UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SHARKNINJA, INC.,
SHARKNINJA OPERATING LLC,
SHARKNINJA MANAGEMENT LLC, AND
SHARKNINJA SALES COMPANY,
Petitioners,

v.

DYSON TECHNOLOGY LIMITED
Patent Owner.

Case No. IPR2023-01322

U.S. Patent No. 10,433,687

DECLARATION OF DONALD DAVIDSHOFER IN SUPPORT OF PATENT OWNER'S RESPONSE

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a. Conrad '630 would not have provided motivation to utilize Conrad '787's handle at the rear 24

b. The disclosure in Conrad '787 of a comfortable handle oriented to limit or reduce torque would not have motivated a POSITA to incorporate the disclosed Conrad '787's handle on Conrad '630's vacuum cleaner 31

c. The disclosure in Conrad '787 that the center of gravity of the handvac is aligned vertically below the user's hand would not have motivated a POSITA to incorporate the disclosed handle on the rear of Conrad '630's vacuum cleaner 34

d. The disclosure in Conrad '787 of the handle's comfort in picking up the vacuum cleaner and using the vacuum cleaner would not have motivated a POSITA to incorporate Conrad '787's handle on the rear of Conrad '630's vacuum cleaner 35

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5. Reduced efficiency and poorer cleaning performance would not have motivated a POSITA to modify Conrad '630 as Petitioners and Mr. Fester propose.....46

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1. The disclosures in Conrad '630 and Dyson that Petitioners and Mr. Fester cite would not have motivated a POSITA to make the proposed combination 51

a. Conrad '630 would not have provided motivation to utilize Dyson's handle at the rear 51

b. Dyson's disclosures would not have motivated a POSITA to incorporate the handle into Conrad '630's vacuum cleaner 54

2. The ability to use hose attachments with Conrad '630's vacuum cleaner would not have led to Petitioners 'and Mr. Fester's proposed modification 58

3. Conrad '630's vacuum cleaner with Dyson's handle would not have improved stair and furniture cleaning and thus would have led away from the proposed combination 58

4. Reduced efficiency and poorer cleaning performance would not have motivated a POSITA to modify Conrad '630 as Petitioners and Mr. Fester propose 59

5. A POSITA would have been discouraged from placing Dyson's handle on the rear of Conrad '630 because use of such handle would add strain 59

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1. Petitioners and Mr. Fester have not shown that it would have been obvious to miniaturize Matsumoto 61

2. Petitioners and Mr. Fester have not shown that a POSITA would have been motivated to combine Matsumoto with Conrad '787 or Dyson as Petitioners and Mr. Fester propose 63

a. Matsumoto discloses minimizing the size of the handle, not increasing the size of the handle as Petitioners and Mr. Fester propose 64

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b. A POSITA would not have placed Conrad '787's or Dyson's handle on the rear of Matsumoto's vacuum cleaner 66

c. Petitioners and Mr. Fester have not shown that there would have been an ergonomic reason to substitute Matsumoto's handle for a Conrad '787's or Dyson's handle 69

VII. TESTIMONY RELEVANT TO SECONDARY CONSIDERATIONS 75

A. The Dyson v10 vacuum cleaner practices the Challenged Claims 75

1. Independent Claim 1 75

a. 1[pre] "A handheld vacuum cleaner, comprising" 75

b. [1a] "a handle by which the vacuum cleaner is supported during normal use;" 75

c. [1b] "a cyclonic separating unit having a longitudinal axis and a dirt collector at one end of the cyclonic separating unit," 76

d. [1c] "the cyclonic separating unit comprising an end wall having a closed configuration in which the dirt is retained within the dirt collector by the end wall and an open configuration for the removal of dirt from the dirt collector, wherein the end wall is movable relative to the longitudinal axis and, when the end wall is in the closed configuration, the longitudinal axis extends through a region bounded by a perimeter of the end wall," 77

e. [1d] "wherein the handle has a pistol grip configuration in which the handle is inclined with respect to the cyclonic separating unit to form an angle of not less than 85 degrees and not greater than 140 degrees between a handle axis and the longitudinal axis of the cyclonic separating unit,

and wherein the handle axis and the longitudinal axis intersect within the vacuum cleaner.” 79

2. Dependent Claim 2 80

3. Dependent Claim 3 81

4. Dependent Claim 4 81

5. Dependent Claim 8 82

6. Dependent Claim 10 83

B. The “Point-and-Shoot” feature of the Dyson Cyclone V10 vacuum is reflected in the Challenged Claims 83

VIII. RESERVATION OF RIGHTS 84

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I, Donald Davidshofer, declare as follows:

1. My name is Donald Davidshofer. I have been retained by Patent Owner to offer technical opinions related to U.S. Patent No. 10,433,687 ("the '687 Patent," EX-1001).

2. I understand that Petitioners have filed a petition for *inter partes* review of the '687 Patent with the Patent Trial and Appeal Board arguing that claims 1-4, 8, and 10 ("Challenged Claims") of the '687 Patent would have been obvious to a person of ordinary skill in the art ("POSITA") at the time of the invention and are therefore unpatentable.

3. In this Declaration, I give my opinions as to whether the Challenged Claims are unpatentable on the grounds presented by Petitioners in the Petition and in the declaration of their expert, Joseph Fester (EX-1003). I provide technical bases for these opinions as appropriate.

4. This Declaration contains statements of my opinions formed to date and the basis and reasons for those opinions. I may offer additional opinions based on further review of materials in this case, including opinions and/or testimony of other expert witnesses. I make this Declaration based upon my own personal knowledge and, if called upon to testify, would testify competently to the matters contained herein.

I. BACKGROUND

A. Qualifications

5. I am over the age of 18 and am competent to write this Declaration. I have personal knowledge of, or have developed personal knowledge of, the relevant technologies based upon education, training, or experience of the matters set forth herein. This Section contains a summary of my educational background, career history, publications, and other relevant qualifications. My full *curriculum vitae* is attached as Appendix A to this Declaration.

6. I believe I am well qualified to serve as a technical expert in this matter based on my educational and work experience. As discussed below, in my career, I have been involved in the product development, prototyping, and testing of vacuum cleaner technology as well as other small handheld appliances.

7. I received an Associate's Degree in Mechanical Design from Morrison Institute of Technology in 1980. During my time at Morrison Institute of Technology, I studied Mechanical Design and Drafting.

8. In approximately 2000, I had an apprenticeship with Dr. Gary Weede at Illinois State University in plastics processing. During that apprenticeship, I studied Plastics, Plastic Part Design, Injection Molding and Processing and Mold and Machine Maintenance.

9. In 2011-2012, I completed the Next Level Leader Training at Electrolux AB. During that training, I discovered Human Resource Management, Critical Thinking and Managing Quality for High Volume Manufacturing.

10. In approximately 1999, I completed a training in Design For Manufacturing and Assembly (DFMA) processes by Boothroyd and Dewhurst. As part of that training, I discovered the Six Sigma House of Quality and the DFMA process as it applies to Product Design and Cost Efficiency. This series also taught the Pugh Selection Matrix and how to recognize customer dissatisfaction utilizing the KANO methodology. As a part of this curriculum I used ethnographic data to understand how our vacuum cleaners were being used and to improve user ergonomics, with a focus on repetitive actions.

11. I worked in product development and engineering for over 40 years. Most relevant to this case, I worked for 34 years as a vacuum cleaner designer, in various roles, at The Eureka Company and Electrolux AB Small Appliances. Note: The Eureka Company was purchased by Electrolux AB in the 1970s, but was run independently until approximately 1998 when Electrolux management took an active role. I later extended my vacuum cleaner career at Tacony Corporation for two years as a Product Manager for Tacony Commercial Floor Care where I created and executed product launch plans for commercial vacuum cleaners,

cleaning solutions and carpet/floor dryers, while assisting internal and external Engineering teams.

12. My 34 year work history at The Eureka Company began in 1980 as a Draftsman. Starting as a Detail Draftsman, drawing parts for an assigned NPD Project. I advanced to various roles and increased responsibility to Layout Draftsman. I began work as a Project Engineer in 1988 working on Power Nozzles and handheld products. I was promoted to Senior Project Engineer in 1998 where I lead the Engineering Teams (in-house and external) on assigned projects. My role included mentoring Designers and Engineers in vacuum cleaner design and assisting in production start-up. I was promoted to a new role as Regional Technical Area Manager in 2007 where I lead the Concept Development phase. As RTAM, I synthesized all Sales and Marketing data to determine planned next-steps and future product design categories. The data included Customer Pain Points, Voice of the Customer, Voice of the Trade, Competitive Data, Performance Data (ASTM), Corp. Spaces-we-want-to-own, Quality Returns and Sales and Marketing needs. In 2011 I was invited to lead NPD as the Insights to Innovation Manager. This new role allowed me to further my RTAM experience by the addition of creating and presenting Global Product Generation Plans for vacuum cleaner product lines (starting with the upright vacuum category). My role at Electrolux AB as a vacuum cleaner influencer ceased mid-2014 when it was announced that

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Electrolux Small Appliances was going to cease operations and brands were to be sold.

13. Based on my work experience, by 2015 I knew or had the ability to:

- Design or implement a handheld or upright vacuum cleaner system, including its known individual components and housing design, cyclonic separation or dust capture system, a suction source, a filter system, and a handle, performance and durability improvements and:
- Implement known ergonomic techniques for improving comfort of the vacuum cleaner during use; and
- Validate through standardized testing a wide variety of performance and reliability measures common for vacuum cleaners.

14. Since 2019, I have been retained as a Design Consultant for Future Generation Power Tools and I accepted a Project Manager role at Flying Pig Designs, LLC in 2021. As a Project Manager I was instrumental in leading NPD teams in Consumer Product and Medical Device categories. I left my position at FPD in Feb 2024 due to market down-turns. I am currently working as a consultant for various small businesses including FGPT and GLG.

15. I am a named inventor on 17 U.S. utility patents and 1 design patent. Relevant (non-wet) patents include:

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a. Vacuum Cleaner with Variable Speed Brushroll - US 20040134014 Filed Jul 15, 2014

b. Upright Vacuum Cleaner - US 20080307597 - Filed Dec 18, 2008

c. Vacuum Cleaner Air Passage System - US20140157542 - Filed Jun 12, 2014

d. Dust Separation System - US7162770 Issued Jan 16, 2007

e. Vacuum Bag Mounting and Viewing Features - US7662200, Feb 16, 2010

f. Vacuum Cleaner Accessory Valve - US8234750 - Issued Apr 7, 2012

g. Vacuum Cleaner with Rotating Handle - US8448295 - Issued May 28, 2013

h. Vacuum Cleaner Sound Reduction Device - US8650707 - Issued Feb 18, 2014

i. Vacuum Cleaner with Movable Wheel - US8656552 - Issued Feb 25, 2014

j. Vacuum Cleaner Floor Seal - US 8904595 - Issued Dec 9, 2014

k. Vacuum Cleaner Cyclone with Helical Cyclone Expansion Region - US8997310 - Issued Apr 7, 2015

l. Vacuum Cleaner Base Assembly - US9345371 - Issued May 24, 2016

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B. Compensation

16. For my efforts in connection with this Declaration, I have been compensated at my standard rate for this type of consulting activity of $300 per hour. My compensation is in no way contingent on the results of this or any other proceeding relating to the ’687 Patent.

C. Materials and Other Information Considered

17. I have considered information from various sources in forming my opinions. I have reviewed and considered all of the documents listed in Appendix B, as well as any documents referred to in this Declaration, in forming my opinions.

II. UNDERSTANDING OF THE RELEVANT LEGAL PRINCIPLES

18. I am not a lawyer, and I will not provide legal opinions. Although I am not a lawyer, I have been advised certain legal standards are to be applied by technical experts in forming opinions regarding the meaning and validity of patent claims.

19. I understand that a patent claim is invalid if it is anticipated or obvious in view of the prior art, and that a claim can be unpatentable even if all of the requirements of the claim cannot be found in a single prior art reference. I further understand that invalidity of a claim requires that the claim be anticipated or

obvious from the perspective of a person of ordinary skill in the art ("POSITA") at the time the invention was made.

20. I have been informed that a patent claim is invalid if it would have been obvious to a POSITA. In analyzing obviousness of a claim, I understand the following factors may be taken into account: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims; (3) the level of ordinary skill in the art; and (4) any secondary considerations of non-obviousness if they are present.

21. I understand that to prove that a prior art or combination of prior art renders a patent obvious, it is necessary to:

a. Identify the particular references that, singly or in combination, make the patent obvious;

b. Specifically identify which elements of the patent claim appear in each of the asserted references; and

c. Explain why a POSITA would have combined the references and how they would have done so to create the inventions claimed in the patent. I further understand that exemplary rationales that may support a conclusion of obviousness include:

i. Combining prior art elements according to known methods to yield predictable results;

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ii. Simple substitution of one known element for another to obtain predictable results;

iii. Use of known technique(s) to improve similar devices (methods or products) in the same way;

iv. Applying a known technique to a known device (method or product) ready for improvement to yield predictable results;

v. "Obvious to try" – choosing from a finite number of identified, predictable solutions with a reasonable expectation of success;

vi. Known work in one field of endeavor may prompt variations of the work for use in either the same field for a different field based on design incentives or other market forces if the variations are predictable to a POSITA; and

vii. Some teaching, suggestion, or motivation in the prior art that would have led a POSITA to modify the prior art reference or to combine the prior art reference teachings to arrive at the claimed invention.

22. I have been informed and understand that secondary considerations of non-obviousness may include:

- Whether the invention proceeded in a direction contrary to accepted wisdom in the field;

- Whether there was a long felt but unresolved need in the art that was satisfied by the invention;
- Whether others tried but failed to make the invention;
- Whether others copied the invention;
- Whether the invention was praised by others;
- Whether others have taken licenses to use the invention;
- Whether experts or those skilled in the art at the making of the invention expressed surprise or disbelief regarding the invention;
- Whether products incorporating the invention have achieved commercial success that is attributable to the invention; and
- Whether or not others having ordinary skill in the field independently made the claimed invention at or about the same time the inventor made the invention.

23. I also understand that there must be a relationship, or nexus, between any such secondary indicia and the invention.

24. I have been further informed that I must weigh secondary considerations evidence with the other obviousness factors if a case of obviousness has been established.

25. I have been informed that, in considering obviousness, hindsight reasoning derived from the patent-at-issue may not be used.

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III. TECHNOLOGICAL BACKGROUND

A. Summary of the '687 Patent

26. The '687 Patent is directed to "a handheld vacuum cleaner comprising a cyclonic separating unit." EX-1001, 1:11-12. The '687 Patent notes that GB 2440111B (EX-2002) also discloses "a handheld vacuum cleaner" with a "cyclonic separator" that includes "a collector for collecting dirt" that "has a base that is pivotally mounted to an outer wall of the collector and held in a closed position by a catch [that] swing[s] open so that the collector can be emptied." EX-1001, 1:16-25. "In order to empty the collector, a user positions the base over a waste bin and then releases the catch [so that] [t]he base swings open and dirt which has been collected falls from the collector into the waste bin." EX-1001, 1:26-29. The '687 Patent states that one drawback of this arrangement is that "it is slightly awkward because the user typically has to twist his or her hand to one side or upwardly in order to direct the dirt away from themselves into the waste bin." EX-1001, 1:29-33. The '687 Patent recognizes that "[a]n improved arrangement is therefore desirable." EX-1001, 1:33-34.

27. The '687 Patent discloses a handheld vacuum with both a "cyclonic separating unit comprising an end portion having a closed configuration in which dirt is retained within the dirt collector by the end portion and an open configuration for the removal of dirt from the dirt collector," as well as a handle

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that "has a pistol grip configuration in which the handle is inclined with respect to the cyclonic separating unit to form an angle of not less than 85 degrees and not greater than 140 degrees between the handle and the longitudinal axis of the cyclonic separating unit." EX-1001, 1:38-51. because the '687 Patent states that with this arrangement, the disclosed handheld vacuum "can be emptied by pointing the cyclonic separating unit away from the user and opening the end portion while maintaining a natural grip on the handle" making "[t]he process of emptying the dirt collector ... both ergonomic and intuitive" and providing "a low risk of the user coming into contact with the dirt as it is emptied because the dirt collector opens away from user." EX-1001, 1:52-59. Specifically, the '687 Patent discloses:

> Referring to FIG. 8, in order to empty the dirt collector 38 and the fine dust collector 51 of either of the described embodiments, the user first disconnects the cleaning tool 10 or the wand 110. Then, whilst gripping the handle 6, the user points the vacuum cleaner 2 towards a suitable receptacle (e.g. a waste bin or bag) into which the dirt is to be emptied. The catch 42 is then released by the user and the end wall 26 pivoted from its closed position into its open position. Since the cyclonic separating unit 8 is pointed away from the user, there is no need for the user to adopt a different grip or posture from that which is adopted during normal cleaning. Consequently, the process by which the dirt collector 38 and the fine duct collector 51 are emptied is very intuitive and ergonomic. Furthermore, dirt exits the dirt collector 38/fine dust collector 51 from the end of the cyclonic separating unit 8 which is furthest from the handle 6. Therefore, there is less risk that dirt will spill from the dirt collector 38/fine dust collector 51 onto a user during emptying.

EX-1001, 5:61-6:11.

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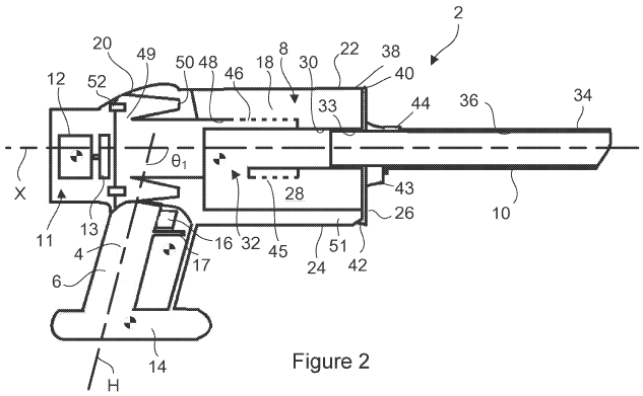


Figure 2

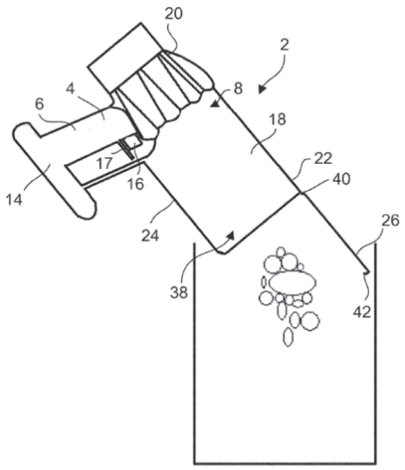


Figure 8

EX-1001 Fig. 2 **EX-1001 Fig. 8**

B. Summary of Asserted Prior Art

28. The Petition asserts that the Challenged claims are unpatentable based on four grounds:

- GROUND 1: Obviousness over Conrad ’630 and Conrad ’787;
- GROUND 2: Obviousness over Conrad ’630 and Dyson;
- GROUND 3: Obviousness over Matsumoto and Conrad ’787; and
- GROUND 4: Obviousness over Matsumoto and Dyson.

