

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MILLERKNOLL, INC.,
Petitioner,

v.

AARON DEJULE AND SCOTT PADIAC,
Patent Owners.

Patent No. 10,292,498
Filing Date: February 10, 2016
Issue Date: May 21, 2019

Title: APPARATUS WITH WEIGHT RESPONSIVE
CHANGEABLE ADJUSTING CHARACTERISTICS

Inter Partes Review No.: IPR2023-01428

**DECLARATION OF MARCUS C. KOEPKE IN SUPPORT OF PETITION
FOR INTER PARTES REVIEW**

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I, Marcus C. Koepke, declare that I have personal knowledge of the facts set forth in this declaration and, if called to testify as a witness, could and would do so competently.

I. INTRODUCTION

1. I, Marcus C. Koepke, have been retained by Banner & Witcoff, Ltd. (“Banner”) on behalf of MillerKnoll, Inc. (“MillerKnoll”) for the above-referenced *inter partes* review proceeding.

2. I reside in Marco Island, Florida.

3. I have been asked to provide a declaration regarding furniture, weight-responsive tilting control assemblies for chairs, and related technologies as well as the relevant industry and level of skill in the art. I have also been asked to render opinions regarding certain matters pertaining to U.S. Patent No. 10,292,498 (Ex. 1101, the “DeJule ’498 Patent”) and the unpatentability grounds set forth in the Petition for this proceeding.

4. I have not previously provided testimony as an expert witness in a legal proceeding, but I am being compensated at my usual consulting rate of \$400 per hour for my work on this matter. My compensation is in no way dependent upon my opinions or testimony, the outcome of this proceeding, or any issues involved in or related to this proceeding.

II. PROFESSIONAL BACKGROUND AND QUALIFICATIONS

5. A description of my professional background and qualifications is provided below. An additional account of my work experience and qualifications is included in my Curriculum Vitae, which is attached as Exhibit 1109 to the Petition.

6. I believe that my extensive industry experience (including experience with designing and developing multiple lines of office seating products) and educational background qualify me as an expert in the relevant field. I am knowledgeable of the relevant skill set that would have been possessed by a hypothetical person of ordinary skill in the art at the time of the invention of the DeJule '498 Patent, which I understand is February 11, 2015 for purposes of this proceeding.

A. Education

7. I obtained a Bachelor of Science degree in Design from the University of Cincinnati College of Design, Architecture, Art and Planning.

B. Professional Experience

8. I am an independent furniture designer that consults with individuals and small businesses in a variety of industries. Prior to this, I worked as a contract designer in the Contract Commercial Furniture Industry from 1989-2016. There, I designed furniture intended for commercial (rather than residential) use. Such commercial furniture must be manufactured to meet established industry standards and is subjected to stringent testing and certification processes.

9. As a contract designer, I developed innovative seating lines for several Contract Furniture Manufacturers, including Allsteel, Kimball International, HON, Gunlocke, and National Office Furniture. In all, I created approximately twenty-two lines of seating in the Contract Furniture Industry, including ergonomic task chairs and guest chairs. Five of the twenty-two chair lines I developed include weight-sensitive task and ergonomic chairs. These include mechanisms and apparatuses that are in the same realm as those disclosed in the DeJule '498 Patent and in the prior art references I discuss below.

10. As one example, I designed the Relate line of seating for Allsteel. *See* <https://www.allsteeloffice.com/products/seating/relate>. The Relate chair includes a weight-sensing synchronized tilt mechanism, and was protected by U.S. patents, including U.S. Patent No. 7,837,265. I include an image of a Relate chair from Allsteel's website below.



11. During this time, I also served as an adjunct professor in Purdue University's Department of Industrial Design. There, I taught an accredited furniture design class annually from around 2002-2014.

12. Before I became a contract furniture designer, I worked at Digital Equipment Corporation ("DEC") from 1974-1989. I started as an Associate Designer and ended my career at DEC as a Design Consultant, the top position in the Design Department. I was responsible for the configuration of the internal components, ergonomics, enclosure, and aesthetic of DEC's Workstation, Monitors, and Keyboards. I worked closely with Ken Olsen, then President of DEC, and his team of planners to help them visualize how the next generation of product might look, feel and cost.

C. Patents & Publications

13. I am a named inventor on over 25 issued utility patents, including several that relate to the weight-sensitive task chairs I referenced above, and over 50 issued design patents. Thus, I am generally familiar with the prosecution of patent applications before the United States Patent & Trademark Office (“USPTO”) and have a general understanding of the novelty and non-obviousness requirements for patentability.

14. I have not authored any publications in the previous ten years.

III. MATERIALS CONSIDERED

15. In forming my opinions, I reviewed and considered the DeJule ’498 Patent (Ex. 1101), as to which I am offering my opinion regarding the validity of certain claims. I have also reviewed and considered the file history of the DeJule ’498 Patent (Ex. 1102), and at least the following references relied on in the Petition:

- U.S. Patent No. 5,080,318 to Takamatsu et al. (Ex. 1103, “Takamatsu ’318”)
- U.S. Patent No. 5,348,372 to Takamatsu et al. (Ex. 1104, “Takamatsu ’372”)

16. In addition, I have reviewed and considered U.S. Patent Application Publication No. 2009/0261637 to Schmitz et al. (Ex. 1105, “Schmitz ’637”); U.S. Patent Application Publication No. 2012/0038195 to Lee (Ex. 1106, “Lee”); and the international publication of Lee, No. WO 2010/120139 (Ex. 1107, “Lee PCT”).

17. In addition to these materials, I may consider additional documents and information in forming any supplemental opinions. To the extent I am provided additional documents or information, including any expert declarations in this proceeding, I may offer further opinions.

IV. APPLICABLE LEGAL STANDARD AND PRINCIPLES

18. I understand that my assessment of the patentability of the claims of the DeJule '498 Patent must be undertaken from the perspective of what would have been known or understood by a person having ordinary skill in the art (a "PHOSITA") upon reading the DeJule '498 patent as of its relevant priority date, and in light of the specification and file history of the DeJule '498 patent. Although I am not an attorney, I have a general understanding of the applicable legal standards pertaining to the patentability issues presented in this proceeding.

19. I understand that, in an *inter partes* review, Petitioner has the burden of proving that each challenged claim is unpatentable by a preponderance of the evidence. I understand this means Petitioner must show it is more likely than not that each challenged claim is unpatentable.

20. I also understand that to be valid, a patent claim must be "novel," and is invalid if "anticipated" by a single prior art reference. I further understand that a reference anticipates if it discloses each and every element as arranged in the claim, so as to enable a PHOSITA to make and use the claimed invention without undue

experimentation. I further understand that a prior art reference can anticipate a claim even if it does not literally disclose all the limitations as arranged or combined in the claim if a PHOSITA, reading the reference, would at once envisage, or immediately envision, the claimed arrangement or combination.

21. I also understand that a prior art reference discloses a means-plus-function claim limitation if the relevant structure disclosed in the prior art reference performs the identical function recited in the means-plus-function limitation, and that structure disclosed in the reference is identical or equivalent to corresponding structure found in the DeJule '498 Patent. I understand that the test for determining the "equivalents" of relevant structures of a means-plus-function limitation is whether the differences between the prior art structure and any disclosed in the DeJule '498 Patent are insubstantial. Put another way, I understand a structure is equivalent if it provides the same function in substantially the same way to provide substantially the same result. I also understand that the equivalent of a means-plus-function limitation must have been available at the time of the issuance of the DeJule '498 Patent claims.

22. I understand that a patent claim is unpatentable if, at the time of the invention, it would have been obvious to one of ordinary skill in the art to combine or modify the teachings of the prior art to yield the patent claim. It is my understanding that this determination is made after weighing the following factors:

(1) the level of ordinary skill in the pertinent art; (2) the scope and content of the prior art; (3) the differences between the prior art as a whole and the claim at issue; and, if present, (4) secondary considerations of non-obviousness.

23. I also understand that a showing of obviousness based on a combination of references requires some articulated reasoning with a rational underpinning to support the combination of references. I also understand that in consideration of the issue of obviousness it is important to identify whether a reason existed at the time of the invention that would have led a PHOSITA to combine elements of the references in a way that yields the claimed invention.

24. It is my understanding that the prior art and claimed invention should be viewed through the knowledge and understanding of a person of ordinary skill in the art at the time of the claimed invention—one should not use hindsight in deciding whether a claim is obvious. I further understand that a person of ordinary skill in the art is presumed to have knowledge of the relevant prior art at the time of the claimed invention, which comprises any prior art that was reasonably pertinent to the particular problems the inventor faced.

25. It is my understanding that an obviousness evaluation can be made on a single reference or a combination of multiple prior art references. I further understand that a proper obviousness analysis focuses on what was known or obvious to a person of ordinary skill in the art, not just the patentee.

