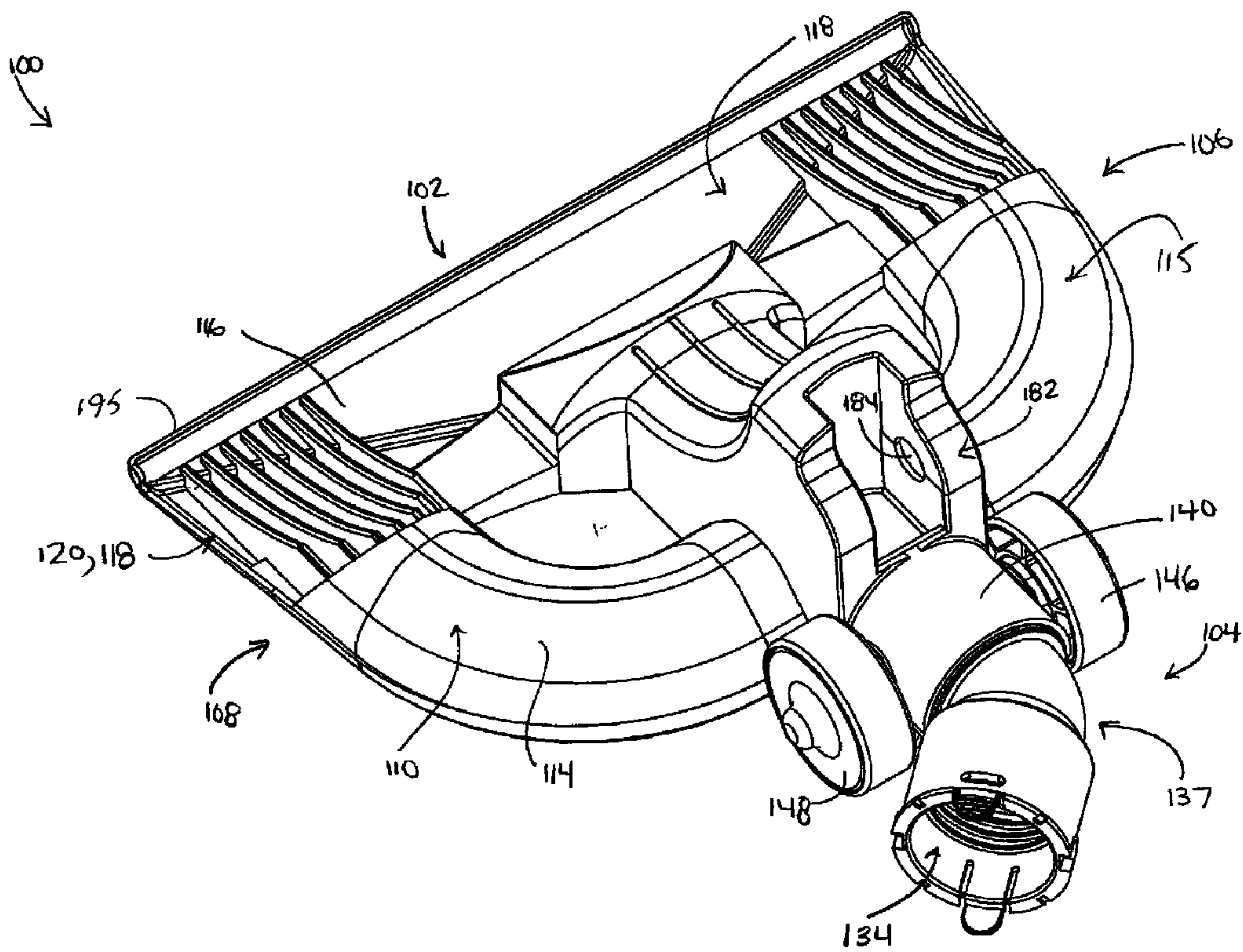




(22) Date de dépôt/Filing Date: 2009/03/13
(41) Mise à la disp. pub./Open to Public Insp.: 2010/09/13

(51) Cl.Int./Int.Cl. *A47L 9/02* (2006.01),
A47L 5/28 (2006.01)
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(54) Titre : TETE DE NETTOYAGE DE SURFACES
(54) Title: SURFACE CLEANING HEAD



(57) Abrégé/Abstract:

A surface cleaning head for a domestic vacuum cleaner comprises one, and preferably two leading surfaces that comprise upwardly extending portions.

ABSTRACT

A surface cleaning head for a domestic vacuum cleaner comprises one, and preferably two leading surfaces that comprise upwardly extending portions.

5

TITLE: SURFACE CLEANING HEAD

FIELD

[0001] The specification relates to surface cleaning heads. More particularly, the specification relates to surface cleaning heads for surface
5 cleaning apparatuses such as domestic vacuum cleaners.

INTRODUCTION

[0002] The following is not an admission that anything discussed below is prior art or part of the common general knowledge of persons skilled in the art.

[0003] U.S. Patent 4,395,794 discloses a vacuum cleaner intake device
10 formed of a V-shaped housing widening in the direction of working. The housing has a funnel shape nozzle, a fitting at the apex of the nozzle for connection to a source of suction and a pair of arms extending in a V-shape respectively forwardly and laterally of the nozzle. A pair of side walls are provided each having a skid at its lower edge elevating said housing above the floor. A hood
15 covers and defines with the arms and the side walls a collection chamber open at the forward and rear edges. Each of the arms are provided on their bottom surface with a pair of spaced battens defining between them an elongated suction groove open to the collection chamber and extending outwardly through the side wall.

20 [0004] Other similar open sided designs are disclosed for different applications, such as U.S. Patent 5,768,744 for a waste collection apparatus. See also U.S. Patent 5,839,157 and U.S. Patent 5,208,941.

SUMMARY

[0005] The following introduction is provided to introduce the reader to the
25 more detailed discussion to follow. The introduction is not intended to limit or define the claims.

[0006] According to one broad aspect, a surface cleaning head for a domestic vacuum cleaner is disclosed. The surface cleaning head comprises a front end, a rear end and a bottom. A plurality of wheels are also provided. An air flow passage extends from a dirty air inlet to an air outlet. The front end has
5 an upwardly curved portion or lip above a portion of the dirty air inlet.

[0007] An advantage of this design is that, if the front is straight, then when the cleaning head is placed against a wall, the upturned lip creates a seal with the wall. This results increased air being drawn in from below the lip and enhances the ability of the cleaning head to collect dirt from the edge defined by
10 the wall and the floor.

[0008] A further advantage of this design is that the lip defines a cam surface to direct the cleaning head over an obstacle. For example, if the surface cleaning head is moved from a low pile carpet or a bare floor to a high pile carper, the lip may not be pushed into the high pile carpet. Instead, the lip my roll
15 up over a transition to the high pile carpet and reduce the force required to push the front of the cleaning head onto the higher pile carpet.

[0009] In some examples, the air flow passage comprises an lower open sided air flow chamber. The lower open sided air flow chamber may comprise sidewalls and the side walls may have a front end that extends upwardly. The
20 front end of the sidewalls may be chamfered or radiused.

