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(54) **FLEXIBLE ATTACHMENT APPARATUS FOR DUST MOPS AND SIMILAR CLEANING DEVICES**

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(57) **ABSTRACT**

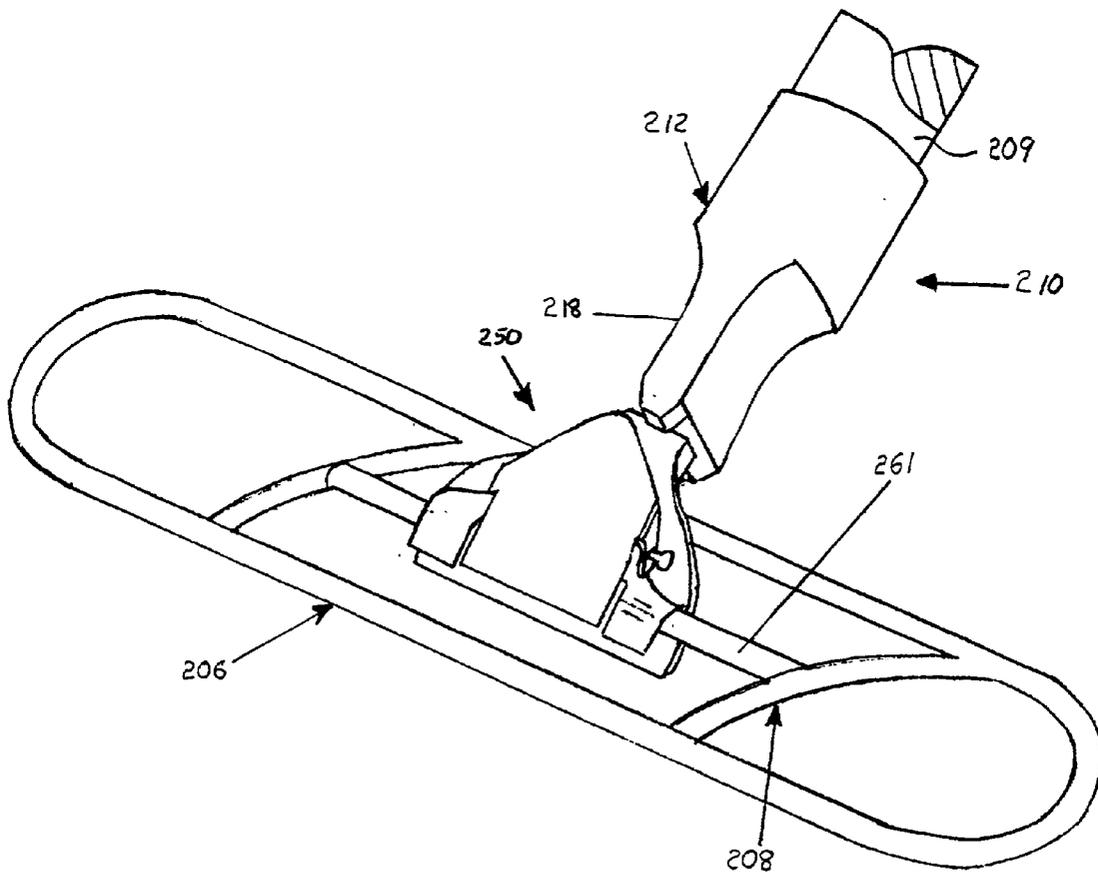
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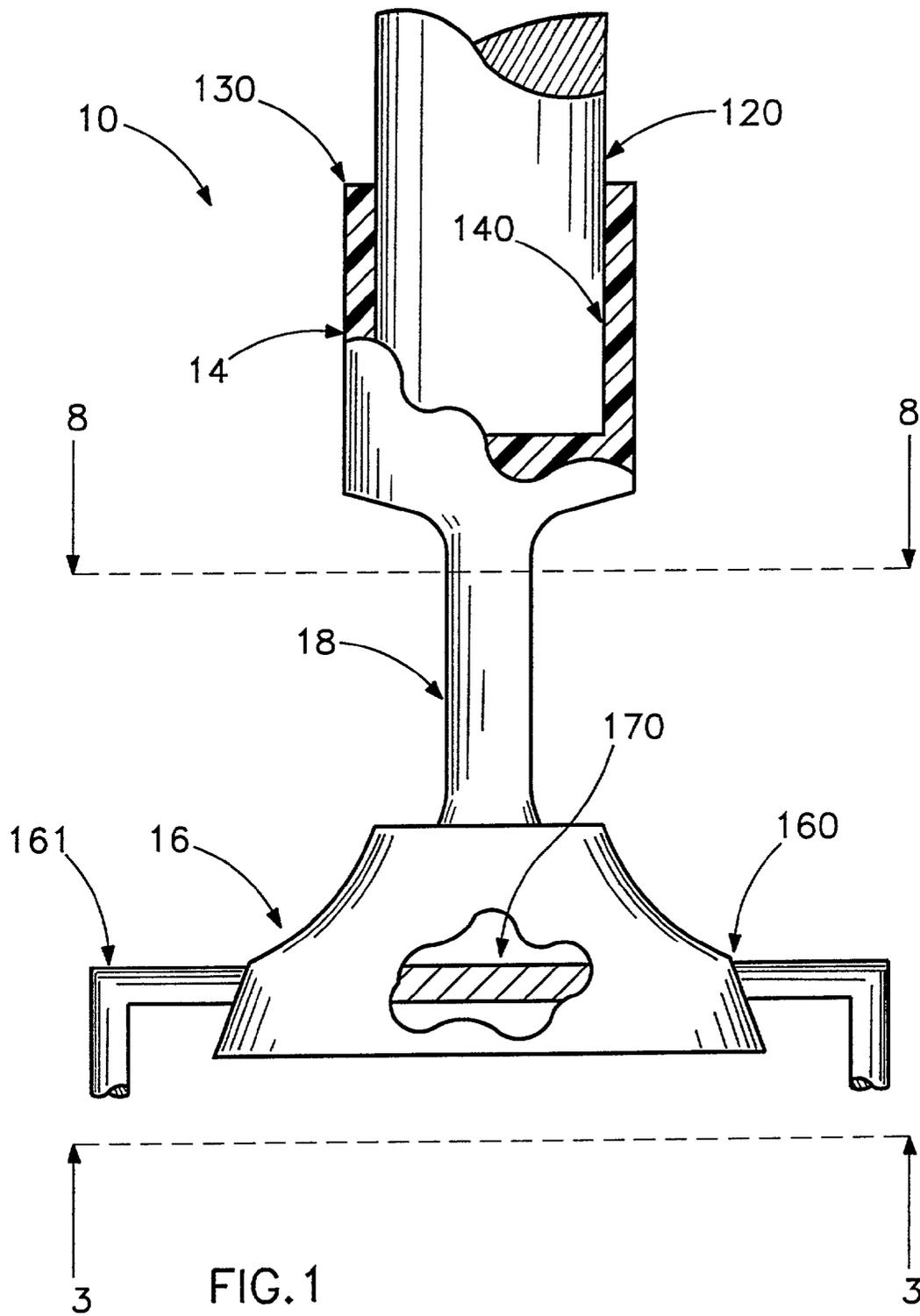
A flexible attachment apparatus for use with dust mops or the like and including a clamping mechanism which is integrally connected or mechanically attached to a flexible unitary molded body with the capability of automatically rebounding back the cleaning head after striking obstacles during use. The unitary molded body has a connecting section for attaching to the clamping mechanism and a retaining section for attaching to a handle of the dust mop.

