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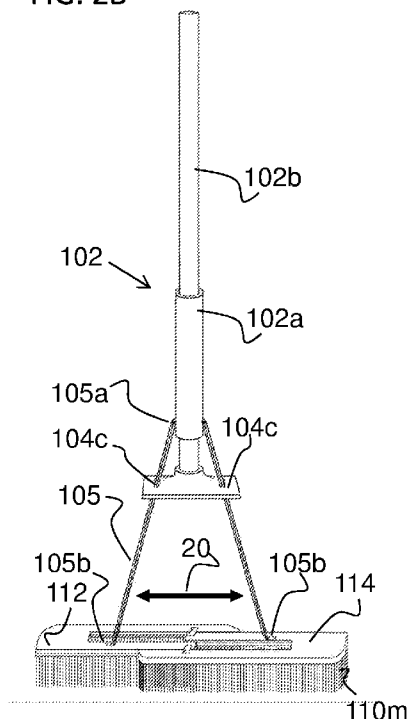
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(54) Title: DEVICE WITH EXPANDABLE CLEANING HEAD

FIG. 2B



(57) Abstract: The present invention relates to a cleaning device and in particular, to such a cleaning device that is adapted to having a controllable and expandable cleaning surface head. The expandable cleaning surface head is associated with a handle where movement in the vertical direction of the handle is adapted to horizontal movement that controls the size of cleaning surface head.



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DEVICE WITH EXPANDABLE CLEANING HEAD

RELATED APPLICATIONS

5 This application claims priority from United States provisional patent application no. 61/924,412 filed January 07, 2014, entitled "VARIABLE-WIDTH SWEEPING TOOL," the entire contents of which are herein incorporated by reference.

FIELD OF THE INVENTION

10 The present invention relates to a cleaning device and in particular, to a cleaning device such as a squeegee, mop or broom that are adapted to having a controllable and expandable cleaning head.

BACKGROUND OF THE INVENTION

15 The present invention relates to cleaning devices in the form of a broom, floor wiper, mop, squeegee, vacuum cleaner, or the like. Such cleaning devices are characterized by a horizontally oriented cleaning head that is attached to a handle that is usually provided in the form of a long vertical stick. The head portion is configured to clean a surface generally in the horizontal plane in a direction perpendicular to the long axis of the
20 cleaning head.

Typically, in the case of a broom, the bottom side of the head comprises the cleaning surface usually in the form of bristles, hair or the like; in a mop it comprises a water-holding and/or absorbing material, such
25 as a sponge or a plurality of fibers, cloth and in a floor wiper or squeegee it typically comprises a cloth, flexible strip, made of rubber or similar substance.

The width of the cleaning head of the cleaning device is generally its longer dimension. Accordingly this width of the cleaning head directly
30 relates to the surface that may be cleaned with a sweep that may be affected at any one time. The sweep size is determined as a compromise between two considerations. On the one hand it is desirable to make the cleaning

head relatively wide, so that fewer sweeps are needed to cover a given floor area. On the other hand, it is often desired to have a narrow cleaning head, so as to be able to sweep narrowly bounded sections of a floor, such as under furniture or in narrow niches. The latter need is particularly pronounced in homes and in offices and therefore most sweeping tools commonly used in such premises have relatively narrow cleaning heads. This may be contrasted to sweeping tools that are designed for industrial and commercial applications, whose heads are relatively wide, for example street sweeper. Yet it may often be desirable to have a sweeping tool, to be employed in homes or offices, whose head can be selectively wide and narrow; it may even be more desirable that the length of the head be settable by its user in a plurality of widths – possible in a continuum of widths between two extreme values, minimum width and maximum width.

15 SUMMARY OF THE INVENTION

There is an unmet need for, and it would be highly useful to have, a cleaning device where the width of the cleaning head surface is controllable and may readily assume a wide conformation or a narrow conformation and may assume any size therebetween.

20 The present invention is generally of a variable-width cleaning device, such as a mop, squeegee, sweeper or broom, comprising a vertical handle portion and a horizontal head portion, the head portion having variable width. The head portion comprises a cleaning surface that may be controllably expanded or retracted to assume variable widths from a narrow cleaning head to a wide cleaning head, or widths therebetween.

The variable width cleaning device is characterized in that the vertical handle provides for controlling the width of the horizontal cleaning head. Specifically the cleaning device of the present invention is characterized in that movement of a portion of the handle along the vertical axis (Y-axis) leads to expansion or retraction of the cleaning head in the horizontal axis

(X-axis) or plane allowing the cleaning head to assume variable widths including a wide or narrow configuration.

Within the context of this application the term cleaning surface refers to that part of a cleaning device such as a broom or mop that is actively used to undertake cleaning. Optionally the cleaning surface may take optional forms for example including but not limited to broom bristles, mop head, cloth, sweeper cloth, static charged cleaning cloth, water retention cloth, water retention fabric, squeegee, squeegee rubber, absorbing material, sponges, polymers, plastic, cleaning pad, abrasive cleaning pad, metallic abrasive cleaning pad, the like, or any combination thereof.

Within the context of this application the term vertical axis may be interchangeable refer to the axis along a handle portion of the cleaning device, and generally refers to the Y-Axis governing the up and down direction.

Within the context of this application the term horizontal axis or plane may be interchangeable refer to the axis along a cleaning head portion of the cleaning device, and generally refers to the X-Axis governing the right to left direction.

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, methods, and examples provided herein are illustrative only and not intended to be limiting.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is herein described, by way of example only, with reference to the accompanying drawings. With specific reference now to the drawings in detail, it is stressed that the particulars shown are by way of example and for purposes of illustrative discussion of the preferred embodiments of the present invention only, and are presented in order to provide what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the invention. In this

regard, no attempt is made to show structural details of the invention in more detail than is necessary for a fundamental understanding of the invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the invention may be embodied in practice.

5 In the drawings:

FIG. 1 is a schematic block diagram of a cleaning device according to the present invention;

FIG. 2A-C are schematic illustrative diagrams of an exemplary cleaning device, depicted in the form of a broom, according to an optional
10 embodiments of the present invention;

FIG. 3A-D are schematic illustrative diagrams of an exemplary cleaning device, depicted in the form of a broom, according to an optional embodiments of the present invention;

FIG. 4A-D are schematic illustrative diagrams of an exemplary
15 cleaning device head portion according to an optional embodiments of the present invention;

FIG. 5 is a schematic illustrative diagram of an exemplary cleaning device according to an optional embodiments of the present invention; and

FIG. 6A-B are schematic illustrative diagrams of exemplary cleaning
20 device that is utilized with an auxiliary electronic devices according to an optional embodiments of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The principles and operation of the present invention may be better
25 understood with reference to the drawings and the accompanying description. The following figure reference labels are used throughout the description to refer to similarly functioning components are used throughout the specification hereinbelow.

- 10 vertical axis or Y-axis;
- 20 horizontal axis or X-axis;
- 100 cleaning device;
- 102 handle assembly;
- 5 102a handle first portion;
- 102b handle second portion;
- 102e extended second portion;
- 104 adaptor assembly;
- 104b adaptor plate upper
- 10 surface;
- 104c adaptor plate rod recess;
- 104p adaptor assembly plate;
- 104r adaptor assembly rods;
- 105 rod shaft;
- 15 105a rod shaft first end;
- 105b rod shaft second end;
- 106 interface assembly;
- 106a interface first portion;
- 106b interface second portion;
- 20 106c interface
- connector/coupler;
- 110 cleaning head assembly;
- 110a upper surface;
- 110b body
- 25 110c lower surface;
- 110m cleaning medium /surface;
- 112 cleaning head first (right)
- portion;
- 112a long arm;
- 30 112b base;
- 112c short arm;
- 112o long arm outer edge;
- 112i long arm inner edge;
- 112d short arm outer edge;
- 35 112e short arm inner edge;
- 112o outer edge;
- 112r rail;
- 112t track;
- 114 cleaning head second
- 40 (left) portion;
- 114a long arm;
- 114b base;
- 114c short arm;
- 114o long arm outer edge;
- 45 114i long arm inner edge;
- 114d short arm outer edge;
- 114e short arm inner edge;
- 114o outer edge;
- 115 unitary cleaning head;
- 50 115a long edge;
- 115b short edge;
- 116 cleaning head central
- portion;
- 120 interchangeable cleaning
- 55 head;
- 120r cleaning head coupling
- recess;
- 150 auxiliary electronic
- devices;
- 60

FIG. 1 shows a schematic block diagram of an optional embodiment of the present invention for a cleaning device 100 that features a head portion 110 provided for cleaning and/or treating a surface, the device 100 is characterized in that the size of the of the head portion 110 is controllable along at least one dimension. Most preferably the head portion 110 of the device may assume at least two or more size configuration along at least one dimension for example length and/or width, where for example the head portion 110 may be selectively and controllably made to be narrow at its minimal configuration and/or wide at its expanded maximal configuration. Optionally and preferably head portion 110 may assume any size within the range of the minimized and maximized configurations.

Device 100 provides for controlling the size of the head portion 110 along at least one dimension by employing a handle assembly 102 and an adaptor assembly 104 that are functionally associated with the head portion 110. Most preferably the handle assembly 102 provides a handle that may be moved in the vertical direction 10 which is adapted and/or converted and/or translated by adaptor 104 to provide head portion 110 with the necessary horizontal movement in the horizontal plane and axis 20 to allow head portion 110 to assume a small configuration (narrow) or an expanded configuration (wide) configuration.