[0010] In some examples, the wheels extend downwardly below the bottom of the sidewalls. The wheels may extend downwardly below the bottom of the surface cleaning head. The wheels may comprise front wheels.

[0011] In some examples, the lower open sided air flow chamber is
25 generally V shaped.

[0012] In some examples, the upwardly curved portion has an upper end spaced a distance above a lower end and the distance may be up to 1 inch and, preferably 0.25-0.5 inches.

[0013] In some examples, the upwardly curved portion has a radius of at least about 0.375 inches.

[0014] In some examples, the upwardly curved portion has a lower surface, and the lower surface defines a portion of the dirty air inlet.

5 It will be appreciated that a surface cleaning head may incorporate one or more of the features of each of these embodiments and examples.

DRAWINGS

[0015] Figure 1 is a top perspective view of an embodiment of a surface cleaning head;

10 [0016] Figure 2 is a side elevation view of the surface cleaning head of Figure 1;

[0017] Figure 3 is a bottom plan view of the surface cleaning head of Figure 1;

15 [0018] Figure 4 is a bottom perspective view of the surface cleaning head of Figure 1;

[0019] Figure 5 is an exploded view of the surface cleaning head of Figure 1;

[0020] Figure 6 is a front perspective view of a surface cleaning apparatus comprising the surface cleaning head of Figure 1;

20 [0021] Figure 7 is a cross-section taken along line 7-7 in Figure 3;

[0022] Figure 8 is a cross-section taken along line 8-8 in Figure 3; and,

[0023] Figure 9 is a cross-section taken along line 9-9 in Figure 3.

DESCRIPTION OF VARIOUS EMBODIMENTS

25 [0024] Various apparatuses or methods will be described below to provide an example of each claimed invention. No example described below limits any claimed invention and any claimed invention may cover processes or

apparatuses that are not described below. The claimed inventions are not limited to apparatuses or processes having all of the features of any one apparatus or process described below or to features common to multiple or all of the apparatuses described below. It is possible that an apparatus or process
5 described below is not an embodiment of any claimed invention.

[0025] Referring to Figures 1-5, and 7-9 an example of a surface cleaning head 100 is shown. Referring to Figure 6, as will be described further hereinbelow, the surface cleaning head 100 is connectable in air flow communication to a surface cleaning apparatus 600, such as a domestic vacuum
10 cleaner, and preferably, an upright vacuum cleaner.

[0026] Referring to Figures 1 to 5 and 7-9, the surface cleaning head 100 comprises a front end 102, and a rear end 104. The surface cleaning head further comprises first 106 and second 108 opposed lateral sides extending between the front 102 and rear 104 ends. A top 110 and a bottom 112 each
15 extend between the front end 102 and the rear end 104, and the opposed lateral sides 106, 108. Surface cleaning head may be of various configuration and preferably has a front 102 that is straight as exemplified.

[0027] Preferably, as exemplified, a clam shell construction may be utilized. For example, the surface cleaning apparatus may comprise a top plate
20 114, and a bottom plate 116. Preferably, the surface cleaning head has a lower open sided air flow chamber. Accordingly, as exemplified, the top plate 114 may extend forwardly of the bottom plate 116. Accordingly, a front portion 118 of the top plate 116 forms a front portion 120 of bottom 112, and the bottom plate 116 forms a rear portion 121 of the bottom 112.

25 [0028] In alternate embodiments, the top plate 114 and the bottom plate 116 may extend for equal distances. In such embodiments, the bottom plate may form all of the bottom 112.

[0029] The surface cleaning apparatus 100 comprises a front dirty air inlet 130, through which dirt laden air enters the surface cleaning head 100. An airflow passage extends from the front dirty air inlet 130 to an air outlet 134 of the surface cleaning apparatus 100.

5 [0030] The airflow passage comprises a first airflow chamber 128, which extends rearwardly from the front dirty air inlet 130 to an air outlet end 132. Preferably, the first airflow chamber 128 is integrally formed in front portion 118 of the top plate 116. For example, as shown, the first airflow chamber 128 is defined by a top wall 190, and side walls 192 and 194. The top wall 190
10 comprises a portion of the front portion 118 of the top plate 114, and the side walls 192, 194 extend downwardly on opposed sides of the front portion 118 of the top plate. Preferably, the first airflow chamber 128 has a lower side 188, wherein at least a portion of the lower side 188 is open. That is, the first airflow chamber 128 is open lower sided. For example, as shown, the entire lower side
15 188 of the first airflow passage 128, opposed to the top wall 190 and extending between sidewalls 192, 194, is open.

[0031] As shown in Figures 3 and 4, in the exemplified embodiment, the side walls 192, 194 are angled inwardly, away from lateral sides 106 and 108, going towards air outlet end 132. Accordingly, airflow chamber 128 is decreases
20 in cross sectional area going in the downstream direction, from inlet 130 to air outlet end 132, and is generally V-shaped. For example, as shown, the air inlet 130 extends across the entire width of the surface cleaning head 100, from the first lateral side 106 to the second lateral side 108. The air outlet end 132 extends across only a portion of the width. Preferably, the air outlet end 132
25 extends across between 20% and 35% of the width. The width of outlet 132 will vary depending, for example, on the cross sectional area of the second passage, the height of the outlet 132.

[0032] Preferably, as shown in Figure 7, the sidewalls 192, 194 have a front end that extends upwardly. For example, as shown most clearly in Figure

7, the front end 151 of sidewall 192 extends upwardly, and the front end 153 of sidewall 194 extends upwardly. More preferably, the sidewalls 192, 194 are chamfered or radiused. For example, as shown, the sidewalls are radiused. Preferably, the front ends 151, 153 of the sidewalls 192, 194 merge with a lip
5 199 at the front of the surface cleaning head 100, as will be described hereinbelow.

[0033] Preferably, the airflow passage further comprises a manifold 198, which is in communication with the air outlet end 132 of the first airflow chamber 128. In such a case, it preferred that each such passage extends outwardly from
10 the manifold as opposed to from another passage. It will be appreciated that manifold may be of any construction.

[0034] Preferably, manifold has an open lower side. As exemplified, the manifold 198 may comprise a rear 181, a front 183, and opposed lateral sides 185, 187. In the example shown, the first airflow passage 128 is in
15 communication with the manifold 198 at the front 183. An outlet port 136 is provided at rear 181. Manifold is preferred if more than one airflow passage is provided.

[0035] As exemplified, the manifold 198 has a top wall 189 extending between rear 181, front 183, and sides 185, 187. The top wall comprises a
20 portion of front portion 118 of top plate 114. Preferably, the lower side 191 of manifold 198 is open.

[0036] Preferably, the manifold 198 is recessed upwardly from the portion of the top wall 190 at the air outlet end 132. For example, as shown, front side 183 of manifold 196 extends upwardly from air outlet end 132. Preferably, as
25 shown in Figure 3, lower side 191 of manifold 198 is spaced above floor F.

[0037] Referring still to Figures 1-5 and 7-9, preferably, as shown, the airflow passage of the surface cleaning head 100 preferably further comprises a second airflow chamber 122, and a third airflow chamber 123. The additional air

flow passages may be of any configuration and construction. Preferably as exemplified, they have a lower open end.