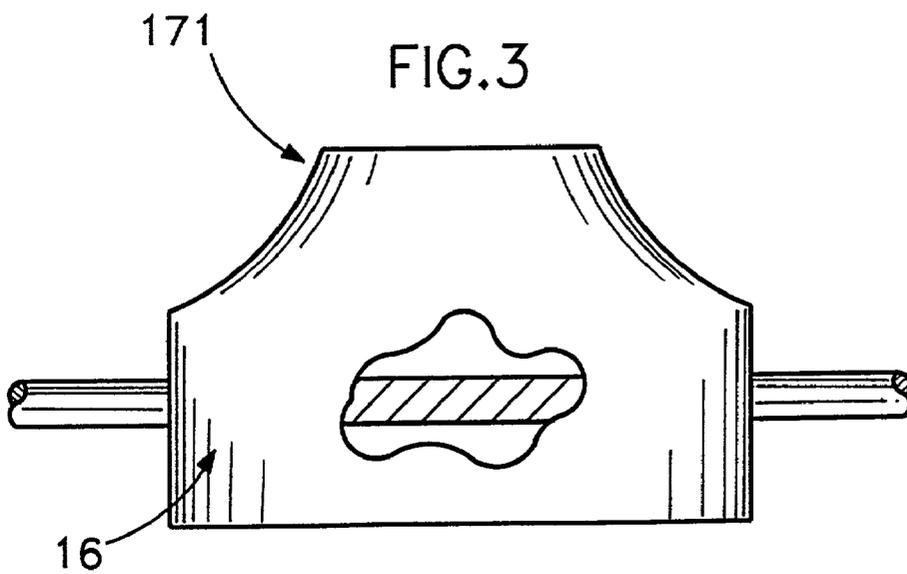
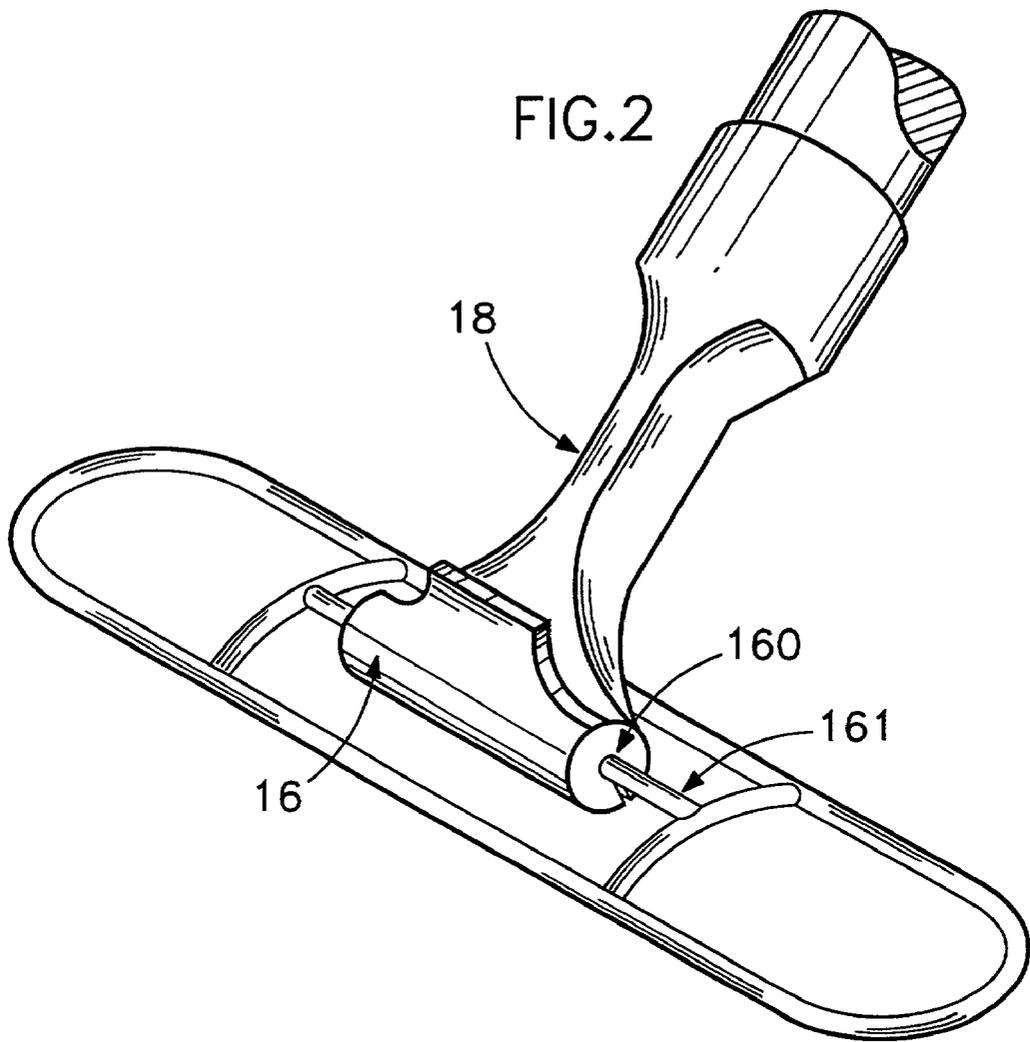
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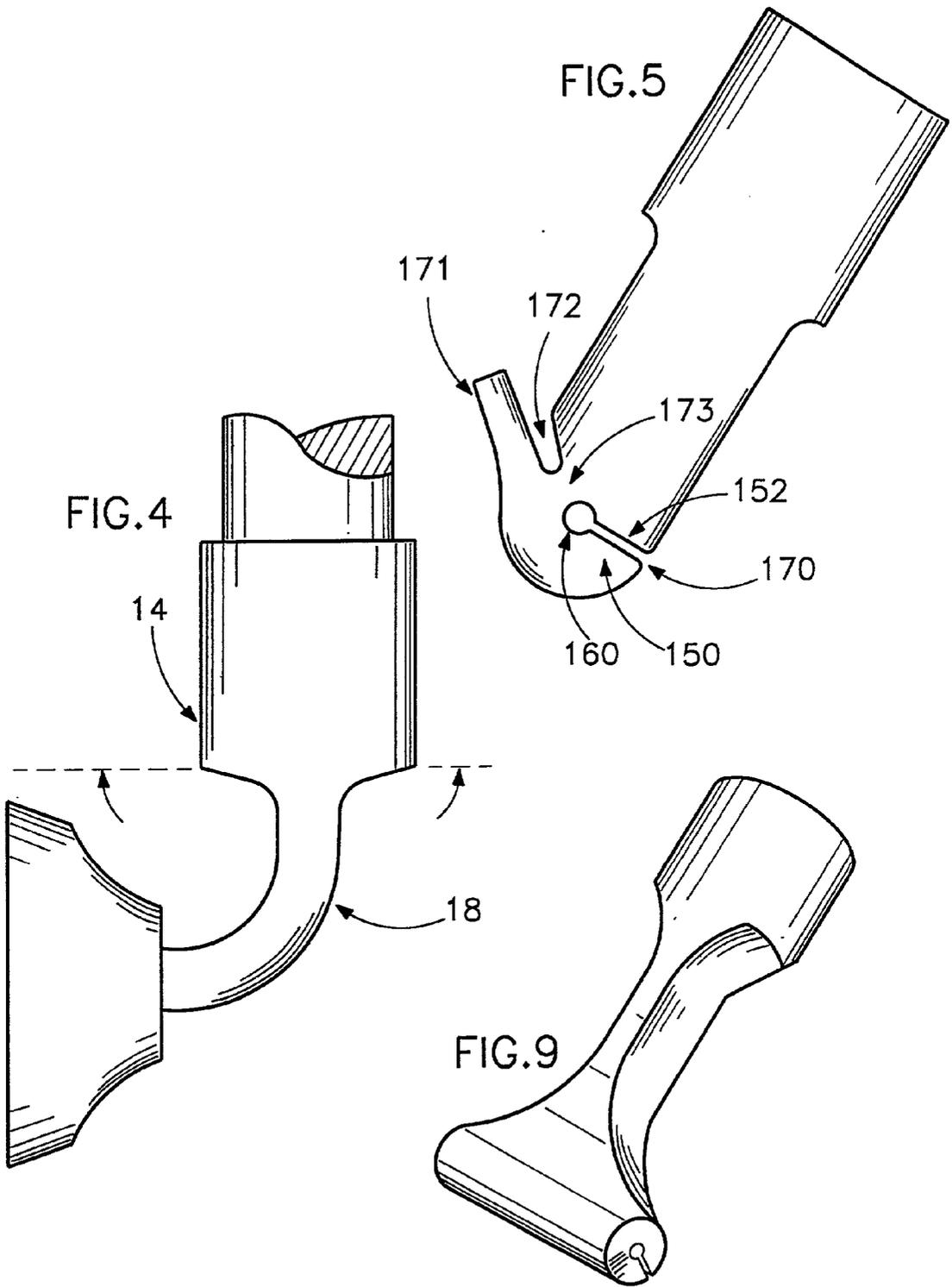
**Related U.S. Application Data**

(63) **Continuation-in-part of application No. 09/548,339, filed on Apr. 12, 2000, now Pat. No. 6,237,182.**