29. In my opinion, Petitioners have not shown that the Challenged Claims are unpatentable based on any of the above grounds.

1. U.S. Patent Publication No. 2011/0314620 (“Conrad ’630”)

30. Conrad ’630 discloses a “hand carried surface cleaning apparatus having a removable dirt chamber.” EX-1004 ¶[0001].

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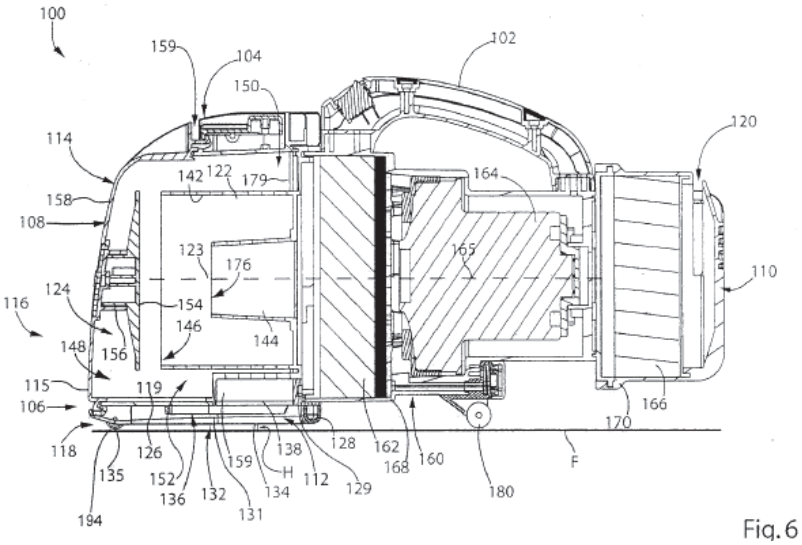


Fig. 6

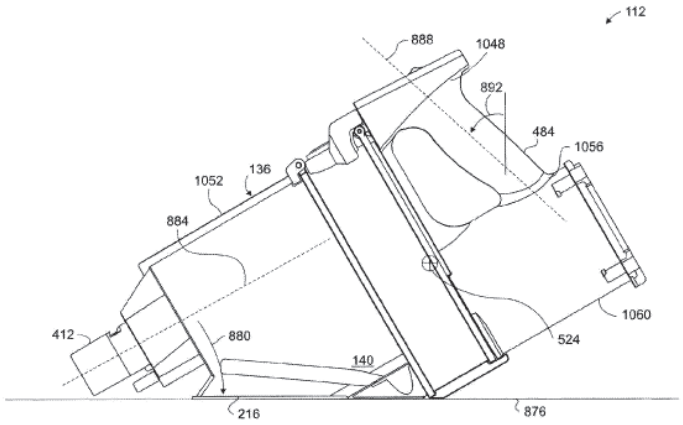
EX-1004 Fig. 6

31. Dirt from the surface to be cleaned is drawn into the vacuum cleaner through "[n]ozzle 112 [that] engages a surface to be cleaned, and comprises a dirty air inlet 118." EX-1004 ¶[0054]. The "nozzle 112 is positioned at the bottom of the vacuum cleaner 100, and, preferably, beneath the cyclone unit 114 [and] may be integral formed as [part] of cyclone unit 114 or may be a one-piece assembly therewith." EX-1004 ¶[0056]. As shown in Figure 6, the "handle 102 is provided at the upper portion 104" opposite nozzle 112. EX-1004 ¶[0052]. The vacuum cleaner is designed to be "moveable along a surface to be cleaned by gripping and maneuvering handle 102," and optionally includes both front wheels 135 and rear wheels 180 located on the bottom in contact with the surface to be cleaned and opposite the handle position. EX-1004 ¶¶[0052], [0067].

32. Although Conrad ’630 mentions alternate examples in which “handle 102 may be provided elsewhere on the vacuum cleaner 100; for example, at the rear 110 and may be of any design,” it does not depict any handle other than that shown in Figure 6.

2. U.S. Patent Publication No. 2016/0174787 ("Conrad ’787”)

33. Conrad ’787 discloses a “stick vacuum cleaner wherein a hand vacuum cleaner is removably mounted to a drive handle.” EX-1006 ¶[0002]. A handvac is illustrated and described in one of the embodiments, EX-1006 ¶[0311], Fig. 78, and this is the embodiment relied upon by Petitioners in Grounds 1 and 3. Pet., 21-22, 29-32, 37-43, 71-74, 80-83; ID, 19.



EX-1006 Fig. 78

34. Conrad ’787 states that the “handvac described in Fig. 78 includes “a flat bottom wall, for supporting the handvac on a horizontal surface, and which extends at an acute angle (e.g., between 20 and 40 degrees) away from the inlet nozzle axis, and optionally at about the in-use orientation.” EX-1006 ¶[0311]. The

"handvac center of gravity 524 is preferably aligned vertically above bottom wall 216 when handvac 112 is supported on horizontal surface 876 by bottom wall 216." EX-1006 ¶[0313]. Conrad '787 discloses "handvac 112 is most comfortably operated in an orientation that does not require an application of torque by the user's hands when the handvac 112 is held by handle 484." EX-1006 ¶[0314]. "This may be the case where the center of gravity 524 of the handvac 112 is aligned vertically below the user's hand." EX-1006 ¶ [0314]. "Accordingly, the center of gravity 524 may be vertically aligned below handle 484 in comfortable in-use orientations of handvac 112." EX-1006 ¶[0314].

35. Conrad '787 describes factors for aligning the handle axis 888 "vertically below handle 848" so that "when a user grasps handvac 112 by handle 484 and lifts handvac 112, handvac 112 may already be in a balanced in-use position with the center of gravity 524 aligned below the user's hands." EX-1006 ¶[0315]. Figure 78 (reproduced above) includes "handle axis 888 of handle 484 extend[ing] at a (non-zero) forward angle 892 to the vertical . . . [which] may provide a comfortable handle alignment for grasping by a user when picking up handvac 112, and when using handvac 112 for cleaning surfaces below the user's elbows." EX-1006 ¶[0317]. Accordingly, Conrad '787 describes the handle positioning and alignment is based on the center of gravity and alignment of the handvac when picking up the handvac and in use.

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3. Int'l Publication No. WO 2008/009888 ("Dyson")

36. Dyson discloses a "hand-held vacuum cleaner in which the arrangement of the handgrip, the motor and fan assembly and the power source allow the hand-held vacuum cleaner to be manipulated easily and comfortably." EX-1007. Dyson states that its hand-held vacuum cleaner that can be manipulated easily and comfortably is an improvement over the prior art discussed in Dyson, such as U.S. Patent No. 1,871,624 ("the '624 patent," EX-2015), which "discloses a hand-held vacuum cleaner having a cylindrical main body and a handgrip arranged at one end . . . [, wherein t]he handgrip is arranged transversely to the longitudinal axis of the cylindrical main body and approximately parallel to the suction conduit." EX-1007, 1:19-23. Dyson explains that the handle positioning in the '624 patent results in the heavy components all being forward of the handgrip, causing the center of mass to be located substantially forward of the handgrip. EX-1007, 1:25-29. Dyson recognizes that this handle position so far back from the center of gravity "may result in the hand-held vacuum cleaner . . . being tiring and uncomfortable to use because the user will have to exert additional effort in order to maintain the hand-held vacuum cleaner in a fixed orientation." EX-1007, 1:29-2:2.

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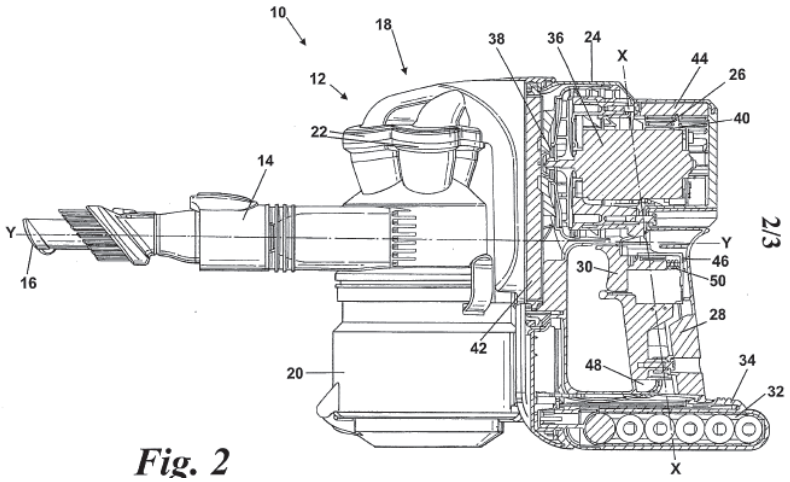


Fig. 2

EX-1007 Fig. 2

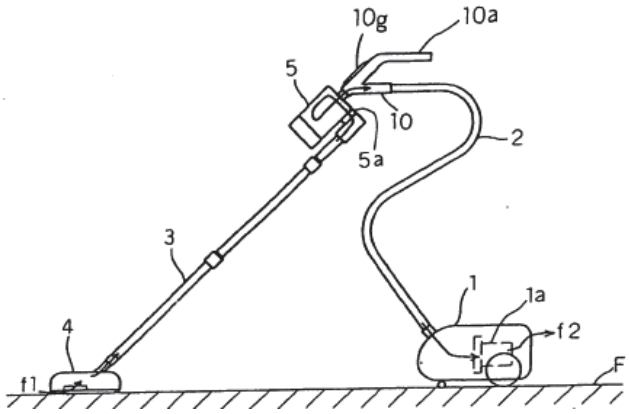
37. In Dyson, the "separating apparatus [18] is located between the suction conduit [14] and the elongate handle [28]," which "improves the weight balance of the hand-held vacuum cleaner." EX-1007, 2:25-27. The handle in Dyson is located "between the airflow generator 36 and the power source 32 allow[ing] the hand-held vacuum cleaner 10 to be manipulated easily in use … because the user's hand will be located between the two heaviest components … result[ing] in a 'dumbbell-like' configuration in which the weight of the hand-held vacuum cleaner 10 is distributed on both sides of the user's hand." EX-1007, 6:6-11. The "elongate handle [28] lies transverse to the longitudinal axis [Y-Y] of the suction conduit," which allows a user "to maintain a comfortable wrist position and movement of the hand-held vacuum cleaner feels comfortable." EX-1007, 2:14-19. Accordingly, Dyson describes the handle positioned and arranged for weight distribution and alignment with the longitudinal axis of the suction conduit.

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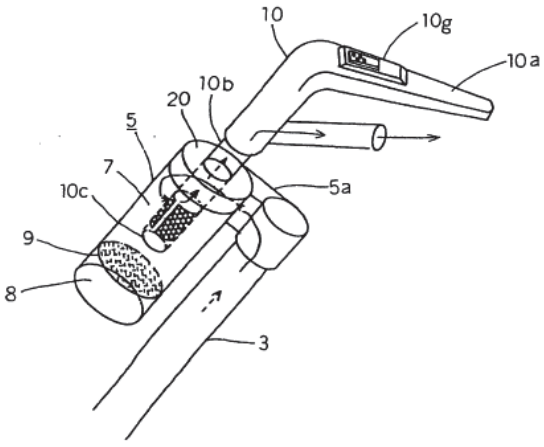
38. Dyson also discloses that "[t]he cyclonic separating apparatus 18 comprises an upstream cyclone 20 and a plurality of downstream cyclones 22." EX-1007, 3:16-18. Thus, the longitudinal axis of the cyclonic separating apparatus is perpendicular to the longitudinal axis Y-Y of the suction conduit. EX-1007, 3:16-18.

4. EP Publication No. 1,199,023 ("Matsumoto")

39. Matsumoto discloses "a vacuum cleaner having a cyclone dust collecting part that separates dust and dirt by forming suction air into a whirling stream." EX-1005 ¶[0001]. The weight of the vacuum cleaner is at least partially distributed to the surface to be cleaned. In no embodiment, is the vacuum cleaner designed to have the entire weight of the vacuum cleaner distributed solely to the user's hand.



EX-1005 Fig. 1

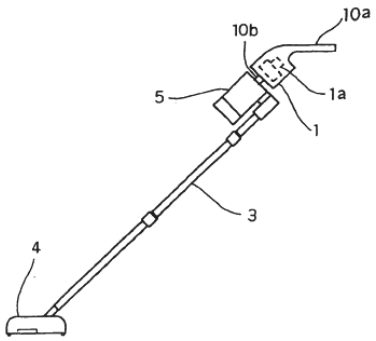


EX-1005 Fig. 2

40. Matsumoto further discloses that the dust collection chamber, as illustrated in Figure 2 above, is emptied by "detach[ing] the first and second dust

collecting chambers 7 and 8 integrally from the vacuum cleaner, and then separate[ing] the first and second dust collecting chambers 7 and 8 from each other above a trash can or the like." EX-1005 ¶[0046].

41. Matsumoto also discloses a fifth embodiment, illustrated in Figure 25, whereby "[t]he handle 10a held by the user during cleaning is formed integrally with the body 1," EX-1005 ¶[0060], and this is the embodiment Petitioners rely upon in Grounds 3 and 4. Pet., 61-80, 83-98.



EX-1005 Fig. 25

42. Matsumoto discloses that "a connection pipe is bent so as to function as a handle held by the user during cl[eaning to] reduce the space occupied by the handle [and] miniaturize a vacuum cleaner and enhance the operability thereof." EX-1005 ¶[0068].

IV. LEVEL OF ORDINARY SKILL IN THE ART

43. I understand that certain issues related the validity of the Challenged Claims must be judged from the perspective of a POSITA, as I have discussed

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below. I have been asked to consider Mr. Fester's and Petitioners' definition of a POSITA that someone would have had at the time of the invention was made, which I understand here is September 2015. In deciding the level of ordinary skill, I have considered the following factors, which I have been informed are relevant to the determination of the level of ordinary skill in the art:

- The levels of education and experience of persons working in the field;
- The types of problems encountered in the art;
- The prior art solutions to these problems;
- The rapidity with which innovations are made; and
- The sophistication of the technology.

44. In my opinion, Mr. Fester's definition seems reasonable. Thus, in rendering my opinions, I have considered a POSITA in the field of vacuum cleaners around September 2015 that had a Bachelor's degree in Mechanical Engineering (or an equivalent discipline) or equivalent work experience, and at least one year's worth of experience in research, design, and/or development related to vacuum cleaners (or other comparable mechatronic appliance or devices or industrial design). A POSITA may also have more education than a Bachelor's degree and less experience, or may have less education than a Bachelor's degree and more experience.

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45. Based on my education, training, and professional experience in the field of the invention, I am familiar with the level and abilities of a POSITA in September 2015. Additionally, I met at least these minimum qualifications of a POSITA at least as of September 2015.

V. CLAIM CONSTRUCTION

46. I understand that the Board applies the claim construction standard used in district courts that seeks to give claim terms their plain and ordinary meaning to a POSITA at the time of the invention. I also understand that if a patent applicant gave a term a special meaning in the specification or during prosecution, then the special meaning should be used.

47. Like Mr. Fester, I reviewed the claim language, specification, and relevant prosecution history to determine the meaning of the claim language as it would have been understood by a POSITA at the time of the invention, and I have applied the plain and ordinary meaning to a POSITA, in view of the specification, of each of the terms in the Challenged Claims.

VI. SPECIFIC GROUNDS OF ALLEGED UNPATENTABILITY

48. Based on my review of the Petition and Mr. Fester's declaration, as well as the other materials cited herein, in view of my experience and knowledge, in my opinion, a POSITA would not have found the Challenged Claims invalid in

view of the grounds provided by Petitioners and Mr. Fester. The reasons for my conclusions are explained more fully below.

A. GROUND 1: The Challenged Claims are not unpatentable as obvious based upon the proposed combination of Conrad '630 and Conrad '787

49. Petitioners and Mr. Fester acknowledge that Conrad '630 fails to disclose limitation 1d of the Challenged Claims—"wherein the handle has a pistol grip configuration in which the handle is inclined with respect to the cyclonic separating unit to form an angle of not less than 85 degrees and not greater than 140 degrees between a handle axis and the longitudinal axis of the cyclonic separating unit, and wherein the handle axis and the longitudinal axis intersect within the vacuum cleaner." Instead, Petitioners argue based upon Conrad '630's disclosure that handle 102, which is mounted on an upper portion of the vacuum cleaner, "may be provided elsewhere on the vacuum cleaner 100, for example, at the rear 110 and may be of any design," to argue that it would have been obvious to a POSITA to incorporate Conrad '787's handle by placing and orienting it in a manner that would meet limitation 1d.[1] Pet., 37-41; EX-1003 ¶¶75-76.

[1] I understand that at his deposition, Mr. Fester stated that his combination would retain Conrad '630 handle and add at the rear of Conrad '630 Conrad '787's handle for this ground and Dyson's handle in Ground 2. EX-2018, 91:6-22, 145:17-146:9.

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50. In my opinion, Petitioners' and Mr. Fester's alleged motivations would not have in fact motivated a POSITA to make the combination and there are additional reasons that would have discouraged a POSITA from making the proposed combination.

51. In my opinion, the Challenged Claims are not unpatentable as obvious based upon Petitioners' and Mr. Fester's proposed combination of Conrad '630 and Conrad '787 for the reasons discussed below.