[0038] Preferably, as exemplified, the second airflow chamber 122 comprises an air inlet 124, and an air outlet end 126, and the third flow chamber 5 123 comprises an air inlet 125 and an air outlet end 127. In the exemplified embodiment, the second airflow chamber 122 extends inwardly from lateral side 106, and the air inlet 124 to the second airflow chamber 122 is at lateral side 106. Accordingly, air inlet 124 forms a first side dirty air inlet 124 to the surface cleaning head 100. Further, the third airflow chamber 123 extends inwardly from 10 lateral side 108, and the air inlet 125 to the third airflow chamber 123 is at lateral side 108. Accordingly, air inlet 125 forms a second side dirty air inlet 125 to the surface cleaning head 100. In some embodiments, inlets 124, 125 may not be provided.

[0039] In alternate embodiments, the surface cleaning head 100 may 15 comprise only a first airflow passage. In further alternate embodiments, the surface cleaning head 100 may comprise only a first and a second airflow passage. In further alternate embodiments, the surface cleaning head may comprise more than three airflow passages.

[0040] In the preferred embodiment, the second airflow chamber 122 has 20 a lower side 129, and at least a portion of the lower side 129 is open, and the third 123 airflow passages has a lower side 131, and at least a portion of the lower side 131 is open. For example, as shown, the second airflow chamber 122 comprises a top wall 133, which comprises a portion of front portion 118 of top plate 114, and opposed side walls 135, 139, extending downwardly from top 25 wall 133. The entire lower side 129, which is opposed to top wall 133, and extends between sidewalls 135, 139, and inlet 124 and outlet 126, is open. Further, as shown, the third airflow chamber 123 comprises a top wall 141, which comprises a portion of front portion 118 of top plate 114, and opposed side walls 143, 145, extending downwardly from top wall 141. The entire lower side 131,

which is opposed to top wall 133, and extends between sidewalls 135, 139, and inlet 124 and outlet 126, is open.

[0041] In the exemplified embodiment, side wall 192 is formed by a first triangular member 167 on front portion 118 of top plate 114. Further, side wall
5 194 is formed by a second triangular member 169 of front portion 118 of top plate 114.

[0042] Preferably, the air outlet end 126 of the second airflow chamber 122 communicates with manifold 198, and the air outlet 127 of the third airflow chamber 123 communicates with manifold 198. For example, as shown, the air
10 outlet end 126 of the second airflow chamber 122 is at lateral side 185 of manifold 198, and the air outlet end 127 of third airflow chamber 123 is at lateral side 187 of manifold 198.

[0043] Preferably, as shown, outlet port 136 of manifold 198 is in communication with a conduit 140, which extends rearwardly from the opening
15 136. A swivel joint 137 may be mounted to a rear end of the conduit 140, and is in airflow communication with the conduit 140. The swivel joint is mountable in airflow communication with the surface cleaning apparatus 600, and comprises the air outlet 134 of the surface cleaning head 100. Accordingly, the airflow passage of the surface cleaning head 100 extends from inlets 130, 124, and 125
20 to air outlet 134.

[0044] Preferably, as shown, the front end 102 of the surface cleaning head 100 has an upwardly curved portion. More preferably, the upwardly curved portion 199 is above at least a portion of a dirty air inlet of the surface cleaning head. For example, as shown, the front portion 118 of top plate 114 comprises a
25 lip 199, which provides the upwardly curved portion. The lip 199 extends forwardly and upwardly. As exemplified, all of the lip 199 is above the front dirty air inlet 130. More particularly, a lower surface 197 of the lip defines the front dirty air inlet 130, and the front dirty air inlet extends between the lower surface

197 of the lip 199 and a floor to be cleaned F. As exemplified, the lip 199 preferably extends across the surface cleaning head, from lateral side 106 to lateral side 108.

[0045] As shown, the lip 199 has an upper end 195, and a lower end 193.

5 Preferably, as shown, the lower surface 197 is generally vertical at the upper end 195, and generally horizontal at the lower end 193. Accordingly, the lip 199 preferably defines an arc that extends for 90°. The radius of the arc may vary. In some embodiments, the radius of the arc is at least about 0.375 inches. Preferably, the radius of the arc is between 0.375 and 0.5 inches.

10 [0046] The height of the lip 199 may vary. In some embodiments, the upper end 195 is spaced above the lower end 193 by up to 1 inch. Preferably, the upper end 195 is spaced above the lower end by between 0.25 and 0.5 inches.

[0047] As shown in Figure 2, in use, a portion of the lip 199 may contact a
15 wall W, and may abut the wall W to form a partial seal with the wall W. This may allow for enhanced edge cleaning. That is, when the lip 199 abuts the wall W, the dirty air inlet 130 is above the portion of the floor F adjacent the wall. As a partial seal is formed between the lip 199 and the wall W, the majority of the air entering the dirty air inlet 130 flows along the floor F into the dirty air inlet 130,
20 rather than flowing into the dirty air inlet 130 from above the dirty air inlet. That is, the majority of the air can not bypass the floor F.

[0048] In addition, the lip 199 may allow the surface cleaning head to transition from a low pile carpet to a higher pile carpet. That is, if surface cleaning head 100 is pushed from a low pile carpet to a high pile carpet, lip 199
25 may serve as a ramp, and may aid in lifting the surface cleaning head 100 from the low pile carpet onto the high pile carpet. More preferably, a second ramped surface is provided on the lower surface of the surface cleaning head. As exemplified in Figure 3, sidewalls 192, 194 of triangular portions 167, 169 define

a leading or front surface, a portion of which, and preferably off of which, are preferably also chamfered or radiused. In accordance with a particularly preferred embodiment, at least the portion of the leading surface adjacent the lateral sides 106, 108 are upwardly directed. As exemplified in Figure 3, the curved portion of the leading surface has an upper end that is adjacent the lower end of lip 199. Accordingly, lip 199 and the leading surface may each comprise a cam surface that are sufficiently close together to define a single continuous cam surface (see for example Figure 7).

[0049] Referring to Figures 2 to 5, the surface cleaning head 100 preferably comprises a plurality of wheels, and more preferably, at least two front wheel assemblies, and at least two rear wheels. In the exemplified embodiment, the surface cleaning head 100 comprises first 142 and second 144 front wheel assemblies, and first 146 and second 148 rear wheels. Any combination of wheels may be used. Preferably, the front wheels comprise wheels that will rotate also about a vertical axis, such as caster wheels, swivel wheels and ball wheels. Accordingly, the front wheel assemblies 142, 144 may rotate about vertical axes, and comprise wheels that are rotatable about horizontal axes.

[0050] For example, in the exemplified embodiment, the first front wheel assembly 142 comprises a first front wheel 150, and second front wheel 144 assembly comprises a second wheel front 152. The first front wheel assembly 142 further comprises a first bracket 154, having outwardly extending arms 156a, 156b. The first front wheel 150 is mounted on a first axle 158 which extends horizontally between the arms 156a, 156b. Accordingly, the first front wheel 150 is rotatable about a horizontal axis H1 defined by first axle 158. The second front wheel assembly 144 further comprises a second bracket 160, having outwardly extending arms 162a, 162b. The second front wheel 152 is mounted on a second axle 164 which extends horizontally between the arms 162a, 162b. Accordingly, the second front wheel 152 is rotatable about a horizontal axis H2 defined by axle 164.