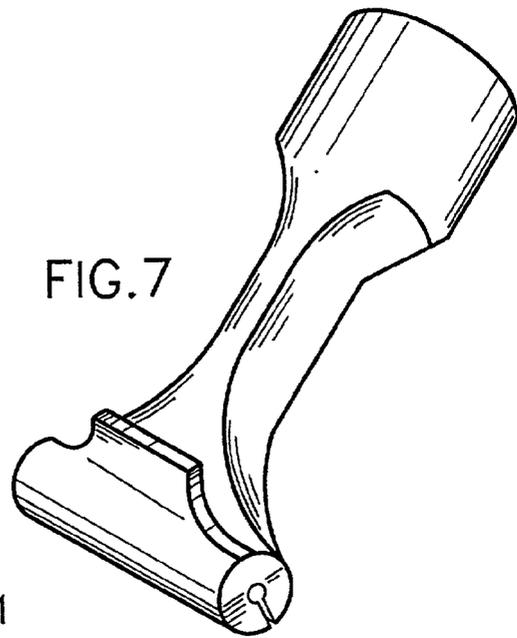


FIG. 8

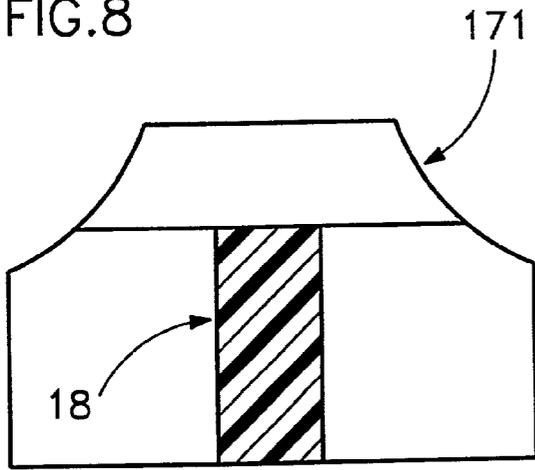
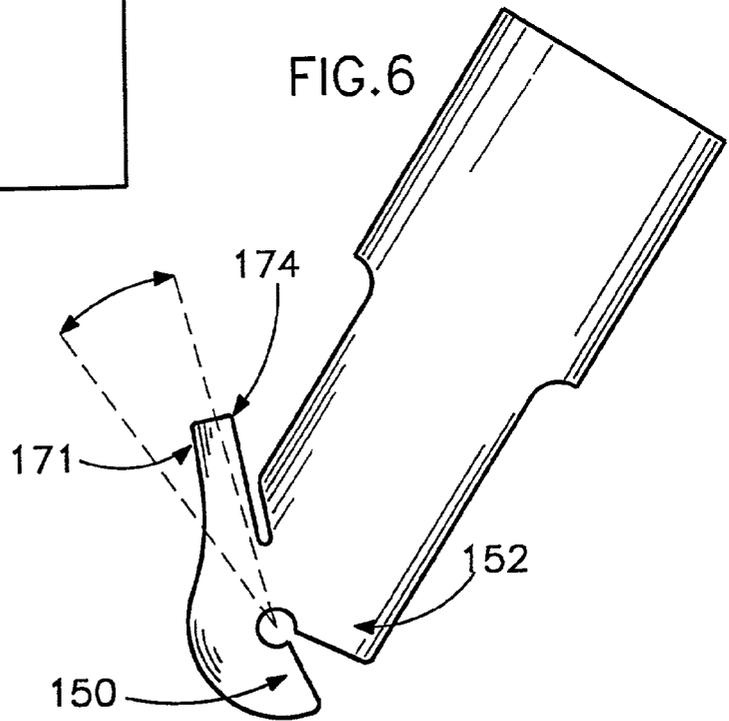
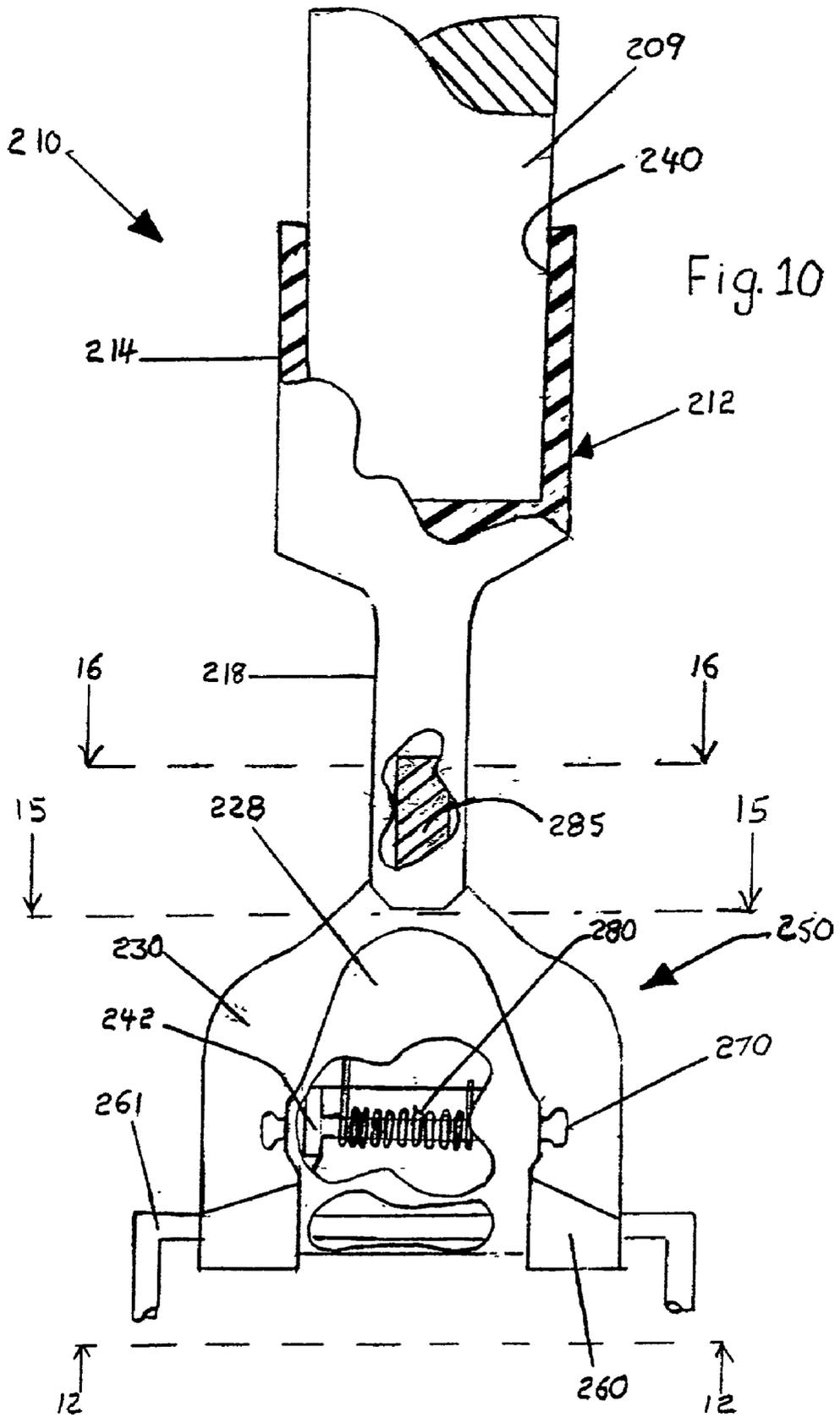
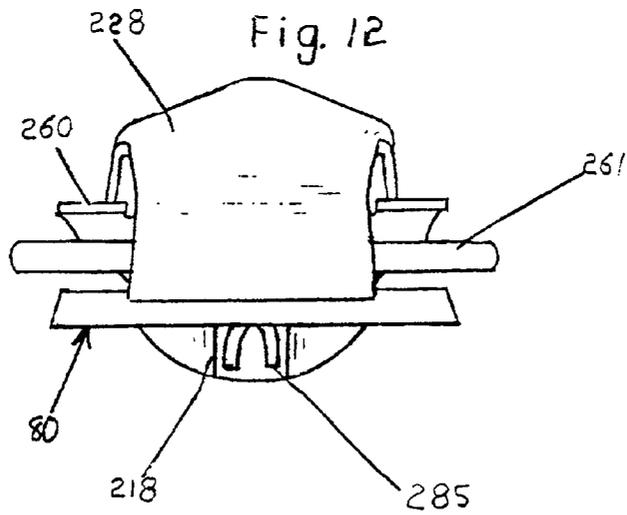
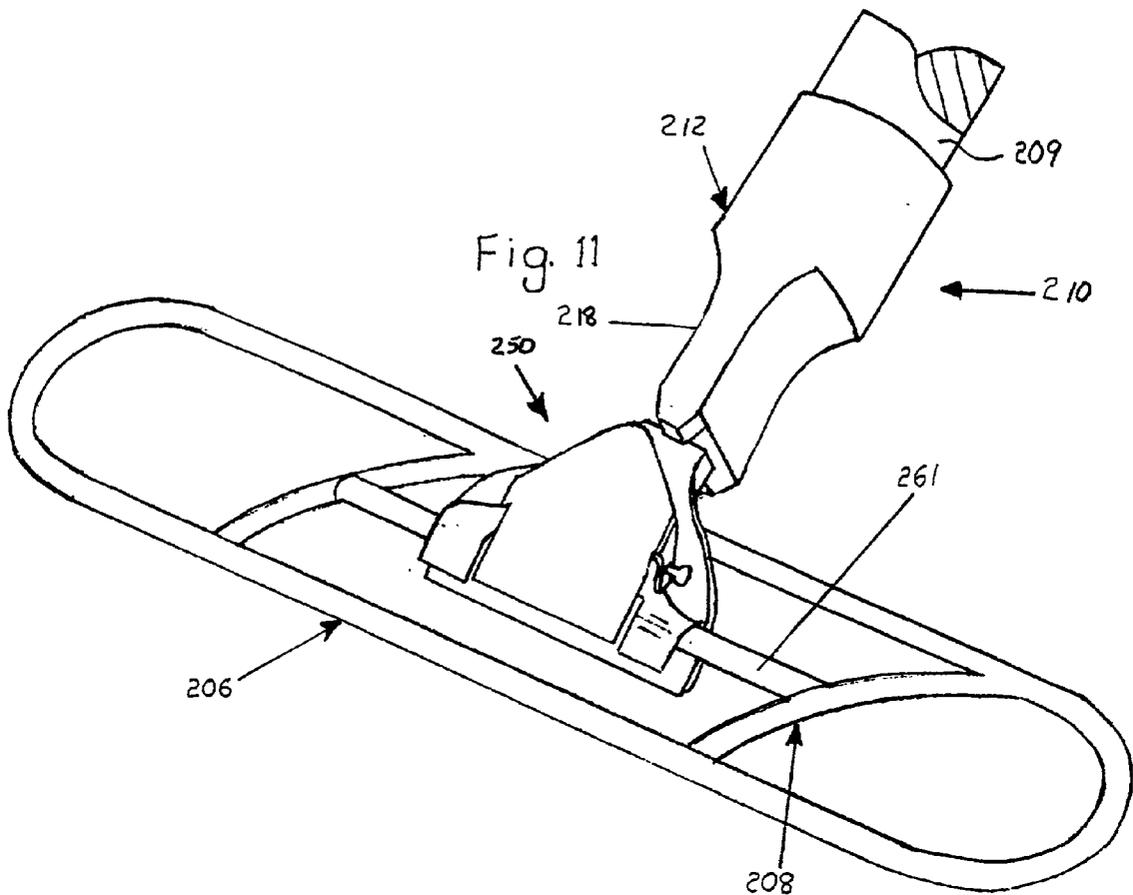
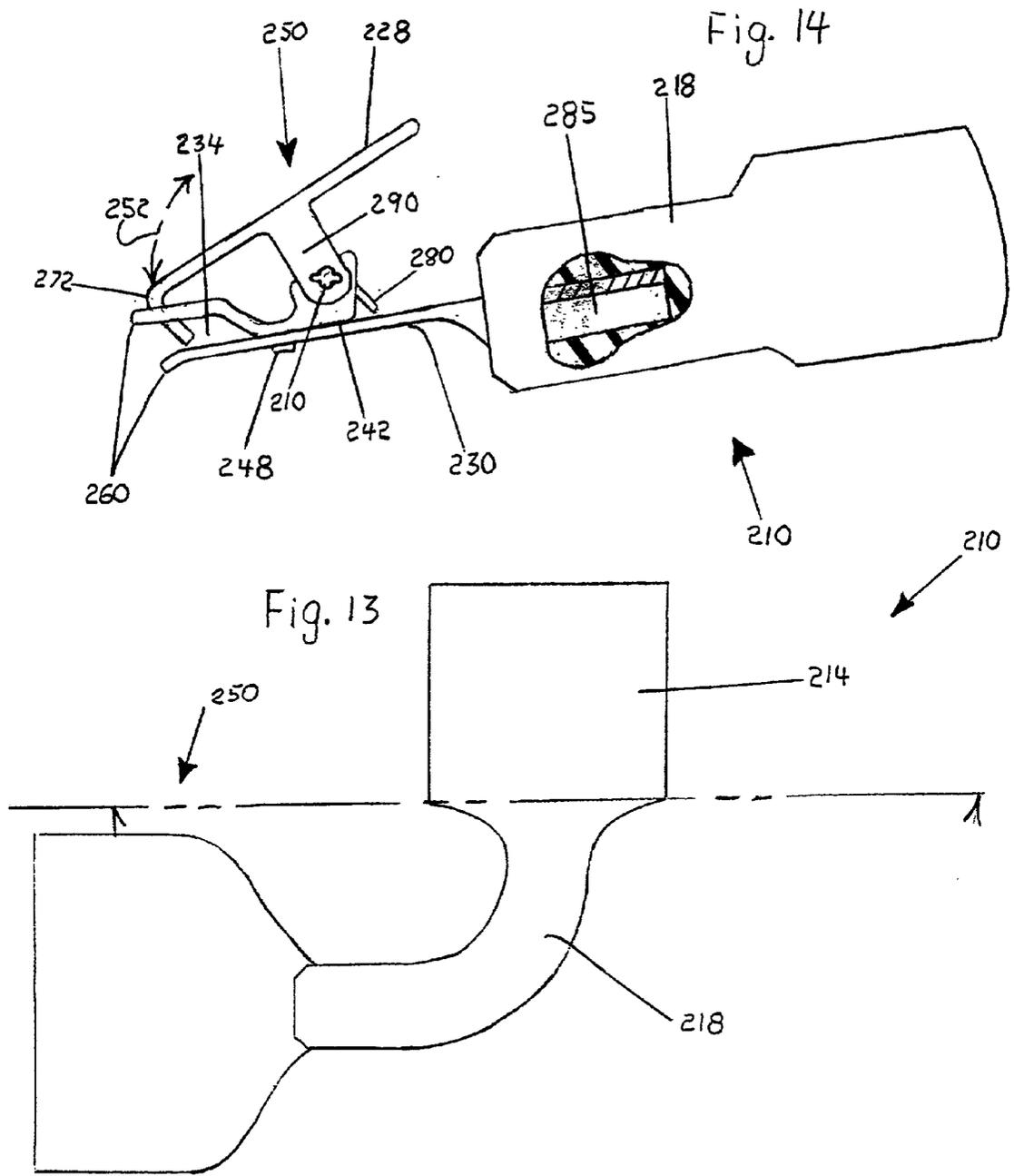


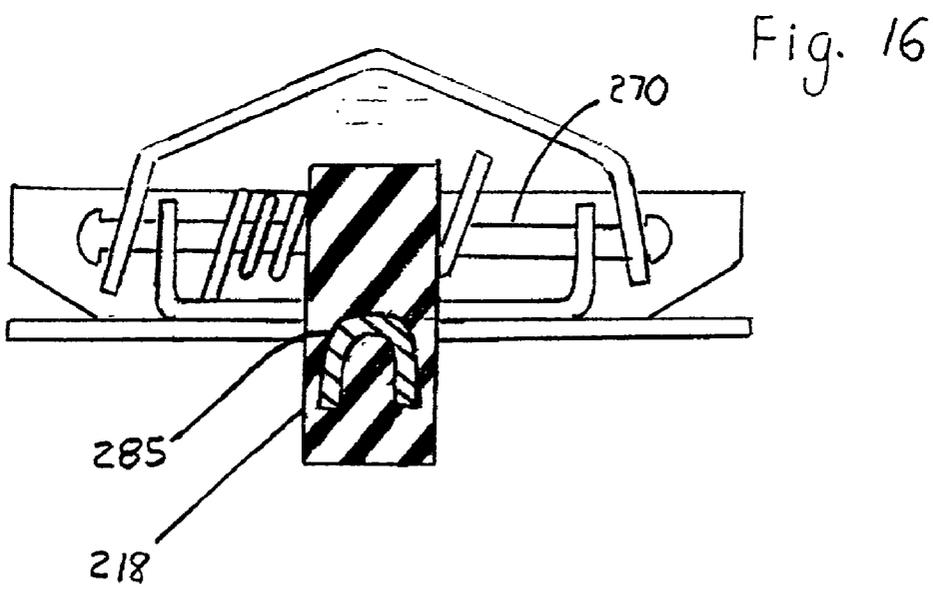
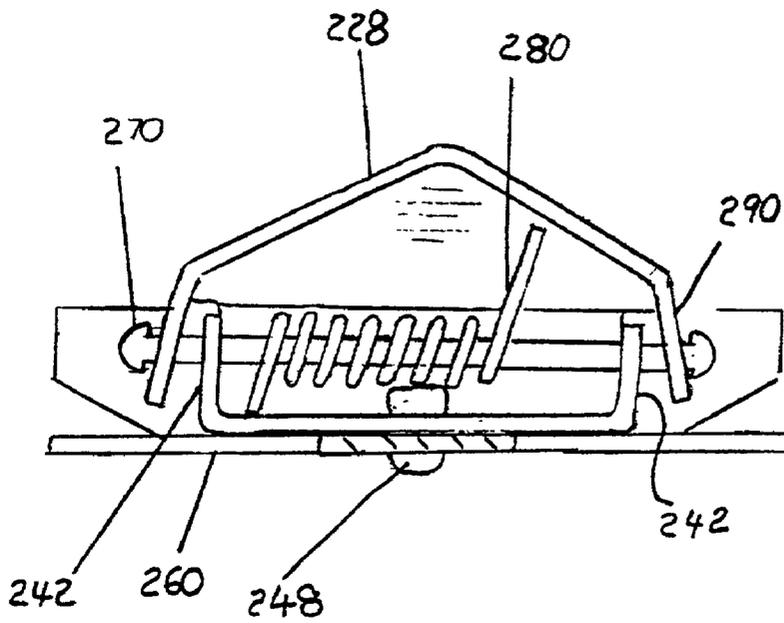
FIG. 6

