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(54) Titre : OUTIL D'ABRASION DE SURFACE CONFIGURE POUR ETRE MONTE SUR UNE TIGE RALLONGE
 (54) Title: SURFACE-ABRASING TOOL CONFIGURED FOR MOUNTING TO AN EXTENSION POLE

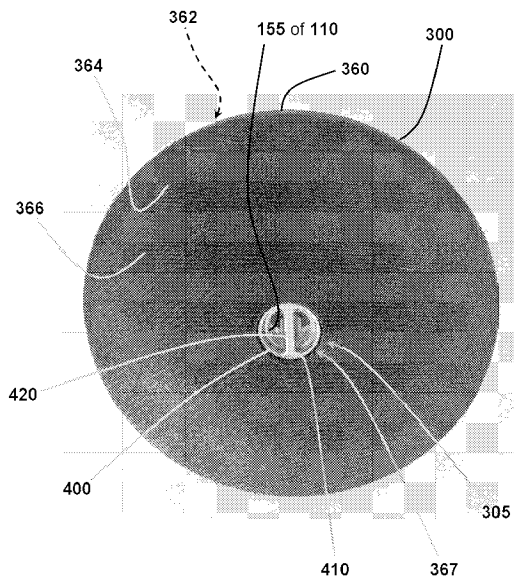


FIG. 3

(57) **Abrégé/Abstract:**

A surface-treating tool is configured for coupling to an extension pole with opposed proximal and distal pole ends. The tool comprises a tool head including a rigid tool support having mutually opposed tool-support upper and lower surfaces. A pole coupling configured for selectively coupling the tool support to the pole distal end is affixed to the tool-support upper surface such that a coupled extension pole is pivotable relative to the tool support about mutually orthogonal first and second pivot axes. A tool pad includes a rigid plate with plate top and bottom surfaces and a resilient layer permanently adhered the plate bottom surface. The resilient layer includes an attachment surface to which a working material may be removably attached without tools. A pad fastener introduced through the resilient layer attaches the tool pad to the tool-support lower surface with the rigid plate between the tool support and the resilient layer.

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(54) Title: SUREACH- ABRADING TOOL CONFIGURED FOR MOUNTING TO AN EXTENSION POLE

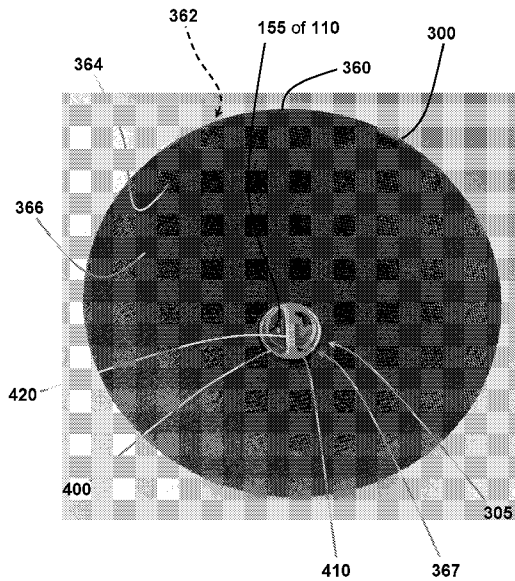


FIG. 3

(57) Abstract: A surface-treating tool is configured for coupling to an extension pole with opposed proximal and distal pole ends. The tool comprises a tool head including a rigid tool support having mutually opposed tool-support upper and lower surfaces. A pole coupling configured for selectively coupling the tool support to the pole distal end is affixed to the tool-support upper surface such that a coupled extension pole is pivotable relative to the tool support about mutually orthogonal first and second pivot axes. A tool pad includes a rigid plate with plate top and bottom surfaces and a resilient layer permanently adhered the plate bottom surface. The resilient layer includes an attachment surface to which a working material may be removably attached without tools. A pad fastener introduced through the resilient layer attaches the tool pad to the tool-support lower surface with the rigid plate between the tool support and the resilient layer.

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SURFACE-ABRADING TOOL CONFIGURED FOR MOUNTING TO AN EXTENSION POLE

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BACKGROUND

Hand manipulated surface-treating tools have been employed since antiquity for the preparation, cleaning, and finishing of surfaces such as walls, ceilings, and floors. A plethora of configurations with tool heads coupleable to extension poles has evolved over time, each providing one or a few advantageous features. Attached or attachable to these tool heads are changeable and/or reconfigurable working materials in the form of pads and or sheets of surface-treating material. Such tools have included pads or sheets for cleaning, polishing, painting, sealcoating, and abrading (e.g., sanding) surfaces.

Embodiments of the present invention improve upon previous related apparatus by, in some versions, variously facilitating rapid, tool-less changing and durable selective securement of tool pads to a unitary tool head with infinite angular displaceability within specified ranges about two mutually orthogonal pivot axes. In alternative versions otherwise substantially similar, securement of tool pads to tool heads is permanent.

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SUMMARY

Illustratively embodied, a hand manipulated surface-treating tool is configured for coupling to an extension pole having longitudinally opposed proximal and distal pole ends. The surface-treating tool has a tool head including a rigid tool support with mutually opposed tool-support upper and lower surfaces bounded by a common tool-support periphery, and, within the tool-support periphery, a tool-support center. A pole coupling is affixed to the tool-support upper surface and configured for selectively coupling the tool support to the pole distal end.

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Illustratively, the pole coupling may include a sleeve member defining an internally-threaded socket into which an externally-threaded pole distal end is selectively threaded. Such threadable coupling between a surface-engaging tool and an extension pole is ubiquitous and not in itself a limitation or a point of novelty relative to the present invention. The pole coupling is affixed to the tool-support upper surface such that an extension pole coupled to the tool head by the pole coupling is pivotable relative to the tool support about mutually orthogonal first and second pivot axes. In various embodiments, this dual-pivot-axis functionality is achieved by what amounts to a universal joint, a mechanical coupling itself also well-known across multiple applications wherever large relative angular displacement along a continuum between two coupled components is desired. Thusly joined, in at least several embodiments, the proximal pole end could occupy an infinite number of points along substantially an imaginary hemispherical shell with a radius that includes the length of the pole and has as its origin a point located near or at a crossing between the mutually orthogonal first and second pivot axes, depending on whether the first and second pivot axes are coplanar or nearly coplanar. An equivalent functionality can be alternatively achieved through use of a ball-and-socket joint.