26. It is my understanding that a particular claimed combination may be proven obvious by showing that it would have been obvious to try the combination. For example, common sense may be a good reason for a person of ordinary skill to pursue known options in the art.

27. It is my understanding that at least the following rationales may support a finding of obviousness: (1) combining prior art elements according to known methods to yield predictable results; (2) simple substitution of one known element for another to obtain predictable results; (3) use of a known technique to improve similar devices in the same way; (4) applying a known technique to a known device ready for improvement to yield predictable results; (5) “obvious to try”—choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; (6) a predictable variation of work in the same or a different field of endeavor if a person of ordinary skill would be able to implement the variation; (7) there existed a known problem for which there was an obvious solution encompassed by the patent’s claims at the time of the claimed invention; (8) known work in one field may prompt variations for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art; or (9) some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify a prior art reference or to combine prior art reference teachings to arrive at the claimed

invention. While I focus on certain, particular rationales below, I note that my opinions from the application of these particular rationales are applicable to other rationales noted above.

V. THE RELEVANT ART AND LEVEL OF ORDINARY SKILL IN THE RELEVANT ART

28. The DeJule '498 Patent relates generally to the field of seating mechanisms, and more particularly, to mechanisms that adjust the resistance provided by a chair to the tilting of the chair's backrest. The DeJule '498 Patent discloses a mechanism that purports to automatically adjust the force required to tilt a chair's backrest based on the weight of a user, incident to the user sitting in the chair's seat.

29. A person having ordinary skill in the art (a "PHOSITA") of the DeJule '498 Patent at the time of the alleged invention of the DeJule '498 Patent, and for at least several years before this time, would have a bachelor's degree in industrial design, mechanical engineering, or a similar discipline, and at least 2-3 years of experience with furniture design. I worked in the relevant field with such persons at, and leading up to, the time of the alleged invention of the DeJule '498 Patent. Thus, I had at least such ordinary skill at the time of the invention and am familiar with the knowledge that such persons had at the time (*i.e.*, February 11, 2015).

30. All of my statements in this declaration regarding what a person of ordinary skill in the art would have known, understood, appreciated, been motivated to do, etc. refer to a PHOSITA on or before February 11, 2015.

VI. THE DEJULE '498 PATENT

A. Prosecution History

31. The DeJule '498 Patent resulted from U.S. Patent App. No. 15/040,735, filed on February 10, 2016 (the "'735 Application"), and also claims priority to U.S. Provisional App. No. 62/114,706, filed on February 11, 2015 (the "Provisional"). Ex. 1101, p. 1.

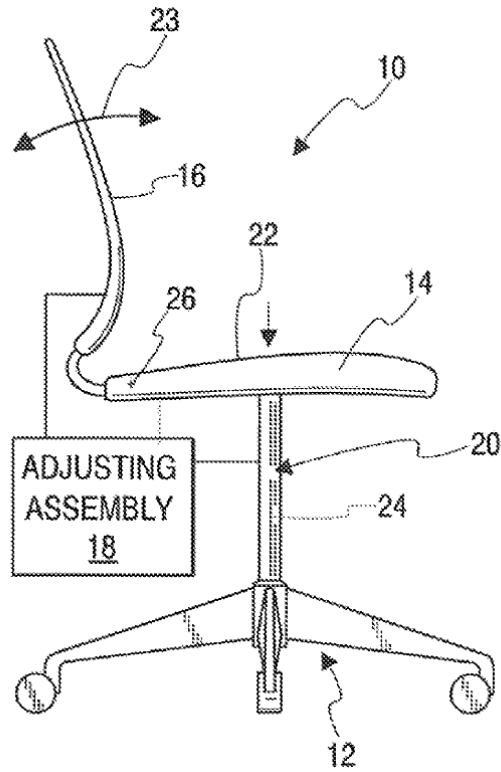
32. During prosecution of the '735 Application, the claims were rejected as anticipated by or obvious in view of Schmitz '637. Ex. 1102, 84-87. In response, the applicants amended independent claim 1 to require that the claimed "adjusting assembly" be "configured so that as an incident of the force being applied in the first manner changing in magnitude, the force being applied in the second manner required to reconfigure the apparatus and move the second component relative to the first component changes in magnitude." *Id.*, 104. In other words, as applied to the context of a chair, the claim was amended to require that the adjusting assembly change the amount of force required to tilt a "second component" (e.g., the backrest) relative to a "first component" (e.g., the seat) in response to the weight of a user sitting on the seat—as opposed to just relative to the chair's frame. The applicants

argued this limitation distinguished Schmitz '637 because, according to the applicants, the backrest of Schmitz '637 “pivot[s]...as a unit” with its seat as opposed to independently of its seat. *Id.*, 112. The '735 Application was allowed without further rejection, and the DeJule '498 Patent issued on May 21, 2019. Ex. 1101, p.1.

33. Additional prior art references anticipate claim 1 and the dependent claims of the DeJule '498 Patent. Unlike Schmitz '637, the other prior art references discussed in Section VII below, including Takamatsu '318 and Takamatsu '372, were never cited or otherwise made of record during prosecution of the application that issued as the DeJule '498 Patent. Ex. 1101, pp. 1-2.

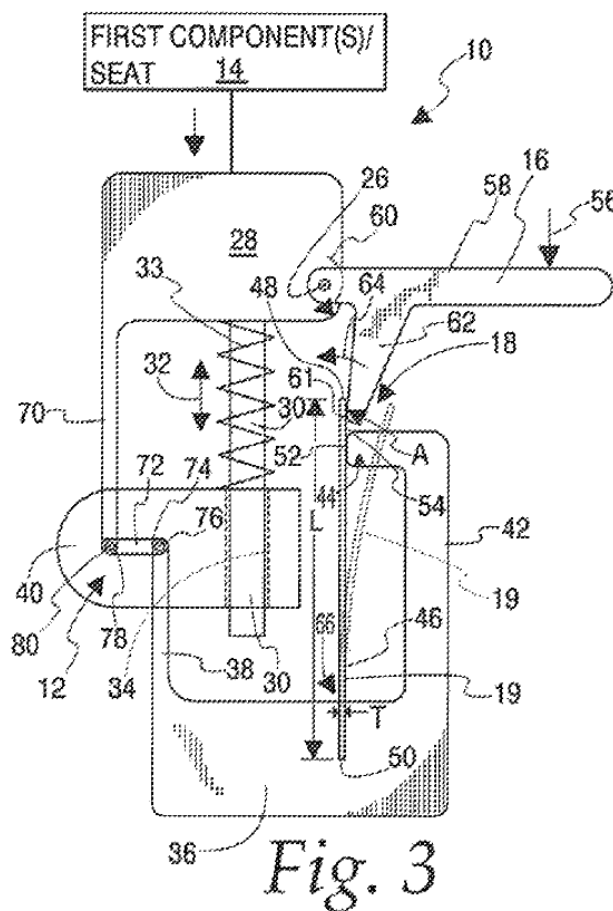
B. Brief Description of the Alleged Invention

34. The DeJule '498 Patent is titled “Apparatus with Weight Responsive Changeable Adjusting Characteristics.” Ex. 1101, p. 1. Referring to Fig. 2 of the DeJule '498 Patent, a chair 10 incorporating an adjusting assembly 18 is disclosed. *Id.*, Fig. 2.



Ex. 1101, Fig. 2

35. Referring to Fig. 3 of the DeJule '498 Patent, an exemplary embodiment of the adjusting assembly 18 is shown. Ex. 1101, Fig. 3. A seat 14 is mounted on a support 28 that has depending post 30 extending below it. *Id.*, 6:7-9. Depending post 30 is received in a guide channel 34 in frame component 12. *Id.*, 6:8-10. A coil spring 33 biases the support 28 upwardly. *Id.*, 6:11-13.



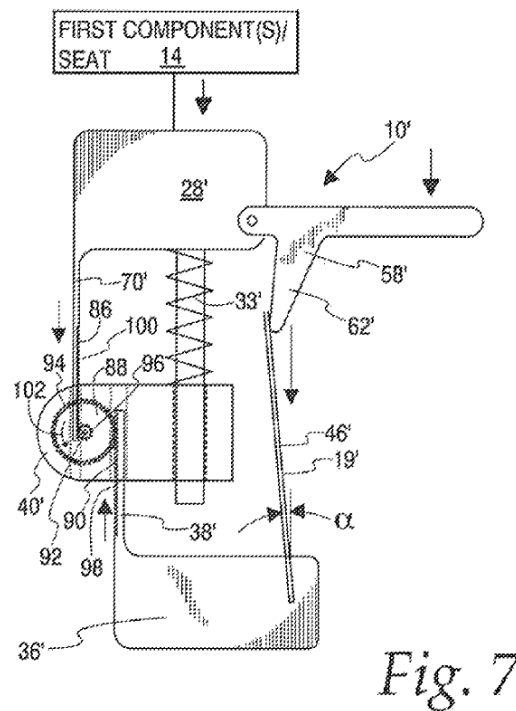
Ex. 1101, Fig. 3

36. Also mounted on support 28 is backrest component 58, which pivots about axis 26 in response to a user leaning his or her back against backrest 16. Ex. 1101, 6:36-43.

