

A ROLL OF DISPOSABLE PIECES OF HYGIENIC PAPER

FIELD AND BACKGROUND OF THE INVENTION

The present invention relates to rolls of disposable pieces of hygienic paper, and in particular to rolls of toilet paper and paper towels that enable removal of a piece of paper for use without needing to tear the paper prior to use. Paper is used in many forms for single-time hygienic purposes. There is a wide variety of packaging of paper towels, ranging from a simple roll of paper towels to high-quality moist towelettes in packages that enable removal of a single towelette at a time. These packages are inefficient when they do not prevent unwanted unraveling of the towelettes or are expensive. However, the packaging of hygienic paper in a long strip of paper rolled onto itself with perforated lines at regular intervals in order to facilitate tearing off pieces of paper for wiping, which are disposed of after use, is the most common type of hygienic paper currently available

. Such rolls of paper can be found in dispensers of suitable sizes such as toilet paper dispensers in toilet rooms and paper towel dispensers near washbowls. Many efforts have been made to develop paper of superior qualities, which are sometimes even contradictory, such as paper strength, dimensions, softness, wiping and absorption capacity, and manufacturing cost.

Fig. 1 is a schematic illustration of the prior art that illustrates a roll of toilet paper **100** in a standard toilet paper dispenser **101**. The roll of paper **100** includes toilet paper **10**, which has perforated lines **11** at regular intervals that enable tearing at the desired places. The toilet paper is a long continuous strip, long in comparison to its width, rolled onto an inner tube **12**. As shown in the illustration, the inner tube **12** is disposed on an arm **13** with a round section, which is part of the toilet paper dispenser **101**. When pulling the toilet paper in order to expose a segment of paper to be torn, this arrangement enables the toilet paper roll **100** to rotate around the arm **13**.

Fig. 2 is a schematic illustration of the prior art that illustrates a continuous hygienic toilet paper roll **102** above which a cutting apparatus **20** is disposed. This roll can perforated lines across its width however this is not necessary seeing as the tearing of the paper **14** is performed by suitably pulling the paper **14** strongly towards the cutting apparatus, which is usually of a heavy and rigid metallic material that could include a cutting knife or saw teeth **21** as shown in the illustration.

In many cases, the standard packaging of continuous paper in a roll of which pieces can be torn for use is inconvenient or even impossible to use. Seeing as the tearing of the paper in

the desired places requires use of both hands, use of such rolls by disabled individuals who are unable to use one hand or individuals with disability with regard to combined use of both hands for this purpose.

5 Use of such rolls of continuous paper is also problematic for observant Jews, seeing as according to the laws of Judaism, tearing of paper is prohibited during the Shabbat and on holidays.

There is thus a widely recognized need for, and it would be highly advantageous to have, a roll of hygienic paper with the same qualities that have made prior art toilet paper popular and with an additional quality that enables removal of pieces of hygienic paper from it with
10 only one hand without any need for tearing.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide rolls of hygienic paper that enable removal of pieces of hygienic paper with one hand and without any need for tearing.
15 According to the present invention, the roll of hygienic paper includes pre-cut pieces of paper in adequate sizes for their purpose. These pieces of paper are packed around an inner tube when each piece of paper overlaps with the next piece above it (namely, at a relative distance with regard to the central axis of the inner tube, that is approximately the thickness of the hygienic paper) as necessary to enable packaging of all the pieces and removing them in turn,
20 one after the other.

According to further features in preferred embodiments of the invention, a roll of disposable pieces of hygienic paper from which pieces of hygienic paper can be removed with one hand without any need for tearing or cutting the hygienic paper including: (a) an inner tube of a rigid material with a symmetry axis and external radius and height dimensions such that
25 the section of the inner tube perpendicular to the symmetry axis is substantially round for the entire height; and (b) at least two pieces of hygienic paper with a surface and thickness, width, and length dimensions deployed so as to synchronously rotate the roll of disposable pieces of hygienic paper when one the piece of hygienic paper is removed, with the pieces of hygienic paper packed onto the inner tube and onto themselves such that: (i) each of the pieces of
30 hygienic paper has a cylindrical shape, with a spiral section around the symmetry axis of the inner tube; (ii) all of the pieces of hygienic paper are substantially packed to be fully overlapping in the width dimension of each piece; and (iii) each of the pieces of hygienic paper

is substantially packed to be partially overlapping in its length dimension with regard to each adjacent piece of hygienic paper that it is in contact with.