The ability to change the size of a head portion 110 in a controllable manner with handle portion 102 that may be maneuvered vertically in the vertical axis is advantageous as a user may seamlessly expand or retract the cleaning head 110 along the horizontal axis, an in particular without having to touch or come into direct physical contact with the cleaning head 110.

Optionally cleaning device 100 may be realized in a variety of forms for example including but not limited to a brush, broom, mop, squeegee, sweeper, the like or any combination thereof.

Cleaning device 100 preferably comprises a handle assembly 102, adaptor assembly 104, and head portion 110. Optionally device 100 may further comprise an interface assembly 106 that facilitates to couple the

adaptor assembly 104 with interchangeable head portions 120, a variant form of head portion 110 as will be discussed below with respect to FIG. 3A-D.

Handle assembly 102 preferably comprises a first portion 102a and a second portion 102b that are concentrically associated with one another where second portion 102b is disposed internal to first portion 102a, for example as shown in FIG. 2A-C. Therefore first handle portion 102a may be maneuvered vertically along the length of second portion 102b.

Most preferably handle assembly 102 is functionally coupled with a portion of adaptor assembly 104, such that the maneuvering of handle first portion 102a in the vertical direction mobilizes adaptor assembly 104.

Adaptor assembly 104 preferably comprises two portions: a plate portion 104p and at least two rods 104r. Preferably rods 104r are pivoted by way of a hinge, folding crease coupler, or the like pivoting connectors with first handle portion 102a. Preferably pivoting rod 104r with first handle portion 102a allows for transferring the motion and position of handle portion 102a to the adaptor assembly 104. Preferably plate portion 104p provides for receiving at least a portion of rod 104r along the length of rods 104r, 105 and provides for directing and/or limiting and/or controlling the movement of rods 104r. Plate portion 104p is preferably coupled with second handle portion 102b therein further providing for transferring vertical motion with handle assembly 102 to adaptor assembly 104.

Adaptor assembly 104 may optionally be coupled with at least one of head assembly 110 or an optional interface assembly 106.

In an optional embodiment, adaptor assembly 104 may be functionally and directly coupled to an interface assembly 106 that functions to receive the horizontal movement provided by assembly 104. Preferably interface assembly comprises at least two or more portions 106a, 106b that are configured to couple with optional configurations of head portions 110, for example in the form of interchangeable head portions 120, shown in FIG. 3A-D. Interface assembly 106 is preferably coupled to head portion 110, 120

with optional coupler 106c that is configured to couple with corresponding couplers provided on head portion 110, 120.

Most preferably interface assembly 106 provides for allowing a user to quickly and seamlessly interchange head portions so as to allow the handle
5 assembly 102 to be readily coupled with different and/or interchangeable head portions 110,120 therein providing a cleaning device that may be realized in optional forms for example including but not limited to a mop, broom, squeegee, sweeper as depicted by the type of head portion 110,120 that is utilized.

10 In an optional embodiment, adaptor assembly 104 may be functionally and directly coupled to head portion 110 that functions to receive the horizontal movement provided by assembly 104. Optionally as described above head portion 110 may be associated with adaptor assembly 104 indirectly via interface assembly 106. Optionally head portion 110 may be
15 coupled to adaptor assembly.

Optionally head portion 110 and adaptor assembly 104 may be coupled with one another over a fixed and/or rigid coupling apparatus, such as welding and/or bolt and/or screw, in such a manner wherein head portion 110 defines the type of cleaning device 100 that is provided. For example,
20 device 100 may be realized as a broom when portions of head portion 110, provided in the form of a broom head, are screwed and/or bolted and/or welded with portions of the adaptor assembly 104, to allow horizontal motion but fixing the type of cleaning head that is available to the end user.

Optionally head portion 110 and adaptor assembly 104 may be
25 securely coupled with one another by way of utilizing a non-rigid and/or readily removable couplers for example including but not limited to male-female couplers, snap fit couplers, hook and look couplers, or the like coupling apparatus so as to allow adaptor assembly to interchange the type of head portion 110 utilized, for example as depicted in FIG. 5.

30 Head portion assembly 110 preferably comprises at least two or more head portions 112, 114 that are intertwined and slideable relative to one

another to form a unitary cleaning head 115 that may assume variable width along the long side of cleaning head 115 to provide a range of width ranging from a narrow (small) configuration, FIG. 2A, to a wide (long) configuration, FIG. 2C.

5 Optionally head portion 112 is configured to be a right handed portion and head portion 114 is a left handed portion that are configured to fit and intertwined with one another to form a unitary cleaning head 115. Optionally portions 112, 114 may be configured to be geometric chiral bodies providing for fitting in a handshake configuration, for example as shown in FIG. 4A.

10 Optionally and preferably each head portion 112, 114, 116 may be fit with corresponding track and rail system so as to allow them associate and slide relative to one another.

 Optionally unitary cleaning head 115 may be provided from at least three sub-portions including a right portion 112 capable of moving along the
15 right horizontal axis, a left portion 114 configured to move along the left horizontal axis, and a stationary central portion 116. Preferably right portion 112 moves to the right relative to central portion 116 and left portion 114 moves to the left relative to the central portion 116. Optionally right portion 112 is configured to slide relative to central portion 116 and left portion 114
20 is configured to slide relative to central portion 116. Preferably right portion 112 may couple and/or associate on the right side of central portion 116 and left portion 114 may couple and/or associate on the left side of central portion 116 to form unitary cleaning head 115.

 An optional embodiment may provide for coupling device 100 with
25 optional auxiliary devices and/or electronic devices 150, for example as shown in FIG. 6A-B. Preferably handle assembly 102, and in particular handle second portion 102b, may be configured to be coupled with a portion of optional auxiliary device and/or electronic devices 150, having a hose or tubing that conveys a flowing fluid for example air, liquid, emulsion or gas
30 wherein the hose may be coupled with a handle assembly 102, for example at

handle second portion 102b, so as to convey the flowing fluid to the cleaning head assembly 110.

Optional auxiliary electronic devices (150) may be selected from the group for example including but not limited to: vacuum cleaner, steam cleaner, pool cleaning device, pool vacuum cleaner, electronic painting
5 device, spray paint gun, electric paint roller, electric paint brush, the like or any combination thereof.

Accordingly device 100 may be configured to be an add-on device and/or a retrofit device onto an existing auxiliary and/or electronic system
10 150 for conveying a flowing fluid via a hose. For example a device 100 may be configured to fit with an off the shelf vacuum cleaner so as to provide an extension member and/or cleaning head and arm capable of assuming variable cleaning head widths.

Now referring to FIG. 2-6 showing detailed depiction of optional
15 embodiments of device 100, according to the present invention where similar parts are labelled accordingly throughout. While the images depicted show device 100 configured in the form of a broom using a head portion (110) in the form of a broom head, the present invention is not limited to such an application where as discussed the head portion 110 may be provided in a
20 variety of optional forms for example including but not limited to squeegee, brush, paint brush, hair brush, sweeper, mop, broom, water retention cloth, static charged cleaning cloth, water retention fabric, street sweeper, the like or any combination thereof.

FIG. 2A-C show an optional embodiment of device 100 comprising a
25 handle portion 102, that is coupled with adaptor portion 104, that is in turn directly affixed to head portion 110. Device 100 is configured to transform vertical movement of a portion of handle portion 102 in the vertical axis 10 to control the width of head portion 110 in the horizontal axis 20 therein allowing device 100 to be realized in various configuration based on its
30 width, for example as shown, a narrow configuration as shown in FIG. 2A, a

wide configuration as shown in FIG. 2C, and an intermediate width configuration as shown in FIG. 2B.

Preferably handle assembly 102 comprises at least two members 102a,102b that are concentrically fit with one another so as to allow a user to
5 vertically slide first handle portion 102a relative to second handle portion 102b. The second handle portion 102b is disposed internally with first handle portion 102a and may slide relative to one another for example as shown by directional arrows 10 depicting the vertical axis.

Most preferably each of first handle portion 102a and second handle
10 portion 102b are individually attached to a portion of adaptor assembly 104, as will be described in greater detail below.

Optionally and preferably handle portion 102 may be provided in the form of an elongated cylindrical rod or the like shape conducive for holding, wherein first portion 102a has an open central channel along its length that is
15 configured to receive second portion 102b.

Optionally handle portion 102 and its parts may be provided from optional materials as is known in the art for example including but not limited to polymers, alloys, metals, plastics, natural fibers, wood, recycled materials, the like or any combination thereof.

20 Optionally and preferably the length second handle portion 102b may be configured to be at least twice the length of first handle portion 102a.

Optionally the length of second handle portion 102b may be at least three times the length of the first handle portion 102a.

Optionally handle assembly 102 may feature at least two or more
25 integrated stopping positions (not shown) provided to limit the movement of first handle portion 102a over second handle portion 102b.

The stopping position may be realized in the form of latch and recess that are disposed along the length of first hand portion 102a and along at least a portion of the second handle portion 102b, that corresponds and
30 interfaces with first portion 102a.

Optionally first handle portion 102a may comprise a plurality of recesses provided as stopping points and second handle portion 102b may feature a latch that may be repositioned between the plurality of recesses.

Preferably each of first handle portion 102a and second handle
5 portion 102b are configured to securely fit with adaptor assembly 104, that comprises a plate member 104p and at least one rod member 104r and more preferably at least two rod members 104r.