While the particular mechanisms employed to enable pivoting about mutually orthogonal first and second axes is quite secondary to the broader inventive aspects, the manner in which it is achieved relative to the illustrative embodiment(s) depicted and later discussed in the detailed description involves a yoke and axle system. An axle is mounted between two stanchions that depend from -- and extend upwardly from -- the tool-support upper surface, one stanchion on each side of the tool-support center. The axle defines the first pivot axis. The axle includes an axle block. A yoke connected to the pole coupling straddles the axle block and is attached for pivotal movement relative to the axle block, thereby defining the second pivot axis, which is orthogonal to the first pivot axis. This illustrative set of mechanisms, while warranted some mention in the summary, is not called out in all of its specific detail

in the detailed description because (i) it is only one illustrative set of pivoting mechanisms that could be implemented and (ii) it is not tied to a claimed point of novelty. Nevertheless, its antecedent is hereby established with sufficient specificity to support a claim if later warranted.

5 An embodiment of the surface-treating tool further includes a tool pad. The tool pad includes a rigid plate having mutually opposed plate top and bottom surfaces bounded by a peripheral plate edge extending between the plate top and bottom surfaces. A resilient layer has a resilient-layer upper surface and an opposed attachment surface. The resilient-layer upper surface is permanently adhered to the
10 plate bottom surface, while the attachment surface is configured for releasably retaining a working material. In each of various embodiments, the working material is an abrading material in the form of a sheet or pad, such as sandpaper or a sanding pad. However, the working material could more broadly be a non-abrading material, such as a cleaning or painting pad or sponge, for example. In any event, it
15 is desirable that the working material be attachable to the attachment surface without the use of tools.

In each of various configurations, by means of a pad fastener, the tool pad is attached to the tool head with the plate top surface in contacting engagement with the tool-support lower surface. More specifically, the tool pad has a tool-pad center
20 at which there is defined through the rigid plate a plate-center hole and, through the resilient layer, a resilient-layer center hole aligned with the plate-center hole. The pad fastener is introduced from below the tool pad into at least the resilient-layer center hole and secured to a portion of the tool-support lower surface configured for receiving the pad fastener. That is, the tool pad is retained by a pad fastener
25 introduced from the tool pad side for fastening to the tool-support lower surface. Among other advantages, this permits the rigid plate to be relatively thin compared to a plate required to carry threads for receiving top-down fasteners from the tool support side, for example.

According to one version, the pad fastener is a permanent fastener such that the tool pad is permanently attached to the tool head with the plate top surface in contacting engagement with the tool-support lower surface. "Contacting engagement" is to be interpreted broadly to include other-than-direct contact; an intermediate medium or element could be present, such as a washer or gasket, by way of non-limiting example. In any event, whether the pad fastener is permanent or not, the tool pad, when mounted and fastened to the tool support, is oriented such that the rigid plate is situated between the resilient layer and the tool-support lower surface.

In a version in which the pad fastener is permanent, it would be installed as part of the fabrication process. In at least one variation, the permanent pad fastener is a threaded fastener that has applied to the threads an adhesive before being threadably joined with the tool support such that, when the adhesive cures, the subsequent unthreading of the fastener and removal of the tool pad from the tool support are prevented. An example of such an adhesive is a fastener-thread adhesive presently sold under the trademark Loctite®. While an illustrative example of a threaded pad fastener is shown as internally threaded in the drawings discussed in the detailed description, it is to be understood that the pad fastener could be internally or externally threaded.

In alternative versions, the tool pad is removably attached to the tool head by a non-permanent, removable pad fastener. The removable pad fastener may be a threaded fastener. In a still-more-specific version, the threaded fastener is a tool-less fastener

Representative embodiments are more completely described and depicted in the following detailed description and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top perspective view of a surface-abrading tool configured for mounting to an extension pole;

5 FIG. 2 shows the tool support, tool pad, and pad fastener of the surface-abrading tool of FIG. 1 in a disassembled state;

FIG. 3 is a bottom perspective view of the surface-abrading tool of FIGS. 1 and 2 showing how a tool pad is attached to the tool support from the bottom using the pad fastener;

10 FIG. 4 is a bottom view of the surface-abrading tool of FIGS. 1-3 with an abrading material sheet removable attached to the tool pad; and

FIG. 5 shows the tool support and tool pad in a disassembled state.

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DETAILED DESCRIPTION

The following description of variously embodied surface-abrading tools is demonstrative in nature and is not intended to limit the invention or its application of uses. Accordingly, the various implementations, aspects, versions and
10 embodiments described in the summary and detailed description are in the nature of non-limiting examples falling within the scope of the appended claims and do not serve to restrict the maximum scope of the claims. Moreover, among the various depicted embodiments, like reference numbers are used to refer to similar or analogous components.

15 Referring to FIGS. 1-5, an embodiment of a surface-abrading tool **10** is configured for coupling with an elongated extension pole **20** having longitudinally opposed proximal and distal pole ends **22** and **24**. The surface-abrading tool **10** includes a tool head **100** having a rigid tool support **110**. The tool support **110** has mutually opposed tool-support upper and lower surfaces **120** and **130** bounded by a
20 common tool-support periphery **140**, and further includes a tool-support center **150**.

