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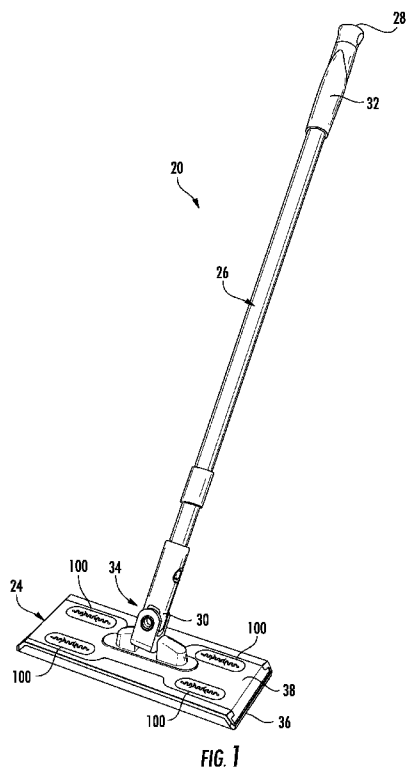
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(54) Title: CLEANING IMPLEMENT WITH IMPROVED SHEET GRIPPING MECHANISMS

(57) Abstract: In one aspect, a cleaning implement may generally include a handle, a cleaning head coupled to the handle and a sheet gripping mechanism at least partially received within a portion of the cleaning head. The sheet gripping mechanism may include a gripper face and a sidewall extending outwardly from the gripper face. The sidewall and the gripper face may at least partially define a cavity extending within the sheet gripping mechanism. In addition, a slit may be defined through the gripper face so that portions of the gripper face are separately moveable with respect to one another upon application of a force directed downwardly into the cavity. Moreover, the sheet gripping mechanism may further include a plurality of buttresses extending within the cavity between the gripper face and the sidewall.





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CLEANING IMPLEMENT WITH IMPROVED SHEET GRIPPING MECHANISMS

FIELD OF THE INVENTION

The present subject matter relates generally to cleaning implements and, more particularly, to improved sheet gripping mechanisms for use within a cleaning implement.

BACKGROUND OF THE INVENTION

Various cleaning devices are known that utilize replaceable, throw-away sheets (e.g., wet or dry sheets) to clean floors and/or other surfaces. For example, mopping and/or sweeping devices are known that include a handle and a head coupled to the handle that is configured to hold a sheet along its underside for cleaning the floor or other surface as the head is moved along such surface. In particular, the head typically includes four sheet attachment structures positioned along the topside of the head. Each sheet attachment structure includes an outer face having a slit defined therethrough for receiving a portion of the sheet to be attached to the head. For instance, the sheet is typically attached to the head by positioning the sheet along the underside of the head with the outer edges or sides of the sheet being folded up onto the topside of the head so that the sheet at least partially overlaps the sheet attachment structures. The user of the cleaning device then presses his/her finger downward against the sheet at each location of one of the sheet attachment structures so that a portion of the sheet is pushed through each slit and held in place by the outer face of the sheet attachment structure, thereby allowing the sheet to be maintained on the head during use of the cleaning device.

To achieve the gripping strength necessary to hold the sheet in place, the outer face of each sheet attachment structure is typically formed from a relatively stiff material. While such material is capable of properly retaining the sheet during use of the associated cleaning device, the stiff material often makes it difficult or inconvenient to attach the sheet to the head of the device. For example, to properly push a portion of the sheet through the slit defined in each outer face, a portion of the user's finger must also be pushed through the slit. Unfortunately, due to the stiffness of the material forming the outer face, it is often difficult to physically poke the sheet through the slit. In addition, even when the user is able to push a portion of the sheet through the slit, the stiffness of the outer face often results in the user's finger getting stuck within the interior of the sheet attachment device or otherwise results in pain or discomfort for the user.

As such, a need currently exists for a cleaning implement having improved sheet gripping mechanisms that allow for proper retention of the sheet during use of the cleaning implement

while also addressing one or more of the issues associated with the attachment of the sheet onto the cleaning implement's head.

BRIEF DESCRIPTION OF THE INVENTION

5 Aspects and advantages of the invention will be set forth in part in the following description, or may be obvious from the description, or may be learned through practice of the invention.

In one aspect, the present subject matter is directed to a cleaning implement including a handle, a cleaning head coupled to the handle and a sheet gripping mechanism at least partially
10 received within a portion of the cleaning head. The sheet gripping mechanism may include a gripper face and a sidewall extending outwardly from the gripper face. The sidewall and the gripper face may at least partially define a cavity extending within the sheet gripping mechanism. In addition, a slit may be defined through the gripper face so that portions of the gripper face are separately moveable with respect to one another upon application of a force directed downwardly into the cavity. Moreover, the
15 sheet gripping mechanism may further include a plurality of buttresses extending within the cavity between the gripper face and the sidewall.

In another aspect, the present subject matter is directed to a cleaning implement including a handle, a cleaning head coupled to the handle and a sheet gripping mechanism at least partially received within a portion of the cleaning head. The sheet gripping mechanism may include a
20 gripper face and a sidewall extending outwardly from the gripper face. The sidewall and the gripper face may at least partially define a cavity extending within the sheet gripping mechanism. In addition, a slit may be defined through the gripper face so that portions of the gripper face are separately moveable with respect to one another upon application of a force directed downwardly into the cavity. Moreover, the gripper face may be formed from a polymeric material having a Shore A hardness
25 ranging from about 20 to about 90.

These and other features, aspects and advantages of the present invention will become better understood with reference to the following description and appended claims. The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and, together with the description, serve to explain the principles of the
30 invention.

BRIEF DESCRIPTION OF THE DRAWINGS

A full and enabling disclosure of the present invention, directed to one of ordinary skill in the art, is set forth in the specification, which makes reference to the appended figures, in which:

FIG. 1 illustrates a perspective view of one embodiment of a cleaning implement configured in accordance with aspects of the present subject matter;

FIG. 2 illustrates another perspective view of the cleaning implement shown in FIG. 1, particularly illustrating a sheet attached to a cleaning head of the implement;

FIG. 3 illustrates a partial perspective view of the cleaning implement shown in FIG. 1, particularly illustrating sheet gripping mechanisms of the cleaning implement exploded away from the implement's cleaning head;

FIG. 4 illustrates a top perspective view of one embodiment of a sheet gripping mechanism suitable for use with the cleaning implement shown in FIGS. 1-3 in accordance with aspects of the present subject matter;

FIG. 5 illustrates a bottom perspective view of the sheet gripping mechanism shown in FIG. 4;

FIG. 6 illustrates a top view of the sheet gripping mechanism shown in FIG. 4;

FIG. 7 illustrates a bottom view of the sheet gripping mechanism shown in FIG. 4;

FIG. 8 illustrates a close-up view of a portion of the sheet gripping mechanism shown in FIG. 5, particularly illustrating a perspective view of a buttress of the sheet gripping mechanism;

FIG. 9 illustrates a cross-sectional view of the sheet gripping mechanism shown in FIG. 6 taken about line 9-9, particularly illustrating the sheet gripping mechanism with a sheet received therein; and

FIG. 10 illustrates a bottom perspective view of another embodiment of a sheet gripping mechanism in accordance with aspects of the present subject matter, particularly illustrating the sheet gripping mechanism including buttresses positioned along both sides of the mechanism's inner cavity.

DETAILED DESCRIPTION OF THE INVENTION

Reference now will be made in detail to embodiments of the invention, one or more examples of which are illustrated in the drawings. Each example is provided by way of explanation of the invention, not limitation of the invention. In fact, it will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the scope or spirit of the invention. For instance, features illustrated or described as part of one embodiment can be used with another embodiment to yield a still further embodiment. Thus, it is intended that the present invention covers such modifications and variations as come within the scope of the appended claims and their equivalents.

In general, the present subject matter is directed to a cleaning implement having improved sheet gripping mechanisms for retaining a sheet (e.g., a wet or dry sheet) using to clean a surface. Specifically, in several embodiments, the cleaning implement may include a handle and a cleaning head pivotally coupled to the handle, with the cleaning head being configured to receive or support a plurality of sheet gripping mechanisms. For example, in one embodiment, the head may define four cavities or sockets positioned at locations adjacent to its corners for receiving four corresponding sheet gripping mechanisms.