Adaptor assembly plate member 104p is a substantially rectangular
10 body including two parallel long edges, two parallel short edges and an upper surface 104b, FIG. 2C. Upper surface 104b is optionally and preferably configured to receive and securely couple with an end second handle portion 102b, for example as shown.

Optionally plate 104p and handle second portion 102b may be
15 coupled by way of corresponding couplers that may for example be selected from the group including but not limited to: threading, male to female connectors, snap fit and recess connectors, latch and recess, the like or any combination thereof.

Preferably adaptor plate 104p further features at least two parallel
20 recesses 104c, FIG. 2B, provided through the adaptor plate surface. The at least two parallel recess 104c are preferably disposed adjacent to the two parallel short edges of plate 104p. Each recess 104c is provided for receiving at least a portion of an adaptor assembly rod 104r along its length 105. Recess 104c is further configured to facilitate and allow plate 104p to slide along rod 104r about its length 105. Such sliding provides for
25 facilitating adapting and/or converting the vertical movement 10U of handle assembly 102 along vertical axis 10 to horizontal movement 20R, 20L along the horizontal axis 20, FIG. 2C, to allowing the head portion 110 of device 100 to assume a plurality of optional configurations as shown FIG. 2A-C.

Optionally the two parallel recesses 104c may be provided in the form
30 of a borehole across the surface of adaptor plate 104p. Optionally recess 104c may be provided with an angle across plate 104p. Optionally recess

104c angle may be up to about 90 degrees relative to a normal of plate upper surface (104b).

Preferably the at least two rod members 104r are configured to securely associate with the first handle member 102a, for example as shown
5 Fig. 2A-C.

Preferably the two adaptor assembly rods 104r are substantially provided in the form of cylindrical rods having a first end 105a, an elongated shaft 105 and a second end 105b.

Preferably rod shaft 105 is configured to be received within adaptor
10 plate 104p along recess 104c.

Preferably rod first end 105a is configured to be pivotally coupled with first handle portion 102a, wherein rod 104r is pivoted with respect to first handle portion 102a over a hinge coupler allowing rod 104r to assume variable angles relative to the shaft of first handle portion 102a. Most
15 preferably the angle assumed by rod 104r relative to first handle portion 102a is limited and/or controlled with plate member 104p and more particularly by recess 104c.

Most preferably two rods 104r are coupled with first handle portion 102a on opposite sides of handle portion 102a.

Optionally the pivotal coupling between rod first end 105a and first
20 handle portion 102a may be mediated with a coupler selected from the group for example including but not limited to: a hinge, ball and socket joint, creasing, folding crease, soft crease, the like or any combination thereof.

Preferably rod second end 105b is configured to associate with a
25 cleaning head portion 110. As shown, the second end 105b of a first rod member 104r is coupled with right hand head portion 112 and the second end 105b of a second rod member 104r is coupled with left hand head portion 114, therein providing for the simultaneous movement of the right hand head portion 112 to move horizontally to the right 20R, while
30 simultaneously left hand head portion 114 moves horizontally to the left 20L, for example as shown in FIG. 2C. Most preferably movement along

the horizontal axis 20 is controlled by the vertical movement, depicted by arrow 10U, wherein second handle portion 102b is displaced vertically upwards (10U) relative to first handle portion 102a.

Optionally adaptor assembly 104 may further define a plurality of
5 stopping points (not shown) for controlling the movement of plate 104p
along rods 104r and therein controlling the movement in the horizontal axis
20. Optionally the stopping points may be realized in the form of notches
and/or graduations disposed on rods 104r along its length 105, while adaptor
plate 104p may be fit with a stopping and/or or holding member (not shown)
10 provided to hold said plate 104p at a stopping points along the rods shaft
104r, 105. Optionally the stopping points associated with plate 104p may be
provided within recess 104c. Optionally plate 104p may be provided with a
clamping member (not shown) disposed along one of its surfaces or edges to
catch and/or prevent plate 104p from sliding along rods 104r

15 Adaptor assembly 104 is provided for translating and/or converting
the vertical movement provided by handle assembly 102 to horizontal
movement 20 of cleaning head assembly 110 so as to provide a controllable
cleaning area.

Preferably cleaning head assembly 110 comprises at least two
20 cleaning head portions 112, 114 that are coupled with one another to form a
unitary cleaning head 115 having at least one variable dimension along the
horizontal axis and/or plane 20. Most preferably the variable dimension is
controllable with the movement of handle assembly 102 along the vertical
axis 10.

25 As best seen in FIG. 4A-D, Unitary cleaning head 115 includes: a
planar body 110b comprising an upper surface 110a and a lower surface
110c. The upper surface 110a is provided for associating with said adaptor
assembly 104, preferably at second end 105b as shown in FIG. 2B-C. Lower
surface 110c provides a surface for receiving and/or housing and/or
30 integrating with a cleaning medium 110m, a non limiting example is shown
in the form of broom brush bristles FIG. 2A-C. Optionally, cleaning

medium 110m may for example include any medium utilized for cleaning a surface but is not limited to a medium selected from the group consisting of: broom brush bristles, squeegee rubber, mop fibers, water retention fibers, water retention cloth, floor wiper cloth, brush fibers, absorbing material, sponges, polymers, plastic, rubber, cleaner pad, abrasive cleaning pad, metallic abrasive pads, polymer cleaner pad, natural fiber cleaning pad, the like or any combination thereof.

Optionally device 100 and in particular adaptor assembly 104 may be further configured to provide the unitary cleaning head 115 with at least one variable dimension in a dimension for example including but not limited to the dimension selected from: long side, short side, length, width, diameter, radius, the like or any combination thereof.

While unitary cleaning head 115 is depicted as having a rectangular body, however cleaning head 115 is not limited to such a rectangular form. Optionally the body 110b of unitary cleaning head 115 may assume any geometric shape for example including but not limited to a geometric shape selected from the group comprising: rectangle, rounded rectangle, quadrilateral, oval, circular, ovoid, ellipsoid, polygon having n sides where n is at least 3 ($n > 2$), the like or any combination thereof.

Now collectively referring to FIG. 4A-D and FIG. 2A-C, showing a specific however non-limiting embodiment of unitary cleaning head 115 according to the present invention. Unitary cleaning head 115 may be provided with a rectangular body 110b including a long edge 115a and a short edge 115b, wherein the variable dimension 115d is width corresponding to the length of the long edge 115a characterized in that the at its wide configuration, FIG. 2C, unitary cleaning head 115 has a length equal to about twice the length of long edge 115a; at in its narrow configuration, FIG. 2A, cleaning head 115 has a length equal to about the length of long edge 115a; at an intermediate length, FIG. 2B, the width of cleaning head 115 is in between the narrowest configuration and widest configuration

larger than the length of long edge 115a and shorter than twice the length of long edge 115a.

FIG. 4A-B, show unitary cleaning head 115 comprises at least two cleaning head portions 112,114 include a right hand cleaning head 112 and a left hand cleaning head 114. The cleaning head portions 112,114 are characterized in that the right hand cleaning head portion 112 and the left hand cleaning head portion 114 may be intertwined and/or slidably fit with one another, so as to form a handshake coupling between right portion 112 and left portion 114.

As shown in FIG. 4B showing a partial exploded view of FIG. 4A. The two cleaning head portions 112,114 are geometric chiral bodies of the other, each portion forming 'U-like' polygonal body comprising a rectangular base 112b, 114b integral with two extending arms including a long arm 112a,114a and a short arm 112c, 114c.

The long arm 112a, 114a having an outer edge 112o,114o and an inner edge 112i,114i.

The short arm 112c, 114c comprising an outer edge 112d,114d and an inner edge 112e,114e.

Preferably the right portion 112 and left portion 114 are configured to intertwine and/or fit with one another in a manner depicted as follows: the long arm inner edge 112i,114i is configured to slidably interface and/or associate with the short arm outer edge 112d,114d of the corresponding cleaning head portion; and the short arm inner edge 112e is configured to slidably interface and/or associate with the corresponding short arm inner edge 114e of the corresponding cleaning head portion.

Optionally and preferably the at least two cleaning head portions 112, 114 are slidably associated with one another by way of utilizing corresponding track and rail system.

Optionally the inner edge 112i, 114i of long arms 112a, 114a comprises a rail 112r,114r extending from the inner edge surface 112i,114i; and the outer edge of 112d,114d of short arms 112c,114c comprises a

recessed track 112t configured for receiving rail 112r on the long arm 112a, 114a; and the short arm inner edge 112e features a track 112t slidingly interface and/or associate with a rail 114r featured along the corresponding short arm inner edge 114e. Optionally the rail and track position may be
5 switched between corresponding parts.

Optionally the short arm 112c, 114c is about 3/4 the length of long arm 112a, 114a.

FIG. 4A shows a perspective long view of unitary head portion 115 showing each of the right hand portion 112 and left hand portion 114.

10 FIG. 4C shows an end view of head portion 115.

FIG. 4D is a midline cross-sectional view of head portion 115 showing the different segments of right hand portion 112 and left hand portion 114 as well as the slide coupling configuration utilizing track 112t, 114t and rail 112r, 114r.

15 FIG. 3A-D show different view of an optional embodiment of the present invention for a cleaning device 100 that utilizes an interface layer and/or member 106. Preferably interface member 106 provides for facilitating a quick connection of the device handle assembly 102 and adaptor assembly 104 to a variety of interchangeable head portion 120 that
20 are configured to couple with interface member 106.

