

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

3M Company, Merck & Co., Inc. and Merck Sharp & Dohme Corp.,
Petitioners

v.

Aptar France S.A.S.,
Patent Owner

Case IPR2018-01055
Patent No. 9,370,631

**DECLARATION OF CHARLES E. CLEMENS IN SUPPORT OF PATENT
OWNER'S PRELIMINARY RESPONSE TO PETITION FOR
INTER PARTES REVIEW OF U.S. PATENT NO. 9,370,631**

I, Charles E. Clemens, declare as follows:

1. I have been asked to evaluate and assess certain information in connection with Aptar's Preliminary Response to 3M Company, Merck & Co., Inc. and Merck Sharp & Dohme Corp.'s (collectively, "Petitioners") petition for *inter partes* review of U.S. Patent No. 9,370,631 ("the Petition"). All of the opinions and conclusions found in this declaration are my own.

Compensation

2. I am being compensated for my work at my normal consulting rate of \$500/hour for time spent in connection with this matter. My compensation is not contingent on the results of my work or on the testimony I provide.

Qualifications and Experience

3. I have over 38 years of experience as an engineer, executive, and consultant in the medical device industry.

4. In 1979, I obtained a Bachelor of Science degree in Mechanical Engineering from San Diego State University.

5. From 1981 to 1995, I worked at IVAC Corporation (now CareFusion, a subsidiary of Becton Dickinson), a company that pioneered intravenous medication delivery systems. During my time at IVAC, I worked in multiple roles, including as a product designer, engineering manager, and technical director for the largest medication delivery system program the company had ever attempted,

which resulted in launching the product in both the US and European markets. My work at IVAC involved design, development, marketing, launch, and manufacturing of numerous drug delivery devices and vital sign monitoring systems. My design and development work at IVAC lead to the filing of five patents on which I was a named inventor. The focus of my work was in both durable and disposable products utilizing small mechanisms, plastic injection molded parts produced in quantities of millions, and precision assembly of parts to achieve high production quality and functional reliability. In 1990, I established and managed training for specialized design tools for Design for Manufacturing and Assembly (DFMA), a design process intended for optimizing assemblies and part count for small plastic devices produced in high quantities.

6. From 1995 to the present, I have been operating a medical device design and development consulting company as the Founder and Principal Consultant. My consulting company focuses on developing innovative medical device products and bringing them to market. During this time I have worked extensively on dozens of medical device designs across many clients in the areas of (a) respiratory care devices such as personal inhalers, (b) liquid medication delivery devices, including intravenous (“IV”) systems and injectors, (c) hemodialysis and other blood handling systems, and (d) in-vitro diagnostic systems.

7. As a consultant, I have performed design, analyses, prototyping, and testing activities of numerous inhalation products. Between 1995 and 1998, I played a significant role in the development of a partial liquid ventilation system for the treatment of Infant and Adult Respiratory Distress Syndrome, including designing and building Clinical Trial systems credited with saving infant lives. Between 1999 and 2000, I developed a patented low cost, injection molded, high performance aerosol generator for use in inhaler products for Aerogen Incorporated. In 2003, I developed aerosol quality testing systems and directed computational fluid dynamic analysis of a small inhaler product indicated for therapeutic inhaled nicotine delivery for InJet Digital Aerosols. Between 2004 and 2012, I assisted several companies in various inhaler product design projects, such as design reviews, risk analyses, and design verification testing. This work was performed for companies such as Dura Pharmaceuticals (2004), KOS Pharmaceuticals BAI (2006), and General Pharm Partners (2012).

8. I am identified as an inventor on 10 issued patents and 6 applications in the field of medical devices, including small mechanisms, plastic injection molding and assembly, patient medication delivery devices, and fluidic control devices.

9. I have worked and am familiar with hundreds of plastic medical device assemblies and mechanisms throughout my career and have significant

experience with medication delivery systems, including MDI-type devices. Further, I have analyzed many injector devices utilizing small plastic dose counting mechanisms.

10. My professional background and technical qualifications are reflected in my *curriculum vitae*, which is attached as Exhibit 2006.