As shown in FIG. 1, a pole coupling **200** configured for selectively coupling the tool support **110** to the pole distal end **24** is affixed to the tool-support upper surface **120**. The pole coupling **200** is configured and affixed to the tool-support upper surface **120** such that the extension pole **20**, when coupled to the tool head
25 **100** by the pole coupling **200**, is pivotable relative to the tool support **110** about mutually orthogonal first and second pivot axes **AP₁** and **AP₂**. While the particular mechanisms employed to enable pivoting about mutually orthogonal first and second pivot axes **AP₁** and **AP₂** is quite secondary to the broader inventive aspects, the manner in which it is achieved relative to the illustrative embodiment(s) depicted is

self-explanatory.

The tool head **100** is configured for use with a removably mountable tool pad **300**. Referring to FIGS. 1 and 5, the tool pad **300** includes a rigid plate **310** which has mutually opposed plate top and bottom surfaces **320** and **330**. The plate top and bottom surfaces **320** and **330** are bounded by a common peripheral plate edge **340** that extends between the plate top and bottom surfaces **320** and **330**. In an exemplary version, the rigid plate **310** is comprised of sheet metal, such as aluminum or steel, but can be fabricated from any material that is self-supporting and provides rigidity.

The tool pad **300** further includes a resilient layer **360** with a resilient-layer upper surface **362** permanently adhered to the plate bottom surface **330**. An attachment surface **364** is situated opposite the resilient-layer upper surface **362** that is adhered to the rigid plate **310**. The attachment surface **364** is configured for releasably retaining a working material **370**. Most commonly, the working material **370** is an abrading material **380** in the form of a sheet or pad, such as sandpaper or a sanding pad. However, the working material **370** could more broadly be a non-abrading material, such as a cleaning or painting pad or sponge, for example. In broader configurations encompassing non-abrading working materials **370**, the tool **10** may be alternatively and interchangeably referred to as a surface-treating tool **10**. The working material **370** pad or sheet may have a back surface **372** attachable to the attachment surface **364** of the resilient layer **360** by a plurality of hook-and-loop fasteners **366** such as those most commonly known and sold under the tradename "Velcro®."

The resilient layer **360** may comprise a material providing cushioning, but also exhibiting a "memory" property allowing it, when deformed, to return to a predefined default shape. Nonlimiting examples of suitable materials include foam, foam-rubber, and rubber. The resilient layer **360** is bounded by a resilient-layer periphery **365**. In at least one version, the resilient-layer periphery **365** extends to the outside of the peripheral plate edge **340** of the rigid plate **310** in order to prevent damage to

surfaces of adjacent workpieces being abraded by the surface-abrading tool **10**. This is clearly shown in FIG. 5.

With principal reference now to FIGS. 1 and 2, in one embodiment, the rigid plate **310** and the tool-support lower surface **130** of the tool support **110** are cooperatively configured to enable removable attachment of the tool pad **300** to the tool head **100** with the plate top surface **320** in contacting engagement with the tool-support lower surface **130**. In the embodiments depicted, and especially most clearly in FIGS. 2 and 3, a single pad fastener **400** retains the tool pad **300** on the tool head **100**. More specifically, the tool pad **300** has a tool-pad center **305**. At the tool-pad center **305** there is a plate-center hole **325** through the rigid plate **310** and a resilient-layer-center hole **367** extending through the resilient layer **360** and at least partially aligned with the plate-center hole **325**.

The tool pad **300** is removably attached to the tool-support lower surface **130** by introducing the pad fastener **400** into at least the resilient-layer-center hole **367** and securing the pad fastener **400** to the tool-support center **150**. More specifically, as seen most clearly in FIG. 2, the tool-support center **150** has defined thereabout an annular pad mount **155** that, in this case, is provided with external threads **156**. The illustrative pad fastener **400** depicted includes a ring **410** provided with internal threads **412** configured for threadable engagement with the external threads **156** of the pad mount **155**.

As shown in FIG. 3, the pad fastener **400**, resilient layer **360**, and the resilient-layer-center hole **367** are configured such that, at least when the pad fastener **400** is fully secured to the tool support **110**, the pad fastener **400** is recessed relative to the attachment surface **364** of the resilient layer **360**. In this way, when an abrading material **380** – or other working material **370** -- pad or sheet is attached to the attachment surface **364** of the resilient layer **360**, as shown in FIG. 4, the pad fastener **400** is covered and does not cause bulging of the abrading material **380** sheet/pad.

Referring again to FIG. 2, it can be seen that the plate-center hole **325** is

smaller than the resilient-layer center hole **367** such that an annular portion **326** of the rigid plate **310** is visible through the resilient-layer center hole **367**. When the tool pad **300** is aligned and mounted to the tool-support lower surface **130**, the annular pad mount **155** -- and external threads **156** of same -- protrude(s) downwardly through the plate-center hole **325** and partially into the resilient-layer center hole **367** below the plate-center hole **325**. The pad fastener **400** is introduced into the resilient-layer center hole **367** and the internal threads **412** of the pad fastener **400** are threaded onto the external threads **156** of the pad mount **155** until the ring **410** of the pad fastener **400** bears down on the annular portion **326** of the rigid plate **310** and forces the rigid plate **310** toward and against the tool-support lower surface **130**.

It is advantageous, and therefore preferred, that the pad fastener **400** be tool-less. That is, that the pad fastener **400** can be tightened and loosened without the use of tools. Accordingly, in the version depicted, a ring bridge **420** extends diametrically across the center of the ring **410**. A user can grasp the ring bridge **420** between two finger fingers -- most likely the thumb and index finger -- to tighten and loosen the pad fastener **400**.

For various reasons, preventing rotation of the tool pad **300** relative to the tool support **110** is advantageous. Accordingly, with reference to FIG. 5, it can be seen that the rigid plate **310** and the tool-support lower surface **130** are complementarily keyed such that, when the tool pad **300** is removably mounted to the tool-support lower surface **130** and the pad fastener **400** is secured, the tool pad **300** is prevented from rotating relative to the tool support **110**. In this particular example, the complementary keying comprises at least one off-center key aperture **328** in the rigid plate **310** and at least one key protrusion **138** extending downwardly from the tool-support lower surface **130**. When the at least one key protrusion **138** is caused to protrude into the at least one off-center key aperture **328**, an interference fit is established between the tool-support **110** and the rigid plate **310**, thereby preventing the aforesaid relative rotation.