[0051] As exemplified, the first bracket 154 comprises a first vertically extending portion 166 provided above the outwardly extending arms 156, and the second bracket 160 comprises a second vertically extending portion 168 provided above the outwardly extending arms 162. First 170 and second 172 vertical pins are mounted to the bottom plate 116, and extend downwardly therefrom. The first vertically extending portion 166 is rotatably received on the first pin 170, and the second vertically extending portion 168 is rotatably received on the second pin 172. Accordingly, the first 154 and second 160 brackets are rotatable about first and second vertical pins 170 and 172, respectively, to rotate first 142 and second 144 front wheel assemblies about vertical axes V1 and V2, respectively.

[0052] Preferably, as shown in Figure 4, the horizontal axis of rotation H1 of the first front wheel 150 is spaced from the vertical axis of rotation V1 of the first front wheel assembly 142, and the horizontal axis of rotation H2 of the second front wheel 152 is spaced from the vertical axis of rotation V1 of the first front wheel assembly 144. For example, as exemplified, outwardly extending arms 156a, 156b extend laterally away from vertically extending portion 166, such that axle 158, which defines axis H1, is spaced from vertically extending portion 166, which defines axis V1. Similarly, outwardly extending arms 162a, 162b extend laterally away from vertically extending portion 168, such that axle 164, which defines axis H2, is spaced from vertically extending portion 168, which defines axis V2.

[0053] Preferably, as shown in Figure 4, the rear wheels 146, 148 are rotatable about horizontal axes H3. For example, as shown in Figure 5, the rear wheels 146, 148 are mounted on axles 174 and 176, respectively, which are fixedly mounted on opposed sides of conduit 140, adjacent rear end 104.

[0054] Preferably, the rear wheels 146, 148 are positioned closer together than the front wheel assemblies 142, 144. For example, in the exemplified embodiment, the front wheel assemblies 142, 144 are positioned adjacent lateral

sides 106, 108, respectively of the surface cleaning head 100. Further, as mentioned hereinabove, the rear wheels 146, 148 are positioned on opposed sides of conduit 140.

[0055] Preferably, the wheels extend downwardly below the bottom of a surface to be cleaned. For example as shown in Figures 3 and 4, a first recess 5 178 and a second recess 180 are provided in bottom plate 116, and extend upwardly. The first front wheel assembly 142 is mounted in the first recess 178, such that bracket 154 is completely received within the first recess 178, and a portion of wheel 150 extends downwardly from the first recess 178 to below the 10 bottom 112. The second front wheel assembly 144 is mounted in the second recess 180, such that bracket 160 is completely received within the first recess 180, and a portion of wheel 152 extends downwardly from the second recess 180 to below the bottom 112. Further, as shown in Figure 2, the rear wheels 146 and 146 extend below the bottom 112.

15 [0056] Preferably, the front wheels 150, 152 have a smaller diameter than the rear wheels 146, 148.

[0057] Referring to Figure 1, in the exemplified embodiment, surface cleaning head 100 further comprises a pivot joint 182, which is mounted to top plate 114. The pivot joint 182 comprises laterally opposed apertures 184 (only 20 one aperture shown). The pivot joint 182 is positioned between the front wheel assemblies 142, 144 and the rear wheels 146, 148. As shown in Figure 6, a support 606 of the surface cleaning apparatus 600 is pivotally mounted to the pivot joint 182 by a pivot pins 605a, 605b.

[0058] Referring now to Figure 6, a surface cleaning apparatus 600 25 comprising surface cleaning head 100 is shown. It will be appreciated that surface cleaning head 100 may be mounted to any suitable surface cleaning apparatus, and surface cleaning apparatus 600 is exemplary only.

[0059] The surface cleaning head may be used with any surface cleaning apparatus and may be connected thereto by any means known in the vacuum arts. In the embodiment shown, surface cleaning apparatus 600 comprises a flexible hose 602, which is mounted to swivel joint 137 and is in fluid communication with air outlet 134. Hose 602 extends upwardly to a cleaning unit 5 604. The cleaning unit 604 is mounted to support 606, which is pivotally mounted to pivot joint 182 of surface cleaning head 100. The cleaning unit 604 includes a cleaning apparatus 608. The cleaning apparatus 608 is in fluid communication with hose 602, and serves to separate dirt from air. The cleaning 10 apparatus 608 may be any type of cleaning apparatus, such as one or more cyclonic cleaning units, and/or one or more filters. The cleaning unit further comprises a suction motor 610, which draws air into the dirty air inlets of surface cleaning head, through surface cleaning head 100 to outlet 134, through hose 602, through cleaning apparatus 608, and out of a clean air outlet 612 of the 15 surface cleaning apparatus 600. A handle 614 is mounted to cleaning unit 604, and may be gripped by a user to move surface cleaning head 100 along a surface.

CLAIMS:

1. A surface cleaning head for a domestic vacuum cleaner comprising:
 - (a) a front end, a rear end and a bottom;
 - (b) a plurality of wheels;
 - 5 (c) an air flow passage extending from a dirty air inlet to an air outlet;
 - (d) the front end having an upwardly curved portion above a portion of the dirty air inlet.
- 10 2. The surface cleaning head of claim 1 wherein the air flow passage comprises an lower open sided air flow chamber.
3. The surface cleaning head of claim 2 wherein the lower open sided air flow chamber comprises sidewalls and the side walls have a front end that extend upwardly.
- 15 4. The surface cleaning head of claim 3 wherein the front end of the sidewalls is chamfered or radiused.
5. The surface cleaning head of claim 4 wherein the wheels extend downwardly
- 20 below the bottom of the sidewalls.
6. The surface cleaning head of any of claims 1-5 wherein the lower open sided air flow chamber is generally V shaped.
- 25 7. The surface cleaning head of any of claims 1-6 wherein the wheels extend downwardly below the bottom of the surface cleaning head.

8. The surface cleaning head of any of claims 1-7 wherein the upwardly curved portion has an upper end spaced a distance above a lower end and the distance is up to ___ inches.
- 5 9. The surface cleaning head of claim 8 wherein the distance is 0.25-0.5 inches.
10. The surface cleaning head of any of claims 1-9 wherein the upwardly curved portion has a radius of at least about 0.375 inches.
- 10 11. The surface cleaning head of any of claims 1-10, wherein the upwardly curved portion has a lower surface, and the lower surface defines a portion of the dirty air inlet
- 15 12. The surface cleaning head of any of claims 1-10, wherein the wheels comprise front wheels.