Materials Considered

11. In arriving at the opinions set forth in this declaration, I relied on the following materials:

- a. Petition for *Inter Partes* Review of U.S. Patent No. 8,936,631 and supporting exhibits;
- b. Expert Declaration of S. David Piper and supporting exhibits;
- c. U.S. Patent No. 8,936,631 (the “’631 Patent”) (Petition Ex. 1001);
- d. French Patent Application No. 03/05858;
- e. International Application No. PCT/FR2004/001189;
- f. File History of U.S. Patent No. 8,936,631;
- g. U.S. Patent No. 8,936,177 (the “’177 Patent”);
- h. International Publication No. WO 00/59806 (“Allsop”) (Petition, Ex. 1006);
- i. U.S. Patent No. 6,283,365 (“Bason”) (Petition, Ex. 1007);
- j. European Patent No. EP 0480488 (“Marelli”) (Petition, Ex. 1008);

- k. U.S. Patent No. 3,205,863 (“Rhoades”) (Petition, Ex. 1009);
- l. Stein, S., *Advances in Metered Dose Inhaler Technology: Hardware Development*, 15 AAPS PHARMSCITECH 326, 330 (2014) (Ex. 2008);
- m. Sander, N., et al., *Dose counting and the use of pressurized metered-dose inhalers: running on empty*, 97 ANNALS OF ALLERGY, ASTHMA & IMMUNOLOGY 34 (2006) (Ex. 2009);
- n. Stuart, A., *More Than Just a Dose Counter*, 46 INNOVATIONS IN PHARMACEUTICAL TECHNOLOGY 40 (Ex. 2010);
- o. Henry, A.R., *The Role of Statistical Tolerance Analysis Tools in Dose Counter Optimization*, available at <http://multimedia.3m.com/mws/media/1159495O/statistical-tolerance-analysis-tools-in-dose-counters.pdf> (Ex. 2011).

Analogous Art

12. I have been informed that, in order for a reference to be proper for use in an obviousness challenge under 35 U.S.C. § 103, the reference must be analogous art to the claimed invention. I understand that prior art is analogous when it is (1) from the same field of endeavor or (2) reasonably pertinent to the particular problem the inventor was trying to solve. A reference is reasonably pertinent if it is one which logically would have commended itself to an inventor’s attention in considering his or her problem. To determine if art is analogous, one

should look to the purposes of both the invention and the prior art. If a prior art reference and the claimed invention have a same purpose, the reference relates to the same problem.

13. The stated purpose of the '631 Patent is to “provide a fluid dispenser including a dose indicator device that prevents any risk of under-counting, i.e. that guarantees that the indicator device is actuated each time fluid is dispensed by the fluid dispenser.”

Rhoades Is Not Analogous Art

14. Rhoades discloses a projecting and retracting ball point pen. The mechanism of Rhoades does not include any means for counting. Rhoades's stated purpose is to “provide a ball point writing instrument having an improved push button operated projecting and retracting mechanism.”

15. The protracting and retracting mechanism disclosed in Rhoades is very different from the actuation of a metered dose inhaler (“MDI”). For example, Rhoades teaches a pen tip that projects outside the pen housing upon the user's first press of the push button. The pen tip remains projected outside the pen housing at rest. When the user presses the push button again, the pen tip is retracted inside the pen housing, where it remains at rest. In summary, Rhoades describes a two-press pen mechanism, one to extend the pen tip for writing, and a

second to retract the pen tip for storage. Rhoades does not teach or suggest any need for precision in dispensing the ink.

16. In contrast, the mechanism of actuation of an MDI is precisely designed to deliver a specific amount of medication to a patient's lungs atomized to respirable aerosol from the inside of the inhaler housing. The MDI includes a canister filled with medication and a valve stem for dispensing the medication out of the canister. The valve stem mounts vertically in a nozzle block in the inhaler. The nozzle block is highly engineered to convert pressurized liquid medication inside the canister to droplets when it exits at high speed. The liquid is forced through a nozzle jet, which allows liquid droplets to form and spray outwards to an aerodynamically designed mouthpiece during a patient's inhalation. The size of the droplets formed and the drug percentage in the carrier liquid must be designed to be inhaled by the patient, allowing the patient to receive the proper dosage of medication. *See* Ex. 2008 (Stein, S., *Advances in Metered Dose Inhaler Technology: Hardware Development*, 15 AAPS PHARMSciTECH 326, 330 (Apr. 2014)). When the patient breathes in the droplets through the mouthpiece, they begin to evaporate so they can shrink to a size that is most likely to deposit correctly in the patient's lungs. If this process is not precisely executed, one of two things can happen. First, the droplets may be too small and will be exhaled by the patient. As a second alternative, the droplets may be too large, in which case the