In connection with various versions, it is envisioned that, when the resilient layer **360** is worn or a change is otherwise indicated, a user of the tool **10** can remove and replace the tool pad **300**, a fact that is readily appreciated from the description above. However, in other cases, the tool **10** is configured at manufacture such that the tool pad **300** and tool head **100** are permanently attached. In one version, the tool **10** is generally configured as described above and illustratively depicted FIGS. 1-5. However, in order to prevent inadvertent or intentional separation of the tool pad **300** from the tool support **110**, a permanent pad fastener **400** is used to retain the rigid plate **310** of the tool pad **300** against the tool-support lower surface **130**. Such a fastener **400** could be variously configured as at least one of a rivet, pin, bolt, screw, spot weld, press-fit interference, or adhesive, by way of non-limiting example. Where a threaded fastener **400** is used, the threads **412** may have applied to them an adhesive **415** before or while being threadably joined with the tool support **110** via the pad mount **155**. The adhesive **415**, when cured, prevents subsequent unthreading of the fastener **400** and removal of the tool pad **300** from the tool support **110**.

The foregoing is considered to be illustrative of the principles of the invention. Furthermore, since modifications and changes to various aspects and implementations will occur to those skilled in the art without departing from the scope and spirit of the invention, it is to be understood that the foregoing does not limit the invention as expressed in the appended claims to the exact constructions, implementations and versions shown and described.

What is claimed is:

1. A hand manipulated surface-treating tool configured for coupling to an extension pole having longitudinally opposed proximal and distal pole ends, the surface-treating tool comprising:

a tool head including a rigid tool support having mutually opposed tool-support upper and lower surfaces bounded by a common tool-support periphery, and further including a tool-support center;

a pole coupling affixed to the tool-support upper surface and configured for selectively coupling the tool support to the pole distal end, the pole coupling being affixed to the tool-support upper surface and further configured such that an extension pole coupled to the tool head by the pole coupling is pivotable relative to the tool support about mutually orthogonal first and second pivot axes; and

a tool pad including (i) a rigid plate having mutually opposed plate top and bottom surfaces bounded by a peripheral plate edge extending between the plate top and bottom surfaces and (ii) a resilient layer with a resilient-layer upper surface permanently adhered to the plate bottom surface and an attachment surface that is opposite the resilient-layer upper surface and configured for releasably retaining a working material, wherein

(a) the tool pad is attached to the tool head with the plate top surface in contacting engagement with the tool-support lower surface;

(b) the tool pad includes a tool-pad center;

(c) there is a plate-center hole through the rigid plate and a resilient-layer-center hole extending through the resilient layer and aligned with the plate-center hole at the tool-pad center; and

(d) the tool pad is attached to the tool-support lower surface by a pad fastener introduced into at least the resilient-layer-center hole and secured to the tool-support center.

2. The surface-treating tool of claim 1 wherein the pad fastener is a permanent fastener such that the tool pad is permanently attached to the tool head with the plate top surface in contacting engagement with the tool-support lower surface.
3. The surface-treating tool of claim 2 wherein the permanent pad fastener is a threaded fastener that has applied to the threads an adhesive before being threadably joined with the tool support such that, when the adhesive cures, the subsequent unthreading of the fastener and removal of the tool pad from the tool support are prevented.
4. The surface-treating tool of claim 1 wherein the pad fastener is a removable fastener such that the tool pad is removably attached to the tool head with the plate top surface in contacting engagement with the tool-support lower surface.
5. The surface-treating tool of claim 4 wherein the removable pad fastener is a threaded fastener.
6. The surface-treating tool of claim 5 wherein the pad fastener is a tool-less fastener.
7. A hand manipulated surface-abrading tool configured for coupling to an extension pole having longitudinally opposed proximal and distal pole ends, the surface-abrading tool comprising:
a tool head including a rigid tool support having mutually opposed tool-support upper and lower surfaces bounded by a common tool-support

periphery, and further including a tool-support center within the tool-support periphery;

5 a pole coupling affixed to the tool-support upper surface for selectively coupling the tool support to the pole distal end, the pole coupling being affixed to the tool-support upper surface and configured such that an extension pole coupled to the tool head by the pole coupling is pivotable relative to the tool support about mutually orthogonal first and second pivot axes; and

10 a tool pad including (i) a rigid plate having mutually opposed plate top and bottom surfaces bounded by a peripheral plate edge extending between the plate top and bottom surfaces and (ii) a resilient layer with a resilient-layer upper surface permanently adhered to the plate bottom surface and an attachment surface that is opposite the resilient-layer upper surface and configured for releasably retaining an abrading material, wherein

15 the tool pad and the tool-support lower surface are cooperatively configured to enable removable attachment of the tool pad to the tool head with the rigid plate between the resilient layer and the tool-support lower surface.

8. The surface-abrading tool of claim 7 wherein

20 (a) the tool pad includes a tool-pad center;

(b) there is a plate-center hole through the rigid plate and a resilient-layer-center hole that extends through the resilient layer and is aligned with the plate-center hole at the tool-pad center; and

25 (c) the tool pad is removably attached to the tool-support lower surface by a pad fastener introduced into at least the resilient-layer-center hole and secured to the tool-support center.

9. The surface-abrading tool of claim 8 wherein the rigid plate and the tool-support lower surface are complementarily keyed such that, when the tool pad

is removably attached to the lower surface of the tool support, and the pad fastener is secured, the tool pad is prevented from rotating relative to the tool support.

5 10. The surface-abrading tool of claim 9 wherein the complementary keying comprises at least one off-center key aperture in the rigid plate and at least one key protrusion extending downwardly from the tool-support lower surface and into the at least one off-center key aperture, thereby establishing an interference fit between the tool-support and the rigid plate.