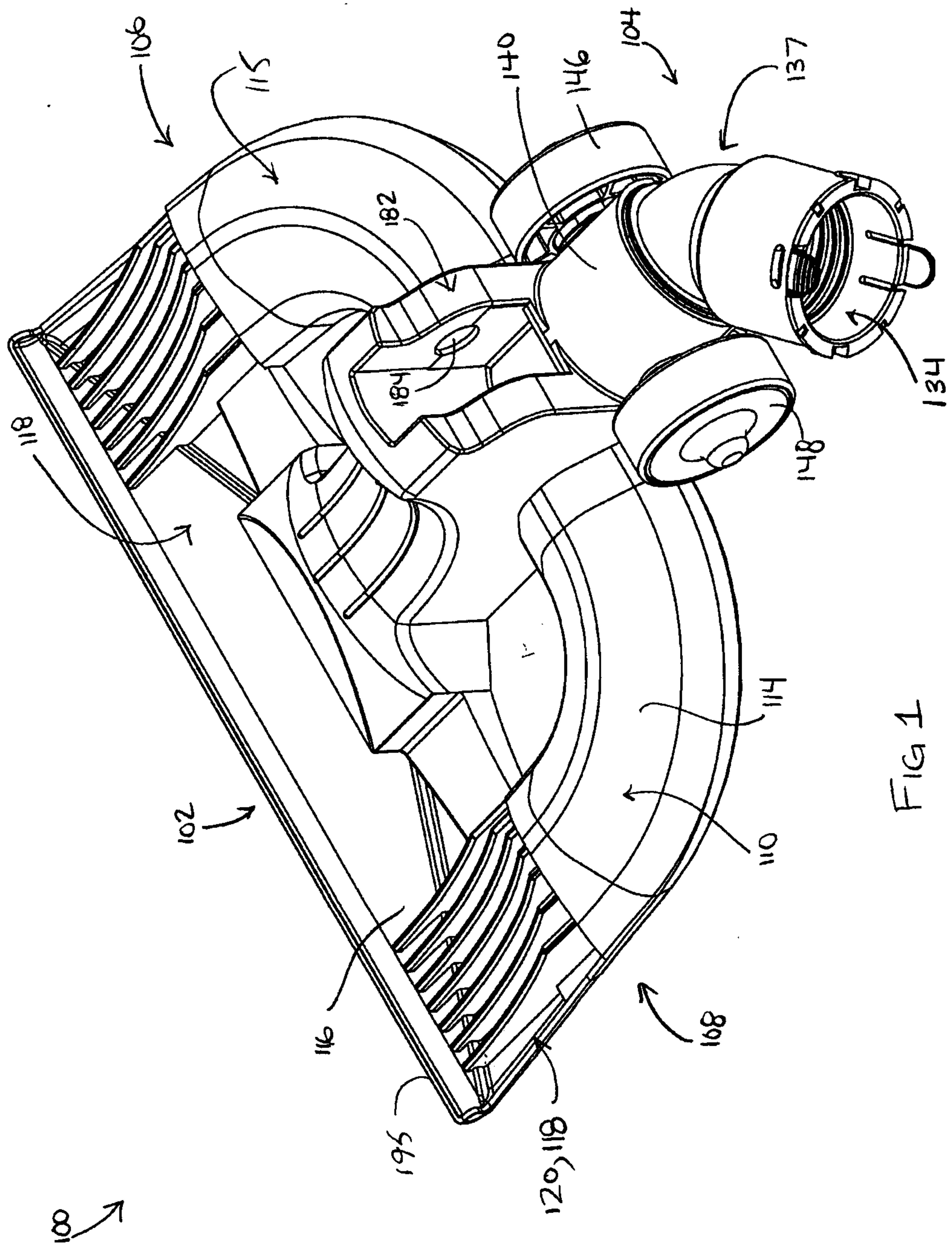
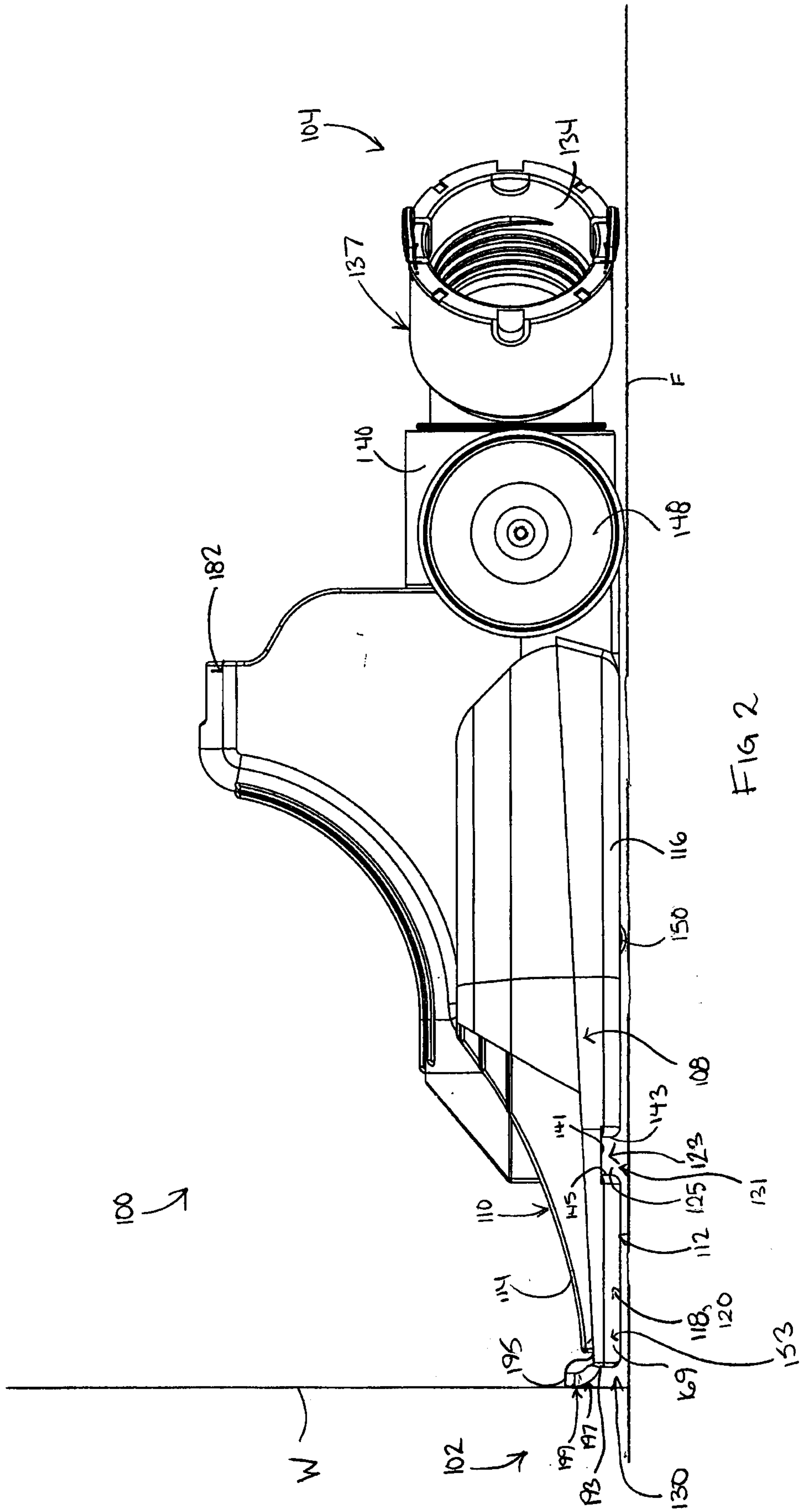