37. The assembly also includes a “U-shaped member 36,” which has one leg 38 mounted on frame 12 and another leg 42. Ex. 1101, 6:14-16. A leaf spring 19 is anchored in U-shaped member 36 and extends upwardly therefrom. Ex. 1101, 6:26-27. An edge 61 of backrest component 58 bears against leaf spring 19, and leaf spring 19 resists rotation, or tilting, of backrest component 58. Ex. 1101, 6:44-53.

38. When a user sits on seat 14, coil spring 33 compresses by an amount proportional to the weight of the user, and seat 14 and support 28 move downwardly relative to frame 12 and U-shaped member 36. Ex. 1101, 6:62-65. As a result, the location at which edge 61 of backrest component 58 bears against leaf spring 19 also moves down relative to leaf spring 19. *Id.*, 6:65-67. This, in turn, shortens the effective length of leaf spring 19, whereby a greater amount of force is required to pivot backrest component 58 about axis 26—or, in other words to tilt backrest 16. *Id.*, 6:67-7:7.

39. Referring to Figure 7 of the DeJule '498 patent, a modified form of the adjusting assembly 18' is shown. Ex. 1101, Fig. 7.



Ex. 1101, Fig. 7

40. In this embodiment, gears, or “cooperating toothed elements,” 86, 96, 94, and 90 interact such that the lowering of the seat 14 and support 28’ also results in an upward movement of member 36’ and leaf spring 19’. Ex. 1101, 7:66-8:11. In particular, rack gear 86 extends downwardly from support 28’ and drives a small pinion gear 96. *Id.* Small pinion gear 96 turns with a larger pinion gear 94, which drives rack gear 90—and thus member 36’ and leaf spring 19’—upward. *Id.*

41. In this way, the effective length of leaf spring 19’ is shortened not just by the distance seat 14 travels down in response to a user sitting, but also by the distance member 36’ moves up in response to movement of seat 14 (as a result of the interaction of the gears).

C. Priority Dates

42. I understand that for claims of a non-provisional utility application to be afforded the priority date of an earlier-filed provisional application, the written description of the provisional application must adequately support the later-filed claims of the non-provisional application. It is my further understanding that to satisfy the written description requirement, a provisional application must describe an invention in sufficient detail that one skilled in the art can clearly conclude that the inventor invented the claimed invention as of the provisional filing date.

43. As discussed in more detail below, it is my opinion that claims 1-10, 14-15, and 18-22 of the DeJule ’498 Patent are anticipated by either Takamatsu ’318

or Takamatsu '372, and that claim 18 is rendered obvious by Takamatsu '318 in view of Takamatsu '372. Takamatsu '318 issued January 14, 1992, Ex. 1103, p. 1, and Takamatsu '372 issued September 20, 1994, Ex. 1104, p. 1. These dates both pre-date the February 11, 2015 filing date of the Provisional. Thus, I understand Takamatsu '318 and Takamatsu '372 are prior art to the claims of the DeJule '498 Patent regardless of whether those claims are entitled to claim priority to the filing date of the Provisional.

D. Claim Construction

44. I understand that my analyses require an understanding of the scope of the claims of the DeJule '498 Patent. I have been informed that in this proceeding, before the Patent Trial and Appeal Board of the U.S. Patent and Trademark Office, claim terms are construed using the same claim construction standard that would be used to construe claims in a civil action, including construing claim terms in accordance with their ordinary and customary meaning, as understood by one of ordinary skill in the art in the context of the specification and the prosecution history pertaining to the patent. I further understand that constructions may also reflect widely accepted meanings of commonly understood words, the content of the patent specification, and extrinsic evidence such as dictionaries and expert evidence. I further understand that express definitions of terms by the inventor should govern the construction of the claim. I have followed these claim construction principles in

forming my opinions. In addition, I have considered and agree with MillerKnoll's proposed claim constructions set forth in its Petition. I reserve my right to amend or alter my analysis and opinions in view of the Patent Owner's proposed claim constructions, if any, or the claim constructions adopted by the Board.

45. Therefore, in my analyses given below I have assumed that all claim terms are construed in accordance with their ordinary and customary meaning as would have been understood by a PHOSITA as of the priority date, in view of the prosecution history and the specification, as discussed herein, with two exceptions.

46. Regarding those exceptions, two claim terms, "adjusting assembly," and "on the frame," all appearing in DeJule '498 Patent claim 1, do not have ordinary and customary meanings. Accordingly, I address the proper construction of these two terms in turn below.

1. "adjusting assembly"

47. It is my opinion that "adjusting assembly" is not a generally recognized term of art in the field of the DeJule '498 Patent at the time of the alleged invention thereof, or at any time for that matter. Rather, as discussed below, in my opinion, "adjusting assembly" should be construed as a so-called "means-plus-function" claim term.

48. I understand that a claim term may be phrased as a "means" for performing a specified function without reciting structure to perform the function. I

understand that such claim terms are referred to as “means-plus-function” (or “MPF”) claim terms.

49. I further understand that such a claim term shall be construed to cover the structure(s) described in the specification corresponding to the specified function, and equivalents thereof. In other words, I understand that when claim terms are considered as means-plus-function limitations, there is a two-step analysis to construe that claim term: (1) identify the function of the MPF limitation, and (2) identify the corresponding structure in the DeJule ’498 Patent that performs the function. As for identifying the corresponding structure that performs the claimed function, I understand it is limited to the structure or structures necessary to perform the claimed function and does not include structures that merely enable the claimed function.

50. I further understand that if claim terms do not use the word “means,” then they are presumed to not be MPF terms. However, I understand that claim terms may nonetheless be construed as MPF terms even if they do not use the word “means.” I understand the test to determine whether a claim term that does not use the word “means” is an MPF term is whether the claim recites a function but does not recite definite structure for providing the claimed function.

51. In my opinion, “adjusting assembly” is properly construed as a means-plus-function claim element. Claim 1 of the DeJule ’498 Patent recites an “adjusting

assembly cooperating between the first component and the at least second component and configured so that as an incident of the force being applied in the first manner changing in magnitude, the force required to be applied in the second manner to reconfigure the apparatus and move the second component relative to the first component changes in magnitude.” Ex. 1101, 12:34-40. In other words, the claim recites an element, “adjusting assembly,” that provides a function: configured so that as an incident of the force being applied in the first manner changing in magnitude, the force required to be applied in the second manner to reconfigure the apparatus and move the second component relative to the first component changes in magnitude. However, in my opinion, Claim 1 does not recite definite structure for providing this function.

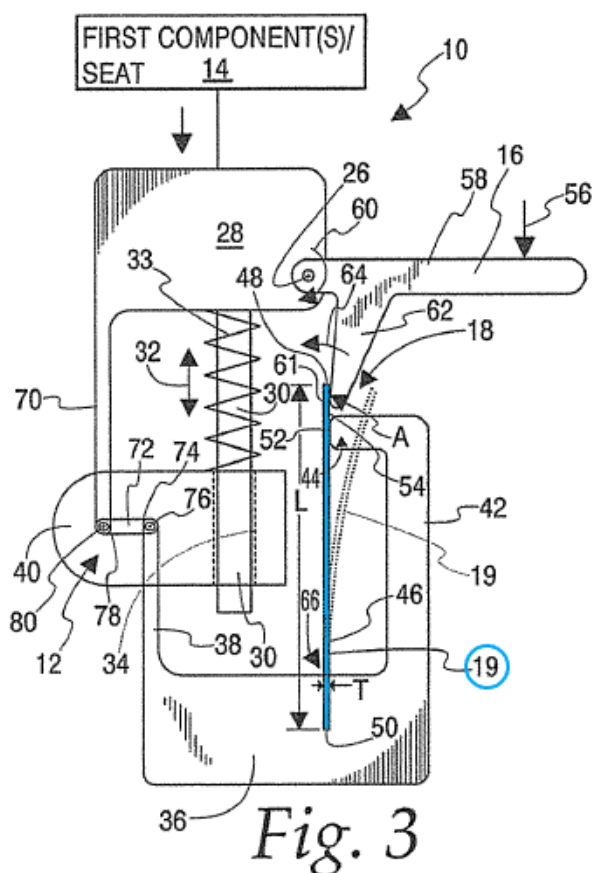
52. As a preliminary matter, a PHOSITA would not understand “adjusting assembly” to refer to definite structure in the art of the DeJule ’498 Patent, including at the time of the alleged inventions thereof. Rather, the phrase “adjusting assembly” could be used to refer to a virtually unlimited number of possible structures that could be incorporated in a seating mechanism to provide some type of adjustability.