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11. A surface-treating tool configured for coupling to an extension pole having opposed proximal and distal pole ends, the surface-treating tool comprising:

a tool head including a rigid tool support having mutually opposed tool-support upper and lower surfaces;

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a pole coupling configured for selectively coupling the tool support to the pole distal end and affixed to the tool-support upper surface such that a coupled extension pole is pivotable relative to the tool support about mutually orthogonal first and second pivot axes;

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a tool pad including a rigid plate with plate top and bottom surfaces and a resilient layer permanently adhered to the plate bottom surface, the resilient layer including an attachment surface to which a working material can be removably attached without tools; and

a pad fastener for attaching the tool pad to the tool-support lower surface, wherein

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the pad fastener is introduced through the resilient layer and secured to tool-support lower surface in order to attach the tool pad to the tool-support lower surface with the rigid plate between the tool support and the resilient layer.

12. The surface-treating tool of claim 11 wherein the working material is an abrading material in the form of one of (i) a sheet and (ii) a pad.

5 13. The surface-treating tool of claim 12 wherein the abrading material is attached to the resilient-layer attachment surface by a plurality of hook-on-loop fasteners.

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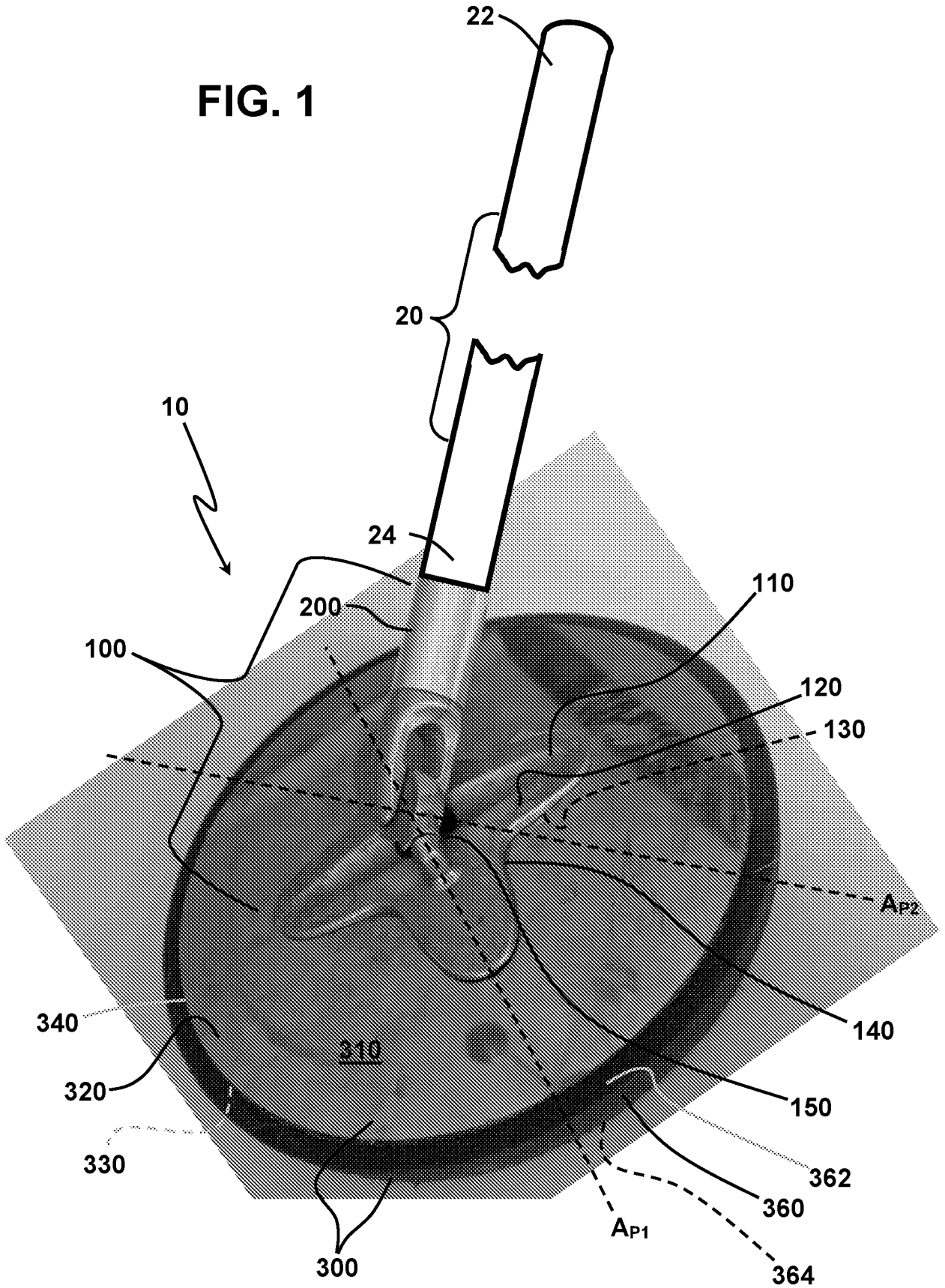
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FIG. 1