droplets will land somewhere in the patient's mouth and render the medication useless. This design is very complex. Unlike Rhoades, the medication in an MDI must be dispensed from inside the inhaler housing and from a fixed mounting, or the improper droplet composition will render the drug ineffective.

17. For at least these reasons, a person of ordinary skill in the art seeking to design a dose indicator device that prevents any risk of undercounting would not have looked to Rhoades's disclosure of an ink pen.

18. U.S. Patent No. 5,234,970 ("Ambrosio") discloses a dosing device for administering powdered medication. In Ambrosio, the patentee discusses prior art U.K. Patent No. 2,165,159 ("Auvinent"), which discloses that a device for rotating the rod is an indexing mechanism much like that of a ball-point pen. Ambrosio expressly teaches away from the mechanism disclosed in Auvinent. Ambrosio states that "because of the cup-like arrangement of this patent, adhesion can occur along the walls of each depression, *which is disadvantageous from a delivery viewpoint.*" A person of ordinary skill in the art with knowledge of Ambrosio and/or Auvinent would not have been motivated to incorporate a ball-point pen mechanism into a precision dosing device, such as an MDI.

19. U.S. Patent No. 7,090,662 ("Wimpenny") was cited by Petitioners for its discussion of the "ball point pen principle" disclosed in prior art patent DE

3,814,023. Wimpenny states that the ball point pen mechanism “does not address the problem of incorrect dose setting by the user.”

Motivation to Combine

20. I have been informed that to establish obviousness, one must identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. I do not believe that a person of ordinary skill in the art would have been motivated or encouraged to combine Bason with Rhoades or Bason with Allsop at the time of the invention of the '631 Patent.

Modification of Bason in View of Rhoades

21. Petitioners assert that a person of ordinary skill in the art would have been motivated to modify Bason in view of Rhoades. However, Petitioners' description of the modification of Bason in view of Rhoades does not contain adequate description of the design concept that shows the interworkings of the device and how it would function, or that the combination practices the limitations of claims 1-4 of the '631 Patent.

22. Petitioners' description of the Bason and Rhoades combination is contained at pages 53 through 56 of the Petition. It states that the combination is a predictable modification where a person of ordinary skill in the art would have slightly extended Bason's inhaler body, integrating the stationary gear (tooth 2) of

Bason into the inhaler body. Petitioners state that the rest of the components would be connected in the same way they are connected in Bason. Petitioners include no figures describing how the modification would have been constructed. They also do not describe how the teeth 2, which are disclosed as a component of Bason's base 1, would be integrated into the inhaler, where the teeth would be located in relation to the remaining components, or how such a modification might affect the efficacy of the dose counting functionality disclosed in Bason. Petitioners do not assert that any particular components of Rhoades would be incorporated into the modification.

No Motivation to Combine Bason with Rhoades

23. First, a person of ordinary skill in the art would not be motivated to combine Bason and Rhoades because the mechanism disclosed in Rhoades does not provide the precision required for an MDI.

24. For example, an MDI requires precise functionality to ensure that the accurate amount of medication is dispensed in each dose. As described above, for example, the atomization of the medication requires a particular design so as to create droplets that are the correct size. Petitioners fail to explain why a person seeking to improve the accuracy of an MDI would look to non-precision components like those of an ink pen.