According to still further features in the described preferred embodiments the pieces of hygienic paper are packed by outward rolling.

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According to another embodiment of the invention a dispenser, for holding and using a roll of disposable pieces of hygienic paper, from which pieces of hygienic paper can be removed, using one hand without any need for tearing or cutting the hygienic paper including:

10 (a) a roll of disposable pieces of hygienic paper, the roll of disposable pieces of hygienic paper including: (i) an inner tube of a rigid material with a symmetry axis and external radius and height dimensions such that the section of the inner tube perpendicular to the symmetry axis is substantially round for the entire height; and (ii) at least two pieces of hygienic paper with a surface and thickness, width, and length dimensions deployed so as to synchronously
15 rotate the roll of disposable pieces of hygienic paper when one piece of hygienic paper is removed, with the pieces of hygienic paper packed onto the inner tube and onto themselves such that: (A) each of the pieces of hygienic paper has a cylindrical shape, with a spiral section around the symmetry axis of the inner tube; (B) all of the pieces of hygienic paper are substantially packed to be fully overlapping in the width dimension of each piece; and (C) each
20 of the pieces of hygienic paper is substantially packed to be partially overlapping in its length dimension with regard to each adjacent piece of hygienic paper that it is in contact with; (b) an arm for carrying the roll of disposable pieces of hygienic paper with the inner tube assembled to the carrying arm whose dimensions enable the roll of disposable pieces of hygienic paper to have rotational movement; and (c) a means of exerting an adduction force on at least part of the
25 surface of the piece of hygienic paper that is in an external location on the roll of disposable pieces of hygienic paper.

According to still further features in the described preferred embodiments the dispenser, for holding and using a roll of disposable pieces of hygienic paper, from which pieces of hygienic paper can be removed using one hand without any need for tearing or cutting the
30 hygienic paper, wherein the means of exerting an adduction force is a cylindrical weight capable of rotating around an axis.

According to still further features in the described preferred embodiments the dispenser, for holding and using a roll of disposable pieces of hygienic paper, from which pieces of

hygienic paper can be removed using one hand without any need for tearing or cutting the hygienic paper, wherein the means of exerting an adduction force is a spring exerting force on the carrying arm.

According to the present invention, a method is provided, including the steps of: (a) providing a roll of disposable pieces of hygienic paper, the roll of disposable pieces of hygienic paper including: (i) an inner tube of a rigid material with a symmetry axis and external radius and height dimensions such that the section of the inner tube perpendicular to the symmetry axis is substantially round for the entire height; and (ii) at least two pieces of hygienic paper with a surface and thickness, width, and length dimensions deployed so as to synchronously rotate the roll of disposable pieces of hygienic paper when one piece of hygienic paper is removed, with the pieces of hygienic paper packed onto the inner tube and onto themselves such that; (A) each of the pieces of hygienic paper has a cylindrical shape, with a spiral section around the symmetry axis of the inner tube; (B) all of the pieces of hygienic paper are substantially packed to be fully overlapping in the width dimension of each piece; and (C) each of the pieces of hygienic paper is substantially packed to be partially overlapping in its length dimension with regard to each adjacent piece of hygienic paper that it is in contact with; (b) installing the roll of disposable pieces of hygienic paper in a dispenser, for holding and using a roll of hygienic paper; and (c) removing a piece of paper from the roll of disposable pieces of hygienic paper.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is herein described, by way of example only, with reference to the accompanying drawings, wherein:

Fig. 1 is a schematic illustration of the prior art showing a roll of toilet paper in a standard toilet paper dispenser.

Fig. 2 is a schematic illustration of the prior art showing a continuous roll of hygienic paper above which a cutting apparatus is disposed.

Fig. 3a and Fig 3b are schematic illustrations of stages in the process of production of a roll of disposable pieces of hygienic paper according to a preferred embodiment of the present invention.