1. The disclosures Petitioners and Mr. Fester cite in Conrad '630 and Conrad '787 would not have motivated a POSITA to make their proposed combination

a. Conrad '630 would not have provided motivation to utilize Conrad '787's handle at the rear

52. Petitioners and Mr. Fester rely heavily on the single sentence in Conrad '630's paragraph [0052] that recites "handle 102 may be provided elsewhere on the vacuum cleaner 100, for example at the rear 110 and may be of

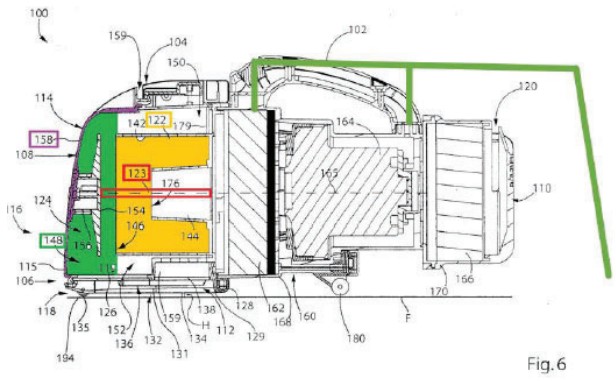
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However, his declaration states that Conrad '787's or Dyson's handle will replace Conrad '630's handle and relies exclusively on the Conrad '787's or Dyson's handles for the claimed "handle." Pet., 23, 37-43, 52, 56-60; EX-1003 ¶¶74-75, 89-106, 128-129, 138-150; ID, 25. Thus, the only relevant handle I consider in determining whether a POSITA would have been motivated to make the proposed combination is Conrad '787's or Dyson's handle.

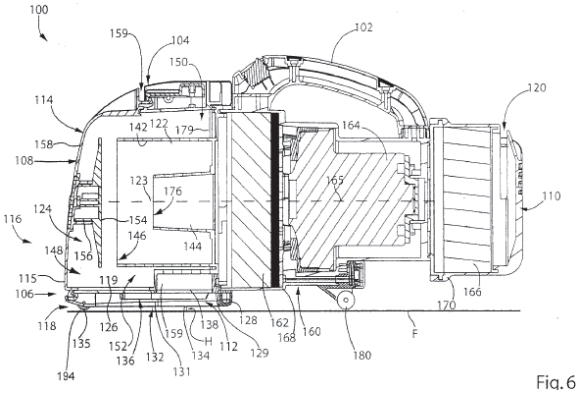
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any design." Pet., 23; EX-1003 ¶65; *see also* ID, 26. Although this statement may imply that a handle may be provided at Conrad '630's rear, the arm and wrist strain caused by increased torque created by utilizing Conrad '787's handle at the rear would have led a POSITA away from this proposed modification.

53. Torque is force times distance, and thus torque increases as the distance between the handle and the heavy components of the object increases. Accordingly, a POSITA would have understood it is more difficult to hold an object in a fixed orientation when all the heavy weight is distributed horizontally away from the hand in one direction (Petitioners' hypothetical Conrad '630 with handle in rear) compared to holding an object where the weight is distributed on opposing horizontal sides of the hand (EX-1004 Fig. 6) or distributed closer to the hand. The strain on the user caused by torque is compounded if the handle is rotated from an orientation substantially transverse to gravity (as shown in EX-1004, Fig. 6) to an orientation substantially parallel to gravity (as shown in Petitioners' proposal below), because the torque adds additional stress on the wrist.



EX-1003 ¶75

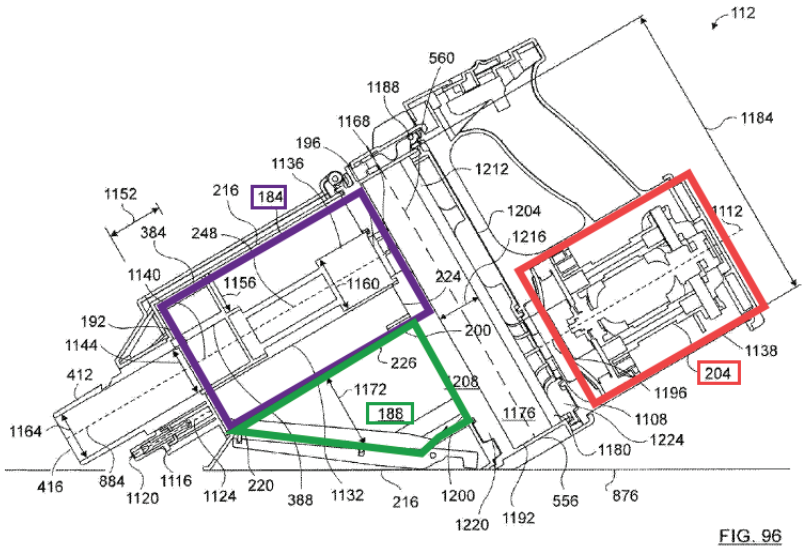


EX-1004 Fig. 6

54. Dyson confirms this concern as it relates to handheld vacuums stating that when the heavy components are located forwardly of the handgrip relative to the user's hand during use, the vacuum cleaner is "tiring and uncomfortable to use because the user will have to exert additional effort in order to maintain the hand-held vacuum cleaner in a fixed orientation." EX-1007, 1:25-2:2. Similarly, Conrad '787 explains that "handvac 112 is most comfortably operated in an orientation that does not require an application of torque by the user's hands when the handvac 112 is held by the handle 484 [which] may be the case where the center of gravity 524 of the handvac 112 is aligned vertically below the user's hand." EX-1006 ¶[0314].

55. Conrad '630 illustrated examples include handle positioning that allows for the weight to be distributed below the user's hand and substantially evenly in opposing directions along the horizontal. Conrad '787's illustrated embodiments also include handle 484 with heavy components vertically below and horizontally on opposite sides of the user's hand. For example, Figure 96 includes suction motor 204 (red) below and behind the handle while cyclone chamber 184 (purple) and dirt collection chamber 188 (green) are below and forward of the handle as oriented in Figure 96.

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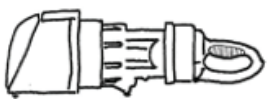


EX-1006 Fig. 96

56. Petitioners proposed modification would result in the heavy components being forward of the handle contrary to the general knowledge of a POSITA, the illustrated positioning of Conrad '630's and Conrad '787's handles, and Dyson's explicit teachings. A POSITA would have found that all of that evidence would have outweighed Conrad '630's single throw away sentence merely suggesting that a handle could be placed on the rear. Therefore, a POSITA would not have expected success in adding Conrad '787's handle to Conrad '630's rear.

57. Conrad '630 provides no further guidance as to the alternative handle design. Conrad '630 does not refer to a handle such as that in Conrad '787 and there were other alternative handle designs available at the time. For example, because Conrad '630 has wheels, the alternative design for a handle in the rear

could be a handle similar to a push cart, where it connects at rear 110 and extends up and/or back to create a handle for pushing the vacuum cleaner along the surface. (See various rearward-extending handle options below). The hypothetical examples below offer the user the comfort to manipulate the vacuum cleaner fore and aft on a horizontal surface that is below the user's elbow, which is a common use condition, with the arm in a natural downward position, which reduces strain on the wrist, elbow and arm compared to Petitioner's proposed handle orientation that would require bending the arm at the wrist or elbow during movement. These hypothetical examples also provide an orientation substantially transverse to gravity that reduces stress on the wrist when holding a vacuum structured like Conrad '630 with the nozzle pointed down compared to a handle that is substantially parallel as Petitioners' and Mr. Fester propose.



AA



BB



CC



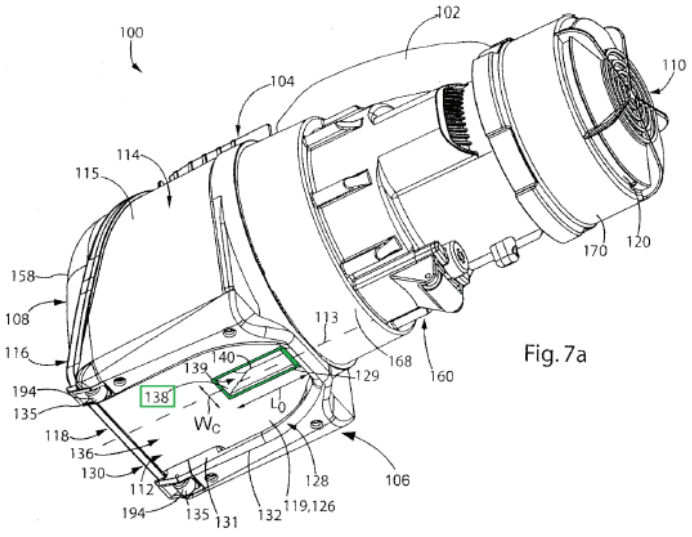
DD

58. Petitioners note that Conrad is an inventor of both Conrad '630 and Conrad '787. Pet., 23; EX-1003 ¶63. In fact, Conrad '787's application was filed five years *after* Conrad '630's application. *Compare* EX-1004, 1 *with* EX-1006, 1. However, Conrad '787 is *not* the vacuum of Conrad '630 with Conrad '787's handle on the rear. Thus, even though the inventor recognized that the handle of

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Conrad ’630 could be moved to the rear and of a different design, there is no evidence of Conrad ’787’s handle on the rear of any vacuum with the configuration of Conrad ’630.

59. This is likely because Conrad ’630’s and Conrad ’787’s vacuum cleaners are designed to function very differently, and a POSITA would have understood that a major factor in determining handle configuration and placement is how the device is designed to be used. Conrad ’630 discloses cleaning a surface by a nozzle positioned at the vacuum cleaner’s “bottom” engaging the surface to be cleaned such that it is “moveable along a surface to be cleaned by gripping and maneuvering handle 102” and optionally includes both front wheels 135 and rear wheels 180 located on the “bottom” in contact with the surface to be cleaned and opposite the handle position. EX-1004 ¶¶[0052], [0054], [0067].



Pet., 18

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60. In contrast, Conrad ’787 discloses a handvac with “a flat bottom wall, for supporting the handvac on a horizontal surface, and which extends at an acute angle (e.g., between 20 and 40 degrees) away from the inlet nozzle axis, and optionally at about the in-use orientation.” EX-1006 ¶[0311].

61. Thus, the positioning of the rear of the vacuum cleaner, the nozzle entrance, and how the vacuum cleaner is manipulated during cleaning are substantially different between Conrad ’630 and Conrad ’787. A POSITA would have recognized that these differences result in different handle configurations and placements for the two vacuum cleaners. Therefore, a POSITA would not have expected a simple substitution of one handle for the other. Instead, a POSITA would have, at most, applied principles found in Conrad ’787 to Conrad ’630, which would have been expected to result in a handle configuration and placement similar to what was already illustrated in Conrad ’630, and certainly not the handle configuration and placement Petitioners propose.

62. At most, a POSITA would have recognized that different handle configurations and positions could be contemplated for Conrad ’630’s vacuum cleaner. Further, as discussed in the following sections, none of the alleged “motivations” Petitioners or Mr. Fester cite would have led a POSITA to modify Conrad ’630 to include the specific handle of Conrad ’787, much less the specific handle at the claimed location and orientation.

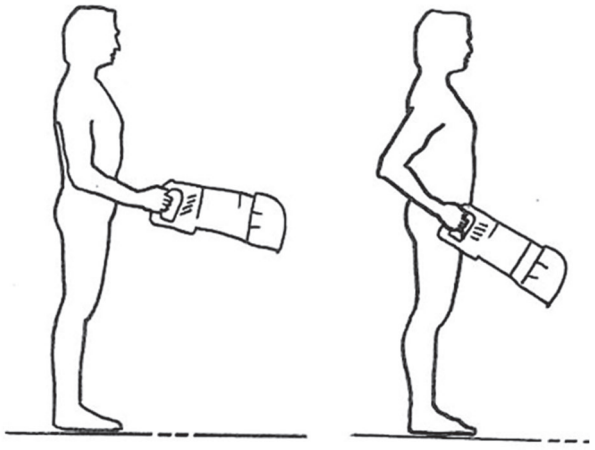
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b. The disclosure in Conrad ’787 of a comfortable handle oriented to limit or reduce torque would not have motivated a POSITA to incorporate the disclosed Conrad ’787’s handle on Conrad ’630’s vacuum cleaner

63. Petitioners and Mr. Fester allege that one motivation to modify Conrad ’630’s handle configuration is that Conrad ’787 discloses that its handle configuration allows the handheld vacuum cleaner to be “comfortably operated in an orientation that does not require an application of torque by the user’s hands when the handvac 112 is held by handle 484.” Pet., 23-24; EX-1003 ¶65. However, Petitioners’ proposed combination where a user is operating Conrad ’630’s vacuum cleaner using Conrad ’787’s handle at the rear is an orientation that creates greater torque on the user’s hand than Conrad ’630’s vacuum.

64. Petitioners rely on Conrad ’787 statement that its handle is positioned on Conrad ’787’s vacuum cleaner limits, or reduces, torque by the user’s hands when in use because the nozzle axis 884 extends at an angle to the horizontal surface to be cleaned resulting in the rear of the handle 484 being above the center of gravity of the handvac. EX-1006 ¶[0312]. As illustrated in A and B below, if a user operates Conrad ’630’s vacuum cleaner using Conrad ’787’s handle located on the rear as Petitioners and Mr. Fester propose, additional strain of the user’s hands/wrist would be caused during fore/aft action commonly used during cleaning. Specifically, as illustrated below, the fore/aft action of the vacuum cleaner of Conrad ’630 if modified, as proposed by Petitioners and Mr. Fester,

would require a bent elbow position that requires engagement of the wrist, elbow, and shoulder.



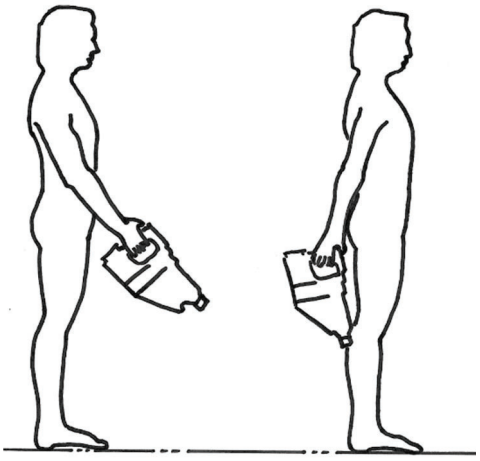
A **B**

65. Although embodiments in Conrad ’630 include wheels to assist in fore/aft movement, the device, during use, is often lifted, or rotated, at the end of a stroke to change the angle or move to another path. Any advantage in pushing the vacuum cleaner from the rear would be negligible compared to the additional strain on the user to lift and manipulate the vacuum cleaner in fore/aft movements where the center of gravity is substantially forward of the handle.

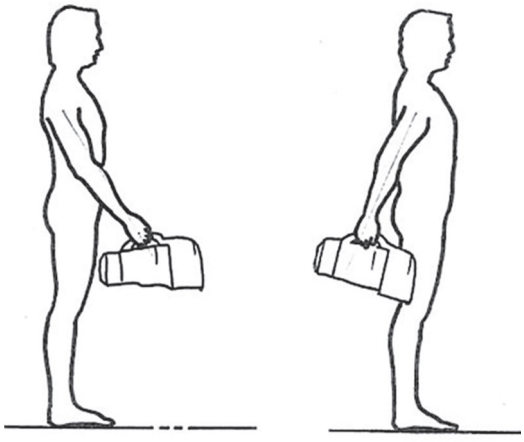
66. As compared to Petitioners’ and Mr. Fester’s proposed combination, a user’s hand while operating Conrad ’787 or Conrad ’630’s vacuum cleaner would be located more directly below the shoulder similar to when the arm is at rest with less or no bending of the wrist and elbow when the nozzle is at the desired angle to

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the surface to be cleaned as illustrated in C and D below for Conrad ’787 and E and F below for Conrad ’630 because both Conrad ’787 and Conrad ’630 disclose a handle that is opposite the nozzle of the vacuum. EX-1004 Fig. 6; EX-1007 Fig. 78. Thus, Petitioners’ proposed combination requires more engagement of the wrist, elbow, and shoulder when manipulating the vacuum cleaner in a fore/aft action commonly used during cleaning than Conrad ’787 or Conrad ’630.



C **D**



E **F**

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c. The disclosure in Conrad ’787 that the center of gravity of the handvac is aligned vertically below the user’s hand would not have motivated a POSITA to incorporate the disclosed handle on the rear of Conrad ’630’s vacuum cleaner

67. Petitioners and Mr. Fester also allege that a POSITA would have been motivated to modify Conrad ’630’s handle configuration because Conrad ’787 describes comfortable operation based on “the center of gravity 524 of the handvac 112 [being] aligned vertically below the user’s hand.” Pet., 24; EX-1003 ¶67. Conrad ’630 without modification already enjoys this benefit and the proposed combination does not reap it when a user is operating the vacuum cleaner using Conrad ’787’s handle.

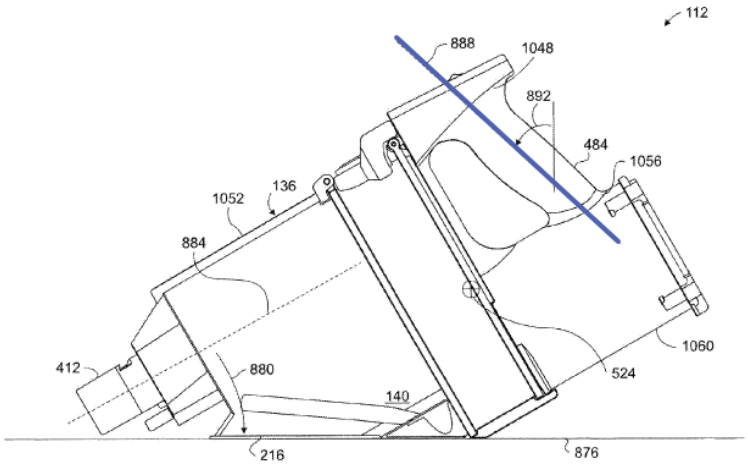
68. Conrad ’787 states that its vacuum cleaner’s center of gravity 524 is aligned vertically below the user’s hand when contacting a horizontal surface to be cleaned. EX-1006 ¶[0314]. Similarly, Conrad ’630’s handle as illustrated in Figure 6 prior to any modification is positioned vertically above the center of gravity of Conrad ’630’s vacuum cleaner as in Conrad ’787 because the heavy components such as the motor 164 are located vertically below the handle in that configuration.

69. In contrast, if a user was operating Conrad ’630’s vacuum cleaner as illustrated in Figure 6 with Conrad ’787’s handle at the rear, the handle would not

be positioned vertically above the center of gravity of the vacuum cleaner because the heavy components such as motor 164 are located forward of the handle.