53. Nor, in my opinion, does the specification of the DeJule ’498 Patent define “adjusting assembly” as referring to any definite structure. Rather, the DeJule ’498 Patent describes example embodiments of the claimed “adjusting assembly” that are schematic, representative, and only exemplary. For instance, the DeJule ’498

Patent explains that “FIGS. 7-16 are partially schematic representations of apparatus incorporating different forms of adjusting assemblies, according to the invention.” Ex. 1101, 4:28-30. And before describing these examples, the DeJule ’498 Patent states that “[e]xemplary specific forms of the adjusting assembly 18 will now be described...[t]hese specific forms are exemplary in nature only.” Ex. 1101, 5:63-67.

54. Nor, in my opinion, does claim 1 recite any other structure sufficient for performing the claimed function, as proven by the patent specification. At least two additional structures are necessary to provide this function: structures that I will refer to as (A) a tilting spring and (B) a weighing spring.

55. As discussed above in Section VI.B, the mechanisms disclosed in the DeJule ’498 Patent purport to vary the amount of force required to tilt a backrest in response to a user sitting in a chair by shortening the effective length of a leaf spring that supports the backrest. Thus, at the very least, the “adjusting assembly” must include the spring that variably resists tilting of the backrest—i.e., the tilting spring. In Figure 3 of the DeJule ’498 Patent, the tilting spring takes the form of leaf spring 19, annotated in blue below. Ex. 1101, Fig. 3.

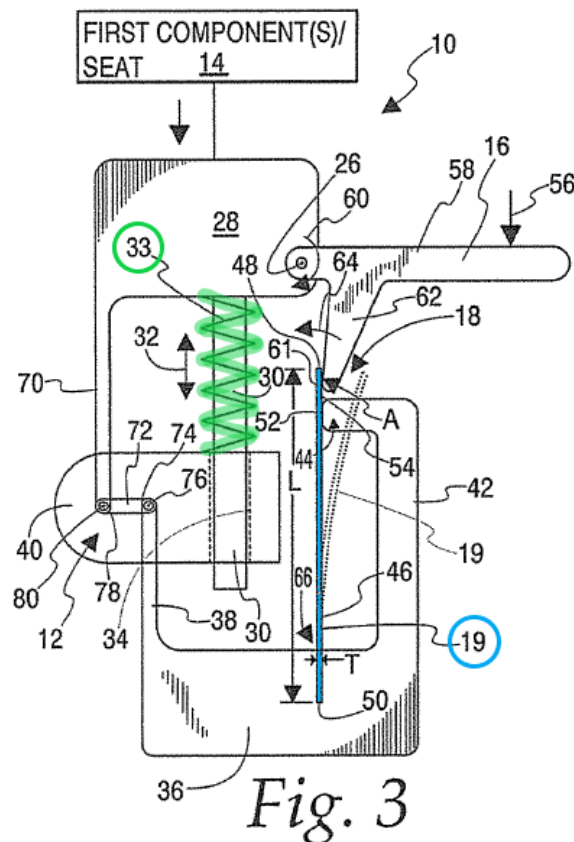


Ex. 1101, Fig. 3 (annotated)

56. The DeJule '498 Patent also discloses alternative structures for providing the tilting spring function, including the use of multiple leaf springs (Figs. 10, 12), coil springs (Figs. 14, 15), a torsion component (Fig. 16), and leaf springs with supported ends (Fig. 17).

57. In addition, the “adjusting assembly” must be able to shorten the effective length of the tilting spring in response to the weight of a user. To do so, as discussed above (§38), the DeJule '498 Patent discloses the use of a coil spring 33 that compresses in proportion to the weight of the user—i.e., the weighing spring.

Ex. 1101, 6:62-6:65. Thus, as discussed above (§38), when the user sits on the seat, the seat—along with the point on leaf spring 19 against which the backrest bears—move down against the force of the coil spring 33, thereby shortening the effective length of leaf spring 19. Ex. 1101, 6:62-7:7. I have colored the coil spring 33 in green below, in addition to the leaf spring 19, which is colored in blue. Ex. 1101, Fig. 3.



Ex. 1101, Fig. 3 (annotated)

58. As shown in the Figures of the DeJule '498 Patent, the only structure disclosed for providing the weighing spring function is a coil spring. Ex. 1101, Figs. 3, 7-10, 13-15.

59. In my opinion, the claimed “adjusting assembly” could not provide the claimed functionality without at least these two structures. And because these structures are not both recited in claim 1 of the DeJule ’498 Patent, or in any of the other claims, it is my opinion that “adjusting assembly” is properly construed as an MPF claim term, even though it does not use the word “means.”

60. As for the correct construction of “adjusting assembly,” in my opinion, the function is that which is recited in the claim itself: “configured so that as an incident of the force being applied in the first manner changing in magnitude, the force required to be applied in the second manner to reconfigure the apparatus and move the second component relative to the first component changes in magnitude.”

61. As for the corresponding structure, my analysis is very similar to my analysis of whether “adjusting assembly” should be construed as an MPF term. In particular, as I discussed above, the specification recites the structures that, at minimum, provide the claimed functionality, namely, coil spring 33 (i.e., the weighing spring) and leaf spring 19 (i.e., the tilting spring). While there are other structures disclosed in the claims and specification of the DeJule ’498 Patent that enable or facilitate the claimed function, such as link 72, none of these additional structures are strictly necessary for the claimed functionality.

62. In sum, in my opinion, “adjusting assembly” is properly construed as an MPF claim term. The function of “adjusting assembly” is “configured so that as

an incident of the force being applied in the first manner changing in magnitude, the force required to be applied in the second manner to reconfigure the apparatus and move the second component relative to the first component changes in magnitude.” And the corresponding structures in the DeJule ’498 Patent for performing that function are coil spring 33 and leaf spring 19.

2. “on the frame”

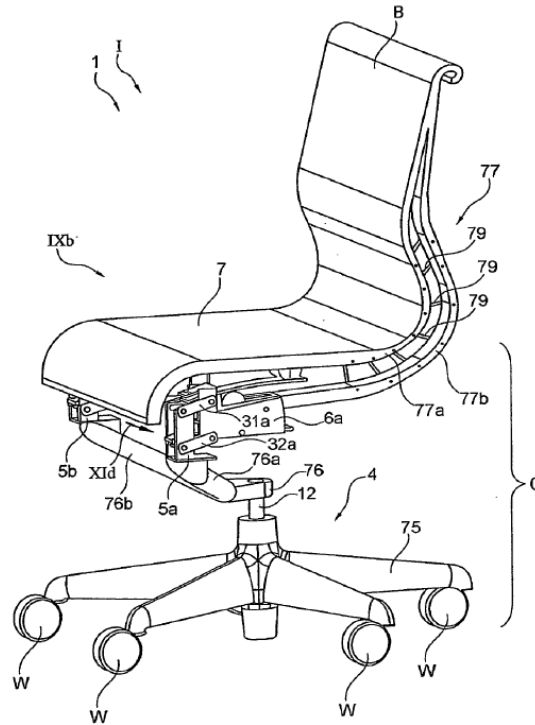
63. It is my opinion that “on the frame” as used in DeJule ’498 Patent claim 1 should be construed as “supported directly or indirectly by the frame.” This construction is consistent with the DeJule ’498 Patent, which makes clear that “on” is not limited to direct touching.

64. Claim 1 recites “on the frame” in connection with two elements: a “first component on the frame” and a “second component on the frame.” Ex. 1101, 12:25-28. I understand that a claim construction that excludes all embodiments disclosed in a patent’s specification is generally incorrect. In my opinion, the DeJule ’498 Patent does not disclose an embodiment in which either a “first component” or a “second component” is directly touching a “frame.”

65. The DeJule ’498 Patent explains that, “[i]n one form...[t]he at least first component is in the form of a seat,” and that “[in] one form, the at least second component is in the form of a back rest.” Ex. 1101, 2:64-3:2. However, the DeJule ’498 Patent does not disclose an embodiment in which either a seat (or any other

first component) or a backrest (or any other second component) is directly touching a frame. Rather, there are always intervening components that come between the first component and the frame and the second component and the frame. For instance, in Figure 3, support 28 comes between first component/seat 14 and frame 12, and between second component/backrest 16 and frame 12. Ex. 1101, Fig. 3; see *id.* Figs. 4-17.