Figure 4 is a schematic illustration of several external pieces of a roll of disposable pieces of hygienic paper according to a preferred embodiment of the present invention.

Figure 5 is a schematic illustration of the forces and moments exerted upon the roll of disposable pieces of hygienic paper.

Figure 6 is a schematic illustration of the roll of disposable pieces of hygienic paper according to a preferred embodiment of the present invention, which is disposed in a standard toilet paper dispenser that is equipped with a spring designated to increase the normal force exerted on the roll.

Figure 7 is a schematic illustration of the roll of disposable pieces of hygienic paper according to a preferred embodiment of the present invention, upon which a weight is placed to increase the normal force.

Figure 8 is a schematic illustration of the roll of disposable pieces of hygienic paper according to a preferred embodiment of the present invention, packaged by inward rolling.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is a roll of hygienic paper and, in particular a roll containing pieces of disposable hygienic paper that enables removal of pieces of paper from it without any need for tearing or cutting the paper. Tests conducted on this roll of hygienic paper according to preferred embodiments of the present invention show that the invention meets the need it comes to serve well.

The principles and operation of a roll of disposable pieces of hygienic paper according to the present invention may be better understood with reference to the drawings and the accompanying descriptions.

Before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and the arrangement of the components set forth in the following description or illustrated in the drawings.

Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. The materials, dimensions, methods, and examples provided herein are illustrative only and are not intended to be limiting.

Referring now to the drawings, figure 3a is a schematic illustration of a stage in the production of the roll of disposable pieces of hygienic paper according to a preferred embodiment of the present invention. Pieces of paper **21** are placed overlapping one another on a plane and are then gathered by rolling onto an inner tube **12** into one package as a roll **200**, as

will be described in the following. The inner tube **12** can be of various materials including cardboard. Each piece of paper **21** that is designated to serve as hygienic paper has geometric dimensions. The thickness is marked by the letter "t", the width by the letter "d", and the length by the letter "a". The length of the overlapping section is marked by the letter "b", with the overlapping of the paper **21** consistent over all of its width "d". The length of the end of the paper **21** without overlapping is marked by the letter "c" and can later serve for a convenient grasp between the users fingers for being pulled out of the roll **200**. The piece of paper **21** can have one or more lines of perforations **11** similar to those shown in Fig. 1, or can be without any perforations at all. As shown in this illustration, the pieces of paper are placed one above the other with a deviation of "c" between each piece so that the farther the piece is from the inner tube **12**, the higher the layer that it is in. This arrangement results in the packaging of the roll of disposable pieces of hygienic paper **200** as described in all items of this application including the specifications and claims as inward rolling packaging.

Figure 3b is a schematic illustration of a stage in the production of the roll of disposable pieces of hygienic paper according to another preferred embodiment of the present invention. This stage is identical to the one described in figure 3a other than the arrangement of pieces of paper **21**, such that the farther the piece is from the inner tube **12**, the lower the layer that it is in. This arrangement results in the packaging of the roll of pieces of disposable hygienic paper **200** as described in all items of this application including the specifications and claims as outward rolling packaging.

Both inward rolling packaging and outward rolling packaging can have an approximately equal measure of overlapping throughout the entire roll **200** or can have differing measures of overlapping according to the location of each piece of paper **21** in the roll **200**. The size of the pieces of paper **21** and the measures of overlapping between pieces can be determined according to testing.

Figure 4 is a schematic illustration of several external pieces of paper **21** in a roll of disposable pieces of hygienic paper **200** according to a preferred embodiment of the present invention in inward rolling packaging. The direction of gravity force is marked in the illustration by the letter "g". As shown in the illustration, the piece of paper **21c** has an almost circular shape when viewed from the side, when a piece of paper **21a** is wound one layer above it, and a piece of paper **21b** is wound in an additional layer. A certain segment of each of the pieces **21a** and **21b** is hung over the roll **200** on planes according to gravity force. The length of this segment depends upon the momentary rotational angle of the roll **200** with regard to its

central axis. The next piece of paper in turn to be removed is the one whose hanging length is the longest, and in the instance shown in this illustration, is the piece of paper **21a**. Pulling the next piece of paper in turn approximately downwards or in any other suitable direction causes a rotational movement of the roll **200** around its axis until the next piece of paper in turn is removed.