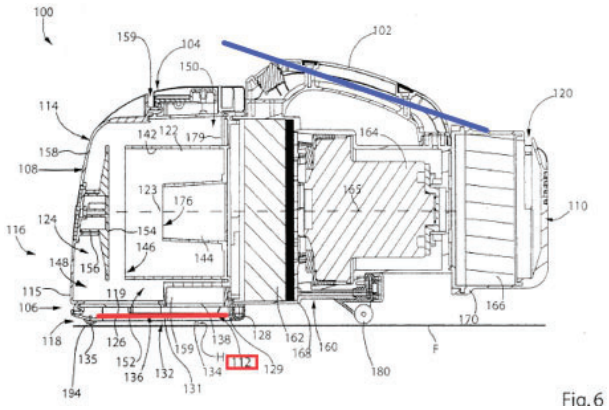
d. The disclosure in Conrad ’787 of the handle’s comfort in picking up the vacuum cleaner and using the vacuum cleaner would not have motivated a POSITA to incorporate Conrad ’787’s handle on the rear of Conrad ’630’s vacuum cleaner

70. Petitioners and Mr. Fester also allege that a POSITA would have been motivated to modify Conrad ’630’s handle configuration because Conrad ’787 describes that its configuration provides a comfortable handle alignment for grasping by a user when picking up from a storage surface as well as using the vacuum cleaner for cleaning surfaces below the user’s elbow. Pet., 24; EX-1003 ¶67. Specifically, Conrad ’787 explains that this alleged benefit is derived from the handle axis extending at a non-zero forward angle to the vertical when the vacuum cleaner rests on the storage surface or is aligned to clean a surface below the user’s elbow, as illustrated and annotated below. EX-1006 ¶[0317]; Pet., 24; EX-1003 ¶67. As shown below, this non-zero forward angle described in Conrad ’787 results in the handle positioned as shown in Figure 78 when the vacuum cleaner is on the surface. To pick up the vacuum in Figure 78, a user can maintain their arm in a mostly downward rest position.



EX-1006 Fig. 78 (annotated)

71. Similarly, when Conrad ’630’s vacuum cleaner is resting on a storage surface below the user’s elbow as shown in Figure 6, the handle axis maintains an angle similar to that of Figure 78 in Conrad ’787 and thus would have the same alleged benefits as Conrad ’787.



EX-1004 Fig. 6 (annotated)

72. Thus, Conrad ’630’s handle is already positioned and angled similarly to Conrad ’787 with regard to grasping by a user when picking up the vacuum cleaner that is below the user’s elbows (see illustration G below).



G

73. In contrast, if Conrad ’630’s vacuum cleaner is modified with Conrad ’787’s handle in the rear as Petitioners and Mr. Fester propose, while the handle axis may extend at a non-zero forward angle to the vertical, it is not in an alignment that Conrad ’787 alleges is comfortable for grasping by a user when picking up the vacuum cleaner or when using the vacuum cleaner to clean a surface below the user’s elbows. Instead, as illustrated below, the user must either bend down such that the forearm can be parallel to the surface on which the vacuum cleaner is stored or contort the user’s wrist in an uncomfortable position when picking up the vacuum cleaner and using it on a surface to be cleaned that is below the user’s elbow. In addition, the center of gravity being so far forward from a rear positioned handle would lead to additional strain on the user when picking up the vacuum cleaner from any surface, including one that is not below the user’s elbow (see illustration H below).

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H

74. Thus, a POSITA applying Conrad ’787’s principles to Conrad ’630 would not have been motivated to modify Conrad ’630’s handle configuration in the manner Petitioners and Mr. Fester propose.

2. The ability to use hose attachments with Conrad ’630’s vacuum cleaner would not have led to Petitioners ’and Mr. Fester’s proposed modification

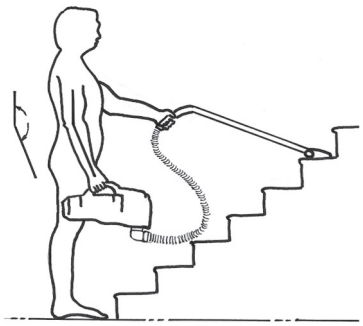
75. Petitioners and Mr. Fester further argue that a POSITA would have been motivated to incorporate Conrad ’787’s handle onto Conrad ’630’s vacuum cleaner in order to take advantage of the Conrad ’787’s handle’s alleged advantages for using attachments. Pet., 24-27; EX-1003 ¶¶69-72. However, utilizing a Conrad ’787’s handle at the rear would negatively impact the ability to use, the hose attachments that Petitioners and Mr. Fester rely on, and Conrad ’787 fails to disclose any advantages for hose attachments in using its handle.

76. Petitioners and Mr. Fester recognize that Conrad ’630 does not disclose use of attachments, however, they allege that Conrad ’663 (EX-1008) is a

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family member of Conrad ’630 and discloses using attachments with Conrad ’630’s vacuum cleaner. Pet., 24-25; EX-1003 ¶71. Notably, Conrad ’663 only discloses using hose attachments with a connector as illustrated in Figure 3b Petitioners cite. Pet., 25; EX-1008, 11:50-51 (“***[F]lexible hose*** 124 serves as an extended cleaning attachment for the hand vacuum cleaner 400.”), 12:7-12 (“[T]he nozzle 41 2 may be directly connected to any one of a number of cleaning tools that have been provided with an appropriate attachment member, including wands, brushes, crevasse tools ***and other hoses***[2].”), Fig. 3b.

77. As discussed above, Conrad ’630’s handle configuration without modification has its handle directly above vacuum cleaner’s center of gravity when the vacuum cleaner is in a “horizontal” orientation in Figure 6, which Conrad ’787 states is a comfortable in-use orientation (EX-1006 ¶[0314]). As illustrated below, the vacuum cleaner would be utilized in a similar manner when utilizing the hose attachments Conrad ’663 discloses (see illustration I below).



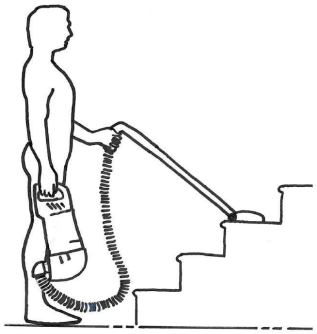
I

[2] Text in bold and italics is added emphasis unless otherwise noted.

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78. Being in a horizontal orientation keeps the lower most part of the vacuum cleaner at a higher elevation to better avoid steps or furniture when moving around to clean compared to Petitioners' and Mr. Fester's proposed modification of Conrad '630.

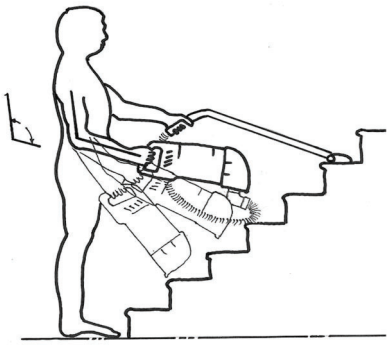
79. As illustrated below, if a user operates Conrad '630's vacuum cleaner with Conrad '787's handle at the rear as Petitioners and Mr. Fester propose, the vacuum cleaner would "hang" vertically, or near vertically from the user's hand, when utilizing Conrad '663's hose attachments (see illustration J below).



J

80. In the vertical position, the lowest portion of the vacuum cleaner is at a lower elevation requiring the user to lift the device more often to avoid contact with stairs or furniture when moving around to clean. This lifting action would increase user arm/hand stress (see illustration K below).

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K

81. Such concerns are irrelevant to Conrad ’787 because it does not disclose hose attachments that require holding the vacuum cleaner in one hand and directing the attachment in the other.

82. Thus, a POSITA applying Conrad ’787’s principles to Conrad ’630 would not have been motivated to modify Conrad ’630’s handle configuration in the manner Petitioners and Mr. Fester propose.

3. Conrad ’787’s handle on Conrad ’630’s vacuum cleaner would not have improved stair and furniture cleaning and would not have motivated the proposed combination

83. Petitioners argue that Conrad ’630’s vacuum cleaner would benefit from Conrad ’787’s handle configuration when cleaning furniture or stairs because Conrad ’787’s “drive handle” would provide easier guiding and steering of the vacuum cleaner. Pet., 26.

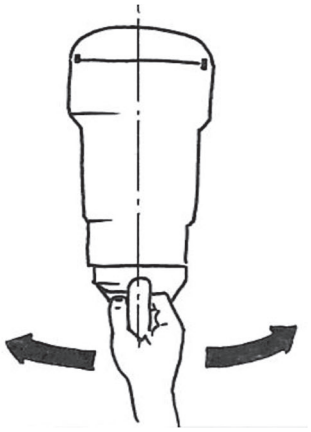
84. I note that Petitioners provide no evidence, including any testimony from Mr. Fester, to support this conclusion.

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85. Modifying Conrad ’630 to incorporate Conrad ’787’s handle on the rear would reduce control of the nozzle on the cleaning surface because the nozzle is on the bottom of the cleaner. Unlike Conrad ’787 where the handle is rearward of the nozzle opening along the nozzle axis, Conrad ’630’s nozzle geometry is approximately perpendicular to the longitudinal axis of the vacuum cleaner, which would intersect a handle on the rear of the vacuum if modified as proposed by Petitioners. Thus, Conrad ’787’s alleged “drive handle” being placed in the rear of Conrad ’630 would result in less control of the nozzle placement relative to the surface to be cleaned than handle 102 as illustrated in Conrad ’630. Illustration L shows the Conrad ’630 handle location where the full arm is used to move the vacuum cleaner left or right. Illustration M shows a rear-ward handle (like Conrad ’787) where the users full arm must travel away from the body to turn the nozzle left and towards the body to turn right. This induces more action by the user to accomplish the same task as the Conrad ’630-style handle.



L



M

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86. One typical cleaning action for a vacuum cleaner is not fore and aft in parallel passes like in illustration N below. Rather, the vacuum cleaner is moved in a sequentially diagonal direction that "walks" the vacuum cleaner across the surface like in illustration O below.



N



O

87. The movement in illustration O is a more efficient manner that covers a large area in a minimal number of passes. This method requires the user to twist the nozzle on the surface to afford the diagonal affect. This twisting action is better achieved when the user operates the vacuum using Conrad '630's handle location compared to Petitioners' and Mr. Fester's proposed rear location because in Conrad '630's location, the twist is either generated by the axial rotation of the full arm, or the user engages the use of their wrist and arm. This arm rotation is a natural use of the arm.

88. Thus, a POSITA would not have found that Conrad '787's "drive handle" would improve the ability to clean stairs or furniture with Conrad '630's

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vacuum cleaner. Instead, a POSITA would have recognized that Petitioners' and Mr. Fester's proposed configuration would reduce a user's ability to guide and steer the vacuum when cleaning, including on stairs and furniture, compared to Conrad '630's handle configuration. Therefore, a POSITA would not have been motivated to modify Conrad '630 to incorporate Conrad '787's handle at the rear as Petitioners and Mr. Fester propose.

4. Petitioners do not provide any motivation for incorporating Conrad '787's handle into Conrad '630 at the claimed angle

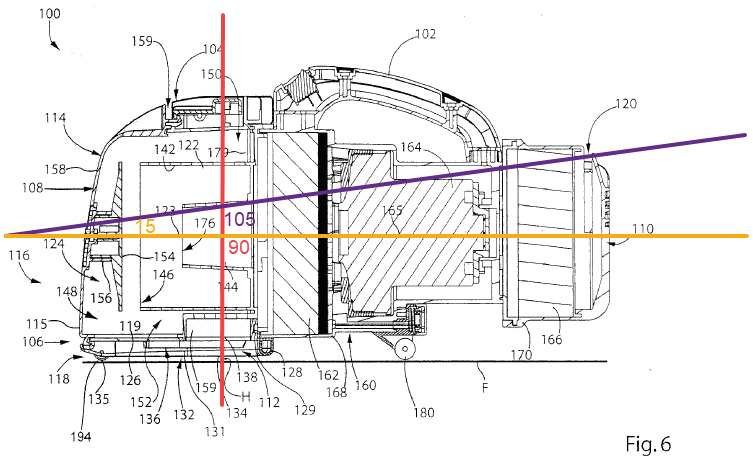
89. Conrad '787 defines line 884 as the "nozzle axis" and the angles Petitioners and Mr. Fester rely upon for the claimed angles relate to the angle between the handle axis and the nozzle axis. Pet., 37-42; EX-1003 ¶¶92-93. Specifically, Conrad '787 defines angle 880 between longitudinal axis 884 and horizontal surface 876, which is surface to be cleaned or on which the vacuum cleaner rests, and angle 892 between handle axis and vertical, which is perpendicular to horizontal surface 876. EX-1006 ¶¶[0312], [317]. Thus, if the teachings of Conrad '787 are applied to Conrad '630, then the handle axis would be at an angle related to the nozzle axis in Conrad '630, not the longitudinal axis of the cyclonic separating unit.

90. Unlike in Conrad '787, the nozzle axis in Conrad '630 is perpendicular to the longitudinal axis of the cyclonic separating unit. Petitioners

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and Mr. Fester failed to consider this difference when alleging that a POSITA would utilize the angles calculated in Conrad ’787 in Conrad ’630.

91. Moreover, when you use Mr. Fester’s calculation in paragraph 91 of his declaration that states the angle between the handle axis and the nozzle axis in Conrad ’787 is 105°, the handle would be at an angle to the longitudinal axis of the cyclonic separating unit outside of the range claimed in the Challenged claims. As illustrated below, when handle axis (purple) is set to 105° relative to the nozzle axis (red) as Petitioners and Mr. Fester propose, the handle is inclined with respect to the cyclonic separating unit (orange) at an angle of 15°, which is outside of the range claimed in the Challenged Claims. The handle axis and the longitudinal axis also do not intersect within the vacuum cleaner as required by the Challenged Claims.

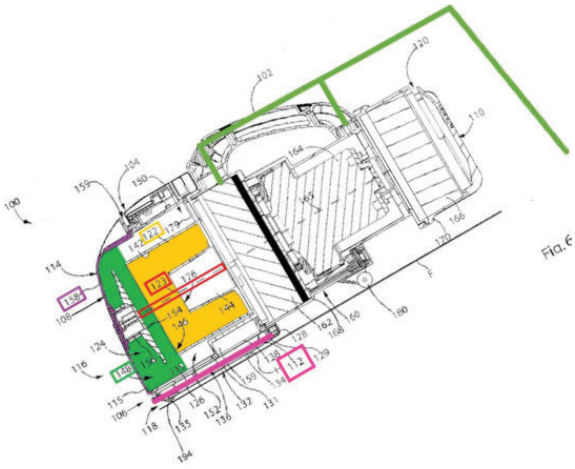


EX-1004 Fig. 6 (annotated)

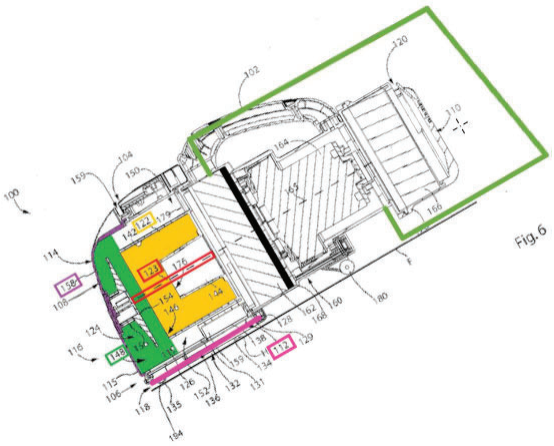
5. Reduced efficiency and poorer cleaning performance would not have motivated a POSITA to modify Conrad '630 as Petitioners and Mr. Fester propose

92. As the distance between the suction nozzle and the floor surface increases, a vacuum cleaner experiences a loss of suction resulting in reduced efficiency and poorer cleaning performance. EX-2019, 1:22-30.

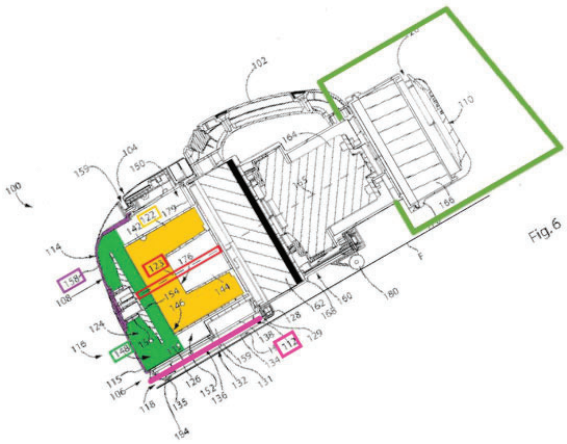
93. As discussed above, because Conrad '630's handle is located opposite of the suction nozzle opening, the nozzle can be located in close proximity to a surface to be cleaned while allowing the user's arm to be extended naturally. To use a Conrad '787's handle at the rear of Conrad '630's vacuum cleaner and keep the nozzle in close proximity to a surface to be cleaned, the user either has to bend his or her elbow, causing stress and tension on the user's wrist, elbow, and shoulder, or the surface to be cleaned has to be inclined as illustrated below using Mr. Fester's mockups.



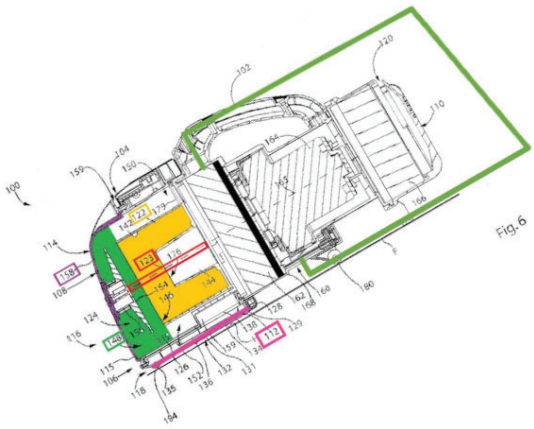
EX-1003 ¶¶ 75, 130 (further annotated)



EX-1003 ¶¶ 76, 131 (further annotated)

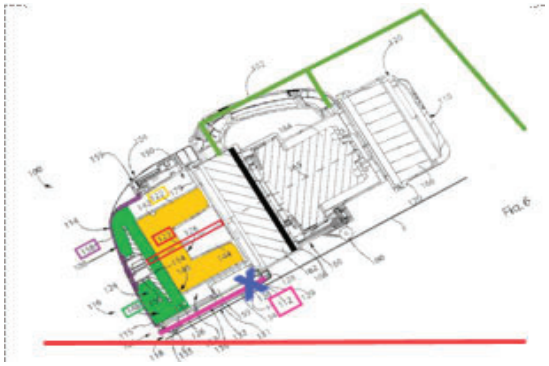


EX-1003 ¶¶ 76, 131 (further annotated)

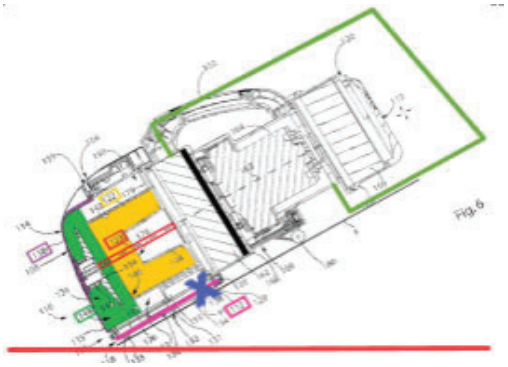


EX-1003 ¶¶ 76, 131 (further annotated)

94. If a user wants to decrease the stress on his or her wrist, elbow, and shoulder while using Conrad '787's handle at the rear of Conrad '630's vacuum cleaner to operate the vacuum cleaner on a surface to be cleaned that is not angled as illustrated above, then the distance between the suction nozzle and the floor surface would increase as shown by the exemplary illustrations where the red line is the surface to be cleaned.