In several embodiments, each sheet gripping mechanism may generally include a gripper face and a sidewall extending outwardly from the gripper face such that an internal cavity is at least partially defined by the sidewall and the gripper face. In addition, a slit may be defined through the gripper face to allow a portion of the sheet desired to be attached to the cleaning head to be pressed or inserted through the gripper face and into the internal cavity. As will be described below, the gripper face may, in several embodiments, be formed from a relatively flexible polymeric material. As a result, the ease at which a user may insert a portion of the sheet through the gripper face may be greatly increased. Moreover, due to the use of a relatively flexible material, the likelihood of the user's finger becoming stuck, injured or otherwise uncomfortably squeezed during the sheet insertion process may be reduced significantly.

Additionally, to provide effective sheet retention, the sheet gripping mechanism may also include a plurality of buttresses extending within the internal cavity between an inner surface of the gripper face and an inner surface of the sidewall. In particular, each buttress may be configured to extend downwardly from the inner surface of the gripper face so that a portion of the buttress is positioned adjacent to and/or abuts/contacts against the inner surface of the sidewall. As a result, when the gripper face is deflected inwardly or downwardly into the cavity when a sheet is inserted through the slit, each buttress may be compressed between the gripper face and the adjacent sidewall. Such compression may result in a reactant force being applied against the gripper face that tends to push the sides of the gripper face extending adjacent to the slit towards one another, thereby providing a gripping force that serves to retain the sheet within the sheet gripping mechanism.

Referring now to the drawings, FIGS. 1-3 illustrate several views of one embodiment of a cleaning implement 20 in accordance with aspects of the present subject matter. Specifically, FIG. 1 illustrates a perspective view of the cleaning implement 20 and FIG. 2 illustrates another perspective view of the cleaning implement 20 after a suitable sheet 22 has been installed onto a cleaning head 24 of the implement 20. Additionally, FIG. 3 illustrates a partially exploded view of the cleaning head 24 shown in FIG. 1.

As shown in FIGS. 1 and 2, the cleaning implement 20 may generally include a handle 26 and a cleaning head 24 pivotally coupled to the handle 26. In general, the handle 26 may extend lengthwise between a first end 28 and a second end 30. As shown, a hand grip 32 may be disposed on the handle 26 at or adjacent to its first end 28 so as to provide an effective means for grasping the handle 26 during use of the implement 20. In addition, a joint 34 may be defined at or adjacent to the second end 30 of the handle 26 for coupling the cleaning head 24 to the handle 26. In general, the joint 34 may be formed using any suitable connection means known in the art that provides for a pivotal connection between the handle 26 and the cleaning head 24, such as a pinned connection, a ball and joint connection, a universal joint connection and/or any other suitable connection joint or means.

The cleaning head 24 may generally be configured to support a sheet 22 (FIG. 2) used to clean one or more surfaces. For example, in the illustrated embodiment, the cleaning head 24 is configured similarly to a mop or broom head and, thus, may be advantageously used to support a sheet 22 when performing a floor cleaning operation, such as a mopping or sweeping operation. However, in the other embodiments, the cleaning head 24 and associated sheet 22 may be used to perform any other type(s) of cleaning operation, such as a furniture or wall cleaning operation (e.g., when dusting furniture or walls). Additionally, it should be appreciated that the cleaning head 24 shown in the illustrated embodiment simply provides one example of a suitable cleaning head configuration that may be used in accordance with aspects of the present subject matter. In other embodiments, the cleaning head 24 may have any other suitable configuration that allows it to support a sheet 22 during the performance of a cleaning operation.

As particularly shown in FIGS. 1 and 3, the cleaning head 24 may include both a bottom side 36 and an opposite top side 38, with bottom side 36 being configured to face towards the surface being cleaned. As such, it should be appreciated that the sheet 22 may generally be configured to be installed onto the cleaning head 24 so as to extend across its bottom side 36. For example, as shown in FIG. 2, the sheet 22 may be installed onto the cleaning head 24 so that it covers all or substantially all of the bottom side 36 of the cleaning head 24. In addition, the edges of the sheet 22 may be configured to be folded over onto portions of the top side 38 of the cleaning head 24, which may allow for the sheet 22 to be attached to otherwise retained on the cleaning head 24 as will be described below.

It should be appreciated that any suitable type of sheet 22 may be configured to be attached to the cleaning head 24 when performing a suitable cleaning operation. For example, in several embodiments, sheet 22 may correspond to a wet sheet or a dry sheet and may be formed from any suitable material and/or combinations of materials, such as woven fabrics, non-woven fabrics, laminates, composites and/or combinations thereof. By way of example only, suitable sheets and/or

sheet structures are described in US 4833003 to Win et al.; US 5284703 to Everhart et al.; US2003/0200991 to Keck et al.; US2003/0121116 to Keck et al.; US2003/0211802 to Keck et al.; US2005/0138749 to Keck et al.; US2006/0128247 to Skoog et al.; US2006/0068167 to Keck et al.; and US2007/0151064 O'Connor et al.

5 In general, the sheet 22 may be retained on the cleaning head 24 using a plurality of sheet gripping mechanisms 100 received within or otherwise supported by the cleaning head 24. For example, in several embodiments, the cleaning head 24 may define a plurality of internal cavities or sockets 40 into which the sheet gripping mechanisms 100 may be received. For example, as shown in the exploded view of FIG. 3, the cleaning head 24 defines four separate sockets 40 for receiving four
10 corresponding sheet gripping mechanisms 100, with each socket 40 being positioned at or adjacent to one of the four corners of the cleaning head 24. However, in other embodiments, the cleaning head 24 may include any other suitable number of sockets 40 configured to receive a corresponding number of sheet gripping mechanisms 100, with each socket 40 being positioned at any suitable location on or within the cleaning head 24.

15 As particularly shown in FIG. 3, in several embodiments, each socket 40 may be defined by a bottom socket wall 42 and a socket sidewall 44 extending outwardly from the bottom socket wall 42 towards the top side 38 of the cleaning head 24. In general, the size and/or shape of each socket 40 may be selected such that a corresponding sheet gripping mechanism 100 may be received therein. For instance, in one embodiment, the size and/or shape of the sockets 40 may be
20 selected such that, when the sheet gripping mechanisms 100 are properly installed within the sockets 40, an outer face 102 of each sheet gripping mechanism 100 (hereinafter referred to as the "gripper face 102") may be aligned with or otherwise positioned adjacent to the top side 38 of the cleaning head 24.

As will be described in greater detail below, each sheet gripping mechanism 100 may
25 include a slit 104 defined through its outer gripper face 102. As a result, when installing the sheet 22 onto the cleaning head 24, the portions of the sheet 22 that overlap the gripper faces 102 along the top side 38 of the cleaning head 24 may be pressed through the slits 104 and into each sheet gripping mechanism 100, thereby allowing the sheet 22 to be properly retained on the cleaning head 24.

Referring now to FIGS. 4-9, several views of one embodiment of a sheet gripping
30 mechanism 100 suitable for use with the cleaning implement 20 described above (or any other suitable cleaning implement) is illustrated in accordance with aspects of the present subject matter. Specifically, FIGS. 4 and 5 illustrate respective top and bottom perspective views of the sheet gripping mechanism 100. FIGS. 6 and 7 illustrate top and bottom views, respectively, of the sheet gripping mechanism 100. FIG. 8 illustrates a close-up, perspective view of a portion of the sheet gripping mechanism 100 shown

in FIG. 5. Additionally, FIG. 9 illustrates a cross-sectional view of the sheet gripping mechanism 100 with a corresponding sheet 22 installed therein.

As shown, the sheet gripping mechanism 100 may generally include an upper gripper face 102, a hollow or open-ended bottom face 106 and one or more sidewalls 108 extending between the upper gripper face 102 and the bottom face 106. For example, as particularly shown in FIGS. 5, the sheet gripping mechanism 100 may include a continuous sidewall 108 extending heightwise (e.g., in the direction of arrow 110 shown in FIGS. 4 and 9) between the gripper face 102 to the bottom face 106. In addition, the sidewall 108 may generally be configured to extend continuously around the entire outer perimeter of the sheet gripping mechanism 100 such that the sidewall 108 generally defines a closed shape, such as substantially elliptical or oval shape. As such, the sidewall 108, along with the gripper face 102, may at least partially define an inner cavity 112 within the sheet gripping mechanism 100. For example, as shown in FIGS. 5 and 9, the inner cavity 112 may extend heightwise 110 within the closed shape defined by the sidewall 108 between an inner surface 114 (FIG. 8) of the gripper face 102 and the bottom face 106 of the sheet gripping mechanism 100.