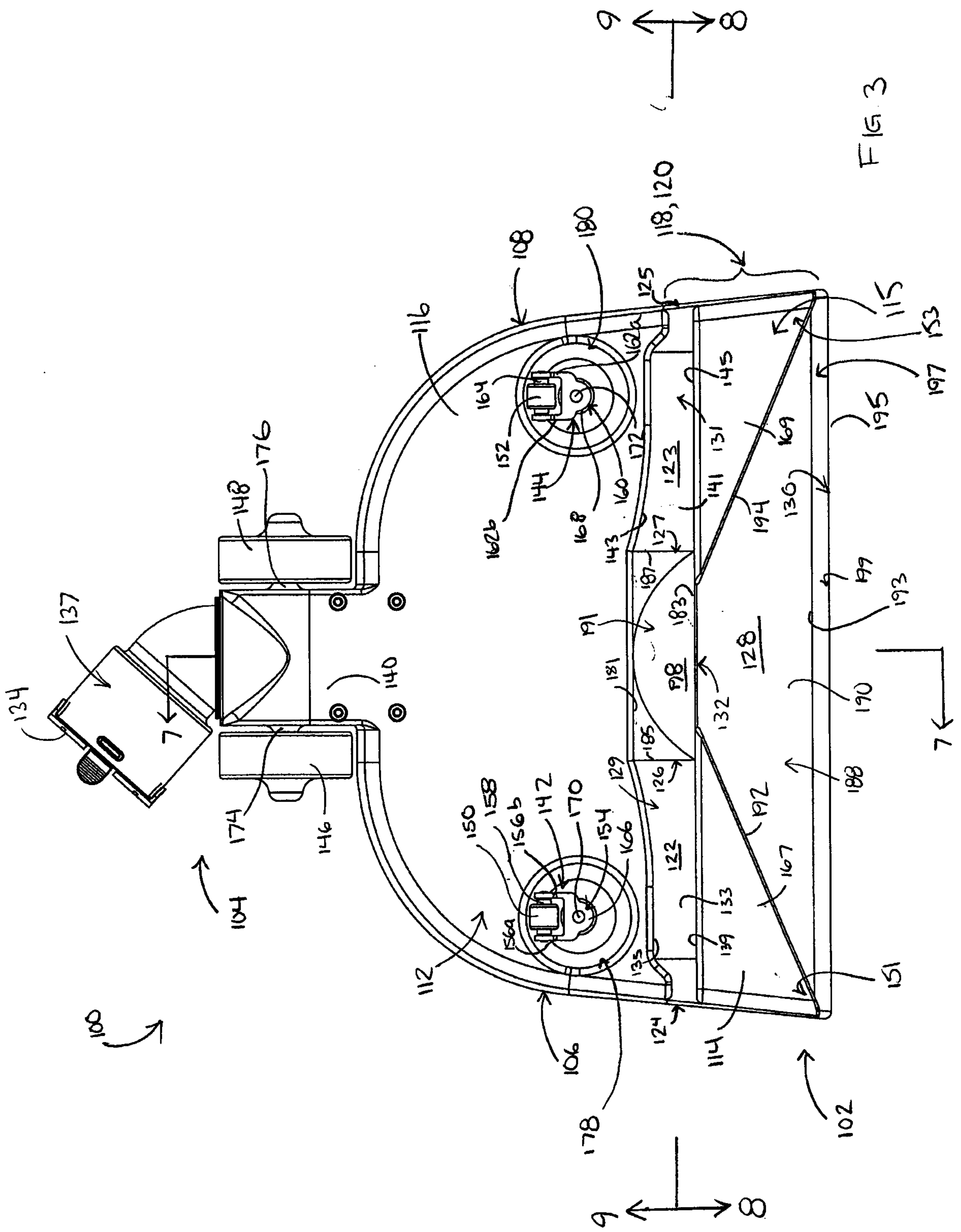