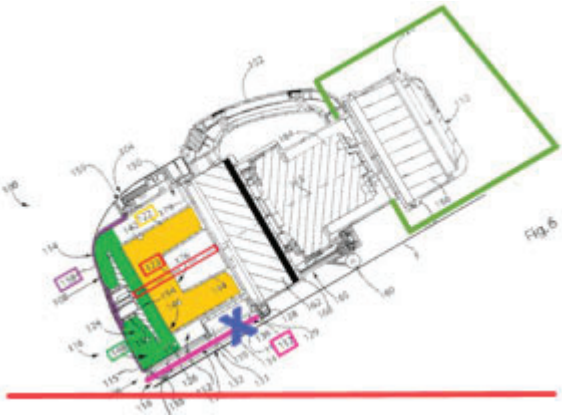


EX-1003 ¶¶ 75, 130 (further annotated)

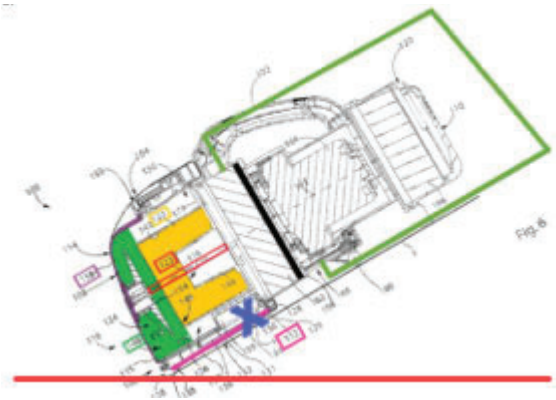


EX-1003 ¶¶ 76, 131 (further annotated)

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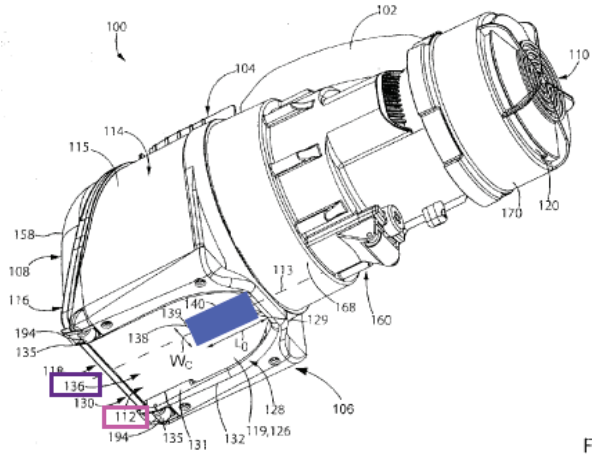


EX-1003 ¶¶ 76, 131 (further annotated)



EX-1003 ¶¶ 76, 131 (further annotated)

95. This issue is even more pronounced for Conrad '630's embodiment that Petitioners rely upon because of the location of nozzle opening 138. Conrad '630 discloses that nozzle 112 (pink) includes airflow chamber 136 (purple) and the opening 138 (blue) is located at the back of nozzle 112. EX-1004 ¶¶[0060]-[0062].



EX-1004 Fig. 7a (annotated)

96. Thus, when a user utilizes Petitioners' proposed combination with Conrad '787's handle at an angle to decrease stress on the user's wrist, elbow, and shoulder as indicated in the illustrations above, the distance between the opening 138 (blue X) and the surface to be cleaned is vast. In addition, nozzle 112 is designed to suck in air and debris using negative pressure created by the suction motor when depending wall 128 is in close proximity to the surface to be cleaned. Where depending wall 128 is not uniformly in close proximity to the surface to be cleaned, negative pressure weakens. Thus, when Conrad '630's vacuum cleaner is at an angle to the surface to be cleaned as shown, it is unlikely that the vacuum cleaner would pick up any debris on the surface.

97. Petitioners' and Mr. Fester's modification would, in most instances, result in reduced efficiency and poorer cleaning performance resulting from the loss of suction that occurs as the distance between the suction nozzle and the floor surface increases.

98. This decrease in performance would have discouraged a POSITA from incorporating Conrad '787's handle at the rear of Conrad '630's vacuum cleaner. Thus, a POSITA would not have been motivated to modify Conrad '630 as Petitioners' and Mr. Fester propose.

B. GROUND 2: The Challenged Claims are not unpatentable as obvious based upon the proposed combination of Conrad ’630 and Dyson

99. Just as in Ground 1, in Ground 2 Petitioners and Mr. Fester acknowledge that Conrad ’630 fails to disclose limitation 1d of the Challenged Claims—“wherein the handle has a pistol grip configuration in which the handle is inclined with respect to the cyclonic separating unit to form an angle of not less than 85 degrees and not greater than 140 degrees between a handle axis and the longitudinal axis of the cyclonic separating unit, and wherein the handle axis and the longitudinal axis intersect within the vacuum cleaner.” Instead, Petitioners argue based upon Conrad ’630’s disclosure that handle 102, which is mounted on an upper portion of the vacuum cleaner, “may be provided elsewhere on the vacuum cleaner 100, for example, at the rear 110 and may be of any design,” to argue that it would have been obvious to a POSITA to incorporate Dyson’s handle by placing and orienting it in a manner that would meet limitation 1d. Pet., 56-59; EX-1003 ¶¶130-131.

100. In my opinion, Petitioners’ and Mr. Fester’s alleged motivations would not have in fact motivated a POSITA to make the combination and there are additional reasons that would have discouraged a POSITA from making the proposed combination.

101. In my opinion, the Challenged Claims are not unpatentable as obvious based upon Petitioners' and Mr. Fester's proposed combination of Conrad '630 and Dyson for the reasons discussed below.

1. The disclosures in Conrad '630 and Dyson that Petitioners and Mr. Fester cite would not have motivated a POSITA to make the proposed combination

a. Conrad '630 would not have provided motivation to utilize Dyson's handle at the rear

102. Just like in Ground 1, Petitioners and Mr. Fester rely heavily on the single sentence in paragraph [0052] of Conrad '630. Pet., 52; EX-1003 ¶124. As discussed in Section VI.A.1.a., although this statement may imply that a handle may be provided at Conrad '630's rear, the combination of a POSITA's general knowledge, the illustrated positioning of Conrad '630's and Conrad '787's handles, and Dyson's explicit teachings would have led a POSITA away from this proposed modification.

103. Dyson discusses disadvantages of handheld vacuum cleaners where heavy components are forward of the handle during use resulting in additional effort to maintain the vacuum cleaner in a fixed orientation. EX-1007, 1:25-2:2. Dyson provides a solution to this problem by placing an elongate handle between the airflow generator and the power source. EX-1007, 2:4-19. Specifically, Dyson states that locating a handle between the airflow generator and power source allows the handheld vacuum to be manipulated easily in use because the user's

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hand is located between the vacuum cleaner's two heaviest components resulting in a "dumbbell-like" configuration. EX-1007, 6:6-11. Thus, Dyson disparages Petitioners' modification that places Dyson's handle at Conrad '630's rear because such a configuration would not create a "dumbbell-like" configuration. Notably, Conrad '630's handle as illustrated in Figure 6 includes the heaviest objects distributed on opposite sides of the handle compared to Petitioners' and Mr. Fester's proposed modification in which all heavy objects are distributed on the same side of the handle. Therefore, a POSITA would not have expected success in adding Dyson's handle to the rear of Conrad '630's vacuum cleaner.

104. As also discussed above in Section VI.A.1.a., Conard '630's paragraph [0052] does not elaborate on the design type of the handle that could be used and does not refer to any handle similar to Dyson's, which was one of many handle designs available at the time. Further, as discussed in detail in Section VI.A.1.a., Conrad '630's inventor did not propose a modification to Conrad '630 with Conrad '787's handle at the rear even though the evidence indicates that he was aware of the relevant disclosures in Conrad '630 as well as disclosures including Conrad '787's handle in the rear of the vacuum cleaner.

105. Just as was true in Ground 1, the vacuum cleaner described in Conrad '630 is designed to function very differently with a different layout from those with a handle described in Dyson, and a POSITA would have understood that a major

factor in determining handle configuration is how the device is designed to be used. As discussed above in Section VI.A.1. a., Conrad ’630 discloses cleaning a surface by a nozzle positioned at the “bottom” of the vacuum cleaner engaging the surface to be cleaned. In contrast, Dyson discloses a vacuum cleaner that includes a handle that is “disposed between the airflow generator [36] and the power source [32] and dimensioned and arranged to be gripped by a user’s hand, wherein the elongate handle [28] lies transverse to the longitudinal axis [Y-Y] of the suction conduit,” which allows a user “to maintain a comfortable wrist position and movement of the hand-held vacuum cleaner feels comfortable.” EX-1007, 2:14-19.

106. Because the two vacuum cleaners function differently with a different layout, a POSITA would not have expected a simple substitution of one handle for the other for the same reasons articulated in Section VI.A.1. a. Instead, a POSITA would have, at most, applied Dyson’s principles to Conrad ’630, which would have been expected to result in a handle configuration and placement similar to Conrad ’630, and certainly not the handle configuration Petitioners and Mr. Fester propose.

107. At most, a POSITA would have recognized that different handle configurations could be contemplated for Conrad ’630’s vacuum cleaner. However, none of Petitioners’ or Mr. Fester’s alleged “motivations” would have led a POSITA to modify Conrad ’630 to include the specific handle of Dyson, much less the specific handle at the claimed location and orientation.

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b. Dyson's disclosures would not have motivated a POSITA to incorporate the handle into Conrad '630's vacuum cleaner

108. Petitioners and Mr. Fester cite two statements within Dyson related to the comfort of the handgrip for the user as providing alleged motivation for incorporating that handgrip into Conrad '630. Pet., 53; EX-1003 ¶125. However, Dyson states that comfort of the handgrip depends upon the handle axis being transverse to the suction conduit. Figure 6 in Conrad '630 includes a handle transverse to the suction conduit. Petitioners' and Mr. Fester's proposed modification of Conrad '630 does not have a handle axis transverse to the suction conduit. Thus, Dyson disparages from Petitioners' and Mr. Fester's proposed combination.

109. Petitioners and Mr. Fester allege that one motivation to modify Conrad '630's handle configuration Dyson's disclosure that its handle configuration allows the handheld vacuum cleaner to "maintain a comfortable wrist position and movement of the hand-held vacuum cleaner feels comfortable" and "[t]his arrangement feels comfortable for a user." Pet., 54 (citing EX-1007, 2:17-19, 4:27-29); EX-1003 ¶125 (citing same). However, the comfort of Dyson's handle in these disclosures depends upon Dyson's arrangement wherein the handgrip 28 lies transverse to the longitudinal axis Y-Y of the suction conduit. EX-1007, 6:13-22. Dyson explains that it is important that the longitudinal axis of the

suction conduit and the handle axis are transverse to one another such that the user's manipulation of the hand-held vacuum cleaner feels comfortable. *Id.*

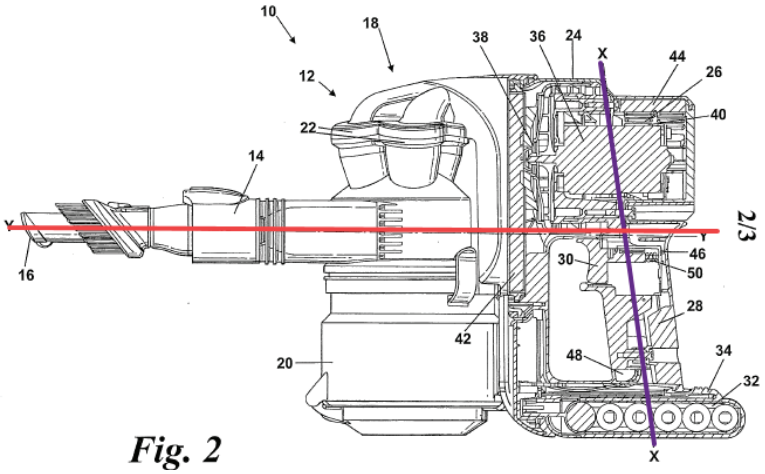


Fig. 2

EX-1007 Fig. 2 (annotated)

110. Similarly, in Conrad '630 without modification, the handle axis (in purple) is transverse to the longitudinal axis of the suction conduit (in red), as illustrated below.

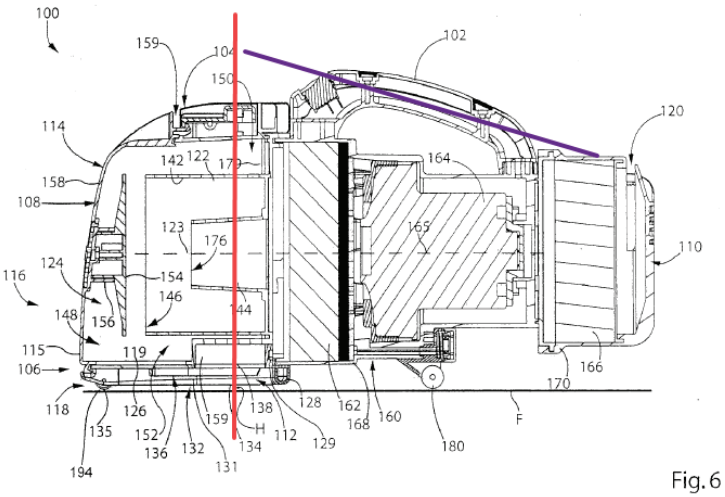
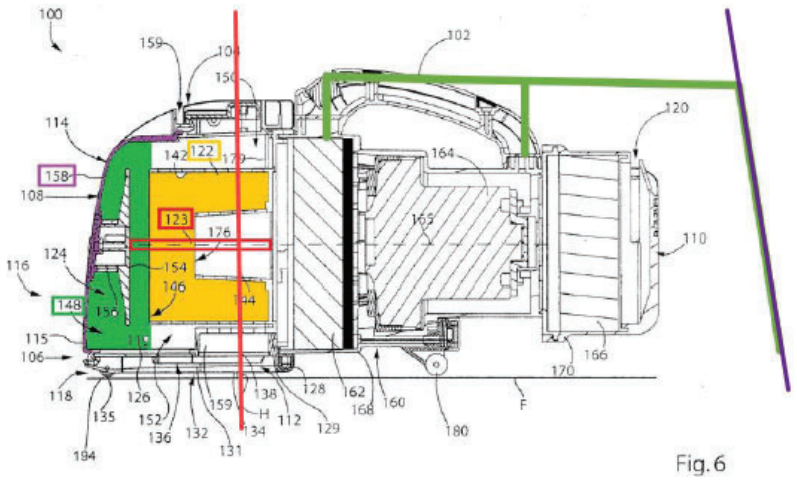


Fig. 6

EX-1004 Fig. 6 (annotated)

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111. In contrast, if Conrad '630 is modified to incorporate a Dyson's handle at the rear of Conrad '630's vacuum cleaner as proposed by Petitioners and Mr. Fester, as illustrated below, the handle axis of the handle (purple) would be substantially parallel to the longitudinal axis of the suction conduit (red) and would not enjoy the comfort that Dyson discloses based on its arrangement.

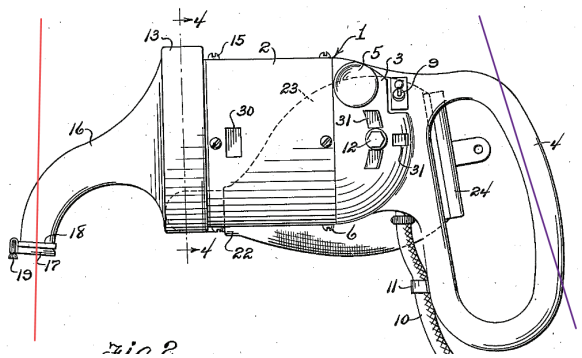


EX-1003 ¶130 (further annotated)

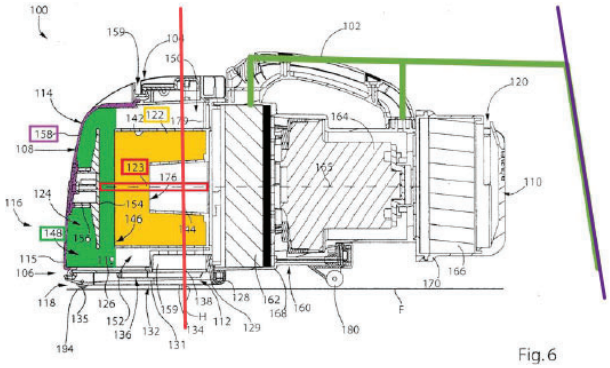
112. In addition to citing passages of Dyson that are inapplicable to their proposed combination, Petitioners and Mr. Fester also ignore Dyson's additional guidance as to the handle configuration, placement, and orientation that is particular to the intended use and positioning of Dyson's vacuum cleaner. Dyson recognizes, and attempts to solve, the problem presented in the '624 patent. EX-1007, 1:19. Dyson recognizes that having the handle positioned so far back from the vacuum cleaner's center of mass, as well as the handle being arranged approximately parallel to the suction conduit, makes it tiring and uncomfortable to

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use the hand-held vacuum cleaner. EX-1007, 1:29-2:2. As shown below lines indicating the handle position (purple) and suction position (red) in the annotations, when a user operates the vacuum cleaner with Dyson's handle on the rear of Conrad '630's vacuum cleaner, the modification of Conrad '630 Petitioners and Mr. Fester propose would result in the same configuration as the '624 patent, which Dyson disparages as uncomfortable.