Most preferably interchangeable head portions 120 has the same configuration as head portion assembly 110, as previously described, however further comprising a coupling interface for securely associating with interface member 106. Most preferably interface member 106 is
25 configured to have the same geometric planar shape as head portions 112, 114, for example as shown in FIG. 3D, so as to facilitate coupling with the upper surface of head portion 110a, and or interchangeable head portion 120.

As shown in FIG. 3A-B interface member 106 is securely coupled
30 with adaptor assembly 104, wherein at least one dimension of interface member 106 may be extended or retracted based on the position of adaptor

assembly 104 to assume a narrow configuration or a wide configuration, as previously described.

Preferably interface 106 is functionally and directly associated with adaptor assembly 104 at second end 105b so that vertical movement of handle assembly 102, is translated/converted/adapted to horizontal movement both in interface layer 106 the head assembly 110,120 to which the interface 106 is coupled.

Preferably interface member 106 further comprises at least one and more preferably a plurality of coupling member 106c. Coupling members, show in FIG. 3A-D taking the form of male snap fit couplers, are provided to couple with corresponding coupling recess 120r disposed along the upper surface of interchangeable head portions 120.

Optionally a coupler and/or coupling interfaces may be utilized to securely couple between interface member 106 and interchangeable head portion 120.

Optionally head portion 110 may be adapted to form an interchangeable head portion 120 by introducing a coupling interface 120c onto upper surface 110a of head portion 110. Coupling interface 120c may be provided in any form for example including but not limited to male-female couplers, snap-fit, hook and loop, the like or any combination thereof.

FIG. 5 shows a schematic illustration of an optional coupling interface between head portion 110,120 and adaptor assembly 104. Different views are provided of an optional coupling configuration between rod second end 105b and upper surface 110a of head portion 110, wherein upper surface 110a comprises a coupling interface 120c in the form of a recess 120r. Optionally coupling interface 120c may be realized in any form capable of securely coupling with adaptor assembly 104 or rod second end 105b.

FIG. 6A-B shows a schematic illustrative depiction of an optional embodiment of the present invention where device 100 is coupled with an

auxiliary electronic device 150, for example as previously described with respect to FIG. 1.

An optional embodiment may provide for coupling device 100 with optional auxiliary devices and/or electronic devices 150 in the form of a vacuum cleaner for example as shown in FIG. 6A or an electronic painting device as shown in FIG. 6B..

Preferably handle assembly 102, and in particular handle second portion 102b, may be configured to be coupled with a portion of optional auxiliary device and/or electronic devices 150, having a hose or tubing 152 that may be used to convey a flowing fluid for example air, liquid, emulsion, mixture, or gas. Hose 152 may be coupled with a handle assembly 102, for example at handle second portion 102b, so as to convey the flowing fluid to the cleaning head assembly 110.

Optionally handle portion 102b may be adapted and provided in the form of an elongated second handle portion 102e, having a hollow central channel to allow a flowing fluid to flow in any direction from hose 152 toward head portion 110.

Optionally and preferably elongated second handle portion 102e may be coupled with interface 106 at every portion thereof. FIG. 6B shows, elongated second handle portion 102e is shown as having a three part end where each of the three handle portion end is provided to associated with a portion of interface 106 so as to convey a flowing fluid from device 150 and onto all portion of head portion 110, 120. Optionally elongated handle 102e may be provided with two part end when interface 106 comprises two portions, for example similar to that depicted in FIG. 3C-D. Optionally and preferably interface 106 provides for distributing the flowing fluid being conveyed through hose 152 and elongated handle portion 102e, toward any portion of head portion 110, 120.

Optionally elongated handle portion 102e may be directly associated about a central portion of interface 106 without directly interfacing with head

portion 110,120, for example as shown in FIG. 6A, in a vacuum cleaner application.

Optionally adaptor assembly 104 may be configured so as to allow plate 104p to slide along the length of elongated handle portion 102e, in the vertical direction as depicted by directional arrow 10.

Optionally auxiliary electronic device 150 may be selected from the group for example including but not limited to: vacuum cleaner, steam cleaner, pool cleaning device, pool vacuum cleaner, electronic painting device, spray paint gun, electric paint roller, electric paint brush, the like or any combination thereof.

Accordingly device 100 may be configured to be an add on device and/or a retrofit device onto an existing auxiliary and/or electronic system 150 for conveying a flowing fluid via a hose. For example a device 100 may be configured to fit with an off the shelf vacuum cleaner so as to provide an extension member and/or cleaning head and arm capable of assuming variable cleaning head widths.

While the invention has been described with respect to a limited number of embodiment, it is to be realized that the optimum dimensional relationships for the parts of the invention, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention.

In the drawings, in a non-limiting depiction of optional embodiments, broken and/or dotted lines may be used to refer to optional items and/or objects and/or portions that may be utilized in some optional embodiments.

Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not described to limit the invention to the exact construction and operation shown and

described and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

It is appreciated that certain features of the invention, which are, for clarity, described in the context of separate embodiments, may also be provided in combination in a single embodiment. Conversely, various features of the invention, which are, for brevity, described in the context of a single embodiment, may also be provided separately or in any suitable sub-combination or as suitable in any other described embodiment of the invention. Certain features described in the context of various embodiments are not to be considered essential features of those embodiments, unless the embodiment is inoperative without those elements.

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 scope of the appended claims.

Citation or identification of any reference in this application shall not be construed as an admission that such reference is available as prior art to the invention.

Section headings are used herein to ease understanding of the specification and should not be construed as necessarily limiting.

While the invention has been described with respect to a limited number of embodiments, it will be appreciated that many variations, modifications and other applications of the invention may be made.

WHAT IS CLAIMED IS:

- 1) A device having a variable width cleaning (head) surface, the device including a handle assembly (102) provided in the vertical axis (10), an adaptor assembly (104) and a cleaning head assembly (110) provided in the horizontal axis (20), said handle assembly (102) is functionally associated with said adaptor assembly (104) which in turn is functionally associated with said cleaning head assembly (110), wherein said adaptor assembly (104) provides for translating vertical movement (up or down) along the vertical axis of said handle assembly (102) to horizontal movement (left or right) along the horizontal axis (20) of said cleaning head assembly (110).
- 2) The cleaning device of claim 1 further comprising an interface layer (106) functionally associated with said adaptor assembly (104) and configured to move along the horizontal axis (20), said interface layer (106) provided to couple with a cleaning head assembly (110) that is provided in the form of interchangeable cleaning heads (120).
- 3) The cleaning device of claim 2 wherein said interchangeable cleaning heads (120) are selected from the group consisting of: broom brush, squeegee, floor sweeper, brush head, mop head, cloth, and statically charged cloth.
- 4) The device of claim 2 wherein said interface layer (106) further comprises at least one connector (106c) provided to facilitate coupling with said interchangeable cleaning heads (120).
- 5) The device of claim 4 wherein said at least one connector (106c) is provided in the form selected from the group consisting of: snap fit connector; male and female connectors; hook and loop, any combination thereof.
- 6) The device of claim 5 wherein said interface layer comprises a plurality of connectors (106c).

- 7) The device of claim 5 wherein said interface layer comprise comprises a male connectors (106c) corresponding to and aligned with a recess (120r) disposed along said interchangeable cleaning heads (120).
- 8) The device of claim 1 wherein said handle assembly (102) comprises at least two members (102a,102b) that are concentrically fit with one another so as to allow a user to vertically slide a first handle portion (102a) relative to a second handle portion (102b); wherein said second handle portion (102b) is disposed internal to said first handle portion (102a); wherein said first handle portion and said second handle portion are individually attached to a portion of said adaptor assembly (104).
- 9) The device of claim 8 wherein handle assembly (102) comprises at least two or more stopping positions provided to limit the movement of said first handle portion (102a) over said second handle portion (102b).
- 10) The device of claim 9 wherein said stopping position are realized in the form of latch and recess that are disposed along the length of said first handle portion (102a) and said second handle portion (102b).
- 11) The device of claim 10 wherein said first handle portion (102a) comprises a plurality of recesses provided as stopping points and wherein said second handle portion (102b) comprises a latch that may be repositioned between said plurality of recesses.
- 12) The device of claim 8 wherein the length of said second handle portion (102b) is at least twice the length of said first handle portion (102a).
- 13) The device of claim 12 wherein the length of said second handle portion (102b) is at least three times the length of said first handle portion (102a).
- 14) The device of claim 8 wherein said handle portion (102) is provided in the form of an elongated cylindrical rod, wherein said first portion (102a) has an open central channel along its length that is configured to receive said second portion (102b).

- 15)The device of claim 8 wherein said adaptor assembly (104) comprises at least two members including: at least one adaptor assembly rods (104r) and an adaptor assembly plate (104p).
- 16)The device of claim 15 wherein said adaptor assembly (104) comprises at least two adaptor assembly rods (104r) and an adaptor assembly plate (104p).
- 17)The device of claim 16 wherein said adaptor assembly plate (104p) is configured to securely associate with an end of the second handle member (102b) and wherein said at least two assembly rods (104r) are configured to securely associate with the first handle member (102a).
- 18)The device of claim 17 wherein adaptor assembly plate (104p) is substantially rectangular including two parallel long edges, two parallel short edges and an upper surface wherein said upper surface (104b) is configured to receive and securely couple with an end of said second handle portion (102b)
- 19)The device of claim 18 wherein said plate upper surface (104b) and said second handle portion (102b) are coupled by corresponding couplers selected from the group consisting of: threading; male to female connectors; snap fit and recess; latch and recess; any combination thereof.
- 20)The device of claim 18 wherein said adaptor plate (104p) further comprises at least two parallel recesses (104c) protruding through the adaptor plate surface, wherein each recess provided for receiving at least a portion of an adaptor assembly rod (104r) along its length (105) and wherein said at least two parallel recess (104c) disposed adjacent to said two parallel short edges.
- 21)The device of claim 20 wherein said two parallel recess (104c) are provided in the form of a borehole across the surface of adaptor plate (104p).
- 22)The device of claim 21 wherein said borehole is provided at an angle.
- 23)The device of claim 22 wherein said borehole angle is up to 90 degrees relative to a normal of the adaptor plate upper surface (104b).