Additionally, in several embodiments, the sidewall 108 may include one or more retention features to assist in retaining the sheet gripping mechanism 100 within its corresponding socket 40 when installed onto the cleaning head 24. For example, as shown in the illustrated embodiment, one or more retention lips 116 may be configured to extend outwardly from the sidewall 108 at one or more locations around the outer perimeter of the sheet gripping mechanism 100. Such retention lip(s) 116 may be configured to engage a corresponding retention feature(s) defined in the cleaning head's socket 40. For example, in one embodiment, each socket 40 may define a corresponding lip(s) (not shown) that is configured to engage the retention lips(s) 116 when the sheet gripping mechanism 100 is inserted within the socket 40, such as by configuring the socket 40 so that its corresponding lip(s) are received within a channel(s) 118 (FIG. 8) defined between the retention lip(s) 116 and the outer edges of the gripper face 102. However, in other embodiments, the sheet gripping mechanisms 100 and/or sockets 40 may have any other suitable retention features that assist in installing and/or retaining each sheet gripping mechanism 100 within its corresponding socket 40.

Moreover, in the several embodiments, the sidewall 108 may also include one or more alignment features for properly aligning and/or orienting the sheet gripping mechanism 100 within its corresponding socket 40. For example, as shown in FIGS. 7 and 8, the sidewall 108 may be recessed at a given location so as to define a channel or keyway 120 extending heightwise 110 between the bottom face 106 and the gripper face 102 of the sheet gripping mechanism 100. In such an embodiment, as shown in FIG. 3, the socket 40 may include a corresponding inwardly extending projection 122 configured to be received within the keyway 120 when the sheet gripping mechanism

100 is inserted within the socket 40. However, in other embodiments, the sheet gripping mechanisms 100 and/or sockets 40 may have any other suitable alignment features that assist in aligning and/or orienting each sheet gripping mechanism 100 relative to its corresponding socket 40.

Referring still to FIGS. 4-9, the gripper face 102 may generally correspond to the upper
5 or top face of the sheet gripping mechanism 100 and, thus, may be configured to receive a portion of the sheet 22 that is desired to be attached to the corresponding cleaning head 24. For example, as indicated above, the gripper face 102 may include a slit 104 defined therein for receiving a portion of the sheet 22. Specifically, as shown in FIGS. 6 and 7, the slit 104 may be configured to extend
10 lengthwise (e.g., in the direction of arrow 124 shown in FIG. 6) between a first end 126 and a second end 128 along a substantial portion of an overall length 130 (FIG. 7) of the gripper face 102. For instance, the slit 104 may define a length 132 (FIG. 6) between its first and second ends 126, 128 that is slightly shorter than the length 130 of the gripper face 104 itself, such as a length 132 that ranges from about 70% to about 99% of the length 130 of the gripper face 102 or from about 80% to about
15 95% of the length 130 of the gripper face 102 and any other subranges therebetween. As a result, the slit 104 may generally serve to separate or divide the gripper face 102 into a first portion 134 extending outwardly towards the outer perimeter of the sheet gripping mechanism 100 from a first side 138 of the slit 104 and a second portion 136 extending outwardly towards the outer perimeter of the sheet gripping mechanism 100 from a second side 140 of the slit 104. Such division of the gripper face 102 may generally allow the first portion 134 of the face 102 to move independent of and separately from the
20 second portion 136. As a result, when a downward force is applied to the gripper face 102 as a sheet 22 is being pressed through the slit 104 by the user's finger, the first and second portions 134, 136 of the gripper face 102 may deflect downwardly and away from one another.

In general, it should be appreciated that the slit 104 may be formed in the gripper face 102 so as to define any suitable shape or pattern along its length 132. For example, as shown in FIG.
25 6, the slit 104 generally defines a wavy or serpentine-like path extending between its first and second ends 126, 128, with off-shoot channels 142 extending outwardly at several locations along the slit 104. However, in other embodiments, the slit 104 may define any other suitable shape or pattern that allows it to function as described herein.

Additionally, the sheet gripping mechanism 100 may also include a plurality of
30 buttresses 146 extending within its inner cavity 112 between the sidewall 108 and the gripper face 102. In general, the buttresses 146 may be configured to assist in retaining a sheet 22 within the sheeting gripping mechanism 100 after the sheet 22 is inserted through the slit 104 and into the cavity 112. Specifically, when the first and second portions 134, 136 of the gripper face 102 are deflected downwardly and away from one another as a sheet 22 is being inserted through the slit 104, the

buttresses 146 may be compressed between the sidewall 108 and the gripper face 102. Since the sidewall 108 is generally maintained in place via the inner sidewalls 44 of the socket 40 within which the sheet gripping mechanism 100 is installed, compression of each buttress 146 may result in a reactive force being applied back against the gripper face 102. This reactive force may generally tend to push the adjacent portion of the gripper face 102 upwardly and towards the other portion of the gripper face 102. As such, the reactive force may provide a gripping force that serves to pinch the inserted sheet 22 between the first and second portions 134, 136 of the gripper face 102, thereby retaining the sheet 22 within the sheet gripping mechanism 100.

In several embodiments, each buttress 146 may be configured to project outwardly within the cavity 112 from the inner surface 114 of the gripper face 102 and the sidewall 108 so as to create a rib or support structure extending between the gripper face 102 and sidewall 108. As particularly shown in FIG. 8, in one embodiment, each buttress 146 may include a pair of opposed sidewalls 148 extending outwardly from the gripper face 102 and the sidewall 108. In addition, each buttress 146 may include a connecting wall 150 (FIG. 8) extending between the opposed sidewalls 148. For example, as shown in FIG. 8, the connecting wall 150 includes a flat portion 152 extending outwardly from the sidewall 108 and an angled portion 154 extending from the flat portion 152 to the gripper face 102. In such an embodiment, the angled portion 154 of the connecting wall 150 may be configured to terminate at a location (e.g. at location 156) that is at or adjacent to the slit 104.

Additionally, as shown in FIG. 8, each buttress 146 may also define a height 158 generally corresponding to the height of the opposed sidewalls 148. Due to the angled portion 154 of the connecting wall 150, the height 158 of each sidewall 148 may generally vary along the width of the buttress 146. Specifically, as shown in FIG. 8, the height 158 may decrease from a maximum height along the flat portion 152 of the connecting wall 154 to a height of zero or substantially zero at location 156 as the buttress 146 extends outwardly from the sidewall 108 in the direction of the slit 104.

In addition, each buttress 146 may define a thickness 160 (FIG. 8) between its opposed sidewalls 148. In general, the thickness 160 may correspond to any suitable thickness that allows the buttresses 146 to function as described herein. For instance, in several embodiments, the thickness 160 of each buttress 146 may be the same or substantially the same as a thickness 162 (FIG. 5) of the gripper face 102. Alternatively, the thickness 160 of each buttress 146 may be greater than or less than the thickness 162 of the gripper face 102.

In several embodiments, the buttresses 146 may only be placed along one side of the slit 104. For instance, as shown in FIG. 5, the buttresses 146 are positioned on the first side 138 of the slit 104 so as to extend within the cavity 112 between the sidewall 108 and the first portion 134 of gripper face 102. However, in another embodiment, the buttresses 146 may only be positioned on the

second side 140 of the slit 104 so as to extend within the cavity 112 between the sidewall 108 and the second portion 136 of gripper face 102. Regardless, by positioning the buttresses 146 on a single side of the slit 104, the gripper face 102 may be stiffened or otherwise rendered less flexible on the side including the buttresses 146. For example, in the illustrated embodiment, the first portion 134 of the gripper face 102 may be stiffer or less compliant or flexible than the second portion 136 of the gripper face 102. In such instance, it may be desirable to orient the sheet gripping mechanism 100 within the cleaning head 24 such that it is more likely that the user's fingernail faces the buttresses 136 (and the first portion 134 of the gripper face 102) when the user inserts his/her finger into the slit 104 in order to install a sheet 22. Such orientation of the sheet gripping mechanism 100 may allow for the non-nail or fleshy side of the user's finger to be exposed to the more flexible portion of the gripper face 102, thereby reducing both user discomfort and the likelihood that the user's finger becomes stuck within the sheet gripping mechanism 100.

In other embodiments, the buttresses 146 may be placed along both sides of the slit 104. For instance, FIG. 10 illustrates an embodiment of a sheeting gripping mechanism 100 that includes buttresses 146 positioned at locations on either side of the slit 102. Specifically, as shown, one or more first buttresses 146A may be positioned on the first side 138 of the slit 104 so as to extend between the sidewall 108 and the first portion 134 of gripper face 102 while one or more second buttresses 146B may be positioned on the second side 140 of the slit 102 so as to extend between the sidewall 108 and the second portion 136 of gripper face 102.