25. In addition, a metered dose inhaler must be executed precisely upon every single actuation, and every function of the inhaler must be effectuated in much tighter geometries, usually just a few millimeters. An MDI requires execution of multiple functions within a very small travel distance. For example, the travel distance of actuation of an MDI with a dose indicator device must permit (1) delivery of the dose of medication; (2) refill of the valve's metering chamber; and (3) engagement of an accurate counting mechanism so as to allow the count to progress. See Ex. 2011 (<http://multimedia.3m.com/mws/media/1159495O/statistical-tolerance-analysis-tools-in-dose-counters.pdf>). Each of the above functions must be accomplished when the user presses down on the inhaler and the medication canister moves up and down, typically traveling only a few millimeters in distance.

26. In contrast, the ball-point pen disclosed in Rhoades is not designed to be a precision-engineered plastic device. Indeed, Rhoades discloses a travel distance which is much larger than that of any traditional MDI. The pen disclosed in Rhoades functions simplistically with wide physical tolerances. These design characteristics are consistent with the Petitioners' assertion that an ink pen can be manufactured in higher volumes at a low cost. Additionally, the pen's function—which is to facilitate writing and maintain the ink reservoir in a retracted state when not in use—is not critical and does not require the same kind of precision as

a drug delivery device. Indeed, Rhoades expressly teaches away from use of “close manufacturing tolerances.” Rhoades at 8:6-16.

27. A person of ordinary skill in the art attempting to achieve the mechanism of action of a dose indicator device—including expulsion of the drug, refill of the metering chamber, and completion of the counting—in such a short distance would have known that the mechanism required precision and very small tolerances, smaller than that of an ink pen. Whether or not Rhoades’s cam mechanism is less expensive to manufacture, a person of ordinary skill in the art would understand that it simply was not designed for the accuracy that is required for functionality in an MDI. As the travel distance of the mechanism of a retracting ink pen is substantially longer and less precise, a person of ordinary skill in the art would not have been motivated to combine the MDI disclosed in Bason with the ball-point pen disclosed in Rhoades. Petitioners do not describe how a person of ordinary skill in the art would have achieved the requisite reengineering or why they would have been motivated to do so.

28. In addition, a person of ordinary skill in the art would not have been motivated to modify Bason in view of Rhoades because the proposed modification would be inoperable for its intended purpose. For example, Petitioners state that a person of ordinary skill in the art would have slightly extended the inhaler body and integrated tooth 2 into the inhaler body. Petitioners state that the remainder of

the components would be connected in the same way that they are connected in Bason.” Petitioners provide no further explanation as to how the teeth (2) would be integrated into the inhaler, where the teeth would be located in relation to the remaining components, or how such a modification might affect the efficacy of the dose counting functionality disclosed in Bason.

29. However, if the “tooth 2” is integrated into the inhaler body, then it cannot engage with tooth 7. When the cap is depressed, the teeth 7 do not engage with tooth 2. This is because the teeth 7 are located near the center of the cap inside of ring 4 compared to tooth 2, which is located on the inhaler body near the outer circumference of the device. As a result, teeth 7 cannot engage with tooth 2 in order to rotate the ring 4. If the ring 4 cannot rotate, then the dose numbers will not advance, and the patient will not know how many doses of medication are in the inhaler. Without an indication of the number of doses remaining in the inhaler, Bason is rendered inoperable for its intended purpose of “indicat[ing] the number of times the pressurized canister is depressed to dispense a dose of the drug.”

30. Alternatively, if base (1), itself, is made integrally with inhaler body (A), Petitioners do not explain how cap (14) can be depressed sufficiently to actuate the inhaler. Nor do Petitioners describe how the canister (C) could be placed inside the body (A) if the base (1) is integral to body (A). In other words, if the base and inhaler body are formed as one integral piece, there is no longer any

access to the interior of the inhaler so that the canister of medicine can be placed inside. Thus, Petitioners' alternative modification also renders Bason inoperable for its intended purpose.

31. A person of ordinary skill in the art would not have looked to Rhoades in improving the MDI disclosed in Bason. A person of ordinary skill in the art would have had no reasonable expectation of success in doing so for the reasons described above.

Modification of Bason in View of Allsop

32. Petitioners assert that a person of ordinary skill in the art would have been motivated to modify Bason in view of Allsop. However, Petitioners' description of the modification of Bason in view of Allsop does not contain sufficient description of the design concept that shows the interworkings of the device and how it would function, or that the combination practices the limitations of claims 1-4 of the '631 Patent.