66. In addition, as discussed in Section VI.A above, the examiner of the '735 Application, which issued as the DeJule '498 Patent, rejected claim 1 of the '735 Application as anticipated by Schmitz '637 even though the "first component" and "second component" thereof do not directly touch the "frame" thereof. Ex. 1102, 84-86. In particular, in connection with Schmitz '637 Fig. 7a, the examiner found that reference numeral "4" is the frame, reference numeral "7" is the first component, and reference numeral "B" is the second component. Ex. 1102, 86. As shown below, these components are not directly touching the frame; they are merely supported by indirect connections to the frame. Ex. 1105, Fig. 7a.



Ex. 1105, Fig. 7a

67. In response, the applicants did not dispute this interpretation of “on the frame”; instead they attempted to distinguish Schmitz ’637 on other grounds. Ex. 1102, 110-113. This further supports my opinion that, in the context of the DeJule ’498 Patent, a PHOSITA would understand “on the frame” to mean “supported directly or indirectly by the frame.”

VII. SUMMARY OF OPINIONS WITH RESPECT TO THE DEJULE ’498 PATENT

68. I understand that the Petitioner is requesting *inter partes* review (“IPR”) of claims 1-10, 14-15, and 18-22 of the DeJule ’498 Patent under the grounds set forth in the table below, based on the listed references.

Ground	DeJule '498 Patent Claims	Basis for Invalidity
I	1-10, 14-15, 19-22	Anticipated by Takamatsu '318
II	18	Anticipated by Takamatsu '372
III	18	Obvious over Takamatsu '318 in view of Takamatsu '372

69. As discussed above, I understand Takamatsu '318 and Takamatsu '372 are prior art to all claims of the DeJule '498 Patent because they were published before the earliest possible filing date to which the DeJule '498 Patent claims priority (February 11, 2015).

70. The claim listing appendix to the Petition includes identifiers (*e.g.*, “[1.a],” “[1.b],” etc.) for the elements of the independent claim. Claim language discussed below is typically indicated in italics.

71. As set forth in further detail below, it is my opinion that the claims of the DeJule '498 Patent are invalid under the grounds listed above. I reserve the right to supplement my opinions in the future to respond to any arguments that Patent Owner or its expert(s) may raise and to take into account new information as it becomes available to me.

VIII. TAKAMATSU '318 ANTICIPATES CLAIMS 1-10, 14-15, AND 19-22

72. For reasons that I will address in more detail below, it is my opinion that Takamatsu '318 anticipates claims 1-10, 14-15, and 19-22.

A. INDEPENDENT CLAIM 1

- 1. [1] A reconfigurable apparatus for supporting at least part of a user's weight with the user in an operative position with respect to the reconfigurable apparatus, the reconfigurable apparatus comprising:**

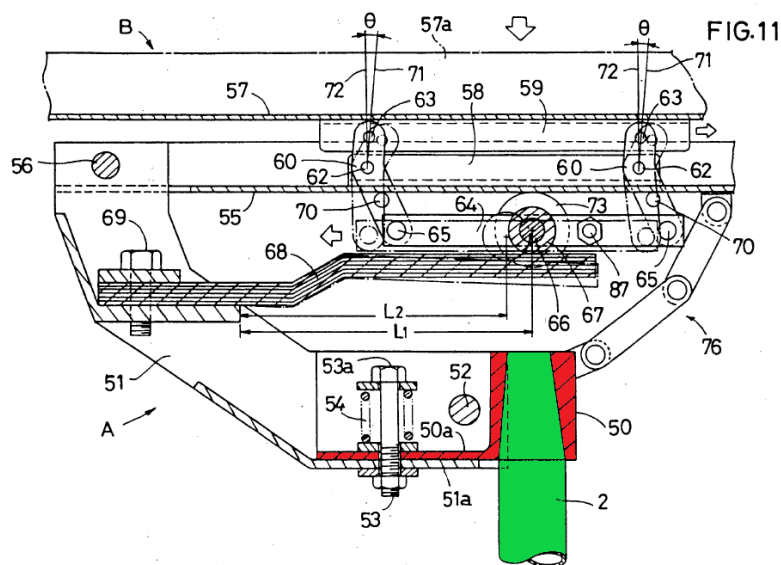
73. In my opinion, Takamatsu '318 discloses a reconfigurable apparatus for supporting at least part of a user's weight with the user in an operative position with respect to the reconfigurable apparatus.

74. Takamatsu '318 discloses that the "invention relates generally to chairs," Ex. 1103, 1:6, and, more particularly, to "chairs of the type wherein the chair seat and/or the chair back are designed to be tiltable at least rearward," *id.*, 1:7-9. In other words, Takamatsu '318 discloses a chair, which is an apparatus for supporting at least part of a user's weight with the user in an operative position, that can be reconfigured, including by tilting the chair.

2. [1.a] a frame,

75. In my opinion, Takamatsu '318 discloses a frame.

76. Takamatsu '318 discloses an embodiment of the reconfigurable apparatus that "comprises a support mechanism A and a seat B." Ex. 1103, 7:47-49. Takamatsu '318 further discloses that the "support mechanism A" includes a "fixed frame 50" that is "secured to the upper end of a chair leg post 2." Ex. 1103, 7:48-51. Further, the "support mechanism A" includes a "pivotal frame 51" that "extend[s]



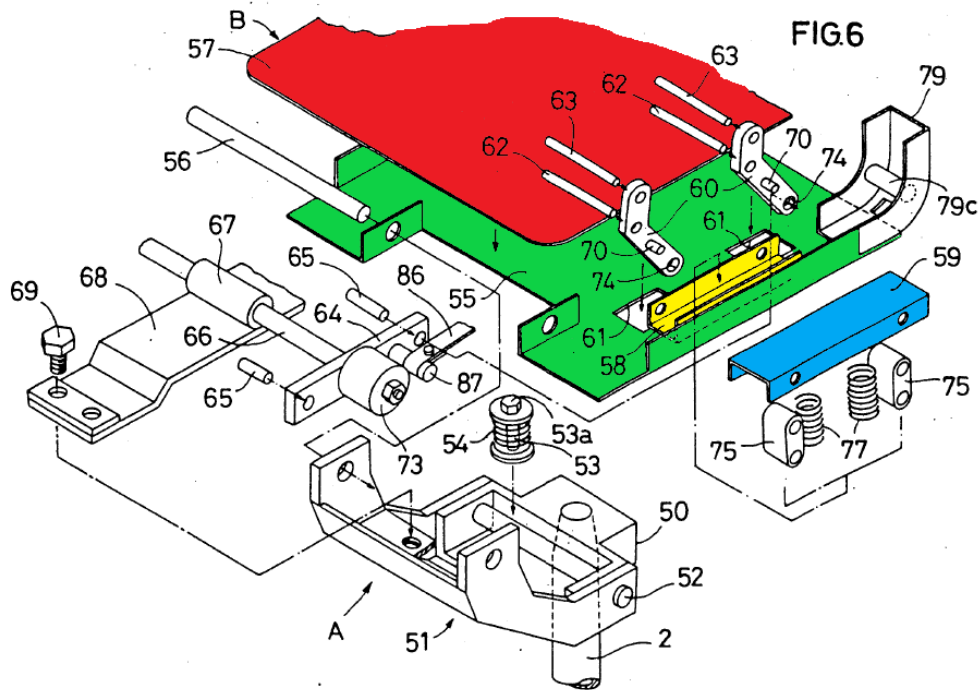
Ex. 1103, Fig. 11 (annotated)

- 3. [1.b] a first component on the frame upon which a force is applied by a user in a first manner as an incident of the user assuming the operative position,**

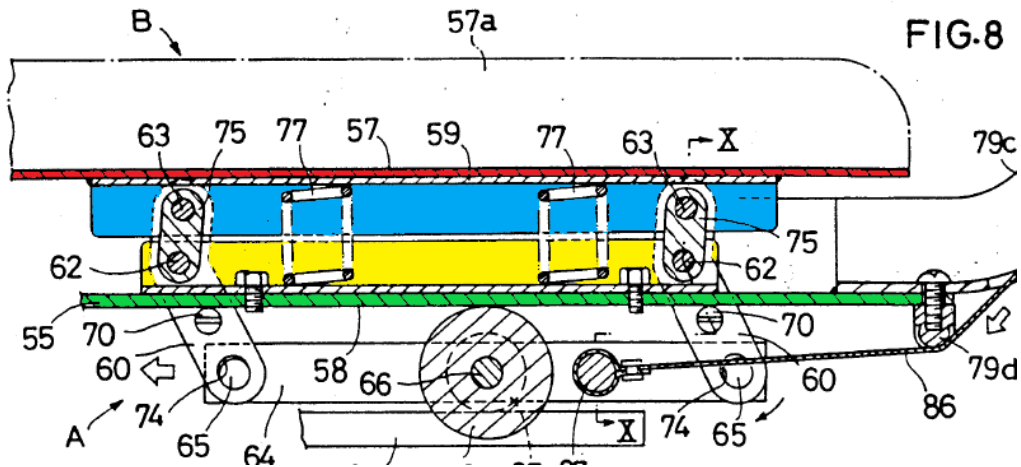
78. In my opinion, Takamatsu '318 discloses a first component on the frame upon which a force is applied by a user in a first manner as an incident of the user assuming the operative position. As discussed above in Section VI.D.2, it is my opinion that a PHOSITA would understand “a first component on the frame” to mean “a first component supported directly or indirectly by the frame.”