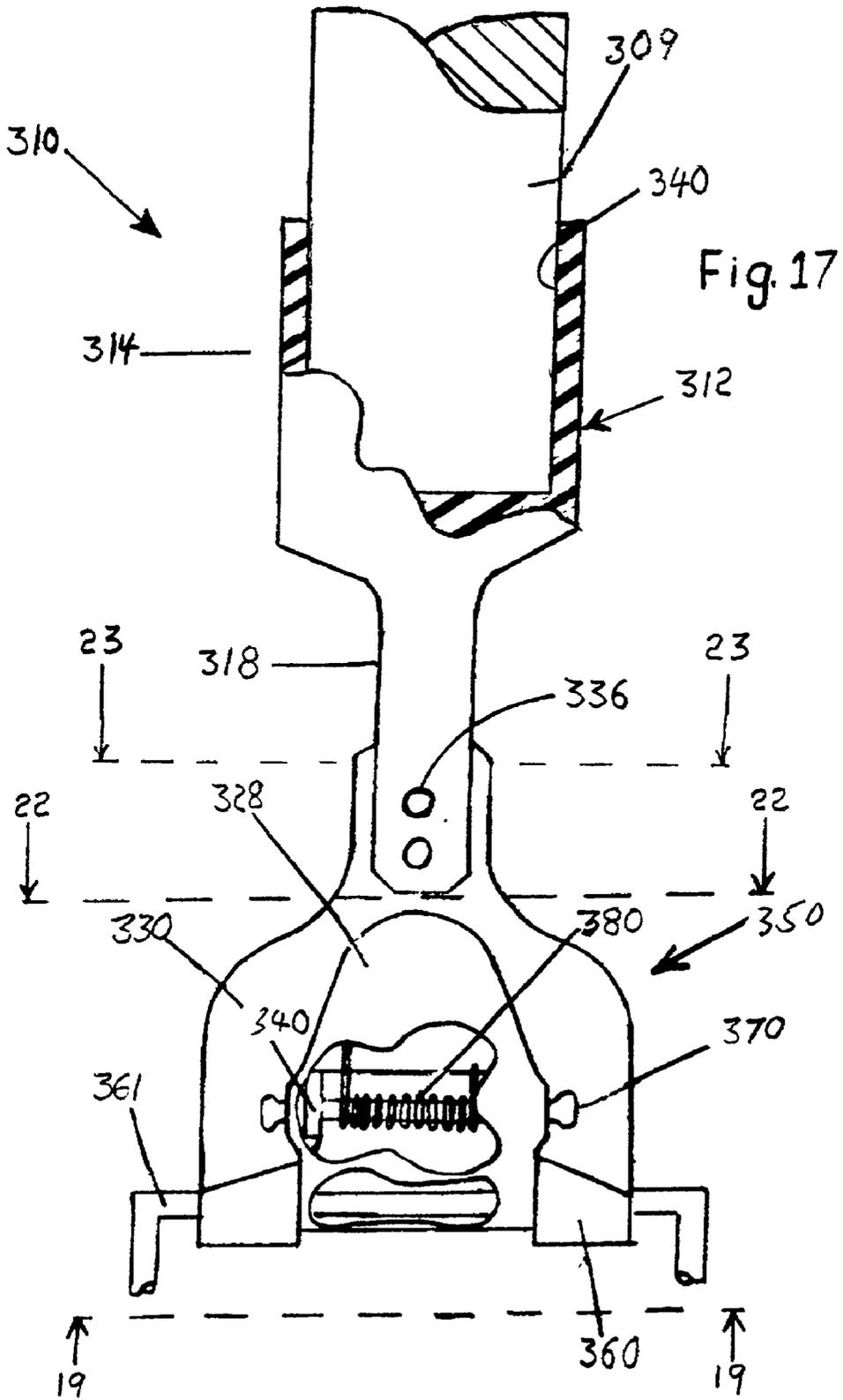


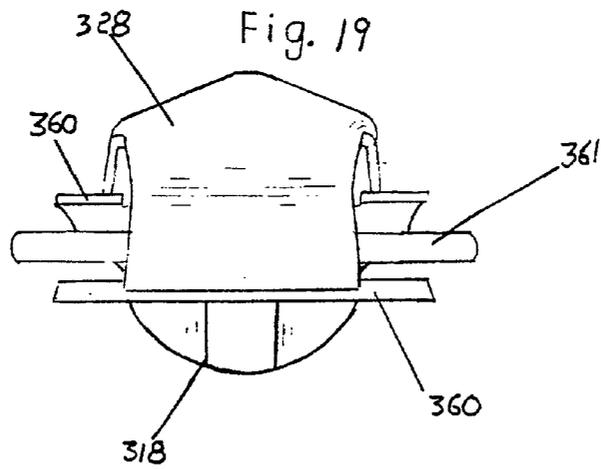
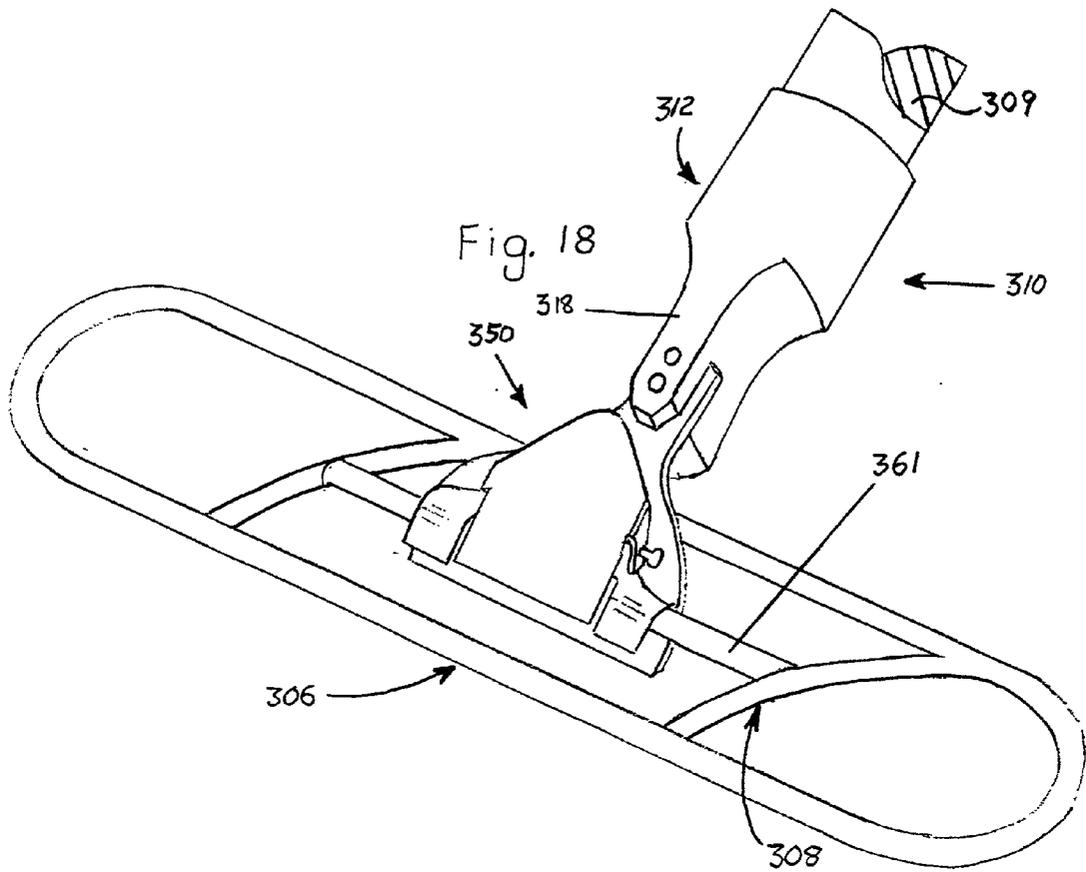