Referring back to FIGS. 4-9, it should be appreciated that each sheet gripping mechanism 100 may generally include any number of buttresses 146 having any suitable spacing relative to one another along the outer perimeter of the cavity 112. For instance, as shown in the illustrated embodiment, the sheet gripping mechanism 100 includes three buttresses 146 extending within the cavity 112, with each buttress 146 being spaced apart equally from adjacent buttress 146. However, in other embodiments the sheet gripping mechanism 100 may include less than three buttresses 146, such as two buttresses or a single buttress, or more than three buttresses 146, such as four or more buttresses, with each buttress 146 being spaced apart equally or at a varied distance(s) relative to other adjacent buttresses 146.

It should also be appreciated that, in general, the buttresses 146 may be positioned at any suitable location around the outer perimeter of the cavity 112. However, in several embodiments, it may be desirable to position the buttresses 146 on one or both sides 138, 140 of the slit 104 along a central portion of the slit 104. For example, as shown in FIG. 7, the buttresses 146 are all located within a central portion 164 of the slit 104 that is spaced apart from either end 138, 140 of the slit 104 by a distance ranging from about 25% to about 75% of the slit's overall length 132, such as a distance

ranging from about 30% to about 70% of the slit's length 132 or from about 40% to about 60% of the slit's length 132 and any other subranges therebetween. Alternatively, in another embodiment, all of the buttresses 146 may be positioned within the inner cavity 112 at locations outside the central portion 164 of the slit 104.

5 Referring particularly to the cross-sectional view of FIG. 9, as indicated above, the buttresses 146 may be configured to assist in retaining a sheet 22 within the sheet gripping mechanism 100. For example, as shown in FIG. 9, a sheet 22 has been inserted through the slit 104 and into the cavity 112 and is being retained between the first and second portions 134, 136 of the griper face 102. As described above, the first and second portions 134, 136 of the griper face 102 are forced
10 downwardly when the sheet 22 is initially pushed through the slit 104 by the user's finger. Once the user's finger is removed from the sheet gripping mechanism 100, the first and second portions 134, 136 may spring back upwards and towards one another due to the nature of the material used to form the gripper face 102 so as to reduce the size of the slit 104 and close the gripper face 102 around the sheet 22. Such natural movement of the first and second portions 134, 136 of the gripper face 102 may
15 provide some amount of spring force to assist in retaining the sheet 22 within the sheet gripping mechanism 100. In addition, for the portion(s) of the gripper face 102 having buttresses 146 positioned adjacent thereto, the buttresses 146 may provide an additional upward force against such portion(s) of the gripper face 102, thereby further pinching the gripper face 102 around the sheet 22. For instance, as shown in the illustrated embodiment, the buttresses 146 may provide an upward reactive or spring
20 force (e.g., as indicated by the arrow 166) that tends to push the first portion 134 of the gripper face 102 upward and towards the second portion 136 of the gripper face 102. Such additional gripping force may allow for the sheet 22 to be retained within the sheet gripping mechanism 100 throughout the performance of any cleaning operation using the associated cleaning implement 20.

It should be appreciated that, in several embodiments, the entire sheet gripping
25 mechanism 100 may be formed as a single integral component. For instance, the entire sheet gripping mechanism 100 may correspond to an injection molded component. Alternatively, one or more of the components and/or features of the sheet gripping mechanism 100 may be formed as a separate component(s) and assembled together to create the complete gripping mechanism 100. For instance, in one embodiment, the sidewall 108 may be formed separate from the gripper face 102 and the
30 buttresses 146.

It should also be appreciated that, in addition to the buttresses 146 (or as an alternative thereto), each sheet gripping mechanism 100 may include any other suitable means for assisting in the retention of a sheet 22. For example, in an alternative embodiment, one side of the

gripper face 102 may be made more or less flexible than the opposing side by forming the sides 138, 140 to have differing thicknesses or material properties.

Moreover, in several embodiments, the gripper face 102, the sidewall 108 and/or the buttresses 146 may be formed from one or more polymeric materials. For instance, in one embodiment, suitable polymeric materials may correspond to any suitable thermoplastic elastomers (also referred to as thermoplastic rubbers), such as styrenic block copolymers, polyolefin blends, elastomeric alloys, thermoplastic polyurethanes, thermoplastic copolyesters, thermoplastic polyamides and/or the like. However, in other embodiments, the various components of the sheet gripping mechanisms 100 may be formed from any other suitable polymeric material(s).

Additionally, as indicated above, the particular polymeric material(s) used to form the component(s) of the sheet gripping mechanisms 100 may, in several embodiments, be selected based on material properties that allow for such components to be relatively flexible. To quantify the flexible nature of the material, the relevant properties may be described in terms of the material's hardness, stiffness, thickness and/or any combinations thereof.

For example, in one embodiment, the Shore A hardness (as measured by ASTM D2240-05) of the polymeric material(s) used to form the component(s) of the sheet gripping mechanisms 100 may be about 90 or less, such as a Shore A hardness ranging from about 20 to about 90. However, in a particular embodiment, the Shore A hardness may range from about 50 to about 90, such as from about 60 to about 90 or from about 75 to about 85 and/or any other subranges therebetween.

Similarly, in one embodiment, the Gurley stiffness (as measured by ASTM D 6125-97 "Standard Test Method for Bending Resistance of Paper and Paperboard") of the polymeric material(s) used to form the component(s) of the sheet gripping mechanisms 100 may be about 11,000 milligrams-force (mgf) or less, such as a Gurley stiffness ranging from about 6000 mgf to about 11,000 mgf. For example, in a particular embodiment, the Gurley stiffness may range from about 8000 mgf to about 10,500 mgf or from about 9500 mgf to about 10,000 mgf and/or any other subranges therebetween.

Additionally, in one embodiment, the thickness of the polymeric material(s) used to form the gripper face 102 may range from about 0.5 millimeter (mm) to about 2.5 mm, such as from about 1 mm to about 2 mm or from about 1.25 mm to about 1.75 mm and/or any other subranges therebetween.

Alternatively, the performance of the polymeric material(s) used to form the component(s) of the sheet gripping mechanisms 100 may be measured directly by using a tensile testing machine to push a ball-shaped probe through the slit 104 defined in the gripper face 102 under controlled conditions and measuring the force(s) acting on the probe. This simulates the use of one's

finger to press a sheet 22 into one of the sheet gripping mechanisms 100. In general, the measurement involves placing a sheet gripping mechanism 100 to be tested underneath a specially-designed probe which is mounted to a tensile tester. The tensile tester lowers the probe into the inner cavity 112 of the sheet gripping mechanism 100 at a predetermined speed and measures the peak load, in grams-force (gf), required to penetrate the gripper face 102. This test, as more specifically described below, results in a value referred to herein as the "Penetration Index". The sheet gripping mechanisms 100 described herein may have a Penetration Index ranging from about 1600 gf to about 2400 gf, such as from about 1700 gf to about 2300 gf or from 1800 gf to about 2200 gf or from about 1900 gf to about 2100 gf and any other subranges therebetween.

The tensile tester is a MTS Sintech 1/G with a MTS 10 pound load cell. The software is Testworks for Windows 3.10. The load cell contains a 0.5 inch grip adapter for receiving the metal ball probe. The ball probe used is approximately 4.5 inches long. The bottom portion of the probe, which contacts the sample to be tested, is ball-shaped and has a ball diameter of 0.75 inch. The middle portion of the probe consists of a connecting "neck" which is approximately 0.375 inches in diameter and 1.375 inches long. The upper section of the probe is approximately 0.5 inch in diameter and 2.4 inches long. The end of the upper section contains a flat area to allow the probe to fit into the grip adapter of the tensile tester. The flat area is 0.125 inch off of the center of the probe.

When conducting the test, the sheet gripping mechanism 100 to be tested is securely placed on a suitable surface such that the center of the slit 104 is placed directly underneath the ball probe. The probe is initially positioned such that it is approximately one inch above the slit 104. Upon the start of the test, the probe moves downward at a rate of 20 inches per minute for a distance of 1.25 inches. The probe is held for one second at this bottom position and then is moved upward to its initial position at the same rate. The test is repeated two additional times. The peak load readings from the tensile tester, expressed as grams-force, are averaged and the result is the Penetration Index for the sample.

This written description uses examples to disclose the invention, including the best mode, and also to enable any person skilled in the art to practice the invention, including making and using any devices or systems and performing any incorporated methods. The patentable scope of the invention is defined by the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they include structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal languages of the claims.