79. First, Takamatsu '318 discloses a first component supported directly or indirectly by the frame. Takamatsu '318 discloses a “seat B,” which is the first component, that includes and is connected to a “seat plate 57.” Ex. 1103, 7:66-8:2. The “seat plate 57” is movably connected to a “seat base 55.” Ex. 1103, 7:66-8:2.

To that end, “upper channel members 59” extend down from “seat plate 57,” and “lower channel members 58” extend up from the “seat base 55.” Ex. 1103, 8:4-11. Figures 6 and 8, below, depict the “seat plate 57” in red, the “seat base 55” in green, the “upper channel members 59” in blue, and the “lower channel member 58” in yellow. Ex. 1103, Fig. 6, Fig. 8.

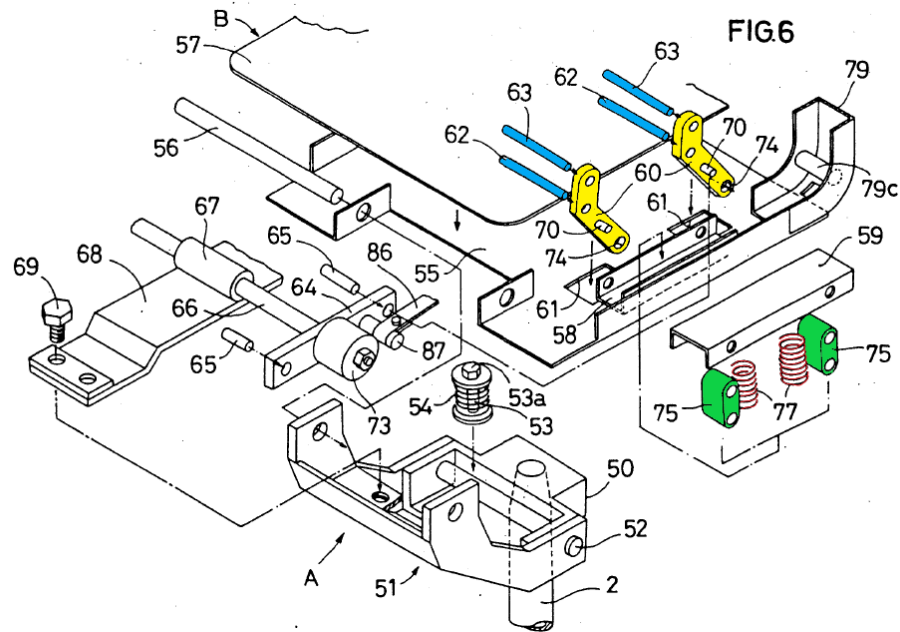


Ex. 1103, Fig. 6 (annotated)

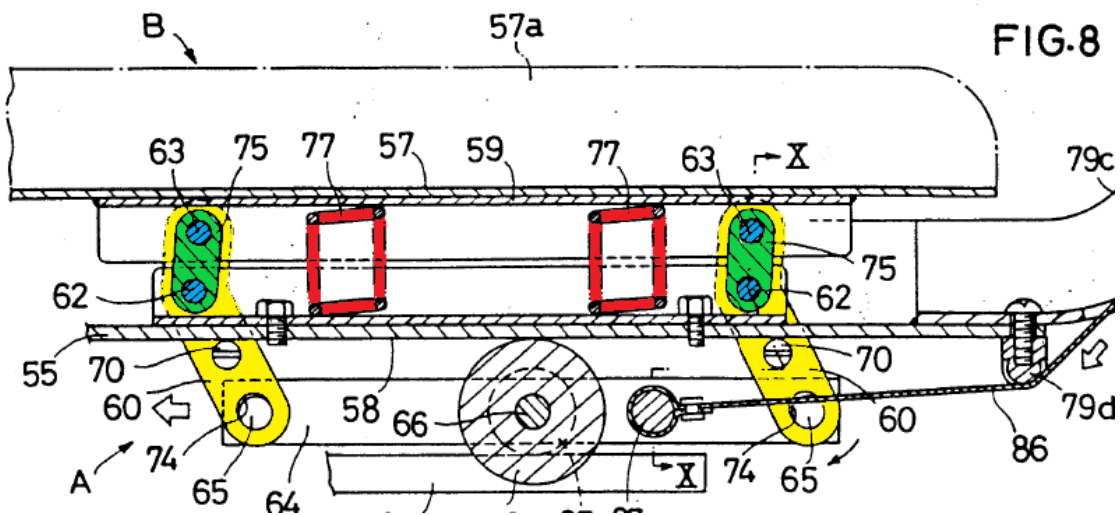


Ex. 1103, Fig. 8 (annotated)

80. The channel members, and thus seat base 55 and seat plate 57, are movably connected via intervening links. Takamatsu '318 explains that the “upper channel members 59” and “lower channel members 58” are pivotally connected by way of “bent links 60” and “auxiliary links 75,” which are mounted to the channel members via “pins 62 and 63.” Ex. 1103, 8:11-20, 9:3-9. Additionally, “weight responsive compression springs 77” are interposed between the “upper channel member 59” and “lower channel member 58” (and thus between seat plate 57 seat base 55). Ex. 1103, 8:39-42. Figures 6 and 8, below, depict the “bent links 60” in yellow, the “auxiliary links 75” in green, the “pin[s]” 62 and 63” in blue, and the “weight responsive springs 77” in red. Ex. 1103, Fig. 6; Fig. 8.



Ex. 1103, Fig. 6 (annotated)



Ex. 1103, Fig. 8 (annotated)

81. Seat base 55, in turn, is pivotally mounted to pivotal frame 51, which is mounted to fixed frame 50. In particular, Takamatsu '318 explains that the front end of the "seat base 55" is pivotally mounted on "pivotal frame 51" by way of the

[illegible]

82. In sum, the first component (i.e. the “seat B”) is indirectly supported by the frame (i.e. the “fixed frame 50”) via the “seat plate 57,” the “seat base 55,” and the “pivotal frame 51.”

83. Second, Takamatsu '318 discloses that a force is applied to the first component by a user in a first manner incident to the user assuming the operative position. Takamatsu '318 teaches that when a “user sits on the seat B,” (i.e. the first component) the “seat plate 57 is displaced downward toward the seat base 55 against the weight responsive springs 77.” Ex 1103, 9:19-23. Further, Takamatsu '318 teaches that these “weight responsive compression springs 77” cause the “upper channel member 59,” which is connected to the “seat plate 57,” to always be “urged away” from the “lower channel member 58,” which is connected to the “seat base 55.” Ex. 1103, 8:39-44.

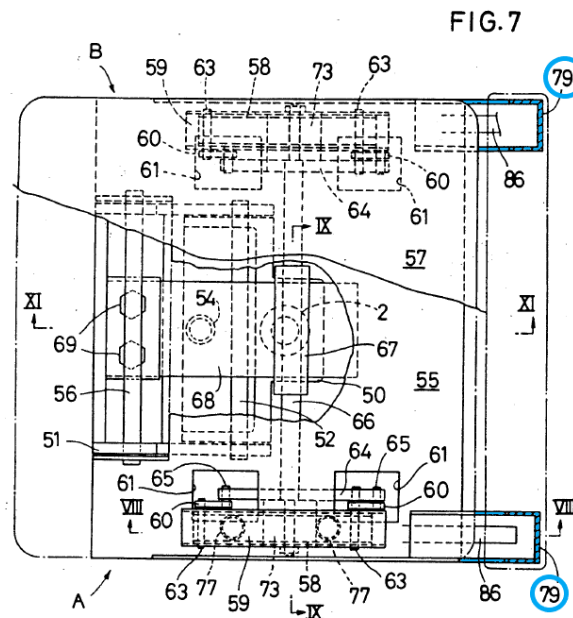
84. In other words, when a user sits on seat B, a force is applied that causes seat B to move down against the force of weight responsive springs 77. Thus, in my opinion, Takamatsu '318 discloses a first component on the frame upon which a force is applied by a user in a first manner as an incident of the user assuming the operative position.