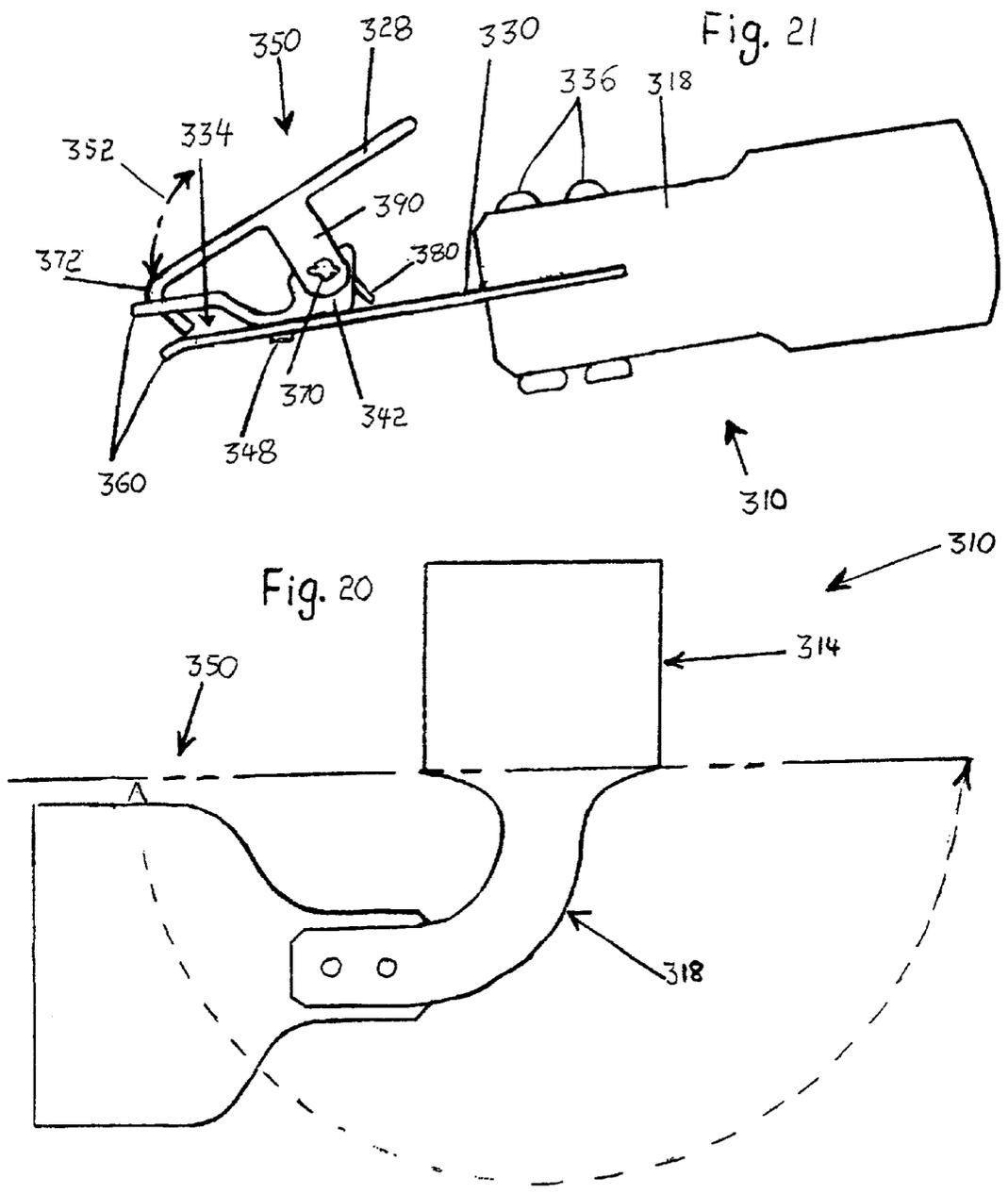


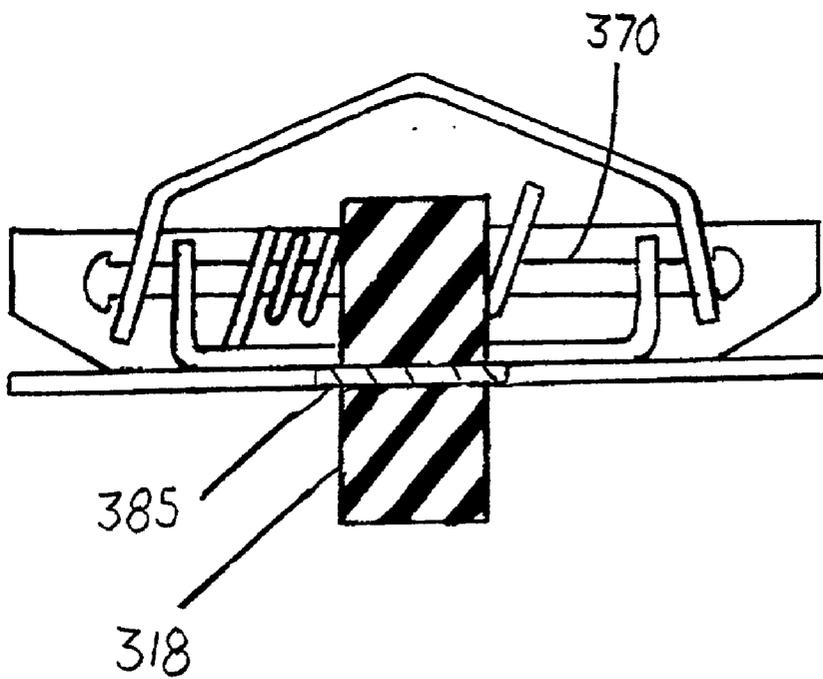
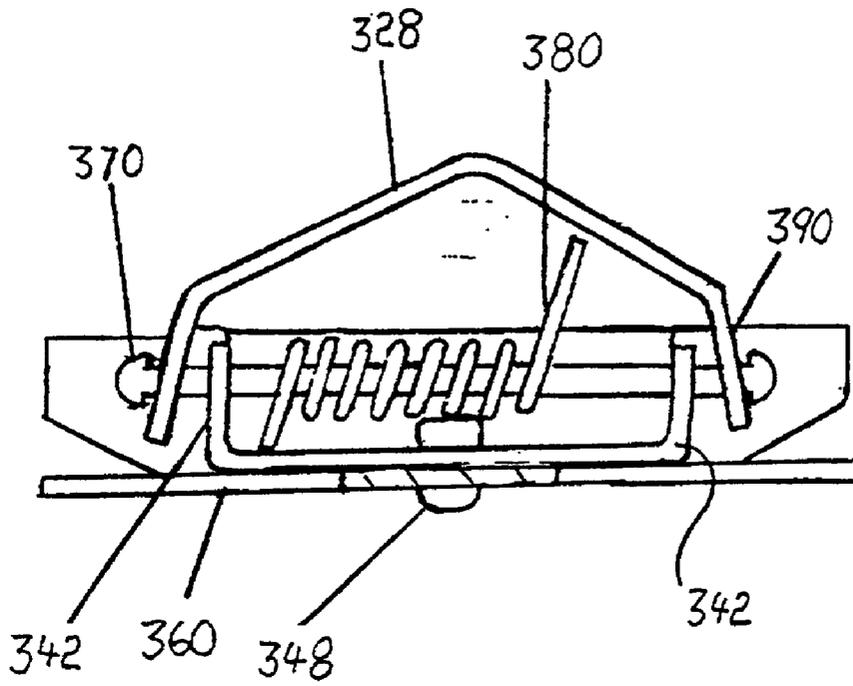


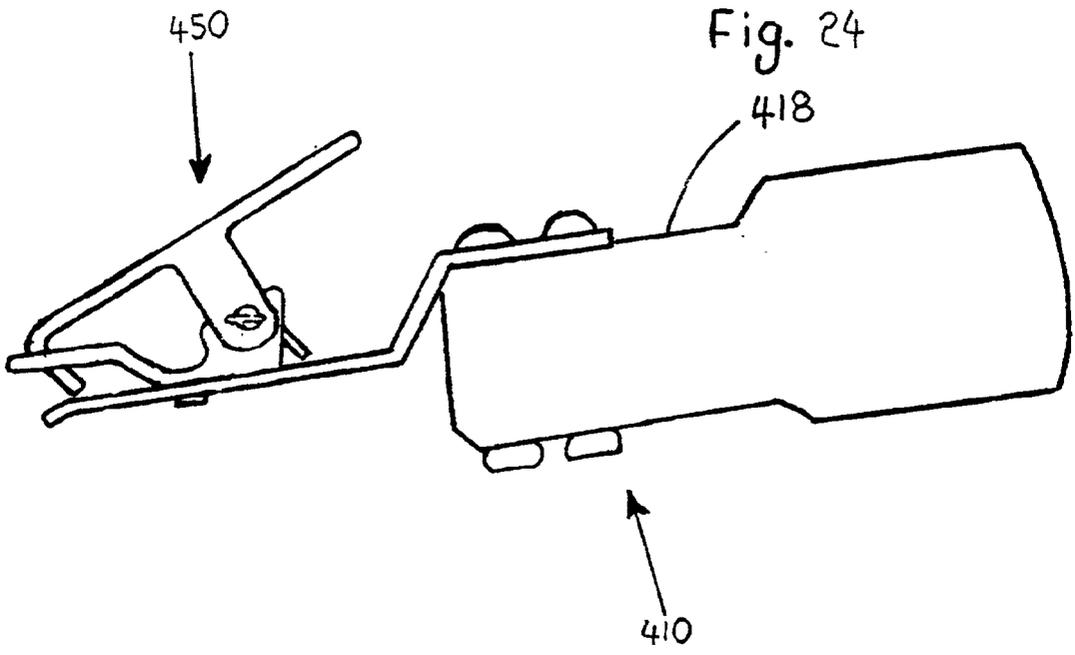












## FLEXIBLE ATTACHMENT APPARATUS FOR DUST MOPS AND SIMILAR CLEANING DEVICES

### BACKGROUND OF THE INVENTION

[0001] This application is a continuation-in-part of application Ser. No. 09/548,339 filed on Apr. 12, 2000, now pending.

[0002] 1. Field of the Invention

[0003] The present invention relates to a dust mopping, cleaning or a sweeping apparatus and in particular to mops or applications where debris is being removed by an apparatus. The present invention relates to a unitary flexible molded elastomer attachment that requires no assembly and allows for the floor dust mop to automatically rebound back after hitting obstacles. The new innovation allows for flexible floor dust mops to be less expensive to manufacture and to reduce an operator workload. In particular, the present invention relates to a flexible attachment device used in conjunction with an embedded or mechanical clamping mechanism for use with cleaning apparatuses or the like.

[0004] 2. Description of the Prior Art

[0005] The standard floor dust mop has two primary components. The first component is the floor dust mop head that comprises a rectangular structure usually made of a metal tube that supports therein a cloth covered sewn bag with a multiplicity of dust-absorbing cotton yarn-like strands. The support structure has a lateral cross bar which is used to attach the mop handle that is comprised of an assembled clamp mechanism consisting of springs and pivot rivets. The second primary component of the floor dust mop is the handle which is usually a cylindrical pole that is attached to a costly floor dust mop handle connector mechanism that requires assembly in order for the attachment to pivot in the transverse axis and allow the floor dust mop to move in multiple directions. The floor dust mop handle connector is removable and is typically fitted with a clamp that engages onto the floor dust mop frame. The floor dust mop handle connector is affixed to the top of the metal frame structure that supports the cotton skirt cover. The combination of the two permits the floor dust mop to be pushed and pulled by the exertion of a force on the handle and flex when coming in contact with obstacles.

[0006] One significant problem with flexible floor dust mops is the costly pivoting mechanism that allows the floor dust mop to flex around obstacles. Secondly, when the floor dust mop moves around an obstacle, the operator must twist the floor dust mop to regain the original position of the floor dust mop. Thirdly, the flexible mechanisms are made from steel and after being in use for a while they start to corrode or the spring on the release mechanism wears out.

[0007] Prior art has been patented on mechanisms or attachments that allow for a flexible joint between the floor dust mop head and floor dust mop handle. However, to date all prior arts are quite costly to manufacture due to the expense of springs and their installation into the floor dust mop head, e.g., U.S. Pat. No. 2,286,655 issued Jun. 16, 1942 to Frederick Supnick.

[0008] Therefore, a significant need exists to improve upon the previous patents that allows for a more cost effective flexible attachment to be made out of a single piece

of elastomeric material, thereby eliminating costly mechanisms that require assembly and could corrode. It is also desirable to provide a flexible attachment that is economical to manufacture so that a floor dust mop that can flex back without operator movement when cleaning around corners, doorways and obstacles on the floor in order for it to be easily negotiated when it is necessary to sweep adjacent or around them.

[0009] It is highly desirable to have a very efficient and also very effective design and construction of a flexible attachment apparatus for use with dust mops or the like. It is desirable to provide a flexible attachment apparatus for use with dust mops, wherein a clamping mechanism is integrally connected to a flexible unitary molded body with the capability of automatically rebounding back the dust mop head after striking obstacles during use. It is also desirable to provide a flexible attachment apparatus for use with dust mops, wherein a clamping mechanism is mechanically attached to a flexible unitary molded body with the capability of automatically rebounding back the dust mop head after striking obstacles during use.

### SUMMARY OF THE INVENTION

[0010] The present invention is a mechanism that is affixed at a location between a floor dust mop handle and a head of the floor dust mop to provide a flexible member at the junction where the handle is attached to the floor dust mop head. Through use of the flexible elastomeric member, when the floor dust mop head comes in contact with a stationary object, the floor dust mop will flex beyond 90 degrees deflection around the longitudinal axis in relation to the floor dust mop handle.

[0011] It is therefore an object of the present invention to provide an apparatus by which a conventional floor dust mop head can efficiently utilize a flexible elastomer floor dust mop handle attachment that can be economically manufactured.

[0012] It is a further object of the present invention to provide an insert that can be adapted to existing floor dust mop heads to provide flexibility.

[0013] It is an additional object of the present invention to provide an attachment which can be attached to the forward end of the floor dust mop handle to thereby provide the option of selling a handle with insert attached which can be affixed to the top of the head of a floor dust mop head.

[0014] Alternatively, the present invention is a flexible attachment apparatus for use with dust mops. The flexible attachment apparatus includes a clamping mechanism which is integrally connected to a flexible unitary molded body with the capability of automatically rebounding back the dust mop head after striking obstacles during use.

[0015] Still alternatively, the present invention is a flexible attachment apparatus for use with dust mops. The flexible attachment apparatus includes a clamping mechanism which is mechanically attached to a flexible unitary molded body with the capability of automatically rebounding back the dust mop head after striking obstacles during use.

[0016] Further novel features and other objects of the present invention will become apparent from the following

detailed description, discussion and the appended claims, taken in conjunction with the drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0017] Referring particularly to the drawings for the purpose of illustration only and not limitation, there is illustrated:

[0018] **FIG. 1** is a perspective view of the preferred embodiment of the present invention floor dust mop handle apparatus attached to the floor dust mop frame.

[0019] **FIG. 2** is a perspective view of the preferred embodiment of the present invention floor dust mop handle apparatus attached to the floor dust mop frame.