- 24) The device of claim 16 wherein said least two adaptor assembly rods (104r) are substantially provided in the form of a cylindrical rods having a first end (105a), an elongated shaft (105) and a second end (105b),
- a) wherein said shaft (105) is configured to be received within an adaptor plate rod recess (104c); and
 - b) wherein said first end (105a) is configured to be pivotally coupled with said first handle portion (102a) wherein said rod is pivoted with respect to said first handle portion (102a); and
 - c) wherein said second end (105b) is configured to associate with a cleaning head (110,120).
- 25) The device of claim 24 wherein said pivotal coupling between said first end (105a) and said first handle portion (102a) is mediated with a coupler selected from the group consisting of a hinge, ball and socket, any combination thereof.
- 26) The device of claim 24 wherein said second end (105b) is directly associated with said cleaning head assembly (110).
- 27) The device of claim 24 wherein said second end (105b) is directly associated with an interface assembly (106) that is directly associated with an interchangeable cleaning head (120).
- 28) The device of claim 24 wherein said second end (105b) is indirectly associated with an interchangeable cleaning head (120).
- 29) The device of claim 15 wherein said adaptor assembly (104) comprises a plurality of stopping points realized in the form of notches along the length of said rods (104r) and wherein said adaptor plate (104p) may be fit with a stopping or holding member provided to hold said plate (104p) at a stopping points along said rods shaft (104r, 105).
- 30) The device of claim 1 wherein said cleaning head assembly (110) comprises at least two cleaning head portions (112, 114) that are coupled with one another to form a unitary cleaning head (115) having at least one variable dimension along the horizontal plane wherein said variable dimension is

controllable with the movement of said handle assembly (102) along the vertical axis (10); the unitary cleaning head (115) including:

- a) a planar body (110b) comprising an upper surface (110a) and a lower surface (110c);
- b) wherein said upper surface (110a) is provided for associating with said adaptor assembly (104);
- c) wherein said lower surface (110c) provides a surface for housing a cleaning medium selected from the group consisting of: broom brush bristles, squeegee rubber, mop fibers, water retention fibers, water retention cloth, floor sweeper cloth, absorbing material, sponges, plastic, rubber, any combination thereof.

31) The device of claim 30 wherein said at least one variable dimension of said unitary cleaning head (115) is selected from the group consisting of: long side, short side, length, width, diameter, radius, any combination thereof.

32) The device of claim 30 wherein the body (110b) of said unitary cleaning head (115) may assume any geometric shape.

33) The device of claim 32 wherein said geometric shape is selected from the group consisting of: rectangle, rounded rectangle, quadrilateral, oval, circular, ovoid, ellipsoid, polygon having n sides where n is at least 3 ($n > 2$), any combination thereof.

34) The device of claim 32 wherein said cleaning head (115) is provided with a rectangular body (110b) including a long edge and a short edge, and wherein said variable dimension is width corresponding to the length of said long edge characterized in that the at its wide configuration the cleaning head (115) has a length equal to about twice the length of said long side and at in its narrow configuration the cleaning head (115) has a length equal to about the length of said long side.

35) The device of claim 34 wherein said unitary cleaning head (115) comprises at least two cleaning head portions (112, 114) include a right hand cleaning head (112) and a left hand cleaning head (114), characterized in that said

right hand cleaning head portion (112) and said left hand cleaning head portion (114) may be intertwined with one another.

- 36) The device of claim 30 wherein each of said at least two cleaning head portions (112,114) are geometric chiral bodies of the other, each portion forming 'U-like' polygonal body comprising a rectangular base (112b, 114b) integral with two extending arms including a long arm (112a,114a) and a short arm (112c, 114c), said long arm (112a, 114a) having an outer edge (112o,114o) and an inner edge (112i,114i) ; and wherein said short arm (112c, 114c) comprises an outer edge (112d,114d) and an inner edge (112e,114e); wherein the long arm inner edge (112i,114i) is configured to slidably interface with the short arm outer edge (112d,114d) of the corresponding cleaning head portion; and wherein said short arm inner edge (112e) is configured to slidably interface with the corresponding short arm inner edge (114e) of the corresponding cleaning head portion.
- 37) The device of claim 36 wherein said at least two cleaning head portions are slidably associated with one another by way of utilizing corresponding track and rail system.
- 38) The device of claim 36 wherein the edges of said long arms (112a,114a) and said short arms (112c,114c) may comprise corresponding track and rail so as to allow sliding along corresponding edges.
- 39) The device of claim 36 wherein said short arm is about 3/4 the length of said long arm.
- 40) The device of claim 1 wherein said cleaning head assembly (110) comprise at least three cleaning head portions (112, 114, 116) including a central cleaning head portion (116), a right hand cleaning head (112) and a left hand cleaning head (114), wherein said right hand cleaning head (112) is configured to associate with said central cleaning head portion extends to the right side ; and wherein said left hand cleaning head (114) is configured associate with said central cleaning head portion (116) extends to the left side.

- 41)The device of claim 40 wherein arms are configured to associate/interface with one another using corresponding track and rail system.
- 42)The device of claim 30 wherein said upper surface (110a) is indirectly associated with said adaptor assembly (104) characterized in that said upper surface (110a) is associated with an interface layer (106) with at least one or more couplers, and wherein said interface layer (106) is functionally and directly associated with said adaptor assembly (104) at second end (105b) wherein vertical movement of handle assembly (102) is translated to horizontal movement both in said interface layer (106) and in said cleaning head assembly (110,120).
- 43)The device of claim 30 wherein said upper surface (110a) is directly associated with adaptor assembly (104) at second end (105b).
- 44)The device of claim 1 wherein a portion of said handle assembly is configured so as to allow association with optional auxiliary electronic devices (150) selected from the group consisting: of vacuum cleaner, steam cleaner, pool cleaning device, pool vacuum cleaner, electronic painting device, spray gun, electric paint roller, electric paint brush, any combination thereof.
- 45)The device of claim 1 wherein said cleaning head assembly (110) is provided in the form of a brush selected from the group consisting of: paint brush, tooth brush, hair brush, any combination thereof.
- 46)The device of claim 1 wherein said handle assembly (102) is configured to associated with any device comprising tubing capable of conveying a flowing fluid so as to deliver a flowing fluid in a controllable manner via head portion (110).