WHAT IS CLAIMED IS:

1. A cleaning implement comprising:
a handle;
a cleaning head coupled to the handle; and
5 a sheet gripping mechanism at least partially received within a portion of the cleaning head, the sheet gripping mechanism including a gripper face and a sidewall extending outwardly from the gripper face, the sidewall and the gripper face at least partially defining a cavity extending within the sheet gripping mechanism,
wherein a slit is defined through the gripper face so that portions of the gripper face are
10 separately moveable with respect to one another upon application of a force directed downwardly into the cavity,
wherein the sheet gripping mechanism further comprises a plurality of buttresses extending within the cavity between the gripper face and the sidewall.
2. The cleaning implement of claim 1, wherein the sheet gripping mechanism is at least
15 partially formed from a polymeric material.
3. The cleaning implement of claim 2, wherein the polymeric material has a Shore A hardness of less than about 90.
4. The cleaning implement of claim 3, wherein the Shore A hardness ranges from about
50 to about 90.
- 20 5. The cleaning implement of claim 2, wherein the polymeric material has a Gurley stiffness of less than about 11,000 mgf.
6. The cleaning implement of claim 5, wherein Gurley stiffness ranges from about 8000 mgf to about 10,500 mgf.
7. The cleaning implement of claim 1, wherein the sheet gripping mechanism has a
25 Penetration Index ranging from about 1600 gf to about 2400 gf.
8. The cleaning implement of claim 1, wherein the plurality of buttresses apply a reactive force against the gripper face when at least a portion of the gripper face is moved downwardly within the cavity upon application of the downwardly directed force .
9. The cleaning implement of claim 1, wherein each buttress includes a pair of opposed
30 sidewalls extending outwardly from the sidewall and the gripper face and a connecting wall extending between the opposed sidewalls.
10. The cleaning implement of claim 13, wherein the connecting wall comprises an angled portion that terminates at the gripper face at a location at or adjacent to the slit.

11. The cleaning implement of claim 1, wherein the slit divides the gripper face into a first portion and a second portion, wherein the plurality of buttresses extend within the cavity between the sidewall and at least one of the first portion or the second portion of the gripper face.

12. The cleaning implement of claim 1, wherein the slit extends lengthwise between a first end and a second end and defines a length between the first and second ends, the plurality of buttresses extending between the gripper face and the sidewall at locations contained within a central portion of the slit.

13. The cleaning implement of claim 12, wherein the central portion corresponds to a section of the slit spaced apart from the first end or the second end by a distance ranging from about 25% to about 75% of the length.

14. The cleaning implement of claim 1, wherein the cleaning head defines a socket, the sheet gripping mechanism being received within the socket.

15. A cleaning implement comprising:

a handle;

a cleaning head coupled to the handle; and

a sheet gripping mechanism at least partially received within a portion of the cleaning head, the sheet gripping mechanism including a gripper face and a sidewall extending outwardly from the gripper face, the sidewall and the gripper face at least partially defining a cavity extending within the sheet gripping mechanism,

wherein a slit is defined through the gripper face so that portions of the gripper face are separately moveable with respect to one another upon application of a force directed downwardly into the cavity,

wherein the gripper face is formed from a polymeric material having a Shore A hardness ranging from about 20 to about 90.

16. The cleaning implement of claim 15, wherein the polymeric material comprises a thermoplastic elastomer.

17. The cleaning implement of claim 15, wherein the Shore A hardness ranges from about 50 to about 90.

18. The cleaning implement of claim 15, wherein the polymeric material has a Gurley stiffness of less than about 11,000 mgf.

19. The cleaning implement of claim 15, wherein Gurley stiffness ranges from about 8000 mgf to about 10,500 mgf.

20. The cleaning implement of claim 15, wherein the sheet gripping mechanism has a Penetration Index ranging from about 1600 gf to about 2400 gf.