- 4. [1.c] at least a second component on the frame that is movable relative to the first component and upon which a force can be applied by a user in the operative position in a second manner to reconfigure the apparatus by moving the at least second component relative to the first component; and**

85. In my opinion, Takamatsu '318 discloses at least a second component on the frame that is movable relative to the first component and upon which a force can be applied by a user in the operative position in a second manner to reconfigure

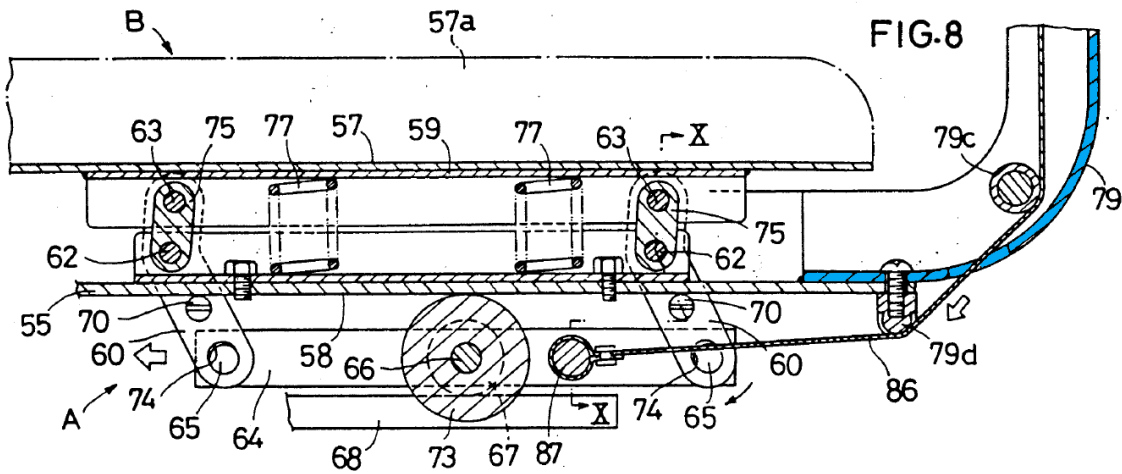
the apparatus by moving the at least second component relative to the first component. As discussed above in Section VI.D.2, it is my opinion that a PHOSITA would understand “a second component on the frame” to mean “a second component supported directly or indirectly by the frame.”

86. First, Takamatsu '318 discloses at least a second component supported directly or indirectly by the frame. Takamatsu '318 discloses “a pair of back support posts 79 [that] are fixed to the rear end of the seat base 55 [and] extend upward therefrom,” and “mounting brackets 79a [that] are fixed to the respective upper ends of the back support posts [79].” Ex. 1103, 9:43-47. Figure 7 (top view), below, shows back support posts 79 in blue extending from each side of seat base 55. Ex. 1103, Fig. 7.

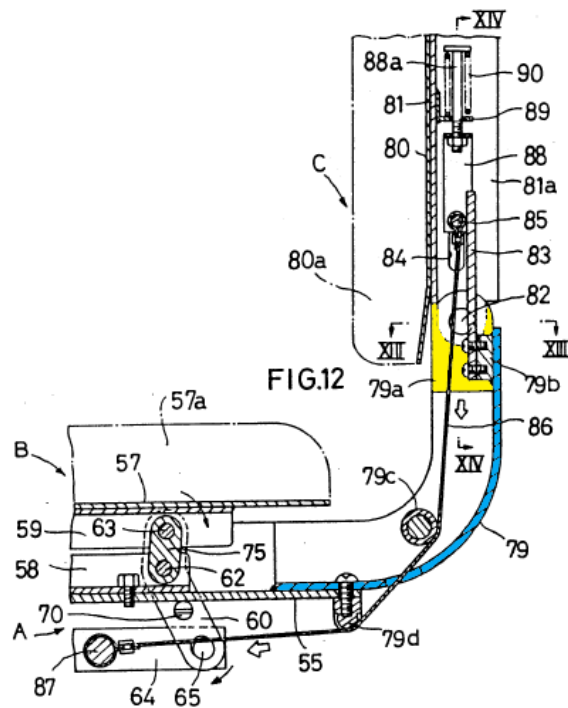


Ex. 1103, Fig. 7 (annotated)

87. Figures 8 and 12, below, show back support posts 79 in blue and mounting brackets 79a (Fig. 12 only) in yellow. Ex. 1103, Figs. 8, 12.

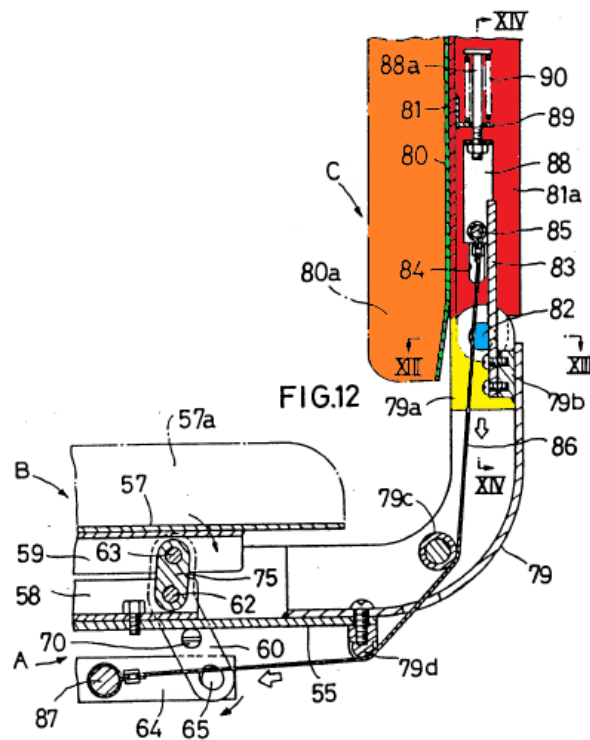


Ex. 1103, Fig. 8 (annotated)

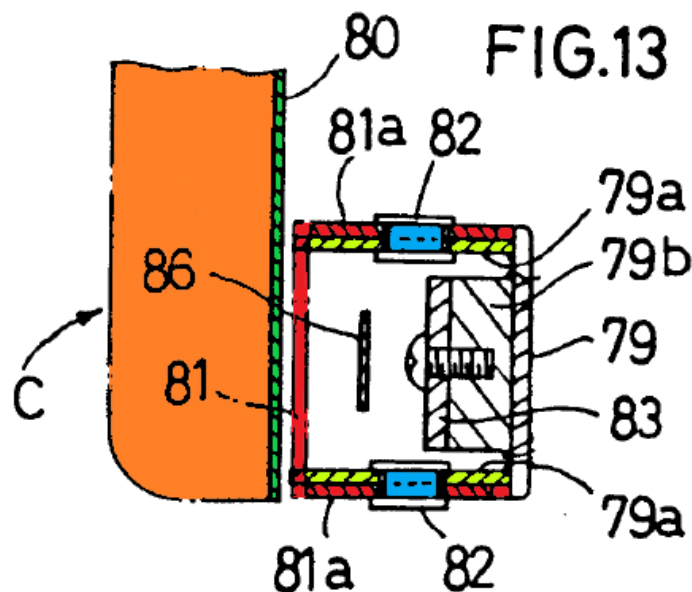


Ex. 1103, Fig. 12 (annotated)

88. A “chair back C”—the second component—is mounted to the respective back support posts 79. Takamatsu ’318 explains that “chair back C” comprises a “back mounting frame 81” with “side flanges 81a” that are pivotally connected to the “mounting brackets 79a” by “horizontal pins 82.” Ex. 1103, 9:47-54. The “chair back C” also comprises a “back plate 80,” which is attached to the “back mounting frame 81” on the one side and a “cushion 80a” on the other. Ex. 1103, 9:47-51. Figures 12 (side view) and 13 (left-post top view), below, depict “back mounting frame 81” and its “side flanges 81a” in red, the “mounting brackets 79a” in yellow, the “horizontal pins 82” in blue, the “back plate 80” in green, and the “cushion 80a” in orange. Ex. 1103, Figs. 12, 13.