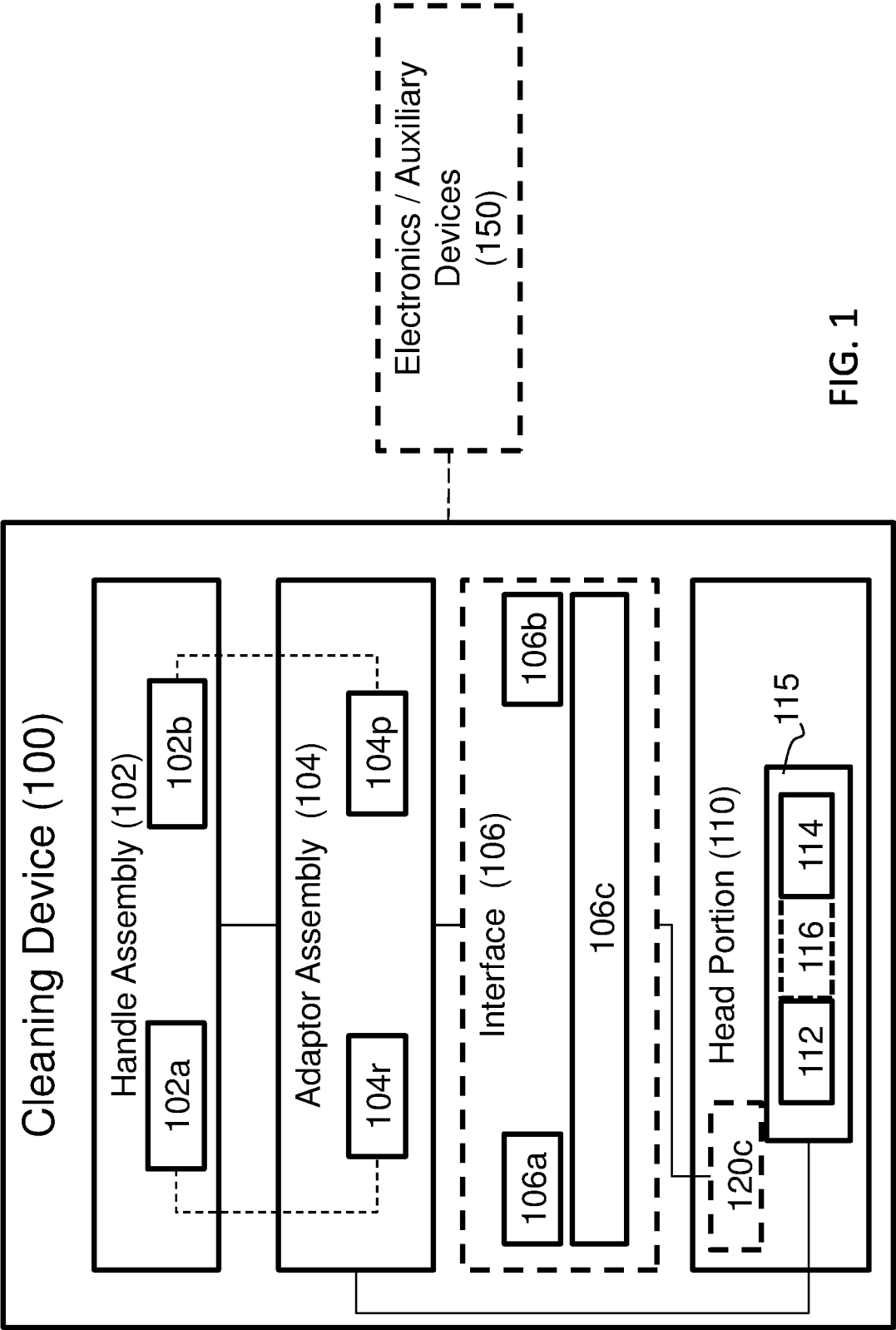


FIG. 1

FIG. 2A

FIG. 2B

FIG. 2C

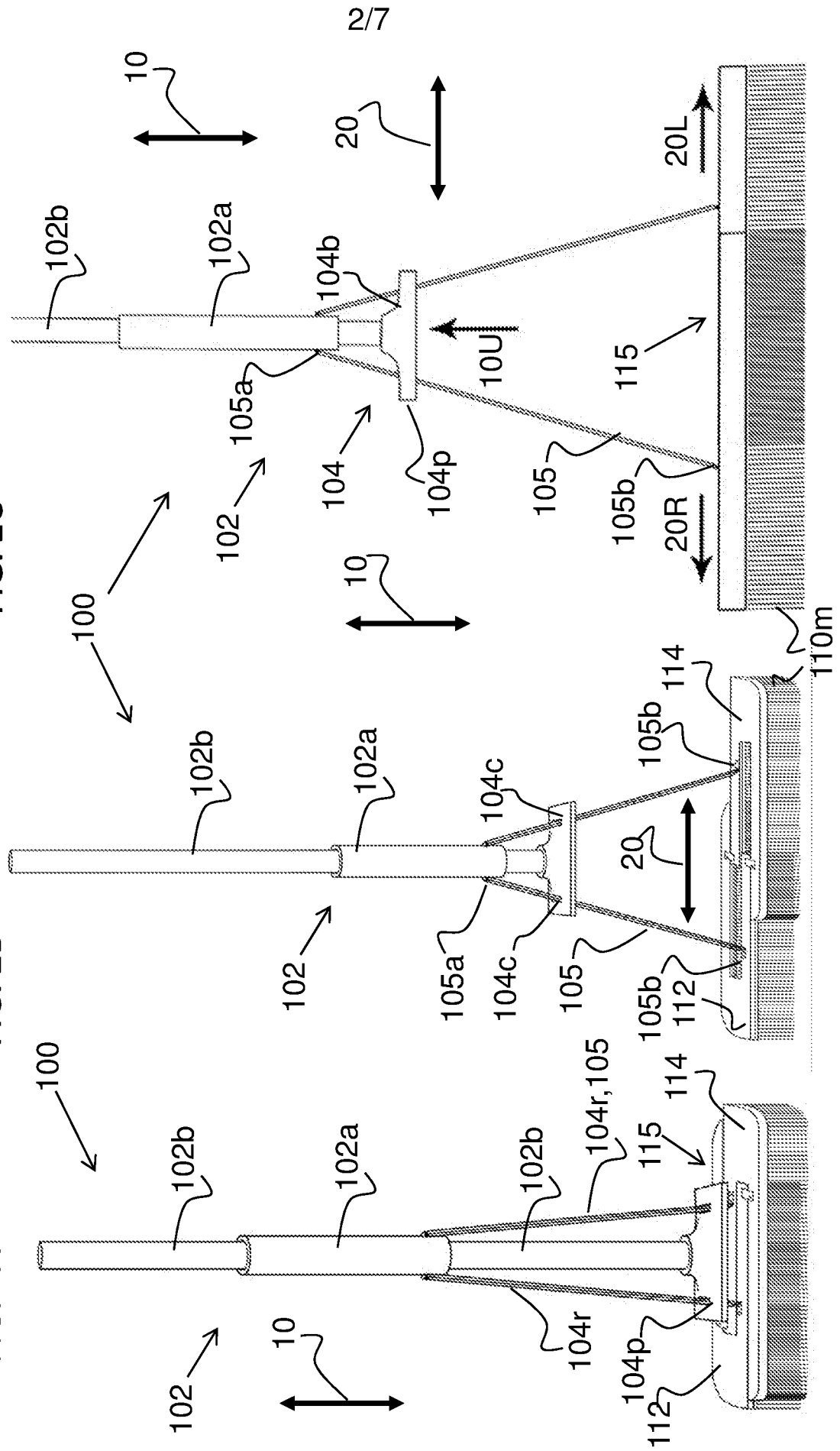


FIG. 3B

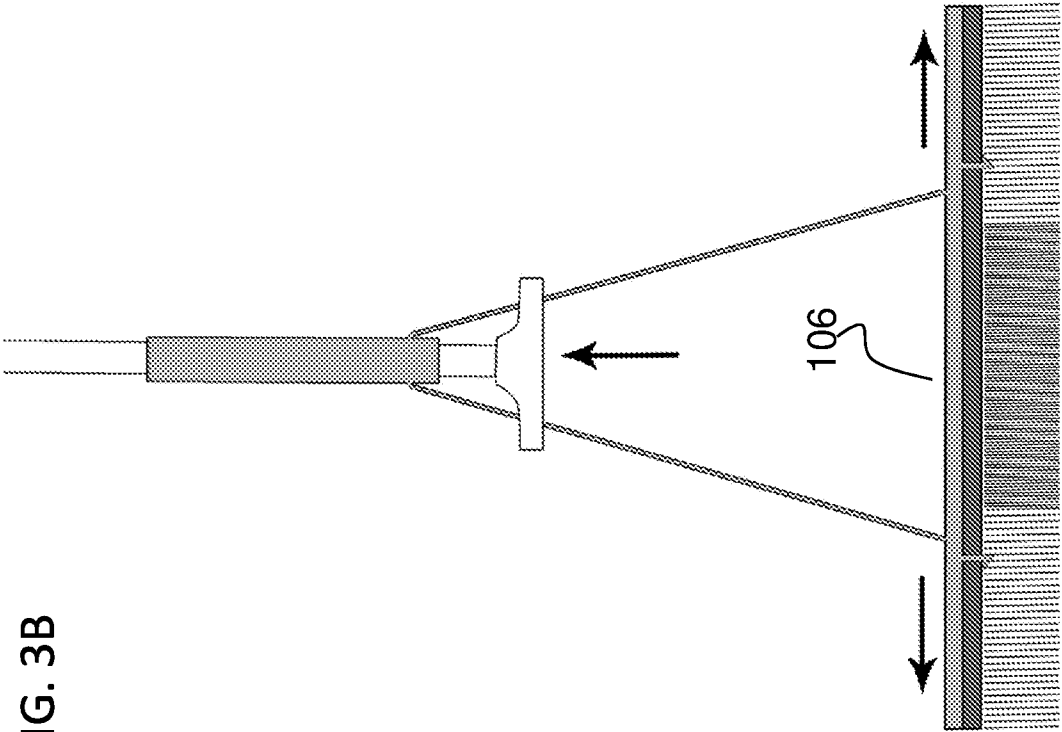