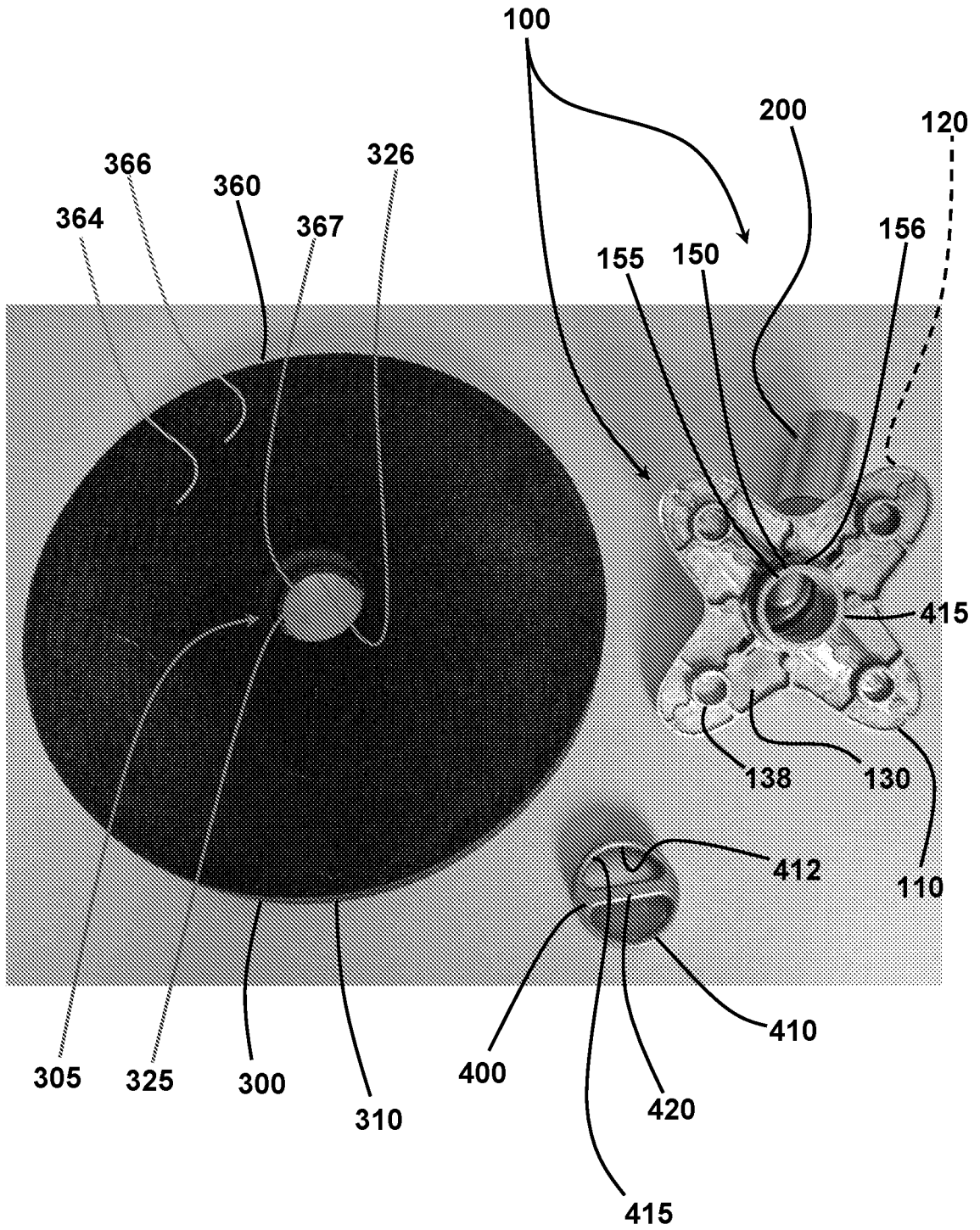


FIG. 2

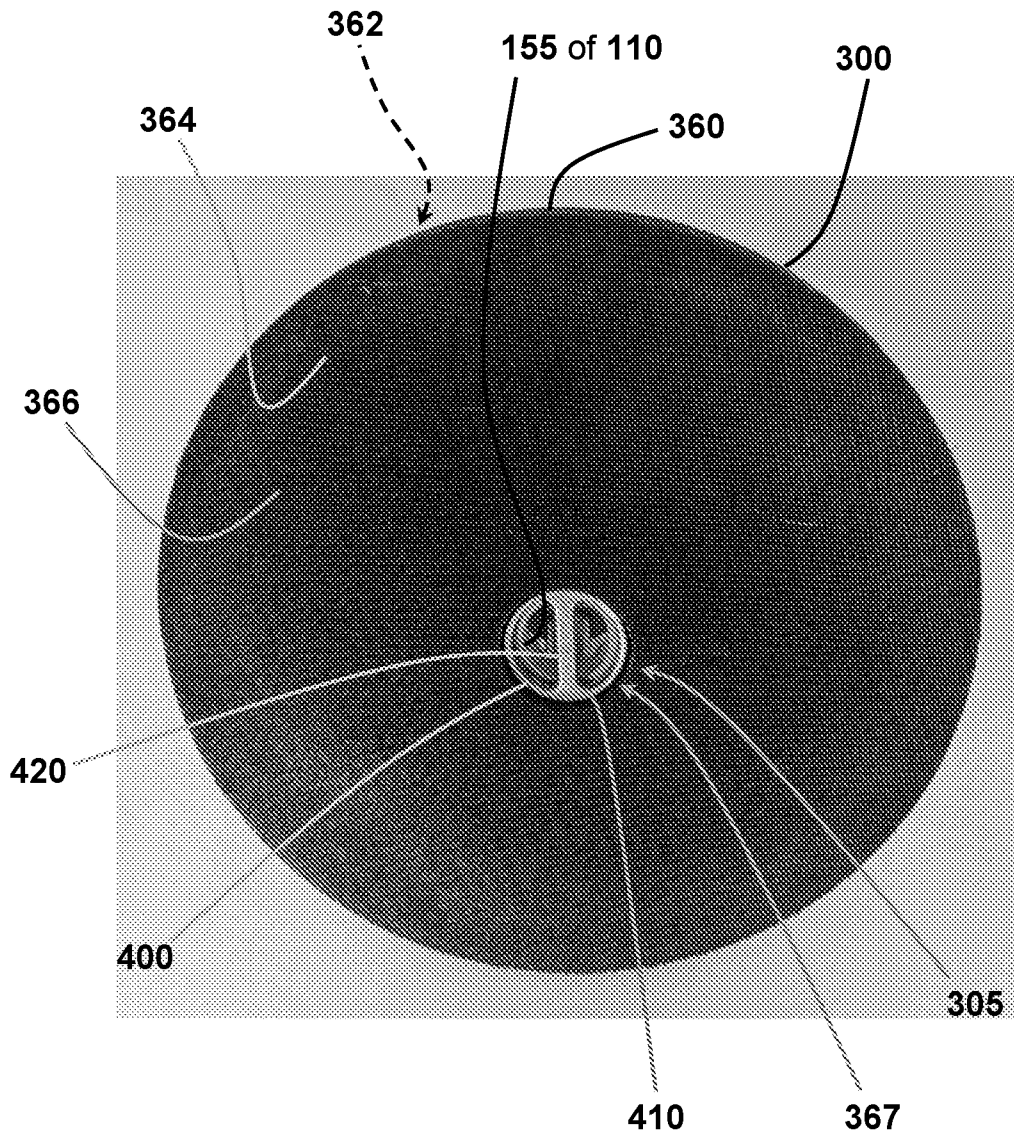