[0020] **FIG. 3** is a cross-sectional view looking up taken along line 3-3 of **FIG. 1**.

[0021] **FIG. 4** is a front elevational view of the preferred embodiment of the present invention floor dust mop handle apparatus illustrating the movement of the attachment when in contact with a stationary object.

[0022] **FIG. 5** is a side elevational view of the preferred embodiment of the present invention floor dust mop handle apparatus.

[0023] **FIG. 6** is a side elevational view of the preferred embodiment of the present invention floor dust mop handle apparatus illustrating the movement of the elastomer hinge allowing an opening for the floor dust mop support frame to be attached.

[0024] **FIG. 7** is an isometric view of the flexible floor dust mop handle attachment in its entirety.

[0025] **FIG. 8** is a cross-sectional view looking down taken along line 8-8 of **FIG. 1**.

[0026] **FIG. 9** is an isometric view of the flexible floor dust mop handle alternate attachment in its entirety.

[0027] **FIG. 10** is a partial cutout elevational view of a further embodiment of the present invention attachment apparatus attached to a floor dust mop frame and handle.

[0028] **FIG. 11** is a perspective view of the present invention attachment apparatus attached to a floor dust mop frame and handle shown in **FIG. 10**.

[0029] **FIG. 12** is a view taken along line 12-12 of **FIG. 10**.

[0030] **FIG. 13** is a front elevational view of the present invention attachment apparatus, illustrating the movement of the attachment apparatus when in contact with a stationary object shown in **FIG. 10**.

[0031] **FIG. 14** is a side elevational view of the present invention attachment apparatus shown in **FIG. 10**.

[0032] **FIG. 15** is a cross-sectional view taken along line 15-15 of **FIG. 1**.

[0033] **FIG. 16** is a cross-sectional view taken along line 16-16 of **FIG. 1**.

[0034] **FIG. 17** is a partial cutout elevational view of another further embodiment of the present invention attachment apparatus attached to a floor dust mop frame and handle.

[0035] **FIG. 18** is a perspective view of the present invention attachment apparatus attached to a floor dust mop frame and handle shown in **FIG. 17**.

[0036] **FIG. 19** is a view taken along line 19-19 of **FIG. 17**.

[0037] **FIG. 20** is a front elevational view of the present invention attachment apparatus, illustrating the movement of the attachment apparatus when in contact with a stationary object shown in **FIG. 17**.

[0038] **FIG. 21** is a side elevational view of the present invention attachment apparatus shown in **FIG. 17**.

[0039] **FIG. 22** is a cross-sectional view taken along line 22-22 of **FIG. 17**.

[0040] **FIG. 23** is a cross-sectional view taken along line 23-23 of **FIG. 17**.

[0041] **FIG. 24** is a side elevational view of an alternative attachment of the present invention attachment apparatus shown in **FIG. 17**.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0042] Although specific embodiments of the present invention will now be described with reference to the drawings, it should be understood that such embodiments are by way of example only and merely illustrative of but a small number of the many possible specific embodiments which can represent applications of the principles of the present invention. Various changes and modifications obvious to one skilled in the art to which the present invention pertains are deemed to be within the spirit, scope and contemplation of the present invention as further defined in the appended claims.

[0043] In the preferred embodiment, the insert member **10** in **FIG. 1** is made of any flexible substance with memory such as rubber, urethane, nylon, plastic, titanium, and polyvinyl. It is also within the spirit and scope of the present invention for the attachment to be made of flexible but strong plastic such as MYLAR®, polypropylene or any other flexible material exhibiting the required characteristics.

[0044] Referring to **FIG. 1**, there is shown at **10** the present invention flexible floor dust mop handle attachment. The apparatus is made from an elastomeric material comprised of a one-piece unitary molded body. In the preferred embodiment, the flexible member **10** comprises a longitudinal section **14** and a lateral section **16** that are interconnected through a flexible connecting section **18** that is not limited to any shape or form, e.g., rectangular, oval, square, etc. when viewed looking down the longitudinal axis as depicted in the cross sectional view of **FIG. 8**. However, it should be noted that a rectangular shape is more economical due to the optimizing of the expensive elastomer material needed to produce the flexible member **18**. A rectangular shape allows for the flexible member to flex around the lateral axis with less material needed to retain rigidity in the forward and aft movement when pushing and pulling the floor dust mop handle. In general appearance, the one piece molded insert looks similar to an extended Roman numeral I (when viewed from a front elevational view, see **FIG. 1**) with the top portion, item **130** being the receptacle to hold

the floor dust mop handle **120**. The floor dust mop handle is supported by the attachment body **14** that is a recessed cavity to hold the floor dust mop handle. Accordingly, the upper sleeve portion of the cylindrical sleeve section **130** includes an axial bore **140** having a uniform dimension so as to receive therein the transverse dimension of the handle **120**. The thickness of the material encapsulating handle **120** is sufficient to not crack when impact to the head of the floor dust mop occurs. The upper sleeve section **130** has a diameter to tightly receive in a generally slip-fit relationship the transverse dimension of the handle to frictionally retain the handle therein. It will be appreciated that the handle is not limited to the slip-fit engagement. It is emphasized that while the slip-fit engagement is preferred, it is also within the spirit and scope of the present invention to utilize threaded means or attached means such as a bolt or rivet. The overall configuration of the flexible member **18** as it joins to the floor dust mop frame support clamp recess cavity **160** resembles an inverted "T" with the mid portion of the vertical leg being thin in the middle and the lower portion of the leg extending outboard in both the left and right lateral directions to form the clamp mechanism **16** as shown in **FIG. 1**. The clamp mechanism when attached to the floor dust mop frame **170** retains the floor dust mop head.

[0045] Referring to **FIG. 2**, there is illustrated in a perspective view the relationship between the floor dust mop frame and floor dust mop handle attachment. The floor dust mop support frame **161** is encapsulated by the clamp mechanism **16** and supported by the lateral recess cavity **160**. The flexible member **18** adjoins the clamp mechanism **16**.

[0046] Referring to **FIG. 3**, there is illustrated the clamp mechanism **16** and the protruding push lever **171** that allows leverage to open the jaws of the clamp.

[0047] Referring to **FIG. 4**, there is illustrated the movement of the flexible connector when in contact with a stationary object. The floor dust mop attachment is made of an elastomeric material member **18** which can flex over **90** degrees in relation to the floor dust mop handle support **14**.

[0048] Referring to **FIG. 5**, there is illustrated the unitary elastomeric clamp mechanism. The clamp mechanism **16** has an upper jaw **152** and lower jaw **150** with an opening **170** that extends laterally. Opening **170** allows for access to cavity **160** that loosely supports the floor dust mop frame in order to pivot along the lateral axis. The upper clamp **152** remains rigid while the lower clamp **150** pivots around the lateral axis at **172**. Protruded lever **171** when depressed displaces cavity **172** allowing for lower clamp **150** to move forward in relation to upper clamp **152** allowing for opening **170** to enlarge as shown in **FIG. 6**.

[0049] Referring to **FIG. 6**, there is illustrated the movement of the clamp mechanism between upper and lower clamps **152** and **150** when force is applied to the protruded lever **171** on side **174**.

[0050] Referring to **FIG. 7**, there is an isometric illustration of the molded flexible attachment in its entirety.

[0051] Referring to **FIG. 8**, there is illustrated a cross sectional view with the flexible elastomeric material shaped as a rectangle shape. The purpose of a rectangular shape is to allow for maximum flexibility in the lateral movement yet retains rigidity in the forward and aft movement.

[0052] Referring to **FIG. 9**, there is shown an isometric illustration of an alternative embodiment of present invention molded flexible attachment without the protruding lever to ease in opening the clamp in its entirety.

[0053] This alternative embodiment is identical for attaching the base of the apparatus to a floor dust mop frame which is illustrated in **FIG. 9**. The alternative attachment is identical to the previous attachment described above except that there is no protruding lever **171**. However, there is still the open recessed cavity **172** as depicted in **FIG. 5** that allows for ease of installing the attachment onto the floor dust mop frame. To install the alternative embodiment, the operator must apply force to press on the attachment onto the floor dust mop frame.

[0054] Defined broadly, the present invention is a flexible unitary one piece molded floor dust mop to handle attachment to thereby provide a controlled flexible connection between the handle and head of the floor dust mop head to cause the floor dust mop head to move back and forth and the flexible insert being flexible.

[0055] Therefore, through use of the present invention, a flexible floor dust mop attachment can be manufactured that is economical, won't corrode and automatically rebounds back when striking a stationary obstacle.

[0056] Referring to **FIGS. 10 and 11**, alternatively there is shown at **210** the present invention flexible attachment apparatus for connecting a dust mop head **206** and a dust mop handle **209** together to form a dust mop (see **FIG. 11**). The attachment apparatus **210** comprises a flexible unitary molded body **212** which is made from elastomeric material and a dust mop metal clamping mechanism **250**. The unitary molded body **212** comprises a longitudinal retaining handle section **214** which is integrally interconnected to a flexible connecting section **218**.

[0057] It will be appreciated that the flexible connecting section **218** is not limited to a cross-section rectangular shaped configuration shown in **FIG. 16**. It is emphasized that while the rectangular shaped is preferred, it is also within the spirit and scope of the present invention to have a plurality of configurations such oval, round, square, etc. However, it should be noted that a rectangular shaped cross section of the flexible connecting section **218** is more economical when using the expensive elastomer material which is needed to produce the flexible unitary molded body **212**. A rectangular shaped cross-section of the connecting section **218** allows the unitary molded body **212** to flex around the lateral axis with less material needed to retain and maintain rigidity in the forward and aft movements of the dust mop. In general, the attachment apparatus **210** has a generally spoon shaped configuration. The longitudinal retaining handle section **214** has a generally cylindrical shaped body with an axial central bore **240**. The central bore **240** has a uniform inside diameter to receive therein the outside diameter of the dust mop handle **209**, where one end of the handle **209** is press-fitted into the central bore **240** of the retaining handle section **214** and frictionally retained therein.

[0058] It will be appreciated that the handle is not limited to the press-fit engagement. It is emphasized that while the press-fit engagement is preferred, it is also within the spirit and scope of the present invention to have the handle threadedly engaged or attached by a bolt or rivet.

[0059] Referring to FIGS. 10, 11, 12, 14, 15 and 16, the clamping mechanism 250 may have several different configurations, thereby allowing a lateral support bar 261 of the dust mop head 206 to engage into the clamping mechanism 250. In this configuration, the clamping mechanism 250 has an upper clamp member 228 and a lower clamp plate 230. The lower clamp plate 230 extends upwardly and bends to form a U-shaped channel 285 (see FIG. 12) or any other shapes that allows the U-shaped channel 285 to be positioned into the flexible connecting section 218 and embedded therein with the flexible material to enclose the U-shaped channel 285 of the clamping mechanism 250.

[0060] The upper clamp member 228 is movably connected to the lower clamp plate 230 by a pivot rod 270 that extends through four aligned holes that are located on upper stationary pivot flanges 290 and lower stationary pivot flanges 242. The upper pivot flanges 290 are located on opposite sides of each other while the lower pivot flanges 242 are also located on opposite sides of each other as well. These pivot flanges 242 and 290 are used to support the pivot rod 270 which retains a spring-loaded coiled spring 280. The pivot rod 270 allows for the lower clamp plate 230 to pivot laterally in relation to the movable upper clamp member 228. The ends of the coiled spring 280 are pre-loaded and engaged with the upper clamp member 228 and the lower clamp plate 230, and allow for the movable clamp member 228 to stay in direct contact with the lower clamp plate 230 to retain the support bar 261. When pressure is applied to the upper clamp member 228, the clamp member 228 pivots around the pivot rod 270, thereby allowing the lower clamp plate 230 and the upper clamp member 228 to open the clamp flanges 260 in relation to flange 272. Once open, the support bar 261 can be released from or secured to the clamping mechanism 250.