EX-2015 Fig. 1 (annotated)



EX-1003 ¶¶75, 130 (further annotated)

113. Thus, a POSITA applying the principles of Dyson to Conrad '630 would not have been motivated to modify Conrad '630's handle configuration, and certainly would not have been motivated to modify Conrad '630 in the manner Petitioners and Mr. Fester propose.

2. The ability to use hose attachments with Conrad ’630’s vacuum cleaner would not have led to Petitioners ’and Mr. Fester’s proposed modification

114. Petitioners and Mr. Fester make the same argument in Ground 2 that they did in Ground 1–that a POSITA would have been motivated to incorporate Dyson’s handle into Conrad ’630’s vacuum cleaner to take advantage of the alleged advantages that Dyson’s handle provides for using attachments. Pet., 54-55; EX-1003 ¶126. Both Petitioners and Mr. Fester rely upon the same evidence for Ground 2 as Ground 1. Pet., 54-55; EX-1003 ¶126. Thus, for the same reasons as in Section VI.A.2. above, a POSITA applying the principles of Dyson to Conrad ’630 would not have been motivated to modify Conrad ’630’s handle configuration in the manner Petitioners and Mr. Fester propose.

3. Conrad ’630’s vacuum cleaner with Dyson’s handle would not have improved stair and furniture cleaning and thus would have led away from the proposed combination

115. As discussed in detail in Section VI.A.3. above, Petitioners’ proposed modification to place Dyson’s handle in the rear of Conrad ’630’s vacuum cleaner would reduce the ability to guide and steer nozzle of Conrad ’630 when cleaning, including on stairs or furniture compared to the handle placement in the illustrated embodiments of Conrad ’630. Thus, for the same reasons articulated in Section VI.A.3., this decrease in performance would have discouraged a POSITA from

incorporating Dyson's handle at Conrad '630's rear. Thus, a POSITA would not have been motivated to modify Conrad '630 as Petitioners and Mr. Fester propose.

4. Reduced efficiency and poorer cleaning performance would not have motivated a POSITA to modify Conrad '630 as Petitioners and Mr. Fester propose

116. As discussed in detail in Section VI.A.5. above, Petitioners' and Mr. Fester's proposed modification would result in reduced efficiency and poorer cleaning performance because of loss of suction due to the increased distance between the suction nozzle and the floor surface relative to use of Conrad '630. Thus, for the same reasons articulated in Section VI.A.5., this decrease in performance would have discouraged a POSITA from incorporating a Dyson's handle at Conrad '630's rear. Thus, a POSITA would not have been motivated to modify Conrad '630 as Petitioners and Mr. Fester propose.

5. A POSITA would have been discouraged from placing Dyson's handle on the rear of Conrad '630 because use of such handle would add strain

117. As discussed above in Section VI.A.1.b., if Conrad '630's handle is incorporated at the rear and placed at the angle in the manner Petitioners and Mr. Fester propose, additional strain or torque of the user's hands/wrist would be caused during fore/aft action. Specifically, if a user was utilizing Dyson's handle in the rear of Conard '630's vacuum cleaner as Petitioners and Mr. Fester propose, the fore/aft action of the vacuum cleaner would require a bent elbow position that

requires engagement and/or torque of the wrist, elbow, and shoulder, compared to Conrad '630's vacuum cleaner utilizing the original handle, the user's hands are provided with reduced torque by allowing for a straight line downward with less or no bending of the wrist, elbow, and shoulder when manipulating the vacuum cleaner in a fore/aft action commonly used during cleaning. Thus, for the same reasons articulated in Section VI.A.1.b., a POSITA would not have been motivated to modify Conrad '630's handle configuration in the manner Petitioners and Mr. Fester propose.

C. GROUNDS 3 and 4: The Challenged Claims are not unpatentable as obvious based upon the proposed combination of Matsumoto with either Conrad '787 and Dyson

118. In my opinion, Grounds 3 and 4 fail for two distinct reasons. First, Petitioners and Mr. Fester have not shown that it would have been obvious to miniaturize Matsumoto, which Mr. Fester acknowledges is necessary for both grounds. Second, just like in Grounds 1 and 2, the alleged motivations Petitioners and Mr. Fester provide do not support the combination and there would have been no motivation for a POSITA to combine Matsumoto with Conrad '787 or Dyson in the manner Petitioners and Mr. Fester propose.

119. In my opinion, the Challenged Claims are not unpatentable as obvious based upon Petitioners' and Mr. Fester's proposed combination of Matsumoto with either Conrad '787 or Dyson for the reasons discussed below.

1. Petitioners and Mr. Fester have not shown that it would have been obvious to miniaturize Matsumoto

120. Petitioners and Mr. Fester rely upon Figure 25 of Matsumoto for its relevant disclosure as to Grounds 3 and 4. Pet., 61, 65-66, 69, 71-73, 93-94; EX-1003 ¶¶162-164, 170, 172-173, 175-176, 210-212, 218, 220-221. During his deposition, Mr. Fester explained that this argument is necessary to both Grounds 3 and 4 because Matsumoto's Figure 25 is used to clean floors and the disclosures Petitioners and Mr. Fester rely upon in Conrad '787 and Dyson relate to cleaning surfaces other than floors. EX-2018, 161:3-163:25; *see also* Pet., 64, 91; EX-1003 ¶¶77, 210. Thus, as Mr. Fester confirmed, to prove the Challenged Claims are unpatentable under Grounds 3 and 4, Petitioners and Mr. Fester must show that a POSITA would have been motivated to miniaturize Matsumoto. EX-2018 at 161:3-163:25. Petitioners and Mr. Fester have not made this showing.

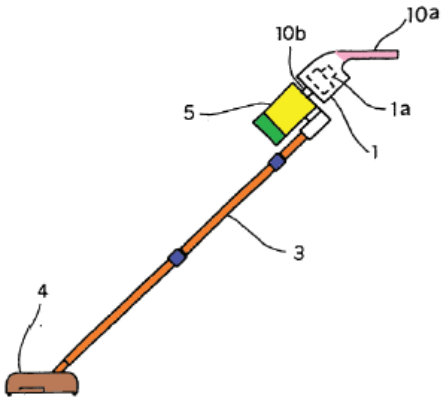
121. Neither of Matsumoto's disclosures that Petitioners and Mr. Fester cite support their contention that a POSITA would have been motivated to miniaturize Matsumoto.

122. Petitioners and Mr. Fester first allege that "Matsumoto explicitly suggests that 'miniaturiz[ing] [the] vacuum cleaner' would 'enhance the operability thereof.'" Pet., 64 (citing EX-1005 ¶[0068]), 91 (citing same); EX-1003 ¶¶77, 210. However, Matsumoto's disclosure about miniaturization is focused on making the handle smaller, not the entirety of the vacuum cleaner:

> Moreover, according to the present invention, a connection pipe is bent so as to function as a handle held by the user during cl [sic]. ***This helps reduce the space occupied by the handle. In this way, it is possible to miniaturize a vacuum cleaner and enhance the operability thereof***.

EX-1005 ¶[0068]. There is no disclosure in Matsumoto of miniaturizing the entirety of the vacuum cleaner as Petitioners propose.

123. Petitioners and Mr. Fester then allege that Figure 25 indicates that there are collars on the connection pipe 3 (annotated in blue by Petitioners) that "indicate the connection pipe 3 is made of multiple pipes connected to one another." Pet., 65; *see also* Pet., 91; EX-1003 ¶¶77, 211.



Pet., 65

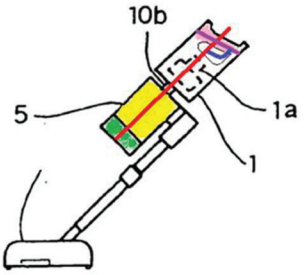
124. However, there is no disclosure in Matsumoto that indicates that the portions annotated in blue are in fact "collars" or that connection pipe 3 is made up of multiple pipes connected to one another. A POSITA reviewing these figures in light of Matsumoto's disclosures could have concluded that the blue portions were not collars, but instead physical friction-fit interfaces, physical bayonet mount

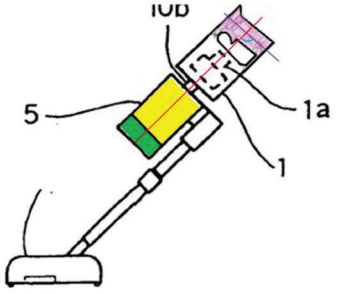
interfaces, structural elements to strengthen the air path, or design features for aesthetic purposes. In addition, if the blue portions were intended to be collars connecting different pipes as Mr. Fester theorizes, a POSITA would have expected Figure 25 of Matsumoto to also include a collar connecting connection pipe 3 to suction port 4.

125. Thus, in my opinion, none of the evidence Petitioners and Mr. Fester cite actually supports miniaturizing Matsumoto's vacuum cleaner into a handvac as required for Grounds 3 and 4. In my opinion, Petitioners and Mr. Fester have not shown that the Challenged Claims are unpatentable under Grounds 3 and 4.

2. Petitioners and Mr. Fester have not shown that a POSITA would have been motivated to combine Matsumoto with Conrad '787 or Dyson as Petitioners and Mr. Fester propose

126. In Grounds 3 and 4, Petitioners and Mr. Fester argue that it would have been obvious to modify Matsumoto to include handles from Conrad '787 or Dyson because Matsumoto's handle is allegedly unergonomic and Conrad '787 and Dyson allegedly provide advantages for use of the handles disclosed in those references. Specifically, Petitioners and Mr. Fester assert that their proposed combination would result in substituting Matsumoto's current handle with the handle of either Conrad '787 or Dyson in after miniaturizing the vacuum cleaner. EX-2018, 176:17-21, 183:7-11.





Pet., 69 (Conrad '787) **Pet., 94 (Dyson)**

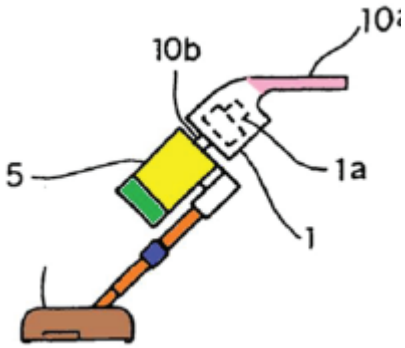
127. In my opinion, Petitioners' and Mr. Fester's alleged motivations would not have in fact motivated a POSITA to make the combination and there are additional reasons that would have discouraged a POSITA from making the proposed combination.

128. In my opinion, the Challenged Claims are not unpatentable as obvious based upon Petitioners' and Mr. Fester's proposed combination of Matsumoto and either Conrad '787 or Dyson for the reasons discussed below.

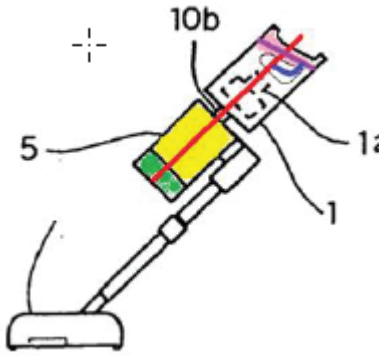
a. Matsumoto discloses minimizing the size of the handle, not increasing the size of the handle as Petitioners and Mr. Fester propose

129. As discussed above, Matsumoto teaches that the handle should be a bent portion of the connection pipe to ***reduce*** the space occupied by the handle. EX-1005 ¶[0068]; *see also id.* ¶[0057]. While Petitioners and Mr. Fester erroneously used this disclosure as a basis to miniaturize the entirety of the vacuum cleaner, they have ignored this disclosure for its actual relevant purpose—modification of Matsumoto's handle. As illustrated below, the handles in

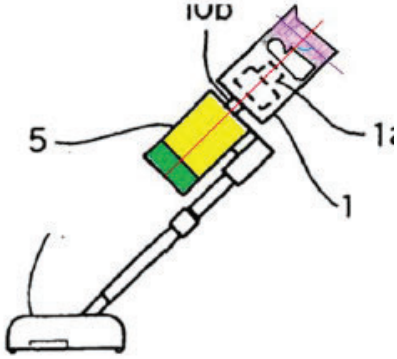
Petitioners' proposed combinations are larger and more robust than Matsumoto's existing handle.



EX-1003 ¶164



EX-1003 ¶170



EX-1003 ¶218

Thus, a POSITA reviewing Matsumoto's full disclosure, including paragraphs 57 and 68, would have been discouraged from using larger more robust handles on Matsumoto's vacuum cleaner.

130. Further, a POSITA would have known that miniaturization of a handle has benefits that would be lost with incorporating larger handles. For example, smaller handles reduce weight-in-hand, reduce cost, reduce storage space required, and reduce packaging size and shipping cost.

131. Thus, in my opinion, a POSITA would not have been motivated to replace Matsumoto's compact handle with either of Conrad '787's or Dyson's handles that would ***increase*** the size of the handle.

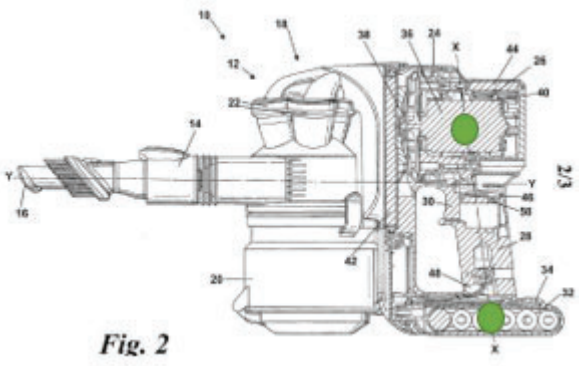
b. A POSITA would not have placed Conrad ’787’s or Dyson’s handle on the rear of Matsumoto’s vacuum cleaner

132. In Matsumoto Figure 25, the vacuum cleaner’s weight is distributed between the user and the floor on which the suction port is resting during use. EX-2018, 173:5-12. Because much of the weight is distributed to the floor and the handle is maintained at a comfortable height based on the length of connection pipe 3, the design considerations for the handle placement and design are substantially different than for Conrad ’787 or Dyson. Recognizing these differences in design considerations, Mr. Fester acknowledged that the motivations he alleged for modifying Matsumoto with Conrad ’787’s or Dyson’s handle at the claimed angle require a miniaturized version of Figure 25’s embodiment, in which the weight would be borne solely by the user in much of the use scenarios. EX-2018,163:7-14. However, a POSITA would have understood change in weight distribution of the vacuum cleaner in making such a modification would have led to severe disadvantages in adding Conrad ’787’s or Dyson’s handle to the rear of Petitioners’ and Mr. Fester’s proposed miniaturized version of Matsumoto.

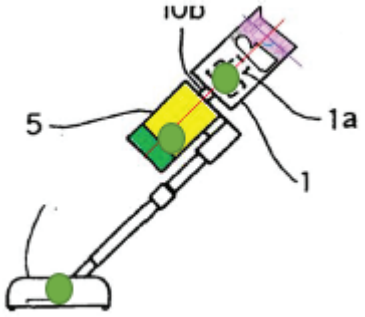
133. As discussed above in Sections VI.A.1.a. and VI.B.1.a., general knowledge of a POSITA, the illustrated positioning of handles in Conrad ’630 and Conrad ’787, and the explicit teachings in Dyson would lead a POSITA away from this proposed modification.

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134. In particular, Dyson specifies that comfort is improved for vacuum cleaners in which weight is being borne solely by the user when the weight of the vacuum cleaner is distributed on both sides of the user's hand. Matsumoto with Conrad '787's or Dyson's handle as Petitioners propose fails to result in the handgrip being positioned and configured to ensure that the weight of the vacuum cleaner is distributed on both sides of the user's hand as shown below with the green dots indicating the heaviest portions of the vacuums.



EX-1007 Fig. 2 (annotated)

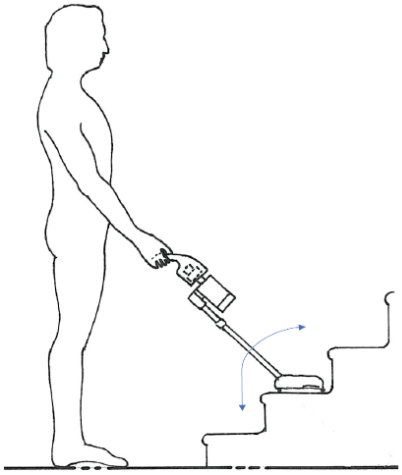


Pet., 94 (annotated)

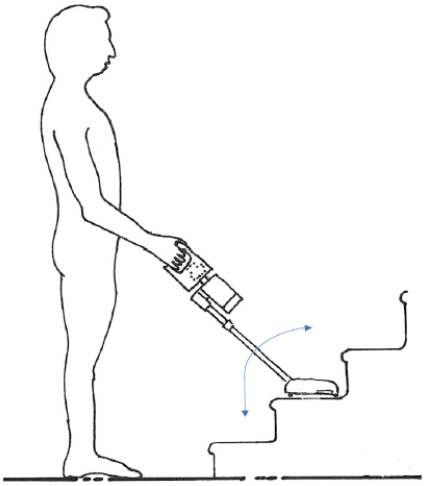
135. Based on the above teachings, a POSITA would not have expected success in replacing Matsumoto's handle with that of Conrad '787's or Dyson's in the miniaturized version of Matsumoto's Figure 25 Petitioners propose. In fact, to more evenly distribute weight on either side of the user's hand, the handle would be moved forwardly from the rear of the miniaturized version of Matsumoto's Figure 25 and may result in a different angle and/or handle shape than the ones

shown in Conrad ’787 or Dyson. Thus, a POSITA would not have been motivated to make Petitioners’ proposed combination.

136. Where a POSITA was designing the vacuum cleaner for the main use condition of Petitioners’ proposed combination, in which the weight is to be borne by the surface to be cleaned as in Matsumoto, the handle before modification is already oriented to reduce torque-caused stress on the user’s hand whereas Petitioners’ and Mr. Fester’ proposed modification to include Conrad ’787’s or Dyson’s handle increases the stress on the user. For example, when cleaning stairs, the weight borne by the user, as opposed to the weight borne by the surface to be cleaned, is a downward force causing the connection pipe to pivot with respect to the suction port, as illustrated by the blue arrow below. Because this force is directly downward, the user is able to counter the force more efficiently where the handle is parallel to the surface to be cleaned (see illustration P), rather than at an angle to the surface that requires bending the wrist and/or elbow (illustration Q).



P



Q

c. Petitioners and Mr. Fester have not shown that there would have been an ergonomic reason to substitute Matsumoto's handle for a Conrad '787's or Dyson's handle

137. The only support Petitioners provide as motivation to replace Matsumoto's handle is Mr. Fester's unsupported statements that Matsumoto's handle is allegedly "unergonomic and uncomfortable" and it would "be likely to break." Pet., 66 (citing EX-1003 ¶¶165-166), 91; EX-1003 ¶¶213-214. However, neither Matsumoto itself nor Conrad '787 or Dyson identify ***any*** issues with Matsumoto's handle.