Figure 5 is a schematic illustration of a side view of the forces and moments exerted on the roll of disposable pieces of hygienic paper **200**, on a perpendicular plane with regard to the axis. When pulling force **T** is exerted on the next piece of paper in turn **21a**, moment force **M** is generated, causing the rotational movement of the roll **200** around its central axis through point **O**. The magnitude of moment **M** depends on the magnitude of force **T** and the external radius **r** of the roll. This is on the condition that there is no sliding motion between the piece of paper **21a** and the roll **200**. In order to prevent this sliding motion, piece of paper **21a** needs to exert the essential moment **M** on the roll **200** that will rotate it in a velocity correspondent to the pulling motion. There are several kinds of forces which paper **21a** can exert on the roll **200**, including electrostatic forces and adhesive forces, however the main force is the friction force whose size depends on the friction coefficient and the normal force, perpendicular to the roll **200** at all points of contact with the paper **21a**. The illustration shows normal force **F_n** exerted on the point at Alpha angle with regard to the gravitational axis. Normal forces of various sizes can be exerted in the entire area of contact between the next piece of paper in turn to be pulled **21a** and the roll **200**, and all are effectively exerted at radius **r** from the center of the roll **200**. The integration of these forces determines the size of moment **M**. A primary source of normal forces is the gravity of the pieces of paper **21** themselves.

Figure 6 is a schematic illustration of the roll of disposable pieces of hygienic paper **200** according to a preferred embodiment of the present invention, disposed in a standard toilet paper dispenser **101** equipped with a spring **15** designated to increase the normal force exerted on the roll **200**. The spring **15** is connected between the base of the dispenser **14** and the arm **13**, as described in Fig. 1. The advantage of increasing the normal force exerted on the roll **200**, is that it enables use of hygienic pieces of paper **21** of length **a**, as shown in Figs. 3a and 3b, which is smaller than what would be required in the case of a smaller normal force.

Figure 7 is a schematic illustration of the roll of disposable pieces of hygienic paper **200** according to a preferred embodiment of the present invention, on which a weight is disposed to increase the normal force. The benefit of adding the weight is similar to the explanation on the normal force exerted on the roll **200** given with regard to Fig. 6. In the present case, the weight

is closer to the location at which the pieces of paper are disconnected from the roll **200**, enabling use of even shorter pieces of hygienic paper **21**. The weight that is described in this illustration is cylindrical **16** on an axis whose distance from the central axis of the roll **200** is determined according to the changing radius of the roll **200**, a radius that decreases in size as the pieces of paper **21** are consumed. The capability of the cylindrical weight **16** to rotate around its axis enables better rotational movement of the roll **200** without the weight interfering with the movement of the pieces of paper **21**.

The apparatuses for increasing the normal force as described in Figs. 6 and 7 are good for both inward rolling packaging and outward rolling packaging.

Figure 8 is a schematic illustration of the roll of disposable pieces of hygienic paper **200**, according to a preferred embodiment of the present invention, in inward rolling packaging. The illustration shows the piece of hygienic paper in turn **23** that will be the first piece to be pulled and removed from the roll **200** and the second piece **24** following in turn.

As shown in testing, both inward rolling and outward rolling packaging have the qualities necessary to fill the need that the present invention comes to fulfill. Simple testing can determine all of the qualities of the roll of disposable pieces of hygienic paper, including the geometrical dimensions of each piece of paper, the geometrical dimensions of the roll of disposable pieces of hygienic paper, and the materials and textures composing the pieces of hygienic paper.

Although the invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. Accordingly, it is intended to embrace all such alternatives, modifications and variations that fall within the spirit and broad scope of the appended claims.