[0061] Referring to FIG. 11, there is shown the perspective view of the present invention attachment apparatus connected between the frame 208 of the dust mop and the handle 209. The support bar 261 of the frame 208 is encapsulated by the clamping mechanism 250 as shown. The clamping mechanism 250 is embedded within the flexible connecting section 218.

[0062] Referring to FIG. 12, there is shown the upper clamp member 228 which retains the support bar 261 thereto. The clamp flanges 260 and the lower clamp plate 230 secure the support bar 261 thereto.

[0063] Referring to FIG. 13, there is shown the movement of the flexible connecting section 218 of the unitary molded body 212 of the attachment apparatus 210 when in contact with a stationary object (not shown). The unitary molded body is made of elastomeric material, where the connecting section 218 can flex over approximately 90° in relation to the clamping mechanism 250 and the retaining handle section 214.

[0064] Referring to FIG. 14, there is shown the U-shaped channel 285, where the U-shaped channel 285 is embedded within the connecting section 218 of the unitary molded body 212. The lower clamp pivot flanges 242 are attached to the lower clamp plate 230 by fastener means 248. The pivot rod 270 engages the upper pivot flanges 290 and the lower pivot flanges 242. The preloaded coiled spring 280 is wrapped around the pivot rod 270. The clamp flanges 260 and 270 form a cavity 234, where the support bar 261 is

retained therein. When pressure is applied to the upper clamp member 228, the flange 272 is lifted upwardly as shown by arrow 252 to release or secure the support bar 261 of the frame 208 thereto. Flanges 260 assist in guiding the support bar 261 into the cavity 234.

[0065] Referring to FIGS. 17 and 18, still alternatively, there is shown at 310 the present invention flexible attachment apparatus for connecting a dust mop head 306 and a dust mop handle 309 together to form a dust mop (see FIG. 18). The attachment apparatus 310 comprises a flexible unitary molded body 312 which is made from elastomeric material and a dust mop metal clamping mechanism 350 which is mechanically fastened to one end of the unitary molded body 312. The flexible unitary molded body 312 comprises a longitudinal handle section 314 and a flexible connecting section 318 which is integrally molded with the handle section 314.

[0066] It will be appreciated that the flexible connecting section 318 is not limited to a cross-section rectangular shaped configuration shown in FIG. 23. It is emphasized that while the rectangular shaped is preferred, it is also within the spirit and scope of the present invention to have a plurality of configurations such oval, round, square, etc. However, it should be noted that a rectangular shaped cross section of the flexible connecting section 318 is more economical when using the expensive elastomer material which is needed to produce the flexible unitary molded body 312. A rectangular shaped cross-section of the connecting section 318 allows the unitary molded body 312 to flex around the lateral axis with less material needed to retain and maintain rigidity in the forward and aft movements of the dust mop. In general appearance, the attachment apparatus 310 has a general spoon shaped configuration appearance. The longitudinal retaining handle section 314 has a general cylindrical body with an axial central bore 340 having a uniform inside diameter to receive therein the outside diameter of the dust mop handle 309. One end of the handle 309 is press-fitted into the central bore 340 of the retaining handle section 314 and frictionally retained therein.

[0067] It will be appreciated that the handle is not limited to the press-fit engagement. It is emphasized that while the press-fit engagement is preferred, it is also within the spirit and scope of the present invention to have the handle threadedly engaged or attached by a bolt or rivet or other suitable means.

[0068] Referring to FIGS. 17 through 23, the clamping mechanism 350 can have several different configurations, thereby allowing the lateral support bar 361 of the frame 308 of the dust mop head 306 to engage into the clamping mechanism. In this configuration, the clamping mechanism 350 includes an upper clamp member 328 and a lower clamp plate 330. The lower clamp plate 330 extends upwardly to engage into the flexible connecting section 318 and fastened thereto by at least one fastener means 336 (two fastener means are shown). The at least one fastener means 336 can be rivets, screws, bolts or any other suitable means.

[0069] It will be appreciated that the method of attachment is not limited to the lower clamp plate inserted into the flexible connecting section 318 (as shown in FIG. 21) or attached on top of the flexible connecting section 318 (as shown in FIG. 24) or underneath the flexible connecting section 318 (not shown). It is emphasized that while the

method of attachment shown in FIG. 21 is preferred, it is also within the spirit and scope of the present invention to utilize other means of attachment not shown herewith.

[0070] Referring to FIGS. 19, 21, 22 and 23, the upper clamp member 328 is movably connected to the lower clamp plate 330 by a pivot rod 370 that extends through four aligned holes located on upper stationary pivot flanges 390 and lower clamp pivot flanges 342. The upper flanges 390 are located on opposite sides of each other while the lower flanges 342 are also located on opposite sides of each other as well. These pivot flanges 342 and 390 are used to support the pivot rod 370 which retains a spring-loaded coiled spring 380. The pivot rod 370 allows for the lower clamp plate 330 to pivot laterally in relation to the movable upper clamp member 328. The ends of the coiled spring are preloaded and engaged with the upper clamp member 328 and the lower clamp plate 330, and allows for the movable clamp member 328 to stay in direct contact with the lower clamp plate 330 to retain the support bar 361. When pressure is applied to the movable clamp member 328, the clamp member 328 pivots around the pivot rod 370, thereby allowing the lower clamp plate 330 and the upper clamp member 328 to open the clamp flanges 360 in relation to flange 372. Once open, the mop support bar 361 can be attached or detached from the clamping mechanism 350.

[0071] Referring to FIG. 19, there is shown a bottom view of the upper clamp member 328 which retains the support bar 361 thereto. The clamp flanges 360 and the clamp plate 330 secure the support bar 361 thereto.

[0072] Referring to FIG. 20, there is shown the movement of the flexible connecting section 318 of the unitary molded body 312 of the attachment apparatus 310 when in contact with a stationary object. The unitary molded body 312 is made of elastomeric material, where the connecting section 318 can flex approximately over 90° in relation to the clamping mechanism 350 and the retaining handle section 314.

[0073] Referring to FIG. 21, the pivot flanges 342 are attached to the lower clamp plate 330 by fastener means 348. The pivot rod 370 engages the upper pivot flanges 390 and lower pivot flanges 342, where the coiled spring 380 is wrapped around on the pivot rod 370. The pivot flanges 360 and 370 form a cavity 334 which retains the support bar 361 (not shown) of the frame 308 of the mop head 306. When pressure is applied to the upper clamp member 328, the flanges 370 are lifted up as shown by arrow 352 to release or secure the support bar 361 of the frame 208 thereto. The flanges 260 assist in guiding the support bar 361 into the cavity 334.

[0074] Referring to FIG. 24, further alternatively, there is shown at 410 the present invention flexible attachment apparatus for connecting a dust mop head and a dust mop handle together to form a dust mop. In this embodiment, the flexible attachment apparatus 410 is very similar to the embodiment just discussed in FIGS. 17 through 23 and the only difference is how the clamping mechanism 450 is attached to the flexible connecting section 418. All of the parts of this embodiment of the present invention flexible attachment apparatus 410 are numbered correspondingly with 400 added to each number. Since it assembles and functions the same as previously described above except that

the clamping mechanism 450 is attached on top of the flexible connecting section 418, the description thereof will not be repeated.

[0075] Defined broadly, the present invention is a flexible unitary one piece molded attachment that holds a handle and fastened to a clamp that retains a floor dust mop frame thereby providing a controlled flexible connection between the handle and head of the floor dust mop head to cause the floor dust mop head to move back and forth and the flexible insert being flexible.

[0076] The present invention is an attachment apparatus which includes a flexible unitary molded body that secures a handle at one end and a clamping mechanism which is integrally connected to the flexible unitary molded body for clamping a frame of a dust mop, thereby providing a controlled flexible connection between the handle and the head of the dust mop.

[0077] Therefore, through use of the present invention, a flexible attachment apparatus for use with a dust mop can be manufactured which is economical, won't corrode and automatically rebounds back when accidentally striking a stationary obstacle.

[0078] The attachment apparatus can be made from several materials. The manufacturing process which could accommodate the construction of the attachment apparatus may be injection, thermoform, etc. or other molding process. By way of example, the attachment apparatus can be made of any flexible substance with memory such as rubber, urethane, nylon, plastic, titanium, and polyvinyl. It is also within the spirit and scope of the present invention for the attachment apparatus to be made of flexible but strong plastic such as Mylar®, polypropylene or any other flexible material which exhibits the required characteristics.

[0079] Defined in detail, the present invention is a dust mop, comprising: (a) a transverse dust mop head having a cleaning surface and a frame attached to the cleaning surface, the frame having a support bar; (b) a longitudinal unitary molded body having a flexible connecting section and a retaining handle section integrally molded with the flexible connecting section; (c) a clamping mechanism having a clamping section and an attachment section integrally formed with the flexible connecting section of the unitary molded body, the clamping section having upper movable clamp means and lower stationary clamp means; (d) a push lever formed with the upper clamp means such that when the push lever is forced inwardly, the upper clamp means moves away from the lower clamp means for allowing the support bar of the frame of the dust mop head to be inserted thereto and secured within a cavity when the push lever is released; (e) the retaining handle section of the unitary molded body having an axial bore with an open end; (f) an elongated handle having one end press-fitted from the open end and secured within the axial bore of the retaining handle section of the unitary body; and (g) the flexible connecting section having a generally rectangular shaped cross section which is thinner than the retaining handle section for allowing lateral flexing of the clamping mechanism; (h) whereby the flexible connecting section of the unitary molded body allows the handle to maneuver the dust mop head to be pushed back and forth while at the same time allows the handle to move laterally relative to the dust mop head and when the dust mop head comes in contact with an object, the flexible

connecting section allows lateral flexing of the clamping mechanism which in turn allows flexing of the dust mop head.

[0080] Defined broadly, the present invention is a flexible attachment apparatus to be used in conjunction with a cleaning device having a handle and a laterally disposed cleaning head with a cleaning surface and a mounting surface having a support bar, the attachment apparatus comprising: (a) a flexible unitary body having a connecting section and a retaining section integrally formed with the connecting section; (b) a clamping mechanism having a clamping section and an attachment section integrally formed with the connecting section of the unitary body, the clamping section having upper clamp means and lower clamp means; (c) means for forcing either one of the upper and lower clamp means away from the other one of the upper and lower clamp means for allowing the support bar of the mounting frame of the cleaning head to be inserted through a retaining means and secured between the upper and lower clamp means; (d) the retaining section of the unitary body having a bore for receiving and press-fitting one end of the handle thereto; and (e) the connecting section having a thickness which is thinner than the clamping mechanism and the retaining section for allowing lateral flexing of the clamping mechanism; (f) whereby the attachment apparatus allows the handle to maneuver the cleaning head to be pushed back and forth while at the same time allows the handle to move laterally relative to the cleaning head and when the cleaning head comes in contact with an object, the connecting section allows lateral flexing of the clamping mechanism in turn allows lateral flexing of the cleaning head.

[0081] Alternatively defined in detail, the present invention is a dust mop, comprising: (a) a transverse dust mop head having a cleaning surface and a frame attached to the cleaning surface, the frame having a support bar; (b) a longitudinal unitary molded body having a flexible connecting section and a retaining handle section integrally formed with the flexible connecting section; (c) a clamping mechanism having a clamping section and an attachment section attached to the flexible connecting section of the unitary molded body, the clamping section having upper movable clamp means and lower stationary clamp means; (d) a push lever formed with the upper clamp means such that when the push lever is forced inwardly, the upper clamp means moves away from the lower clamp means for allowing the support bar of the frame of the dust mop head to be inserted thereto and secured within a cavity when the push lever is released; (e) the retaining handle section of the unitary molded body having an axial bore with an open end; (f) an elongated handle having one end press-fitted from the open end and secured within the axial bore of the retaining handle section of the unitary body; and (g) the flexible connecting section having a generally rectangular shaped cross section which is thinner than the retaining handle section for allowing lateral flexing of the clamping mechanism; (h) whereby the flexible connecting section of the unitary molded body allows the handle to maneuver the dust mop head to be pushed back and forth while at the same time allows the handle to move laterally relative to the dust mop head and when the dust mop head comes in contact with an object, the flexible connecting section allows lateral flexing of the clamping mechanism which in turn allows flexing of the dust mop head.