33. Petitioners' description of the Bason and Allsop combination is contained at pages 66 through 68 of the Petition. It states a person of ordinary skill in the art would have modified Bason by moving the Bason dose counter below the Bason canister, where the rotational mechanism is located in Allsop, and integrally molded the teeth 2 into the inhaler housing.

34. Petitioners do not disclose how the components of Bason would be modified as Petitioners describe while maintaining operability of the device as described in Bason. For example, Petitioners have not explained how the dose counting components of Bason can be disengaged from the base 1, moved below the canister, engaged with some stationary component so as to allow the canister to be axially displaceable to such component, and still function in the way described in Bason. Petitioners also do not describe how the valve extending from the canister through the counting mechanism would clear the components of the counting mechanism and still allow the canister to be axially displaceable relative to a stationary component (which must also engage with the counter element) as required by the claims of the '631 Patent. Petitioners also fail to explain how teeth (2) can be integrally formed in the housing if the dose counter is moved to the bottom of the device.

No Motivation to Combine Bason with Allsop

35. Petitioners have failed to explain why a person of ordinary skill in the art would have been motivated to make the asserted modification to Bason and reasonably expect success in doing so. Petitioners assert that “the prior art explained that the fewer components and tolerances that needed to be modulated, the more accurate and reliable a device would be.” However, Bason teaches away from the concept of fewer components, expressly teaching that “[p]referably, the

entire device with the possible exception of spring 3 is made from individual pieces.” Bason at 3:58-60.

36. In addition, Petitioners’ proposed modification to Bason would render it inoperable for its intended purpose. Bason’s display window for viewing the number of doses remaining is on the top of the dose counter. *See* Bason at Abstract (“Within the cap (14) is a pair of independently rotatable rings, each carrying on its upper surface indicia visible through a window (13) in the cap.”). If a person of ordinary skill in the art were to remove the counter from the top of the canister and place it below the canister, the display window would no longer be a portal for viewing the number of remaining doses. It would instead show the top of the canister, and there would be no way to view the remaining doses from the side of the inhaler body. This is because the dose numbers are on the top of the dial and the counting mechanism allows for rotation of each number based on a rotation viewed from the top of the device rather than the side of the device. The counting mechanism would be completely useless for its intended purpose, as the patient could not see the number of doses remaining in the inhaler. Bason at 1:15-20.

Secondary Considerations of Non-Obviousness

37. For nearly fifty years before the invention of the dose indicator device as claimed in the ’631 Patent, there was no method by which a patient could accurately determine how many doses remained in his or her MDI. As a result,

patients were left to guess how many doses were left in their MDIs and had only two practical options: (1) throw away an MDI that still contained medicine or (2) use an MDI that may be empty of medicine and risk not receiving the correct drug dose. Competitors in the industry at the time of the invention of the '631 Patent were aware of this problem, and yet were unable to create a satisfactory solution.

38. Despite the proliferation of inferior MDIs for many years, drug makers (including Petitioners), failed to create an accurate MDI dose counter. Indeed, although the FDA issued draft guidance in 2001, the FDA's final Guidance for Industry was issued in March 2003, two months before Aptar filed its French application disclosing the groundbreaking technology of the '631 Patent. And MDIs had been available for nearly fifty years before the final Guidance was issued. The '631 Patent therefore clearly addressed the long-felt need in the industry for an accurate dose counter that avoided undercounting.

39. In my opinion, a person of ordinary skill in the art would not have combined Bason with Rhoades or Bason with Allsop. And if a person of skill in the art were lead to these combinations, it is only through the benefit of the '631 Patent's teaching and using hindsight to reconstruct such combinations. If the combinations Petitioner suggests were actually obvious to a person of ordinary skill in the art, I believe someone involved in development of MDIs would have

made the combinations in the many years before the invention of the '631 Patent.

No one successfully combined these features until the invention of the '631 Patent.

I declare under penalty of perjury under the laws of the United States of America and the State of California that the foregoing is true and correct.

Dated: August 15, 2018

A handwritten signature in black ink, appearing to read "C. E. Clemens", is written over a horizontal line.

Charles E. Clemens