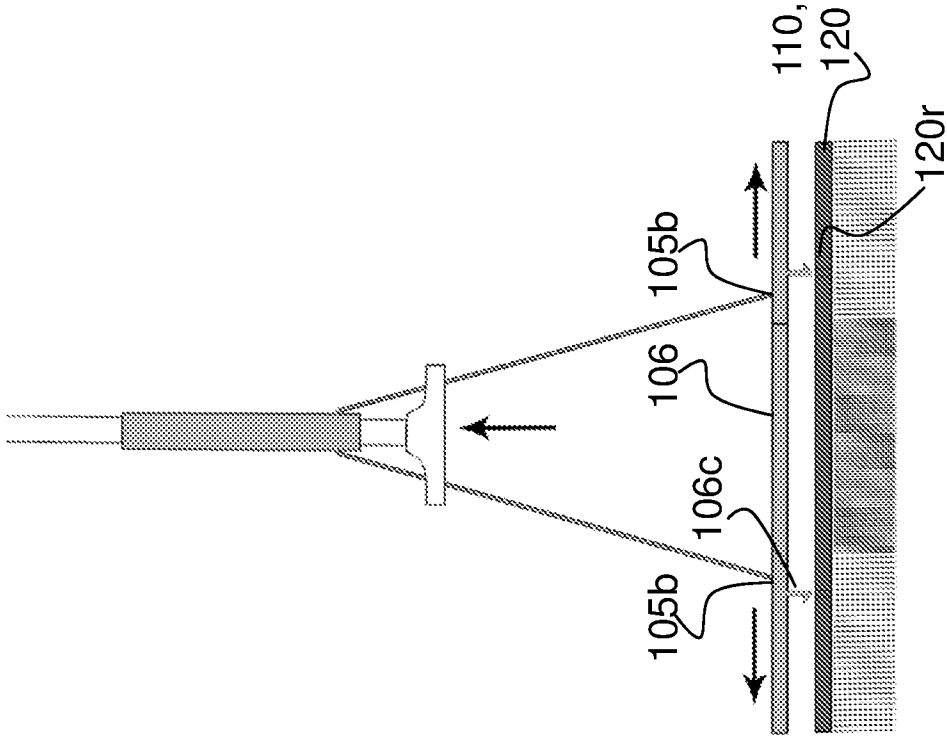
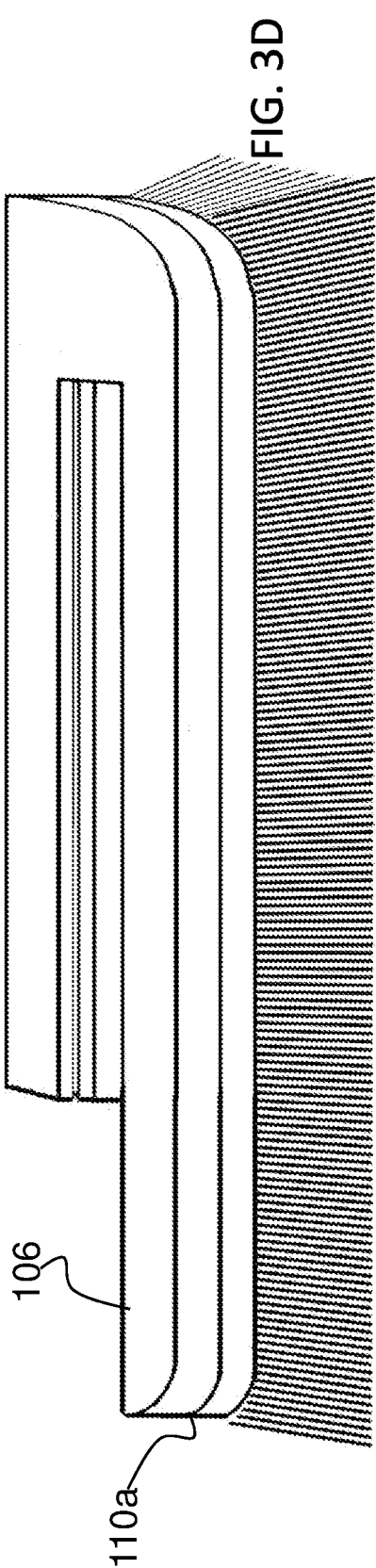
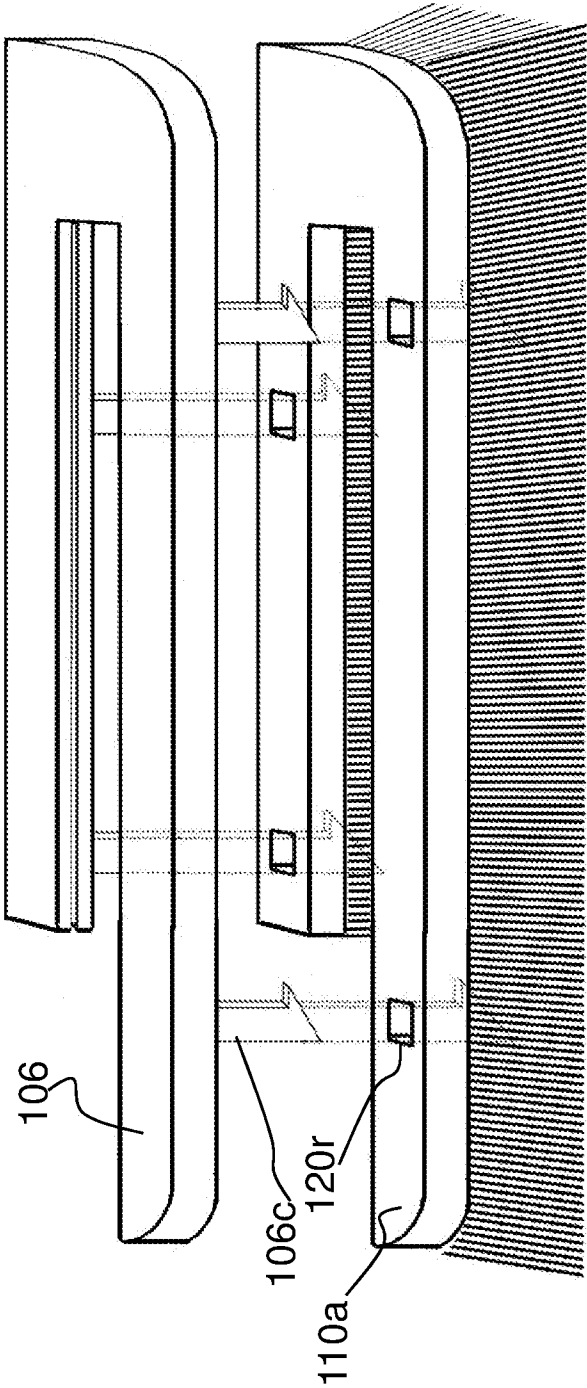
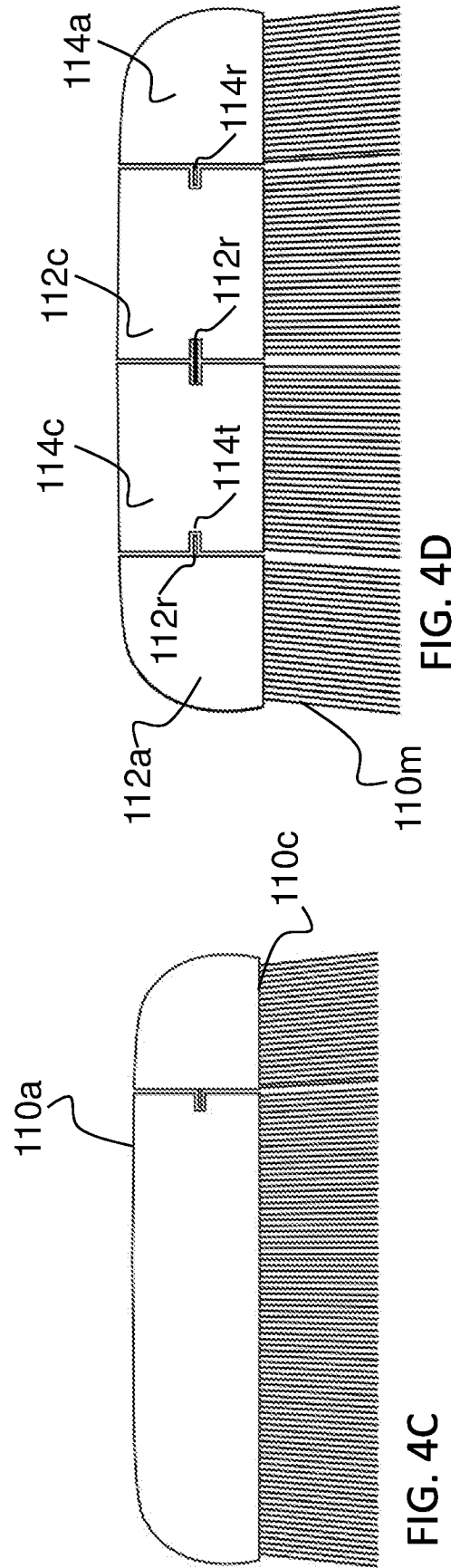
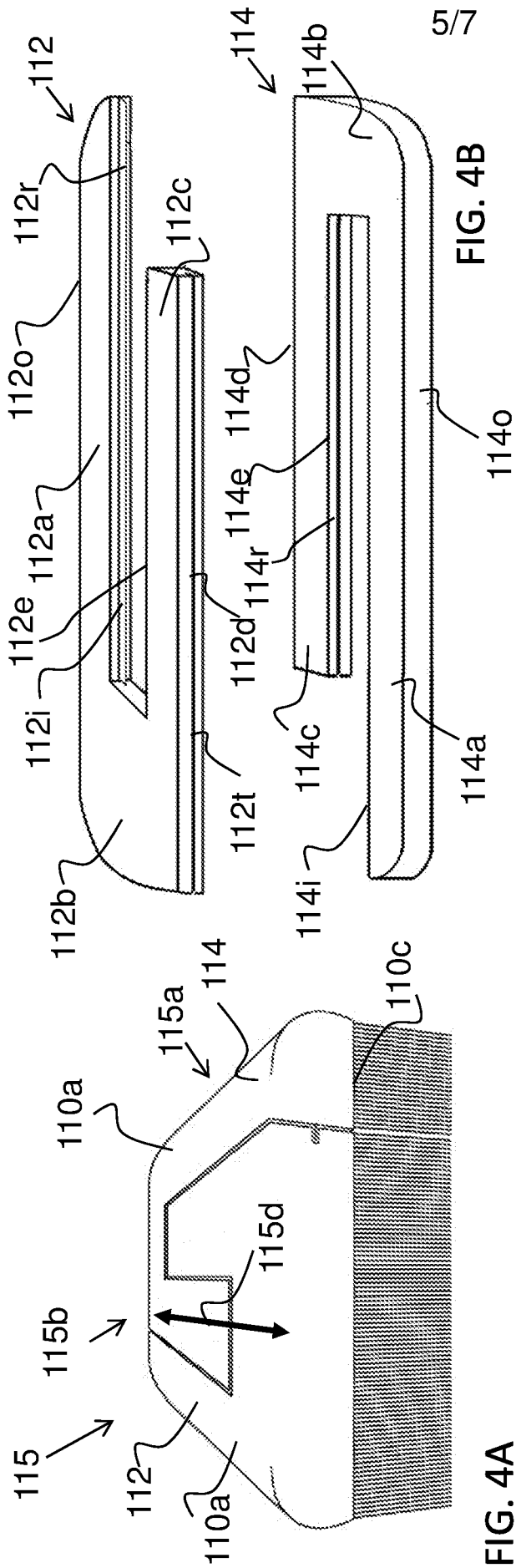