FIG 1





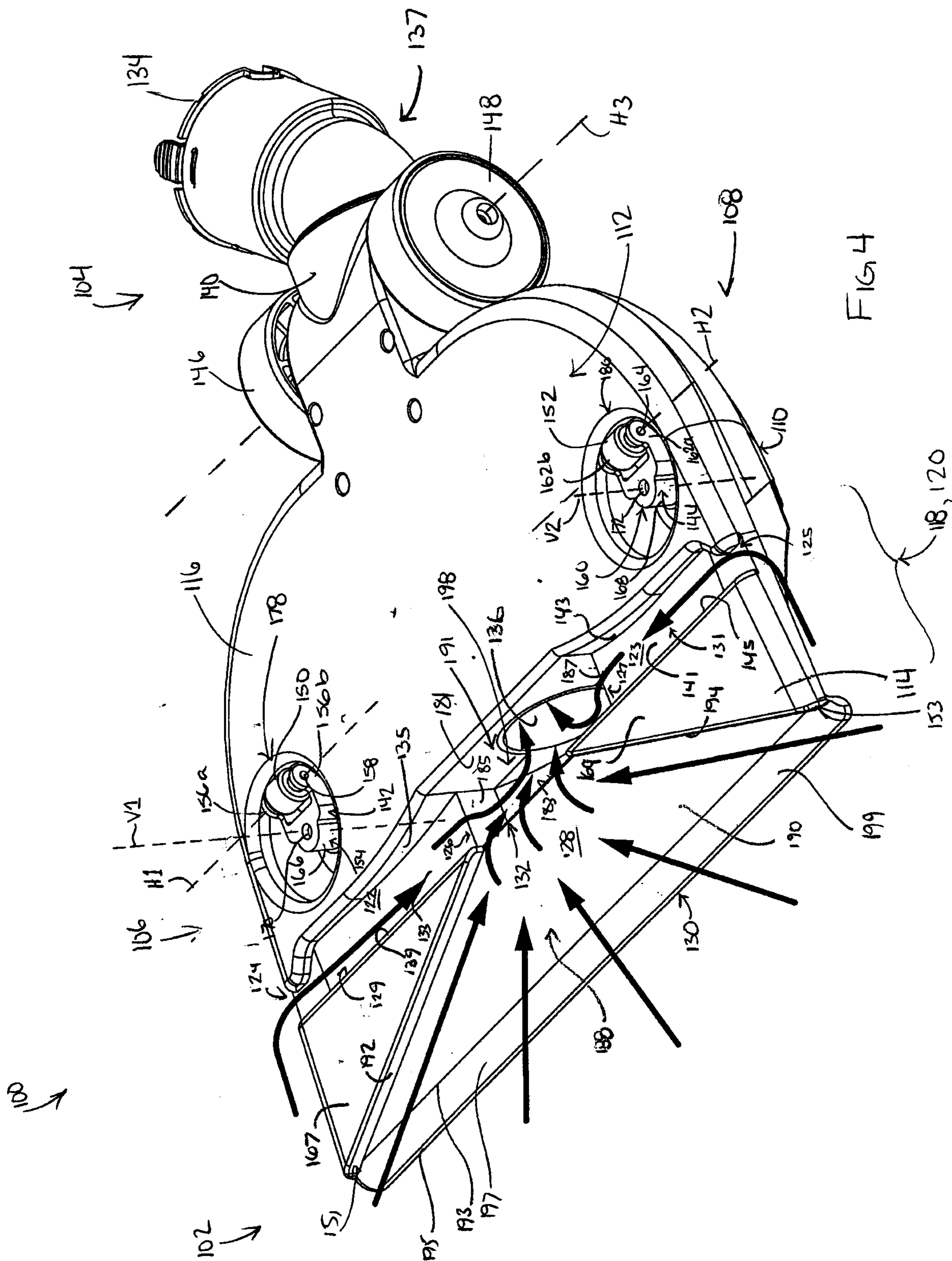


FIG 4

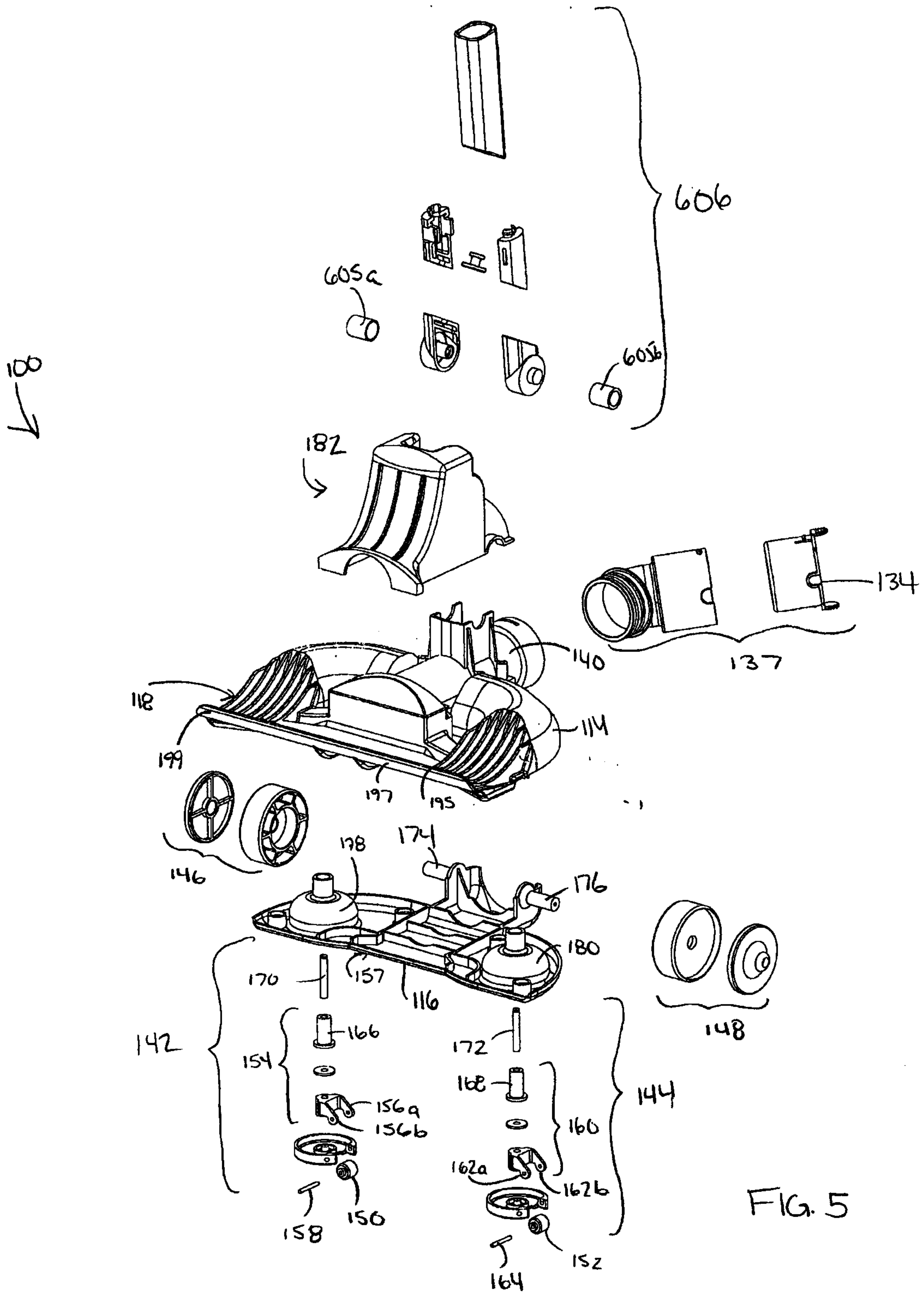


FIG. 5