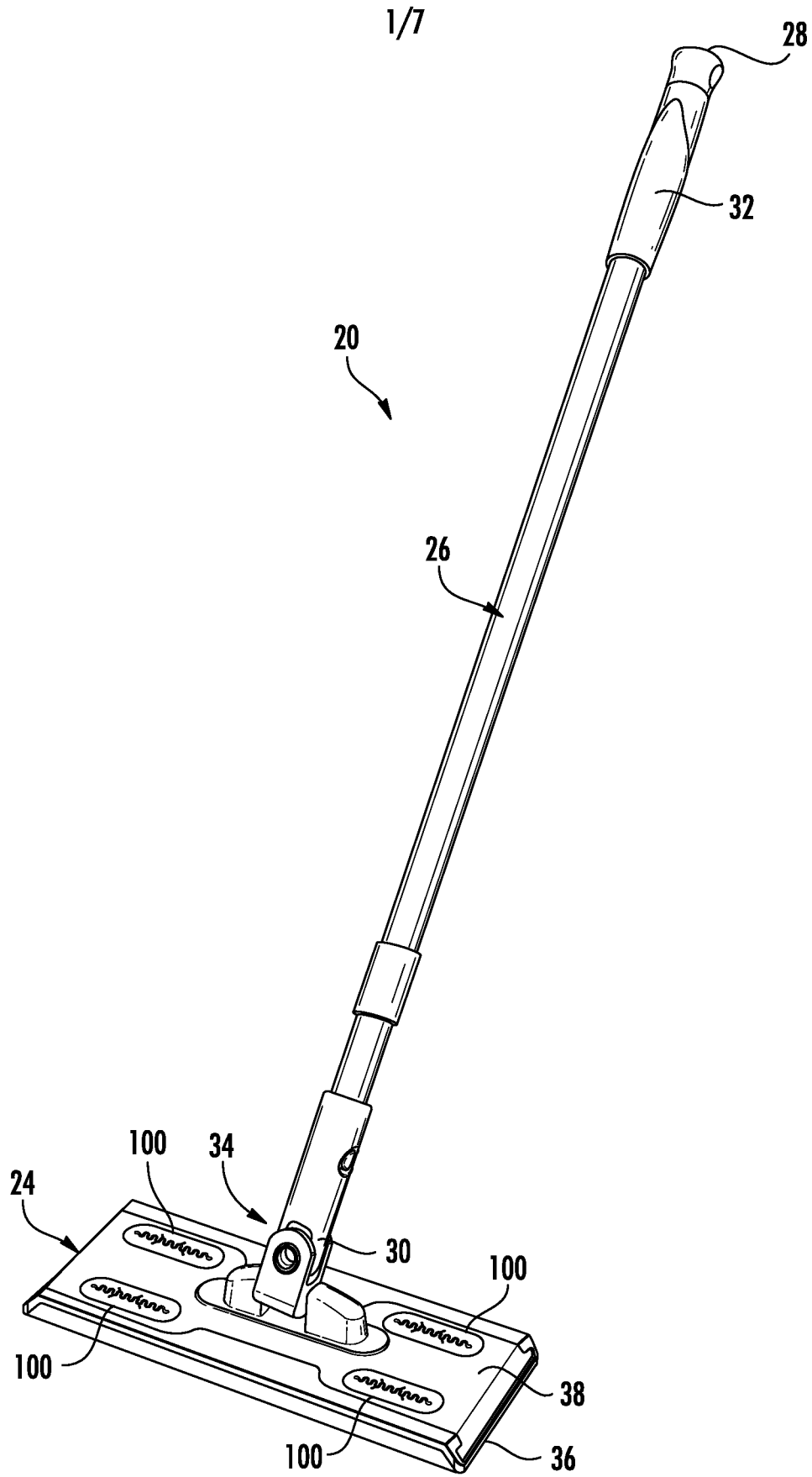


FIG. 1

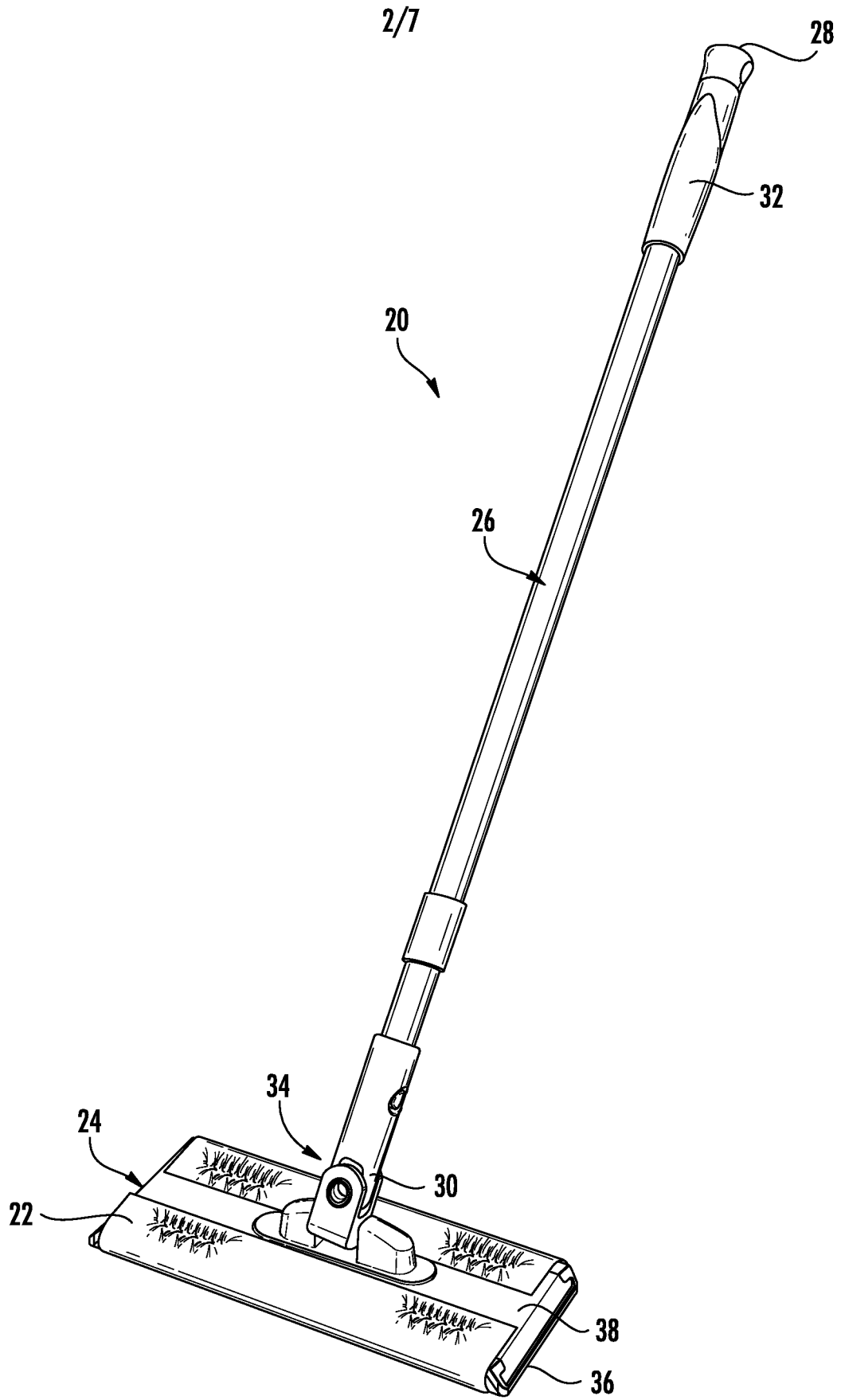
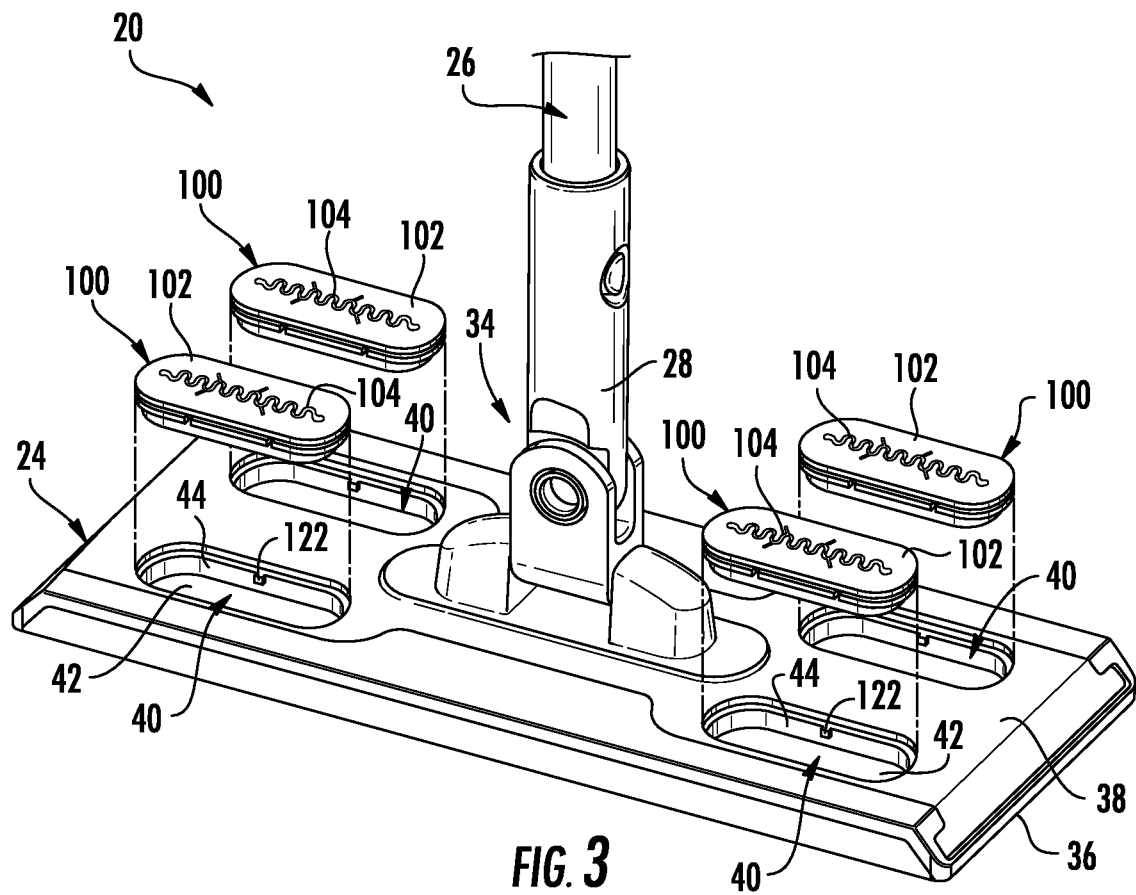
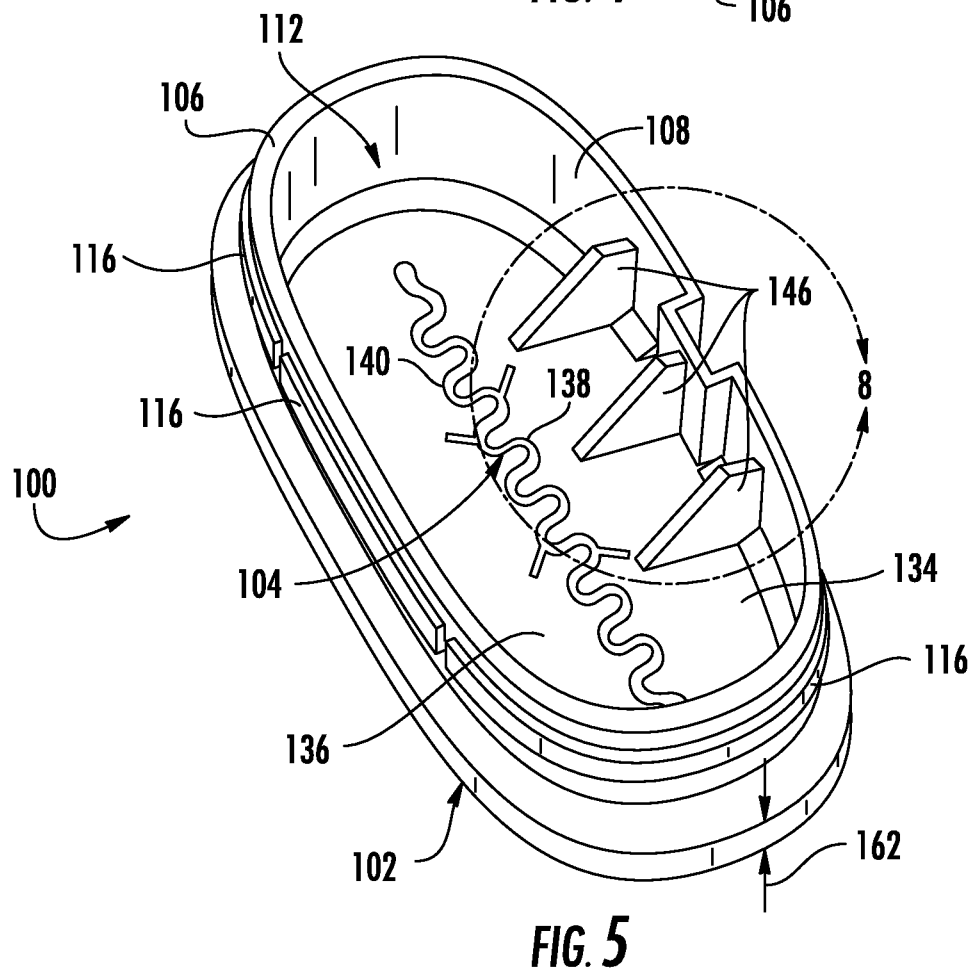
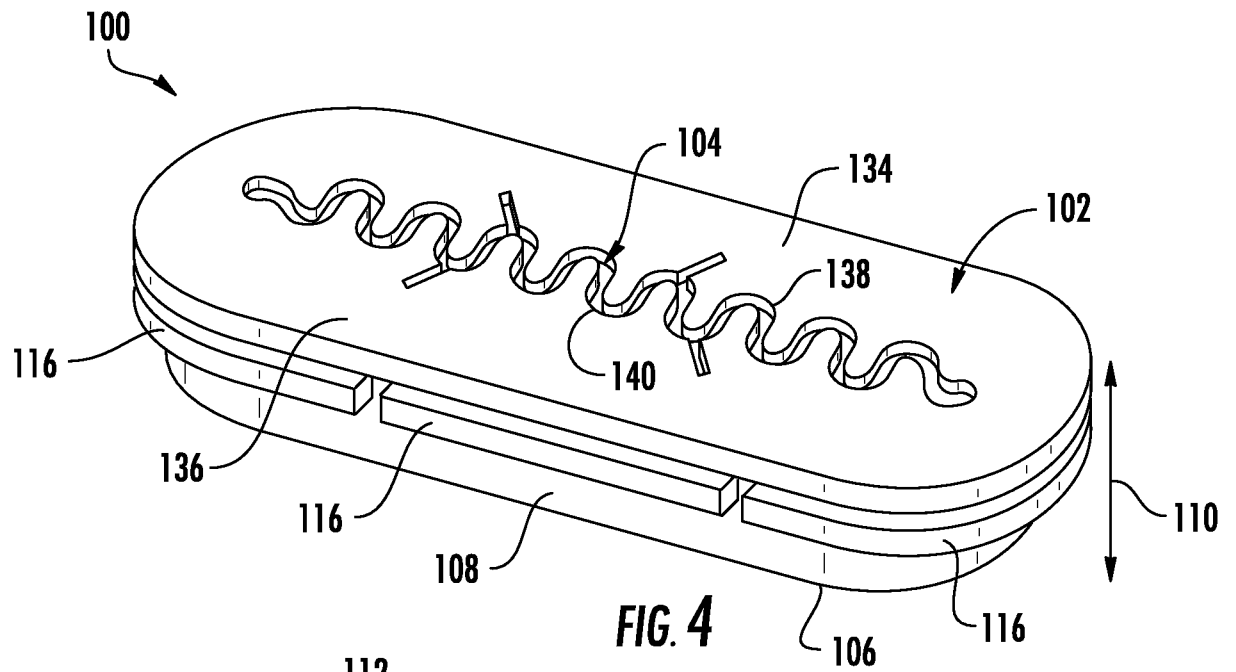