FIG. 3A







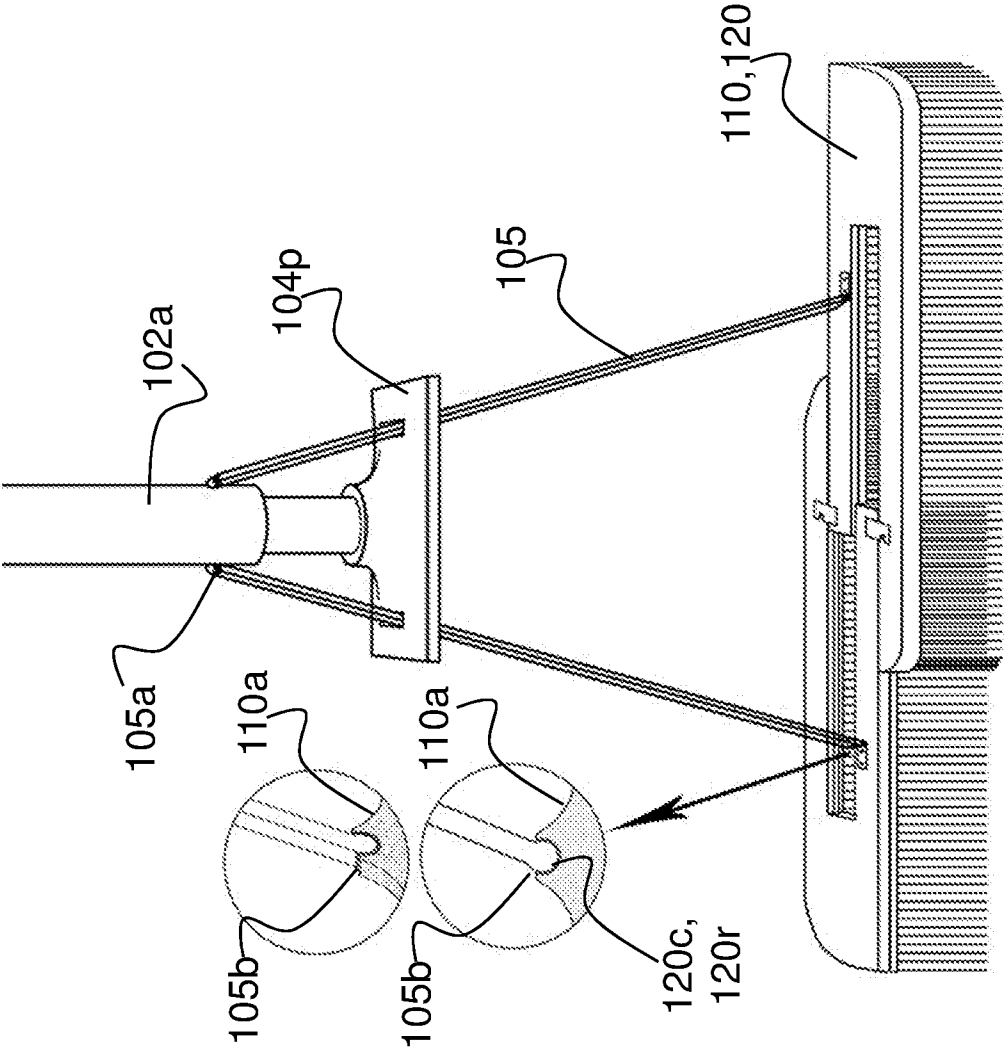


FIG. 5

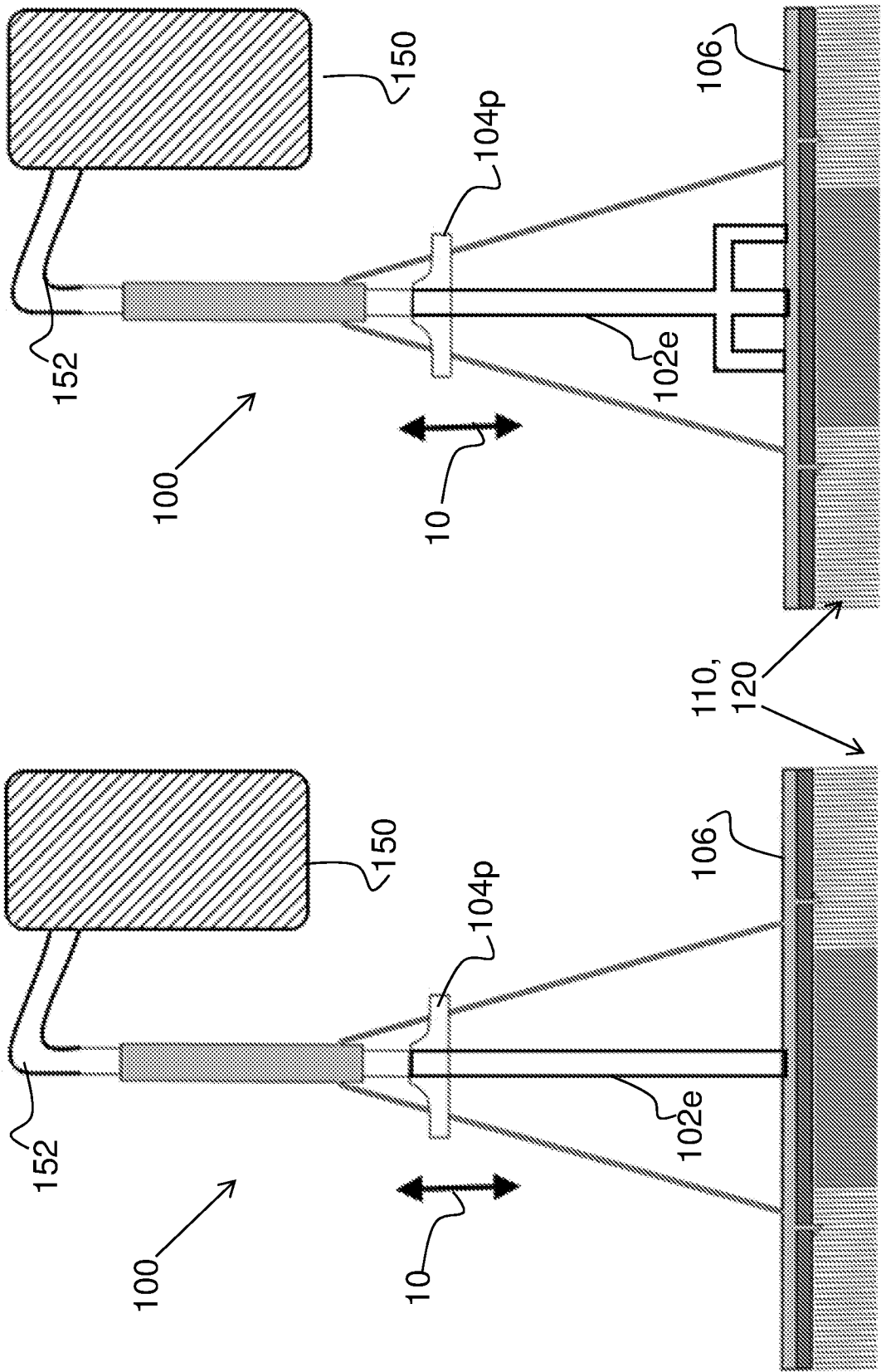


FIG. 6B

FIG. 6A

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL2015/050026

A. CLASSIFICATION OF SUBJECT MATTER IPC (2015.01) A47L 13/00, A46B 7/02, A47L 13/24 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) IPC (2015.01) A47L 13/00, A46B 7/02, A47L 13/24 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Databases consulted: THOMSON INNOVATION, Esp@cenet, Google Patents, PatBase		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 2603654 Y YINGJIE ENTPR CO LTD 18 Feb 2004 (2004/02/18) The Whole document	1-46
X	CN 202288169 U UNIV SHANDONG SCIENCE & TECH 04 Jul 2012 (2012/07/04) The Whole document	1
A	US 7350258 B2 CROWLEYJONES LP 01 Apr 2008 (2008/04/01) The Whole document	1-46
A	US 2903730 A Murphy Frank R 15 Sep 1959 (1959/09/15) The Whole document	1-46
☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "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 "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 14 May 2015		Date of mailing of the international search report 17 May 2015
Name and mailing address of the ISA: Israel Patent Office Technology Park, Bldg.5, Malcha, Jerusalem, 9695101, Israel Facsimile No. 972-2-5651616		Authorized officer LAHAV Ronen Telephone No. 972-2-5651732

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/IL2015/050026

Patent document cited search report			Publication date	Patent family member(s)			Publication Date
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				CA	2537557	A1	17 Mar 2005
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