.

9. The allergy barrier of claim 6 further comprising a reinforced orifice in each corner adapted to journal said pull string ends.

10. The allergy barrier of claim 1 where said material is selected from the group consisting of: a microporous film; a tightly woven fabric; a nonwoven fabric; a woven fabric; or a laminate of one or more of the above listed fabrics or films.

11. An allergy barrier for bedding comprising:
   a sheet adapted to fit a wide variety of mattress depths by enclosing a top, all sides, and a portion of the bottom of a mattress;
   said sheet being made of a material having a mean average pore size of less than ten (10) microns;
   said material being selected from the group consisting of:
   a microporous film; a tightly woven fabric; a nonwoven fabric; a woven fabric; or a laminate of one or more of the above listed fabrics or films;
   where said sheet has no exposed enclosure means on said top and all sides;
   a plurality of pull strings inserted within an outer hem of said sheet;
   said pull strings being adapted to secure said sheet to said mattress;
   where said outer hem of said sheet forms substantially a rectangle on an under side of said mattress, said rectangle having four corners, and four sides and further comprising eight pull string ends, two in each corner adapted for securely gathering material of said sheet in each corner;
   where pull string ends terminate outside said outer hem; and
   said sheet being made of a material that is not porous.

12. The allergy barrier of claim 1 where said sheet having no exposed enclosure means on said top and all sides.

13. The allergy barrier of claim 1 further comprising a tack point located about center of each side of said outer hem.

14. The allergy barrier of claim 11 where said sheet being adapted to easily be applied or removed by a single person.

15. The allergy barrier of claim 11 further comprising a locking device for said pull string.

16. The allergy barrier of claim 11 where said sheet is made of a tightly knit synthetic fabric.

17. The allergy barrier of claim 11 where said reinforced orifice is selected from the group consisting of: plastic, metal, fiber stitched reinforcing or a combination thereof.

18. An allergy barrier for bedding comprising:
   a sheet adapted to fit a wide variety of mattress depths by enclosing a top, all sides, and a portion of the bottom of a standard mattress;
   a pull string inserted within an outer hem of said sheet;
   said pull string being adapted to secure said sheet to said mattress; and
   said sheet being made of a material that is not porous.

19. The allergy barrier of claim 9 where said sheet having no exposed enclosure means on said top and all sides.

20. The allergy barrier of claim 9 where said sheet being adapted to easily be applied or removed by a single person.