FIG. 3

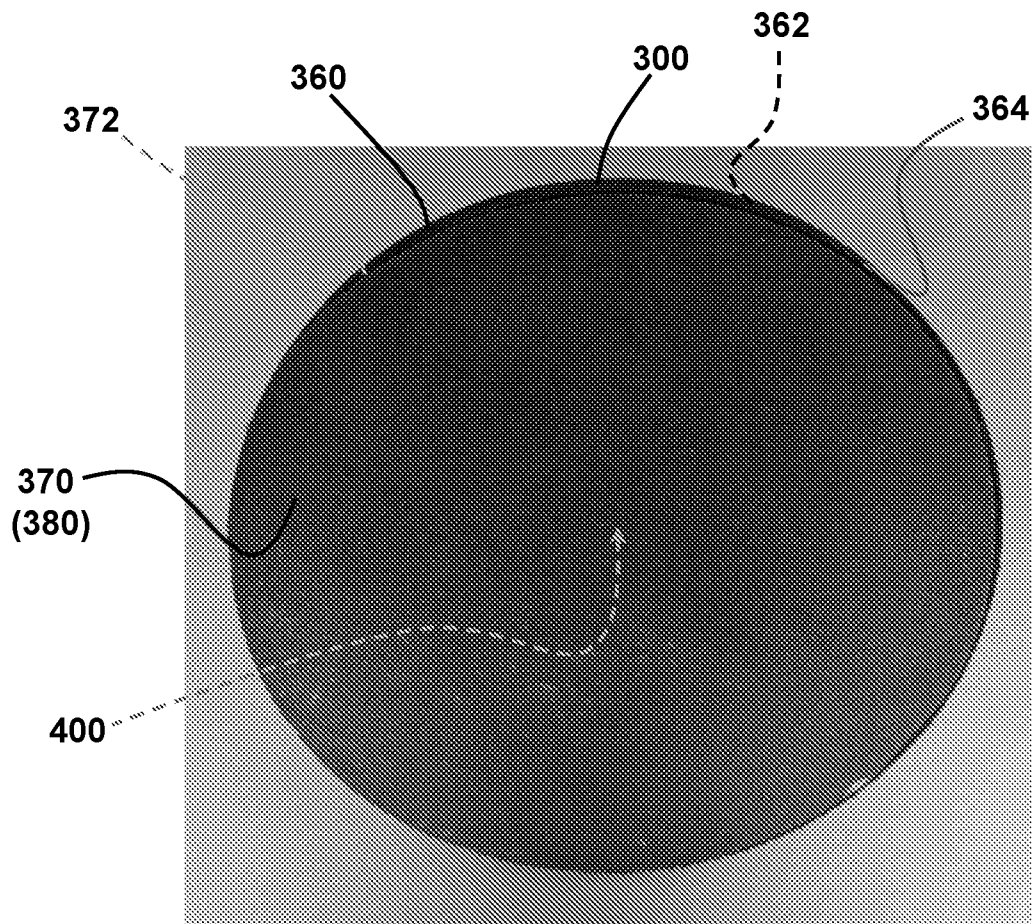


FIG. 4