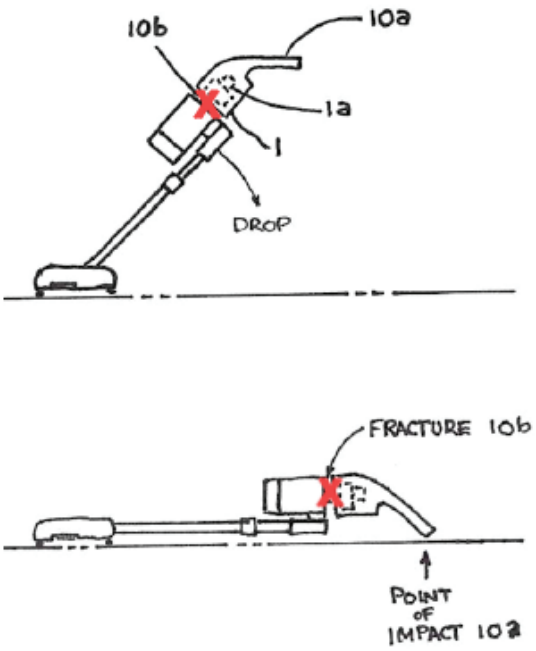
138. The ergonomics of Matsumoto's handle is superior actually to that of Matsumoto's vacuum cleaner with Conrad '787's or Dyson's handle as Petitioners and Mr. Fester propose. Similar to the discussion in Sections VI.A.1.b. and VI.B.5., Matsumoto's handle is at an angle and location that enables less restricted fore/aft travel by being parallel to the ground and at a height that allows full

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extension of a user's arm during movement back and forth (see illustration P above).

139. In contrast, Petitioners' and Mr. Fester's proposed modification of Matsumoto to include handles similar to those disclosed in Conrad '787 and Dyson would limit the fore-aft travel of the cleaner. Conrad '787's or Dyson's handle being located at the rear of Matsumoto's vacuum cleaner requires a bent elbow during use, restricting the total amount of travel and additional elbow and wrist strain as compared to Matsumoto's vacuum cleaner without modification (see illustration Q above).

140. In addition, a POSITA would not have expected the handle (10a) to be the biggest break risk if the vacuum cleaner fell to the floor line. Where there is such an impact, a POSITA would have expected failure to occur at the separation vessel outlet - 10b (RED X) because the heavy portion of the vacuum cleaner is 1 and 1a, which would put extra force on the separation vessel outlet when impacting the floor (see Illustration R below).



R

141. For Ground 3, Petitioners and Mr. Fester point to the same disclosures they relied upon in Ground 1—a comfortable handle oriented to limit or reduce torque by the user's hand; the handvac's center of gravity is aligned vertically below the user's hand; and comfort in picking up the vacuum cleaner due to the angle of the handle relative to the vertical. Pet., 67; EX-1003 ¶168. Similarly, in Ground 4, Petitioners' point to the same disclosures as they relied upon in Ground 2—the arrangement where the longitudinal axis of the suction conduit lies transverse to the handle axis allowing for comfort to the user. Pet., 92; EX-1003 ¶215. However, these alleged benefits are dependent upon a static relationship between the handle axis and other portions of the vacuum cleaner, such as the

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suction nozzle or the vertical when the vacuum cleaner is positioned on the surface to be cleaned.

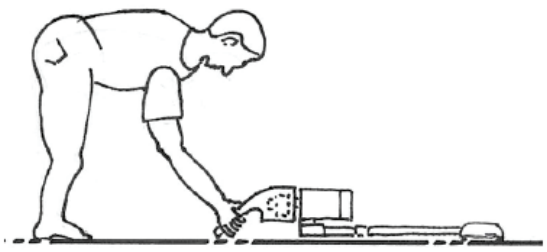
142. Matsumoto's vacuum cleaner's orientation and operation is significantly different. Matsumoto's handle is not statically connected to the suction port; instead, the handle and suction port body 4 are pivotably connected through connection pipe 3. EX-1005 ¶¶ [0027] , [0029]. Because of this, the orientation of the handle axis relative to other parts of the vacuum cleaner fluctuates depending upon the angle of connection pipe 3 relative to suction port body 4. Petitioners and Mr. Fester[3] do not even recognize this important difference, let alone account for it in providing Conrad '787's and Dyson's alleged support for their position that a POSITA would have been motivated to substitute Matsumoto's handle for Conrad '787's or Dyson's handle.

143. Further, to the extent they are relevant, neither Conrad '787's nor Dyson's disclosures would have motivated a POSITA to use its handle with Matsumoto. As discussed above, Matsumoto's handle is oriented to limit or reduce the stress on the user's hand caused by torque during common use whereas

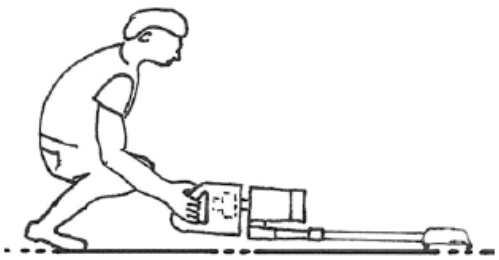
[3] Mr. Fester confirmed that the only modifications the proposed to Matsumoto in Grounds 3 and 4 are to miniaturize Matsumoto and replace the handle with Conrad '787's or Dyson's handle. EX-2018, 183:7-15.

Matsumoto as modified by Petitioners and Mr. Fester increases the stress on the user. This is further supported by the fact that Petitioners and Mr. Fester have not shown that the center of gravity of Matsumoto's vacuum cleaner is vertically below Matsumoto's handle in Petitioner's and Mr. Fester's proposed modification.

144. Further, in contrast to Conrad '787, the handle axis in Matsumoto modified with Conrad '787's or Dyson's handle as Petitioners and Mr. Fester propose is not in a comfortable alignment for grasping by a user when picking up the vacuum cleaner below the user's elbows. Instead, as illustrated below, the user must either bend down such that the forearm can be parallel to the surface on which the vacuum cleaner is stored or contort the user's wrist in an uncomfortable position when picking up the vacuum cleaner and using it on a surface to be cleaned that is below the user's elbow (see illustrations S & T below).



S



T

145. Additionally, Petitioners and Mr. Fester do not consider the recognized problem at the time of the invention of reducing the amount of dust and other particles released into the air when the dirt collector was opened. EX-1003

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¶16. Patent Owner discovered that particular advantages could be obtained by orienting the handle as recited in Claim 1 in order to address this problem. One of the advantages provided by the particular orientation and position of the '687 Patent's handle is to allow, "whilst gripping the handle 6, the user [to point] the vacuum cleaner 2 towards a suitable receptacle (e.g. a waste bin or bag) into which the dirt is to be emptied." EX-1001, 5:64-66. This advantage cannot be accomplished in Petitioners' and Mr. Fester's modification of Matsumoto with Conrad '787's or Dyson's handle because the nozzle port 4 and connection pipe 3 extends beyond the wall of the dust collecting chambers. Further, such considerations are not relevant to Matsumoto, which discloses that the dust collection chamber, as illustrated in Figure 2, is emptied by "detach[ing] the first and second dust collecting chambers 7 and 8 integrally from the vacuum cleaner, and then separate[ing] the first and second dust collecting chambers 7 and 8 from each other above a trash can or the like." EX-1005 ¶[0046]. Matsumoto only teaches positioning its handle to push and pull the vacuum cleaner to move the suction port 4 along the floor and does not disclose optimizing the handle for emptying the dirt collector, which is accomplished without use or consideration of the handle placement. EX-1005 ¶[0046].

146. When the references are properly considered as a whole, a POSITA would have had no reason to modify Matsumoto in the manner Petitioners and Mr.

Fester propose and would have been dissuaded from such modification. Thus, in my opinion, Petitioners and Mr. Fester have not shown that a POSITA would have been motivated to combine Matsumoto with either Conrad '787 or Dyson in a way that discloses all of the limitations of the Challenged Claims.

VII. TESTIMONY RELEVANT TO SECONDARY CONSIDERATIONS

A. The Dyson v10 vacuum cleaner practices the Challenged Claims

147. In my opinion, the Dyson Cyclone V10 vacuum cleaner that I understand was released in the U.S. in 2018 practices all of the Challenged Claims.

1. Independent Claim 1

148. In my opinion, the Dyson Cyclone V10 vacuum cleaner practices all of the limitations of Claim 1.

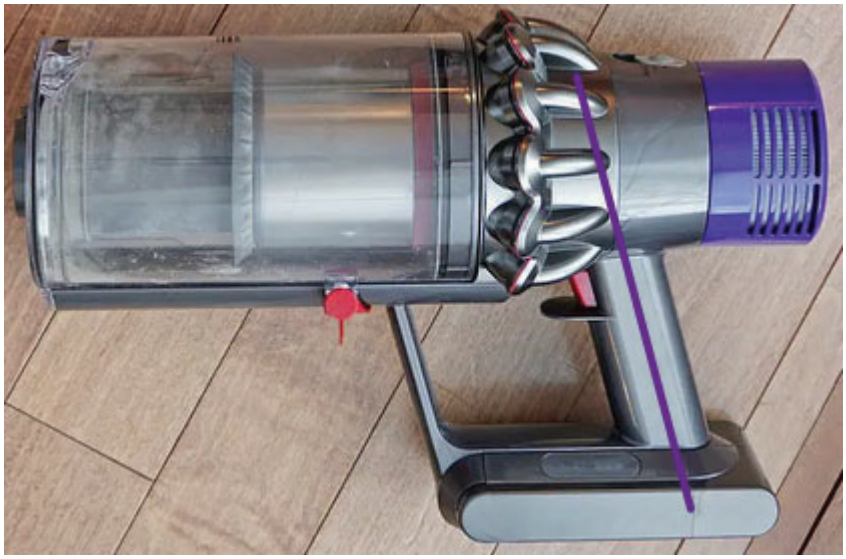
a. 1[pre] "A handheld vacuum cleaner, comprising"

149. As reflected in EX-2020 through EX-2025, the Dyson Cyclone V10 is a handheld vacuum cleaner.

b. [1a] "a handle by which the vacuum cleaner is supported during normal use;"

150. As illustrated below and annotated in purple, the Dyson Cyclone V10 has a handle by which the vacuum cleaner is supported during normal use.

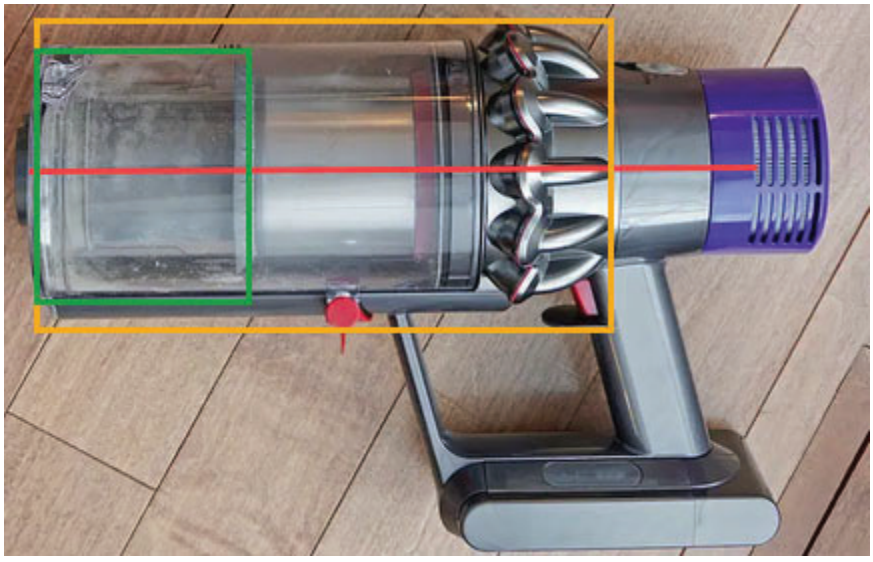
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EX-2021 (annotated)

c. [1b] "a cyclonic separating unit having a longitudinal axis and a dirt collector at one end of the cyclonic separating unit,"

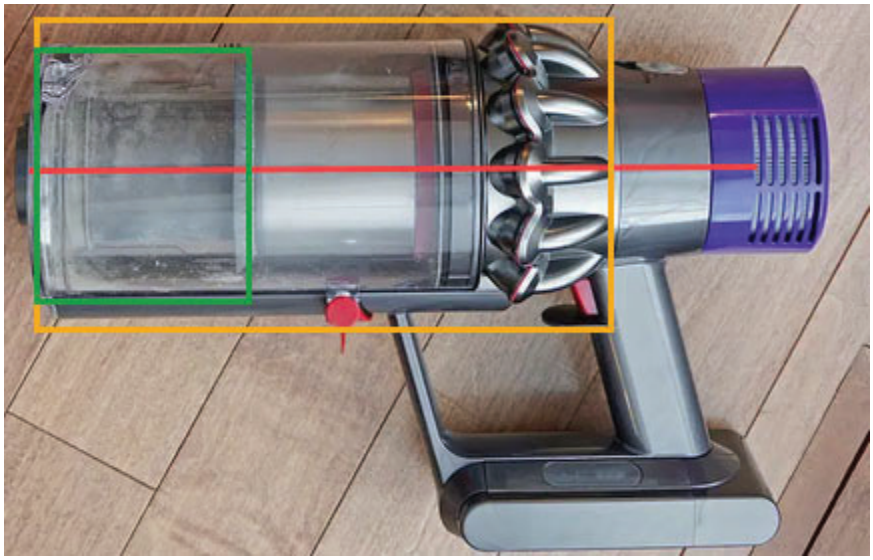
151. As illustrated below, the Dyson Cyclone V10 has a cyclonic separating unit (yellow) having a longitudinal axis (red) and a dirt collector (green) at one end of the cyclonic separating unit.



EX-2021 (annotated)

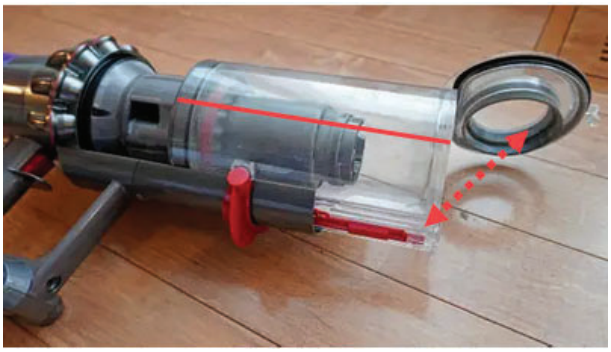
d. [1c] "the cyclonic separating unit comprising an end wall having a closed configuration in which the dirt is retained within the dirt collector by the end wall and an open configuration for the removal of dirt from the dirt collector, wherein the end wall is movable relative to the longitudinal axis and, when the end wall is in the closed configuration, the longitudinal axis extends through a region bounded by a perimeter of the end wall,"

152. As illustrated below, the Dyson Cyclone V10 has a cyclonic separating unit (yellow) that has an end wall having a closed configuration in which the dirt is retained within the dirt collector (green) by the end wall.



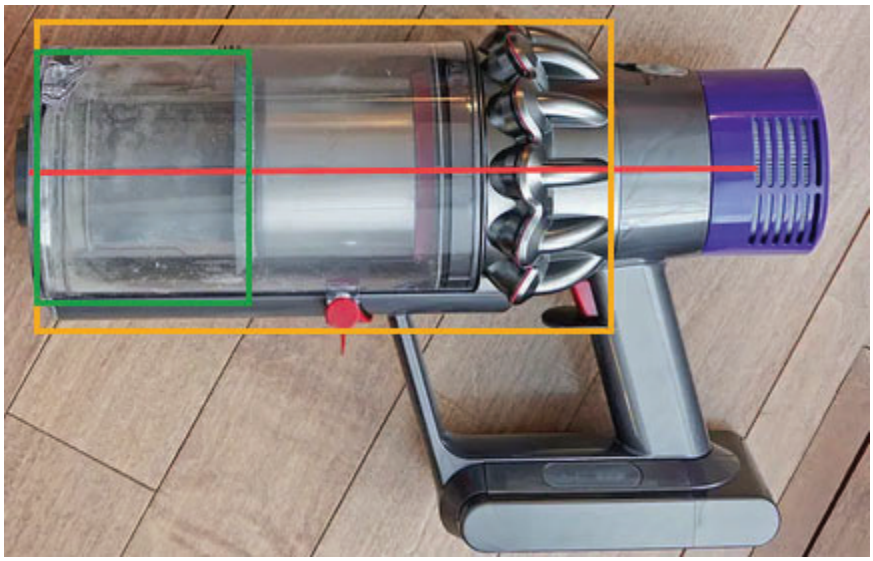
EX-2021 (annotated)

153. Further, as illustrated below, the cyclonic separating unit has an open configuration for removal of the dirt from the dirt collector, wherein the end wall is movable (as illustrated by the dotted red arrow) relative to the longitudinal axis (the solid red line).



EX-2021 (annotated)

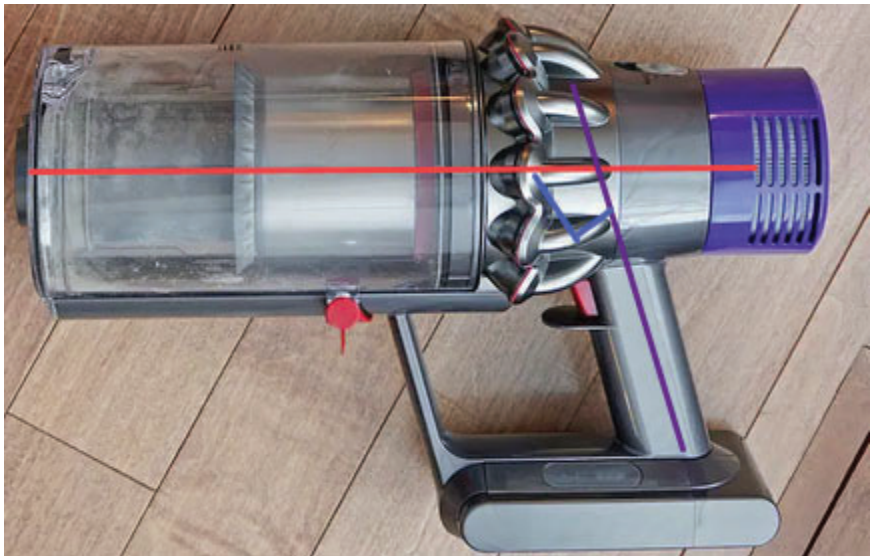
154. Finally, as illustrated below, when the end wall of the cyclonic separating unit (yellow) is in the closed configuration, the longitudinal axis (red) extends through a region bounded by a perimeter of the end wall.