[0082] Alternatively defined broadly, the present invention is a flexible attachment apparatus to be used in conjunction with a cleaning device having a handle and a laterally disposed cleaning head with a cleaning surface and a mounting surface having a support bar, the attachment apparatus comprising: (a) a flexible unitary body having a connecting section and a retaining section integrally formed with the connecting section; (b) a clamping mechanism having a clamping section and an attachment section attached to the connecting section of the unitary body, the clamping section having upper clamp means and lower clamp means; (c) means for forcing either one of the upper and lower clamp means away from the other one of the upper and lower clamp means for allowing the support bar of the mounting frame of the cleaning head to be inserted through a retaining means and secured between the upper and lower clamp means; (d) the retaining section of the unitary body having a bore for receiving and press-fitting one end of the handle thereto; and (e) the connecting section having a thickness which is thinner than the clamping mechanism and the retaining section for allowing lateral flexing of the clamping mechanism; (f) whereby the attachment apparatus allows the handle to maneuver the cleaning head to be pushed back and forth while at the same time allows the handle to move laterally relative to the cleaning head and when the cleaning head comes in contact with an object, the connecting section allows lateral flexing of the clamping mechanism in turn allows lateral flexing of the cleaning head.

[0083] Further defined more broadly, the present invention is a flexible attachment apparatus to be used in conjunction with a cleaning device having a handle and a laterally disposed cleaning head with a frame, the attachment apparatus comprising: (a) a body member having a flexible connecting section and a retaining section for receiving and securing one end of the handle of the cleaning device thereto; (b) a clamping member attached to the flexible connecting section and having means for receiving and securing the frame of the cleaning head thereto; and (c) the flexible connecting section having a thickness which is thinner than the thickness of the retaining section for allowing lateral flexing of the clamping member which in turn allows flexing the cleaning head; (d) whereby the attachment apparatus allows the handle to maneuver the cleaning head of the cleaning device to be pushed back and forth while at the same time allows the handle to move laterally relative to the cleaning head and when the cleaning head comes in contact with an object, the flexible connecting section allows lateral flexing of the clamping member which in turn allows flexing of the cleaning head.

[0084] Of course the present invention is not intended to be restricted to any particular form or arrangement, or any specific embodiment, or any specific use, disclosed herein, since the same may be modified in various particulars or relations without departing from the spirit or scope of the claimed invention hereinabove shown and described of which the apparatus or method shown is intended only for illustration and disclosure of an operative embodiment and not to show all of the various forms or modifications in which this invention might be embodied or operated.

[0085] The present invention has been described in considerable detail in order to comply with the patent laws by providing full public disclosure of at least one of its forms.

However, such detailed description is not intended in any way to limit the broad features or principles of the present invention, or the scope of the patent to be granted. Therefore, the invention is to be limited only by the scope of the appended claims.

What is claimed is:

1. A dust mop, comprising:
  - a. a transverse dust mop head having a cleaning surface and a frame attached to the cleaning surface, the frame having a support bar;
  - b. a longitudinal unitary molded body having a flexible connecting section and a retaining handle section integrally molded with the flexible connecting section;
  - c. a clamping mechanism having a clamping section and an attachment section integrally formed with said flexible connecting section of said unitary molded body, the clamping section having upper movable clamp means and lower stationary clamp means;
  - d. a push lever formed with said upper clamp means such that when the push lever is forced inwardly, said upper clamp means moves away from said lower clamp means for allowing said support bar of said frame of said dust mop head to be inserted thereto and secured within a cavity when the push lever is released;
  - e. said retaining handle section of said unitary molded body having an axial bore with an open end;
  - f. an elongated handle having one end press-fitted from said open end and secured within said axial bore of said retaining handle section of said unitary body; and
  - g. said flexible connecting section having a generally rectangular shaped cross section which is thinner than said retaining handle section for allowing lateral flexing of said clamping mechanism;
  - h. whereby said flexible connecting section of said unitary molded body allows said handle to maneuver said dust mop head to be pushed back and forth while at the same time allows said handle to move laterally relative to said dust mop head and when said dust mop head comes in contact with an object, said flexible connecting section allows lateral flexing of said clamping mechanism which in turn allows flexing of said dust mop head.
2. The dust mop in accordance with claim 1, wherein said unitary molded body is made out of elastomer material.
3. The dust mop in accordance with claim 1, wherein said flexible connecting section can flex over approximately 90° relative to said clamping mechanism and said retaining handle section.
4. A flexible attachment apparatus to be used in conjunction with a cleaning device having a handle and a laterally disposed cleaning head with a cleaning surface and a mounting surface having a support bar, the attachment apparatus comprising:
  - a. a flexible unitary body having a connecting section and a retaining section integrally formed with the connecting section;
  - b. a clamping mechanism having a clamping section and an attachment section integrally formed with said connecting section of said unitary body, the clamping section having upper movable clamp means and lower stationary clamp means;
  - c. means for forcing either one of said upper and lower clamp means away from the other one of said upper and lower clamp means for allowing said support bar of said mounting frame of said cleaning head to be inserted through a retaining means and secured between said upper and lower clamp means;
  - d. said retaining section of said unitary body having a bore for receiving and press-fitting one end of said handle thereto; and
  - e. said connecting section having a thickness which is thinner than said clamping mechanism and said retaining section for allowing lateral flexing of said clamping mechanism;
  - f. whereby said attachment apparatus allows said handle to maneuver said cleaning head to be pushed back and forth while at the same time allows said handle to move laterally relative to said cleaning head and when said cleaning head comes in contact with an object, said connecting section allows lateral flexing of said clamping mechanism in turn allows lateral flexing of said cleaning head.
5. The attachment apparatus in accordance with claim 4, wherein said flexible unitary body is made out of elastomer material.
6. The attachment apparatus in accordance with claim 4, wherein said connecting section is generally a rectangular shaped cross section.
7. The attachment apparatus in accordance with claim 4, wherein said retaining means includes a cavity.
8. The attachment apparatus in accordance with claim 4, wherein said means for forcing either one of said upper and lower clamp means away from the other one of said upper and lower clamp means includes a push lever formed with said upper clamp means such that when the push lever is forced inwardly, said upper clamp means moves away from said lower clamp means.
9. A dust mop, comprising:
  - a. a transverse dust mop head having a cleaning surface and a frame attached to the cleaning surface, the frame having a support bar;
  - b. a longitudinal unitary molded body having a flexible connecting section and a retaining handle section integrally formed with the flexible connecting section;
  - c. a clamping mechanism having a clamping section and an attachment section attached to said flexible connecting section of said unitary molded body, the clamping section having upper movable clamp means and lower stationary clamp means;
  - d. a push lever formed with said upper clamp means such that when the push lever is forced inwardly, said upper clamp means moves away from said lower clamp means for allowing said support bar of said frame of said dust mop head to be inserted thereto and secured within a cavity when the push lever is released;
  - e. said retaining handle section of said unitary molded body having an axial bore with an open end;

- f. an elongated handle having one end press-fitted from said open end and secured within said axial bore of said retaining handle section of said unitary body; and
- g. said flexible connecting section having a generally rectangular shaped cross section which is thinner than said retaining handle section for allowing lateral flexing of said clamping mechanism;
- h. whereby said flexible connecting section of said unitary molded body allows said handle to maneuver said dust mop head to be pushed back and forth while at the same time allows said handle to move laterally relative to said dust mop head and when said dust mop head comes in contact with an object, said flexible connecting section allows lateral flexing of said clamping mechanism which in turn allows flexing of said dust mop head.
- 10.** The dust mop in accordance with claim 9, wherein said unitary molded body is made out of elastomer material.
- 11.** The dust mop in accordance with claim 9, wherein said flexible connecting section can flex over approximately 90° relative to said clamping mechanism and said retaining handle section.
- 12.** A flexible attachment apparatus to be used in conjunction with a cleaning device having a handle and a laterally disposed cleaning head with a cleaning surface and a mounting surface having a support bar, the attachment apparatus comprising:
- a flexible unitary body having a connecting section and a retaining section integrally formed with the connecting section;
  - a clamping mechanism having a clamping section and an attachment section attached to said connecting section of said unitary body, the clamping section having upper clamp means and lower clamp means;
  - means for forcing either one of said upper and lower clamp means away from the other one of said upper and lower clamp means for allowing said support bar of said mounting frame of said cleaning head to be inserted through a retaining means and secured between said upper and lower clamp means;
  - said retaining section of said unitary body having a bore for receiving and press-fitting one end of said handle thereto; and
  - said connecting section having a thickness which is thinner than said clamping mechanism and said retaining section for allowing lateral flexing of said clamping mechanism;
  - whereby said attachment apparatus allows said handle to maneuver said cleaning head to be pushed back and forth while at the same time allows said handle to move laterally relative to said cleaning head and when said cleaning head comes in contact with an object, said connecting section allows lateral flexing of said clamping mechanism in turn allows lateral flexing of said cleaning head.
- 13.** The attachment apparatus in accordance with claim 12, wherein said flexible unitary body is made out of elastomer material.
- 14.** The attachment apparatus in accordance with claim 12, wherein said connecting section is generally a rectangular shaped cross section.
- 15.** The attachment apparatus in accordance with claim 12, wherein said retaining means includes a cavity.
- 16.** The attachment apparatus in accordance with claim 12, wherein said means for forcing either one of said upper and lower clamp means away from the other one of said upper and lower clamp means includes a push lever formed with said upper clamp means such that when the push lever is forced inwardly, said upper clamp means moves away from said lower clamp means.
- 17.** A flexible attachment apparatus to be used in conjunction with a cleaning device having a handle and a laterally disposed cleaning head with a frame, the attachment apparatus comprising:
- a body member having a flexible connecting section and a retaining section for receiving and securing one end of said handle of said cleaning device thereto;
  - a clamping member attached to said flexible connecting section and having means for receiving and securing said frame of said cleaning head thereto; and
  - said flexible connecting section having a thickness which is thinner than the thickness of said retaining section for allowing lateral flexing of said clamping member which in turn allows flexing said cleaning head;
  - whereby said attachment apparatus allows said handle to maneuver said cleaning head of said cleaning device to be pushed back and forth while at the same time allows said handle to move laterally relative to said cleaning head and when said cleaning head comes in contact with an object, said flexible connecting section allows lateral flexing of said clamping member which in turn allows flexing of said cleaning head.
- 18.** The attachment apparatus in accordance with claim 17, wherein said body member is made out of elastomer material.
- 19.** The attachment apparatus in accordance with claim 17, wherein said receiving and securing means of said clamping member includes upper movable clamp means and lower stationary clamp means.
- 20.** The attachment apparatus in accordance with claim 19, wherein said upper clamp means further comprises a push lever such that when the push lever is forced inwardly, said upper clamp means moves away from said lower clamp means for allowing said frame of said cleaning head to be inserted thereto and secured within a cavity when the push lever is released.
- 21.** The attachment apparatus in accordance with claim 17, wherein said flexible connecting section is a generally rectangular shaped cross section.
- 22.** The attachment member in accordance with claim 17, wherein said retaining means includes a cavity.
- 23.** The attachment apparatus in accordance with claim 17, wherein said means for receiving and securing one end of said handle thereto includes an axial bore.