WHAT IS CLAIMED IS:

1. A roll of disposable pieces of hygienic paper from which pieces of hygienic paper can be removed with one hand without any need for tearing or cutting said hygienic paper comprising:

(a) an inner tube of a rigid material with a symmetry axis and external radius and height dimensions such that the section of the inner tube perpendicular to said symmetry axis is substantially round for the entire said height; and

(b) at least two pieces of hygienic paper with a surface and thickness, width, and length dimensions deployed so as to synchronously rotate said roll of disposable pieces of hygienic paper when one of said piece of hygienic paper is removed, with said pieces of hygienic paper packed onto said inner tube and onto themselves such that:

(i) each of said piece of hygienic paper has a cylindrical shape, with a spiral section around the symmetry axis of the inner tube;

(ii) all of said pieces of hygienic paper are substantially packed to be fully overlapping in said width dimension of each piece; and

(iii) each of said pieces of hygienic paper is substantially packed to be partially overlapping in its length dimension with regard to each adjacent said piece of hygienic paper that it is in contact with.

2. The roll of disposable pieces of hygienic paper of claim 1, wherein said pieces of hygienic paper are packed by outward rolling.

3. The roll of disposable pieces of hygienic paper of claim 1, wherein said pieces of hygienic paper are packed by inward rolling.

4. A dispenser, for holding and using a roll of disposable pieces of hygienic paper, from which pieces of hygienic paper can be removed using one hand without any need for tearing or cutting said hygienic paper comprising:

(a) a roll of disposable pieces of hygienic paper said roll of disposable pieces of hygienic paper including:

(i) an inner tube of a rigid material with a symmetry axis and external radius and height dimensions such that the section of said inner tube perpendicular to said symmetry axis is substantially round for the entire height; and

(ii) at least two pieces of hygienic paper with a surface and thickness, width, and length dimensions deployed so as to synchronously rotate said roll of disposable pieces of hygienic paper when one of said piece of hygienic paper is removed, with said pieces of hygienic paper packed onto said inner tube and onto themselves such that:

(A) each of said pieces of hygienic paper has a cylindrical shape, with a spiral section around said symmetry axis of said inner tube;

(B) all of said pieces of hygienic paper are substantially packed to be fully overlapping in said width dimension of each piece; and

(C) each of said pieces of hygienic paper is substantially packed to be partially overlapping in its length dimension with regard to each adjacent said piece of hygienic paper that it is in contact with;

(b) an arm for carrying said roll of disposable pieces of hygienic paper with said inner tube assembled to said carrying arm whose dimensions enable said roll of disposable pieces of hygienic paper to have rotational movement; and

(c) a means of exerting an adduction force on at least part of said surface of said piece of hygienic paper that is in an external location on said roll of disposable pieces of hygienic paper.

5. The dispenser, for holding and using a roll of disposable pieces of hygienic paper, from which pieces of hygienic paper can be removed using one hand without any need for tearing or cutting said hygienic paper, wherein said means of exerting an adduction force is a cylindrical weight capable of rotating around an axis.

6. The dispenser, for holding and using a roll of disposable pieces of hygienic paper, from which pieces of hygienic paper can be removed using one hand without any need for tearing or cutting said hygienic paper, wherein said means of exerting an adduction force is a spring exerting force on said carrying arm.

7. A method of using a roll of disposable pieces of hygienic paper, comprising the steps of:

(a) providing a roll of disposable pieces of hygienic paper said roll of disposable pieces of hygienic paper including:

(i) an inner tube of a rigid material with a symmetry axis and external radius and height dimensions such that the section of said inner tube perpendicular to said symmetry axis is substantially round for the entire height; and

(ii) at least two pieces of hygienic paper with a surface and thickness, width, and length dimensions deployed so as to synchronously rotate said roll of disposable pieces of hygienic paper when one said piece of hygienic paper is removed, with said pieces of hygienic paper packed onto said inner tube and onto themselves such that;

(A) each of said pieces of hygienic paper has a cylindrical shape, with a spiral section around said symmetry axis of said inner tube;

(B) all of said pieces of hygienic paper are substantially packed to be fully overlapping in said width dimension of each piece; and

(C) each of said pieces of hygienic paper is substantially packed to be partially overlapping in its length dimension with regard to each adjacent of said piece of hygienic paper that it is in contact with;

(b) installing said roll of disposable pieces of hygienic paper in a dispenser, for holding and using a roll of hygienic paper; and

(c) removing a piece of paper from said roll of disposable pieces of hygienic paper.