EX-2021 (annotated)

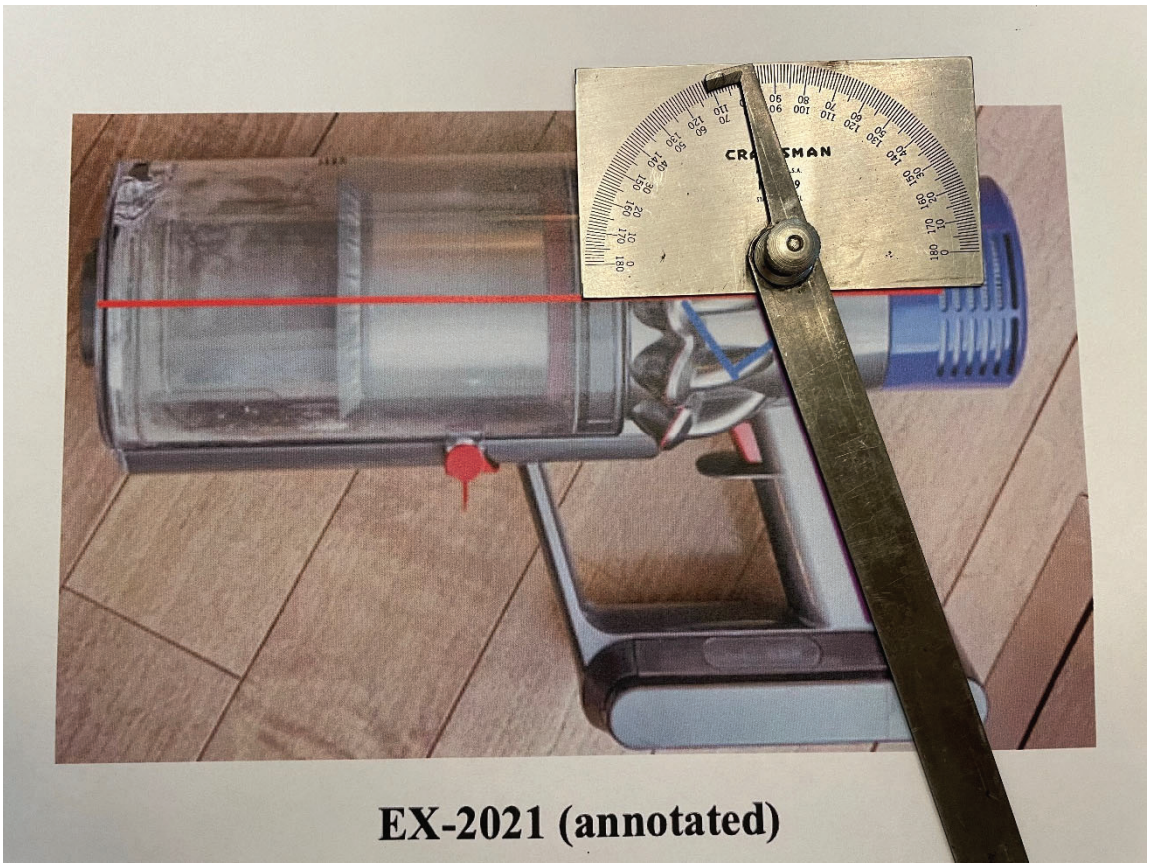
e. [1d] "wherein the handle has a pistol grip configuration in which the handle is inclined with respect to the cyclonic separating unit to form an angle of not less than 85 degrees and not greater than 140 degrees between a handle axis and the longitudinal axis of the cyclonic separating unit, and wherein the handle axis and the longitudinal axis intersect within the vacuum cleaner."

155. As illustrated below, the Dyson Cyclone V10 has a handle in a pistol grip configuration that is inclined with respect to the cyclonic separating unit to form an angle (blue) of not less than 85 degrees and not greater than 140 degrees between a handle axis (purple) and the longitudinal axis of the cyclonic separating unit (red).



EX-2021 (annotated)

156. I calculated the claimed angle as being approximately 107 degrees. In order to come to my calculation, I used a protractor to measure this angle (see below).



157. In addition, as illustrated above, the handle axis (purple) and the longitudinal axis (red) intersect within the vacuum cleaner.

2. Dependent Claim 2

158. In my opinion, the Dyson Cyclone V10 practices dependent Claim 2 that recites "The handheld vacuum cleaner of claim 1, wherein the handle is inclined with respect to the cyclonic separating unit to form an angle of not less than 100 degrees and not greater than 125 degrees between the handle axis and the longitudinal axis of the cyclonic separating unit."

159. As discussed above in Section VII.A.1., in my opinion, the Dyson Cyclone V10 practices each limitation of independent Claim 1.

160. As also discussed above in Section VII.A.1.e., I calculated the angle between the handle axis and the longitudinal axis of the cyclonic separating unit to be approximately 107 degrees. Thus, the Dyson Cyclone V10 practices the additional limitation of claim 2 requiring the handle to be inclined with respect to the cyclonic separating unit to form an angle of not less than 100 degrees and not greater than 125 degrees between the handle axis and the longitudinal axis of the cyclonic separating unit.

3. Dependent Claim 3

161. In my opinion, the Dyson Cyclone V10 practices dependent Claim 3 that recites: "The handheld vacuum cleaner of claim 1, wherein the end wall comprises an end wall of the cyclonic separating unit."

162. As discussed above in Section VII.A.1., in my opinion, the Dyson Cyclone V10 practices each limitation of independent Claim 1.

163. As discussed above in Section VII.A.1.d., in my opinion, the Dyson Cyclone V10 includes an end wall that comprises the end wall of the cyclonic separating unit.

4. Dependent Claim 4

164. In my opinion, the Dyson Cyclone V10 practices dependent Claim 4 that recites: "The handheld vacuum cleaner of claim 1, wherein the end wall is arranged to pivot between the closed configuration and the open configuration."

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165. As discussed above in Section VII.A.1., in my opinion, the Dyson Cyclone V10 practices each limitation of independent Claim 1.

166. As discussed above in Section VII.A.1.d., in my opinion, the Dyson Cyclone V10 has an end wall that is arranged to pivot between a closed configuration and an open configuration.

5. Dependent Claim 8

167. In my opinion, the Dyson Cyclone V10 practices dependent Claim 8 that recites: "The handheld vacuum cleaner of claim 1, wherein the dirt collector is disposed forward of the handle."

168. As discussed above in Section VII.A.1., in my opinion, the Dyson Cyclone V10 practices each limitation of independent Claim 1.

169. As illustrated below, the dirt collector (green) is disposed forward of the handle (purple), as illustrated by the direct of the red arrow.



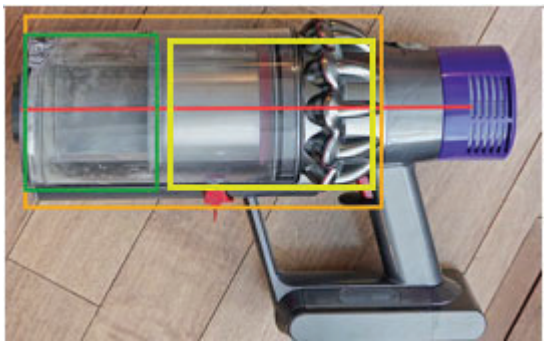
EX-2021 (annotated)

6. Dependent Claim 10

170. In my opinion, the Dyson Cyclone V10 practices dependent Claim 10 that recites: "The handheld vacuum cleaner of claim 1, wherein the cyclonic separating unit comprises a cyclonic separator having an axis that defines the longitudinal axis of the cyclonic separating unit."

171. As discussed above in Section VII.A.1., in my opinion, the Dyson Cyclone V10 practices each limitation of independent Claim 1.

172. As illustrated below, the cyclonic separating unit (orange) comprises a cyclonic separator (yellow) having an axis that defines the longitudinal axis of the cyclonic separating unit (red).



EX-2021 (annotated)

B. The "Point-and-Shoot" feature of the Dyson Cyclone V10 vacuum is reflected in the Challenged Claims

173. EX-2020 through EX-2025 discuss the Dyson Cyclone V10's point-and-shoot feature that allows a user to point the vacuum cleaner and eject dust into the dust bin in one action.

174. The point-and-shoot feature is accomplished through a combination of two of the limitations that are recited in independent Claim 1: "the end wall [of the cyclonic separating unit] is movable relative to the longitudinal axis [of the cyclonic separating unit] and, when the end wall is in the closed configuration, the longitudinal axis extends through a region bounded by a perimeter of the end wall" from limitation 1c and "wherein the handle . . . is inclined with respect to the cyclonic separating unit to form an angle of not less than 85 degrees and not greater than 140 degrees between a handle axis and the longitudinal axis of the cyclonic separating unit, and wherein the handle axis and the longitudinal axis intersect within the vacuum cleaner" from limitation 1d.

VIII. RESERVATION OF RIGHTS

175. My opinions are based on the information that I have considered to date. I reserve the right, however, to supplement my opinions in the future to respond to any arguments raised by Petitioners or Mr. Fester and to take into account new information that becomes available to me.

Signature on next page

I, Donald Davidshofer, declare that all statements made herein of my knowledge are true, and all statements made on information and believe are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment under Section 1001 of Title 18 of the United States Code.

Executed on May 22, 2024.

By:



Donald Davidshofer

APPENDIX A

DON DAVIDSHOFER

Phone: 980.333.1165 **Email:** don.davidshofer@gmail.com
Linkedin: https://www.linkedin.com/in/dondavidshofer

Project / Product Manager

Technical Project Manager with experience in product design, engineering, manufacturing and strategic planning. Business and technical savvy with expertise in market trends. Cross-functional team leader contributing a deep understanding of the product development process including Marketing, Engineering and Design. Recognized for ability to identify, define and validate innovative growth areas. Demonstrated history of product and process improvements in a high volume manufacturing environment, both in-house and sourced. Competent in product cost improvements and design-to-cost principles. Proficient in all aspects of the product development process including concept development and patent documentation (clearance and protection).

Skill Areas:

Product/Project Management - Cross-Functional Team Leadership - Design-to-Cost Principles - Process Management - Project and Product Estimation - Product Design - Concept Development - Verification and Validation (V&V) - Agile Processes - Engineering Management

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Professional Experience

Project Manager - NPD - Consumer Products Consultant

DAVIDSHOFER DESIGN and ENGINEERING - Lafayette, CO 2024-Present

New Product Development expert with experience from concept to production.

Project Manager

FLYING PIG DESIGNS, LLC - Broomfield, CO 2021-2024

Lead Engineering Design team from inception to production. Create, and enforce, WBS and Gantt Schedule with cross-sectional team. Prepare weekly project dashboards and budget reports for client.

- Launched Leaf Blower Design for Client, Completed intubation medical device design, FDA submittal and certified animal lab for client.

Technical Design Consultant

FUTURE GENERATION POWER TOOLS (FGPT) - Peoria, IL 2019-2021

Subject matter expert on design of electro-mechanical products. Design and build innovative concepts for proof-of-concept. Provide product planning and marketing sell-in for key product.

Program Manager

BUNN-O-MATIC - Commercial Beverage Appliances - Springfield, IL 2017-2019

Lead cross-functional team for key projects. Create and control BOM's using design-to-cost principles. Mentor Designers and Engineers with a focus on risk reduction while meeting scheduled

deliverables. Maintain a professional team and lead by example. Report project status to leadership team.

- Implemented fact-based Engineering processes while streamlining non-value-added procedures. Defined and protected product costs and schedules through the design process. Met project schedule to-tooling-release and complied with project cost goals within 3%.

Product Manager

TACONY CORP. - Commercial Floor Care Div. - Fort Worth, TX 2015 - 2017

Drive product-to-market efforts in support of commercial vacuums, blowers, self-contained scrubbers, cleaning solutions and parts and accessories. New project management, validating new and adjacent product categories.

- Implemented 25% SKU reduction plan, introduced 3 new product platforms and 2 adjacent platforms.

Insights to Innovation Manager / Technical Concepts Manager

ELECTROLUX, Small Appliances Div. - Charlotte, NC 2011 - 2014

Create product generation plans with a focus on new technologies and market trends. Initiate and validate product concepts and lead implementation through the product development process. Mentor technical design and quality teams with an emphasis on the customer. Build prototypes and validate concepts with market research. Create and lead the Concept Development process and communicate status to leadership team. Lead Design-to-Cost projects and principles.

- Created product strategies for “professional” and “upright” vacuum cleaner categories with a combined projected growth of 28% over 4 years.
- Technical team leader on multiple projects meeting product performance goals and realizing (within 2%) cost targets.

Regional Technical Area Manager

ELECTROLUX, Small Appliances Div. - Bloomington, iL 2007 - 2011

Create and lead the Concept Development process. Inject consumer insight-driven innovation into all product categories. Synthesize customer pain points, attitudes-and-usage studies and over-the-counter-return data to grow product portfolio. Reduce product costs within existing platforms.

- Initiated product concepts for two new upright vacuum platforms and led one team to production, with realized savings of 8.3% over previous model. Developed alternate model variants for key retail accounts. Product platform exceeded Sales expectations by 23%, producing over 4 million units over 6 years.

Senior Project Engineer

ELECTROLUX, Small Appliances Div. - Bloomington, iL 1998-2007

Represent Engineering on cross-functional New Product Development teams. Lead product technical team, owning the product from inception to production.

- Technical team leader on multiple upright vacuum cleaner platforms with innovative dust separation system. Champion production start-up on two product platforms (concurrently) at separate global mfg. sites. Meet target production date and cost targets within 2%.

Project Engineer

THE EUREKA COMPANY - Bloomington, iL 1988-1998

Lead Engineering activities on NPD teams including Layout and Design of Assemblies and performance characteristics per product specifications. Create technical concepts and develop CAD models for performance testing and validation.

- Released multiple products to production with an emphasis on cost-down measures. Assisted in Testing and Measurement validation of designs per ASTM standards prior to production launch.

Draftsman

THE EUREKA COMPANY - Bloomington, iL 1980-1988

Develop detail drawings and layouts per Project Engineer/Designer requirements. Create technical concepts and develop models for performance testing and validation. Assist Sr. Engineer on BOM generation and Cost analysis.

- Instrumental in the product launch of various canister vacuum cleaners and accessories. Includes tooling review, packaging design and prototype assembly.

Professional Development and Experience

Morrison Institute of Technology - Associates Degree in Mechanical Design
Dr. Gary Weede (Illinois State University) - Plastic Processing Apprenticeship
Chris Pankow - Electrolux Leadership - Next Level Leader Training
Botthroyd and Dewhurst - DFMA processes

U.S. Patents

17 Utility patents including 1 design patent *(see Linkedin profile for comprehensive list)*

APPENDIX B

APPENDIX B – MATERIALS CONSIDERED

Paper	Description
2	Petition for *Inter Partes* Review of U.S. Patent No. 10,433,687
6	Patent Owner's Preliminary Response
7	Decision Granting Institution of *Inter Partes* Review

Exhibit	Description
1001	U.S. Patent No. 10,433,687
1002	File History for U.S. Patent No. 10,433,687 (Appl. No. 15/269,430)
1003	Declaration of Joseph Fester
1004	U.S. Patent Publication No. 2011/0314630 ("Conrad '630")
1005	EP Publication No. 1,199,023 ("Matsumoto")
1006	U.S. Patent Publication No. 2016/0174787 ("Conrad '787")
1007	Int'l Publication No. WO 2008/009888 ("Dyson")
1008	U.S. Patent No. 9,301,663 ("Conrad '663")
2001	U.S. Patent Publication No. 2017/0071426 A1 ("Krebs")
2002	GB 2440111B
2003	Chinese Patent Application No. 201610830364.1
2004	Chinese patent document no. CN1178622C
2005	China National Intellectual Property Administration, Case No. 4W114231 (Oct. 19, 2022) original
2006	China National Intellectual Property Administration, Case No. 4W114231 (Oct. 19, 2022) translation
2007	The People's Republic of China Beijing Intellectual Property Court Administrative Judgment (Oct. 25, 2023) original
2008	The People's Republic of China Beijing Intellectual Property Court Administrative Judgment (Oct. 25, 2023) translation
2009	U.S. Patent Application Publication 2016/0150923 A1 ("Conrad '923")
2010	U.S. Patent No. 8,156,609 ("Milne")
2011	Chinese patent document no. CN101489454A
2012	Chinese patent document no. CN1361673A
2013	China National Intellectual Property Administration, Case No. 4W114082 (Sept. 23, 2022) original
2014	China National Intellectual Property Administration, Case No. 4W114082 (Sept. 23, 2022) translation
2015	U.S. Patent No. 1,871,624 ("the '624 patent")
2018	Deposition Transcript of Joseph Fester (Apr. 26, 2024)
2019	U.S. Patent No. 8,789.235 ("the '235 patent")

Exhibit	Description
2020	https://www.dyson.com/vacuum-cleaners/cordless/v10/shop-all (accessed May 7, 2024)
2021	Dyson's Pricey Cordless Vac is So Good, It's Killing Cords Altogether, Mar. 8, 2018, *available at* https://gizmodo.com/dysons-pricey-cordless-vac-is-so-good-its-killing-cord-1823469578 (accessed May 7, 2024)
2022	Dyson Cyclone V10: Seriously powerful cordless vacuum starts at $500, Mar. 5, 2018, *available at* https://www.cnet.com/reviews/dyson-cyclone-v10-absolute-preview/ (accessed May 7, 2024)
2023	Dyson Cyclone V10 vacuum review: Bigger isn't always better, Mar. 6, 2018, *available at* https://web.archive.org/web/20180306235846/https:/mashable.com/2018/03/06/dyson-cyclone-v10-review/#nWCAg.es4kqi (accessed May 7, 2024)
2024	Dyson to go all cordless with vacuums, starting with the Cyclone V10, Mar. 6, 2018, *available at* https://www.engadget.com/2018-03-06-dyson-cyclone-v10-vacuum-cordless-handheld.html (accessed May 7, 2024)
2025	Dyson is done with corded vacuums as the powerful Cyclone V10 looks to clean up, Mar. 6, 2018, *available at* https://www.techradar.com/news/the-dyson-cyclone-v10-wants-to-clean-up-on-powerful-cordless-vacuums (accessed May 7, 2024)