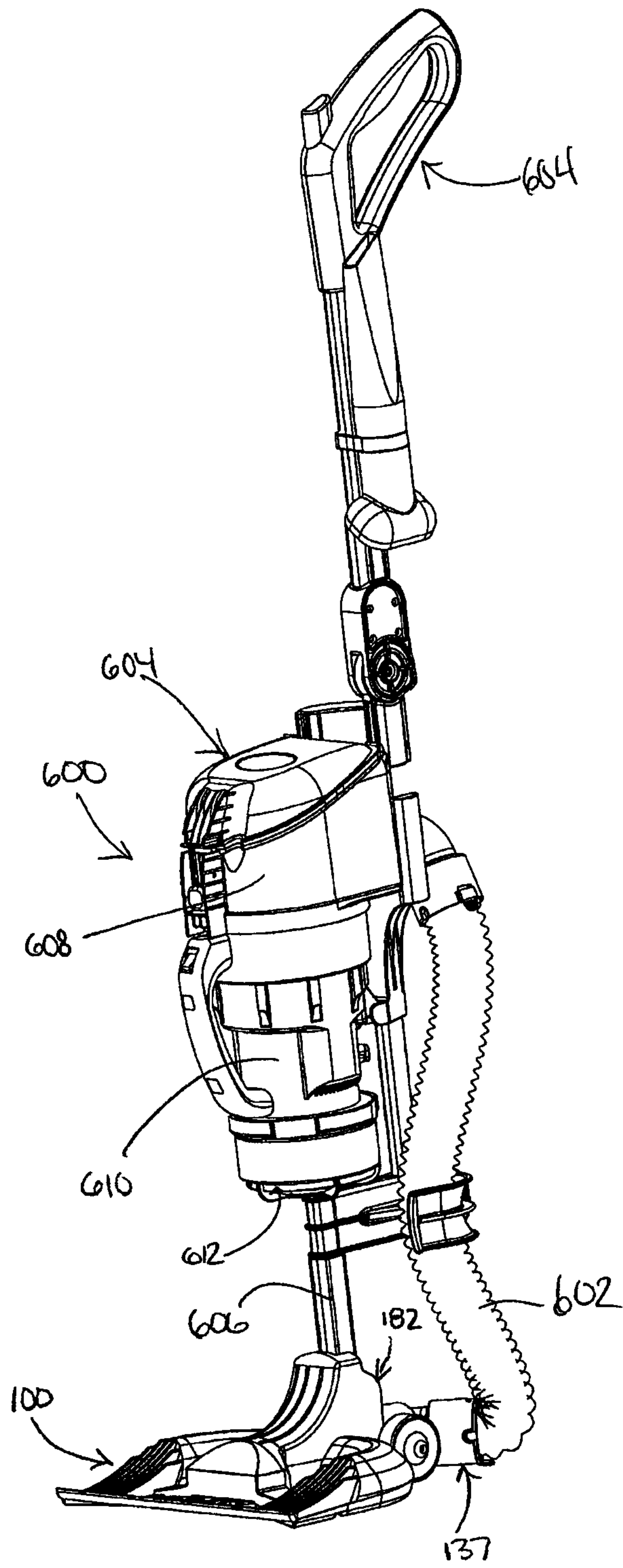


FIG. 6

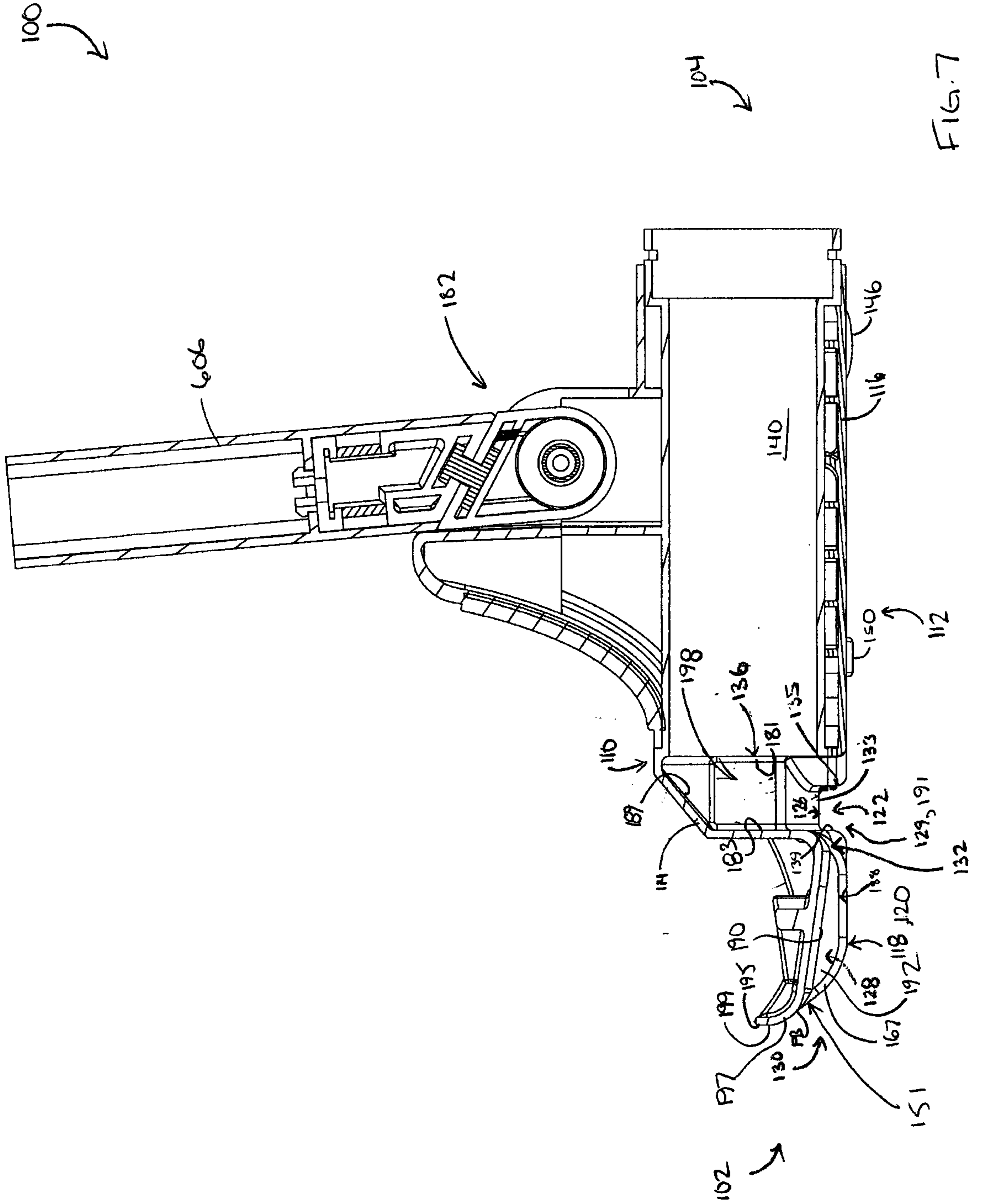


FIG. 7

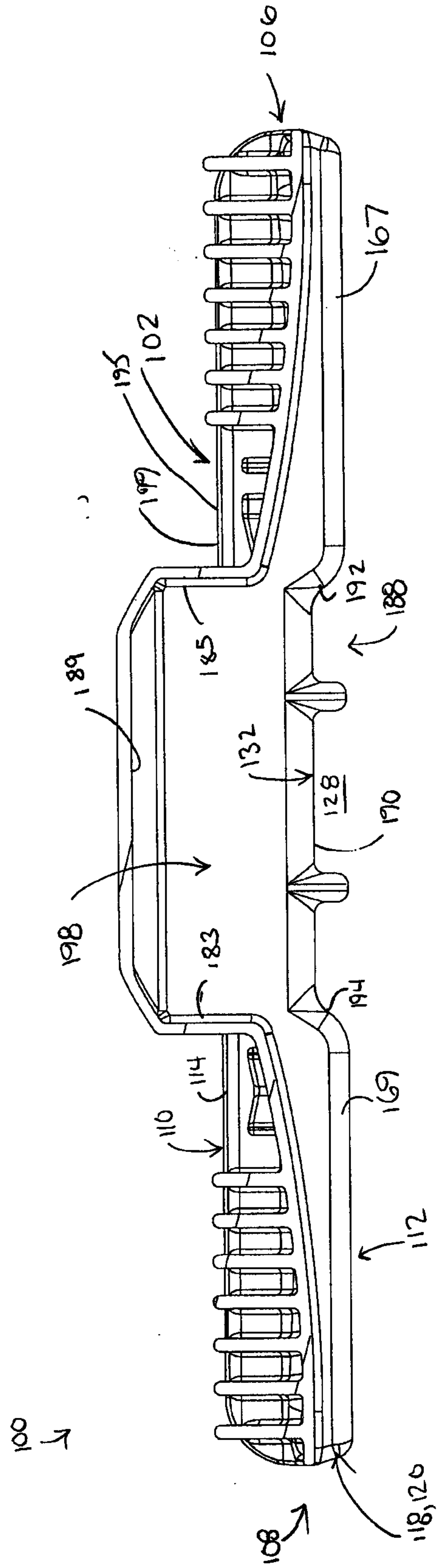


Fig 8