FIG. 2

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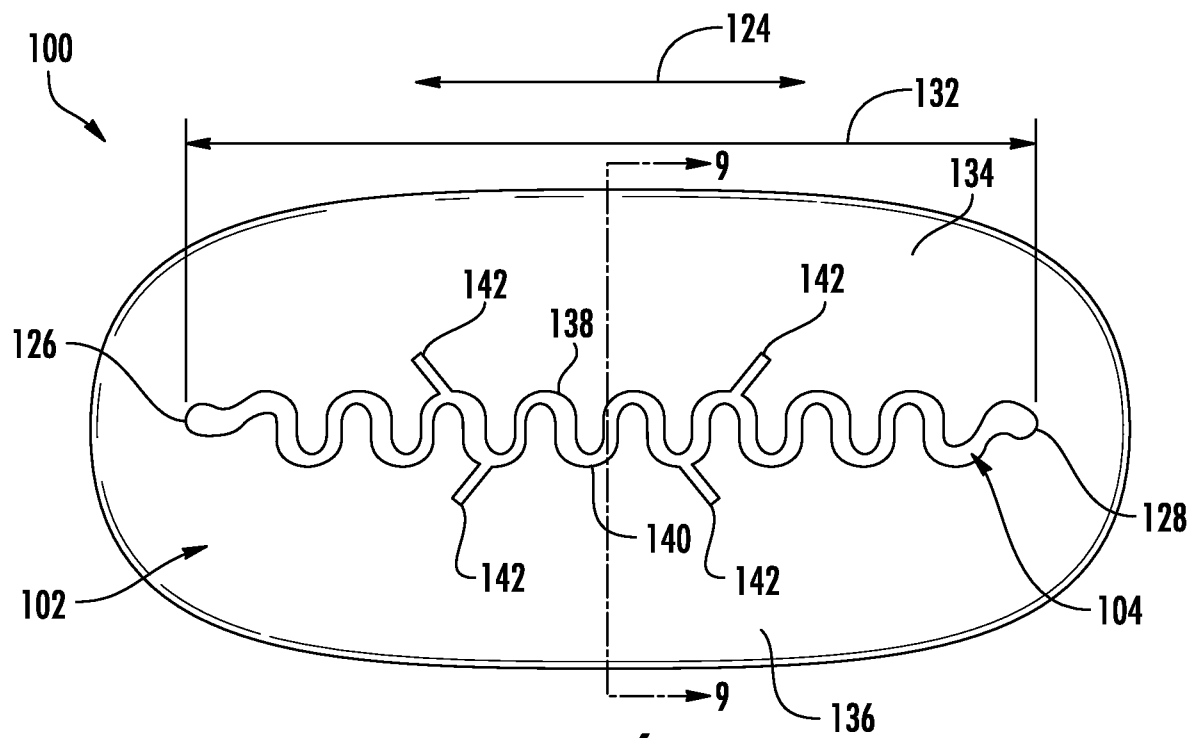