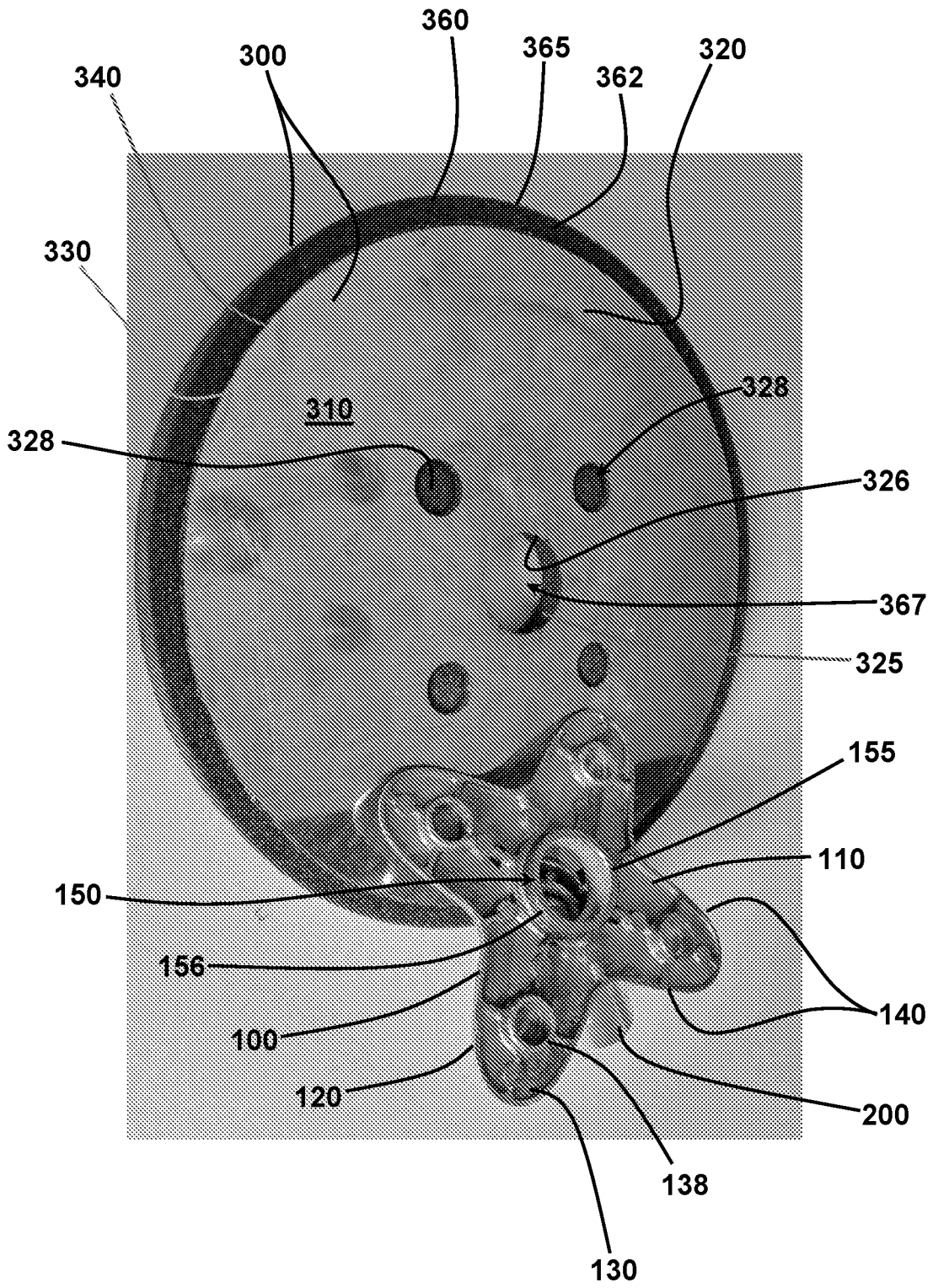


FIG. 5

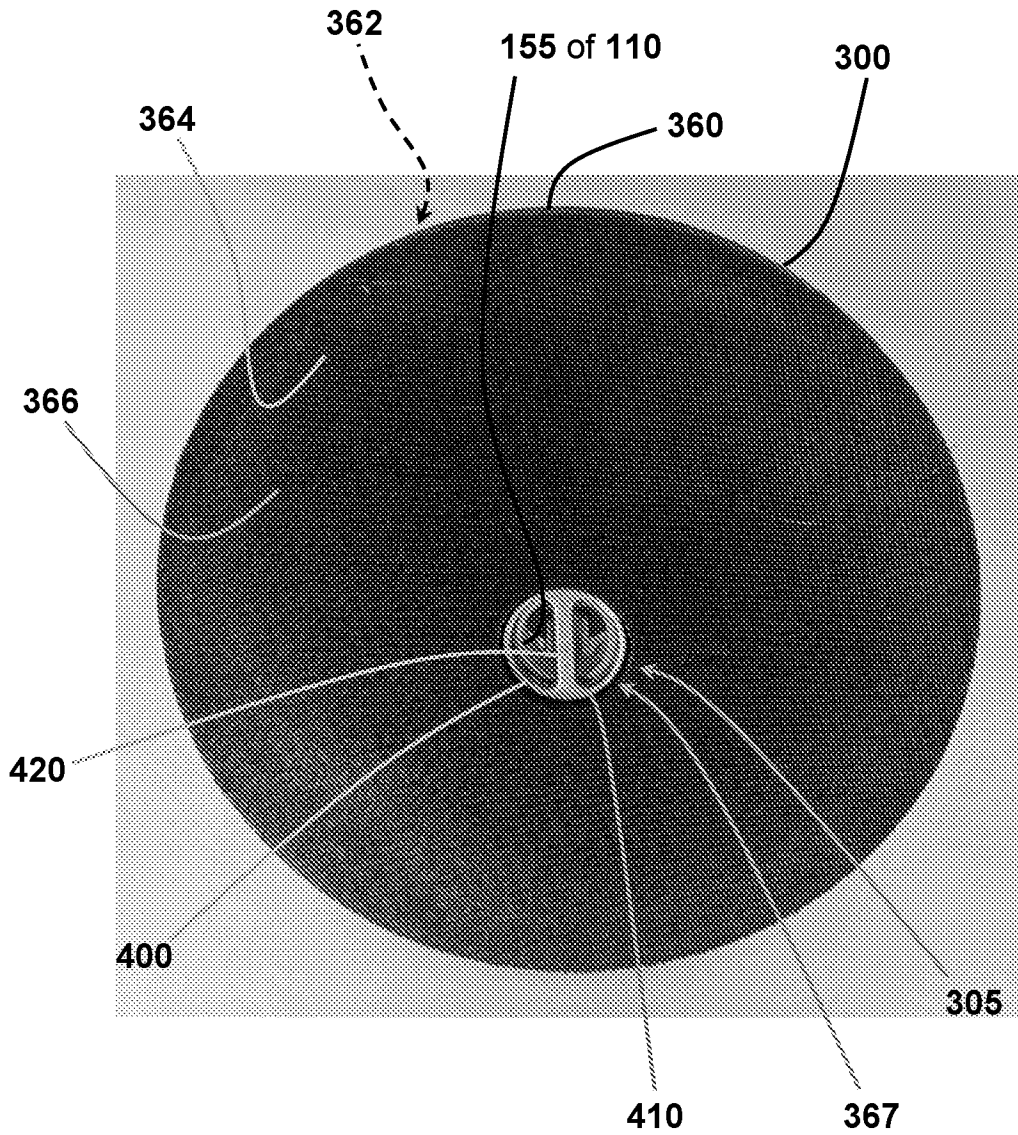


FIG. 3