FIG. 6

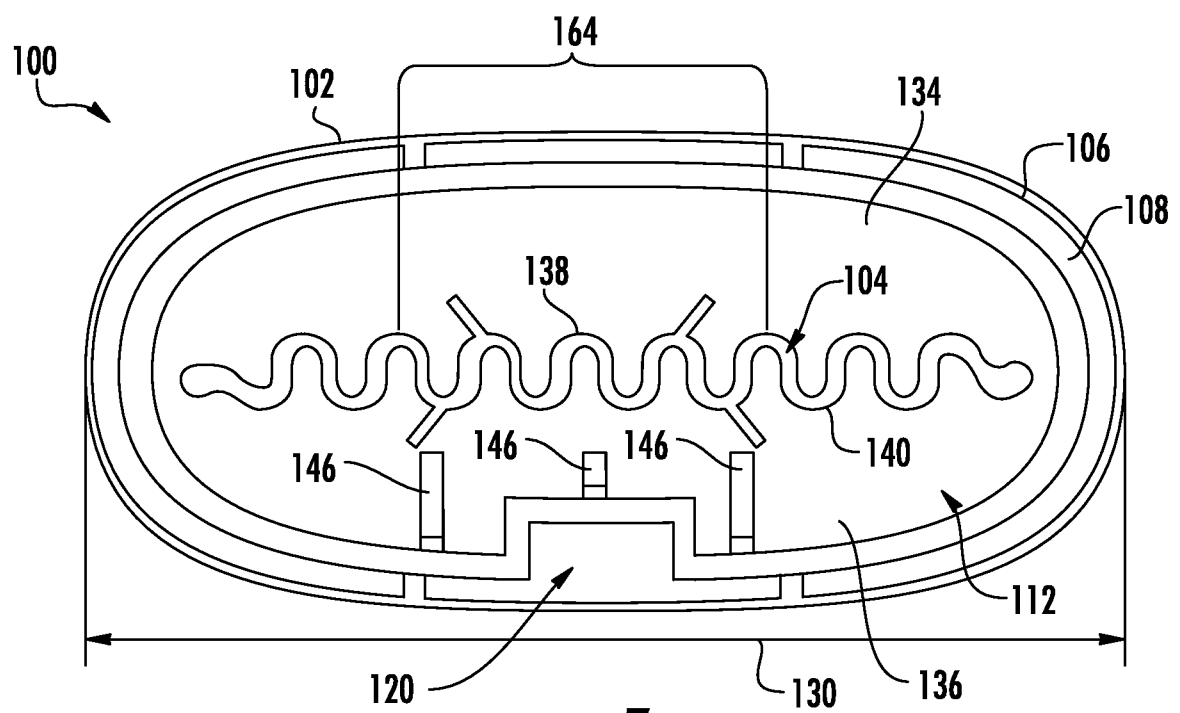


FIG. 7

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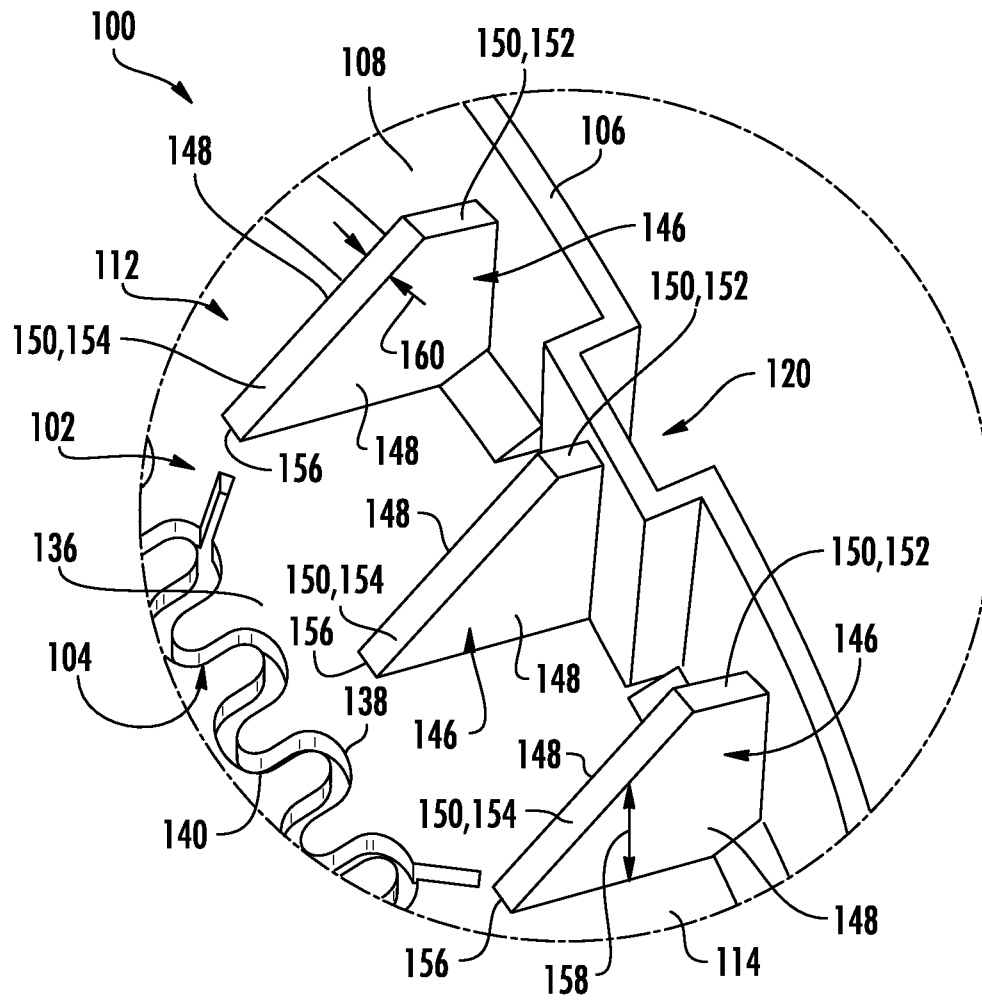
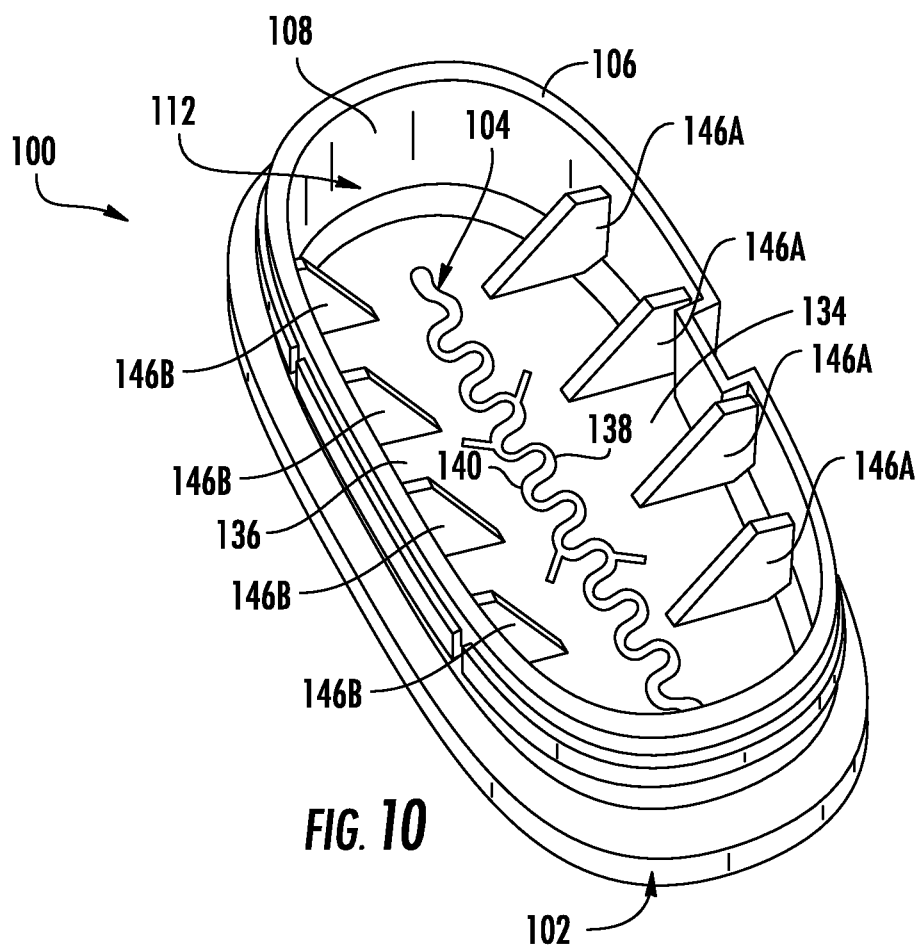
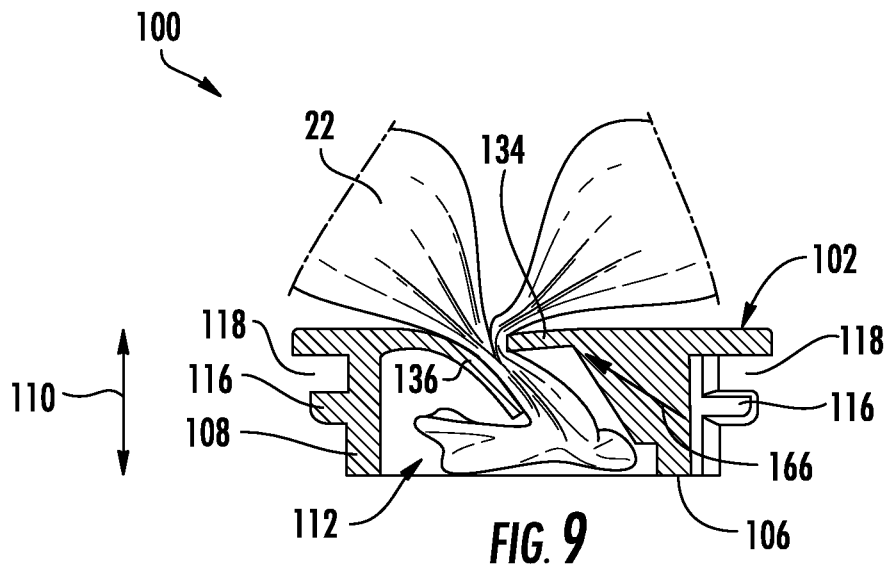


FIG. 8

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2015/048461**A. CLASSIFICATION OF SUBJECT MATTER****A47L 13/256(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47L 13/256; A47L 13/24; A47L 13/10; A47L 13/16; A47L 13/20

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: clean, sheet, slit, buttress

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	See abstract, paragraphs [0006]-[0018], [0025] and figures 1-7(b).	2-6, 14-20
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A	US 2004-0011382 A1 (GARY WILLIAM KINGRY et al.) 22 January 2004	1-20
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	See abstract, claims 1, 10 and figures 1-6.	



Further documents are listed in the continuation of Box C.



See patent family annex.

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

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11 December 2015 (11.12.2015)

Date of mailing of the international search report

15 December 2015 (15.12.2015)

Name and mailing address of the ISA/KR

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