Ex. 1103, Fig. 12 (annotated)

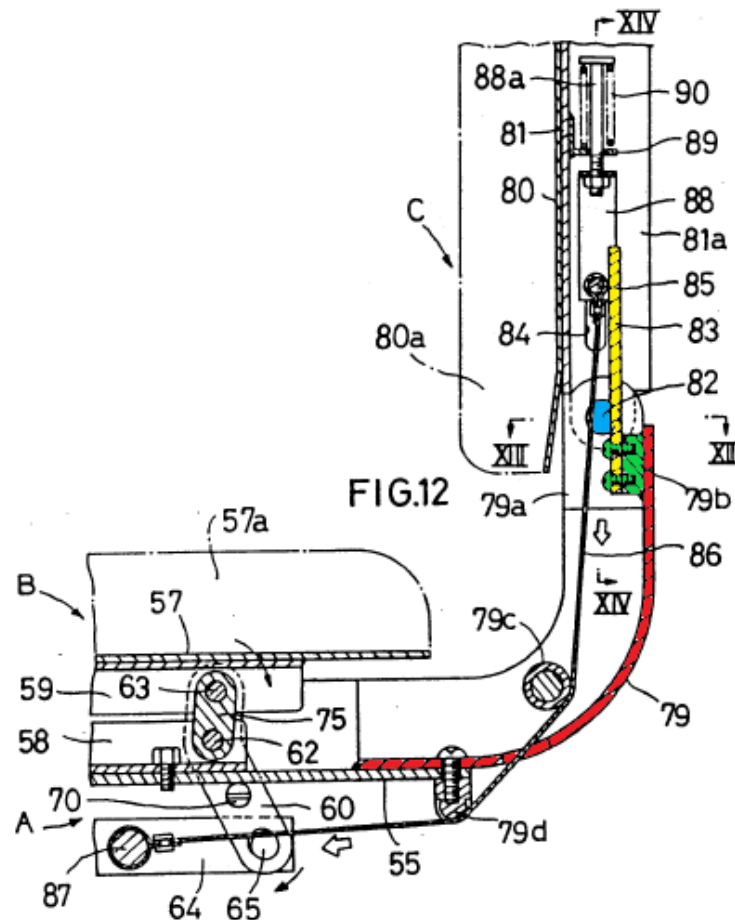


Ex. 1103, Fig. 13 (annotated)

89. In short, “chair back C” is mounted to seat base 55 via back support posts 79. And, as discussed above (¶¶75-77), seat base 55 is indirectly mounted on the “fixed frame 50,” which is part of the claimed frame. Thus, chair back C is indirectly supported by the frame.

90. Second, Takamatsu '318 discloses that the second component, chair back C, is movable relative to the first component, chair seat B, and that force can be applied to chair back C “in a second manner” to move it relative to chair seat B. Takamatsu '318 teaches that the “chair back C is tiltable rearward about the pins 82 independently of...chair seat B” and that “[s]uch tilting of the chair back C is controlled by the second tilting control plate springs 83.” Ex. 1103, 10:6-10. To that end, a “second tilting control plate spring 83” is attached to each of the “back support

post 79” via a “spacer” 79b. Ex. 1103, 9:55-57. Figure 12, below, shows the “pins 82” in blue, the “second tilting control spring 83” in yellow, the “back support post 79” in red, and the “spacer” 79b in green. Ex. 1103, Fig. 12.

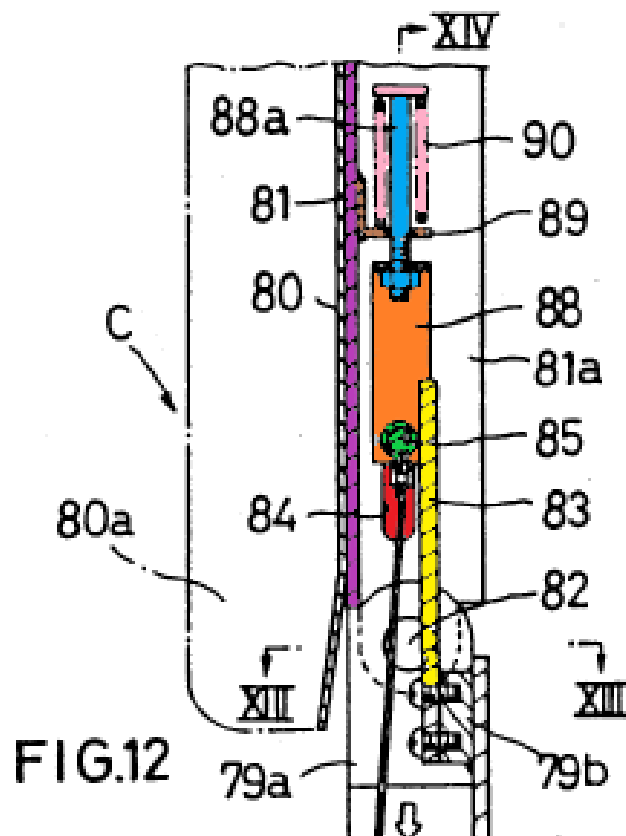


Ex. 1103, Fig. 12 (annotated)

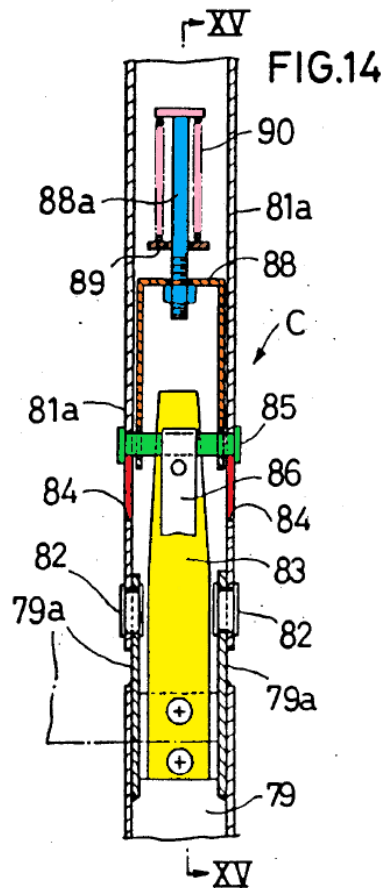
91. Takamatsu '318 explains that the “chair back C” bears against the “second tilting control plate springs 83” via “contact pin[s] 85,” Ex. 1103, 10:6-12, which are received in “vertical guide slots 84” formed in the “side flanges 81a” of each back support frame 81. Ex. 1103, 9:57-60. Each “contact pin 85 is supported

by a vertical carrier 88 which...is connected to a carrier bolt 88a" that is "urged upward by a compression spring 90." Ex. 1103, 9:67-68; 10:4-5. The "carrier bolt 88a," for its part, penetrates an "L-shaped bracket 89" that is fixed to the "back support frame 81." Ex. 1103, 10:1-4.

92. Figures 12 (side view) and 14 (front view), below, show the "second tilting control plate spring 83" in yellow, the "contact pin 85" in green, the "vertical guide slots 84" in red, the "vertical carrier 88" in orange, the "carrier bolt 88a" in blue, the "L-shaped bracket 89" in brown, the "back support 81" in purple, and the "compression springs 90" in pink. Ex. 1103, Figs. 12, 14.

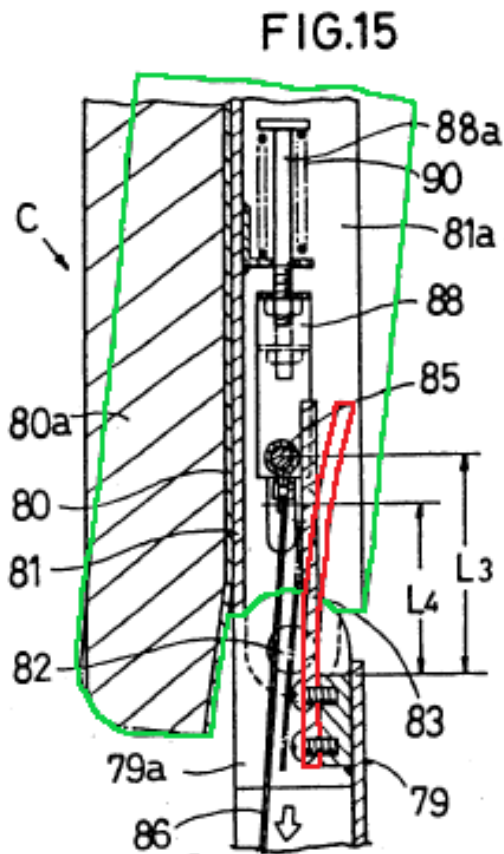


Ex. 1103, Fig. 12 (annotated)



Ex. 1103, Fig. 14 (annotated)

93. Thus, when a user bears his or her back against “chair back C”—a force applied in a second manner—the “contact pins 85” bear against the “second tilting control plate springs 83” such that they are elastically deformed and the “chair back C” rotates relative to the “seat B” about “pins 82”—the second component moving relative to the first component. Ex. 1103, 10:6-12. Figure 15, below, shows chair back C, in green, and second tilting control plate spring 83, in red, after chair back C has rotated relative to seat B against the resisting force of the tilting control plate spring 83. Ex. 1103, Fig. 15.



Ex. 1103, Fig. 15 (annotated)

94. Therefore, in my opinion, Takamatsu '318 discloses at least a second component on the frame that is movable relative to the first component and upon which a force can be applied by a user in the operative position in a second manner to reconfigure the apparatus by moving the at least second component relative to the first component.

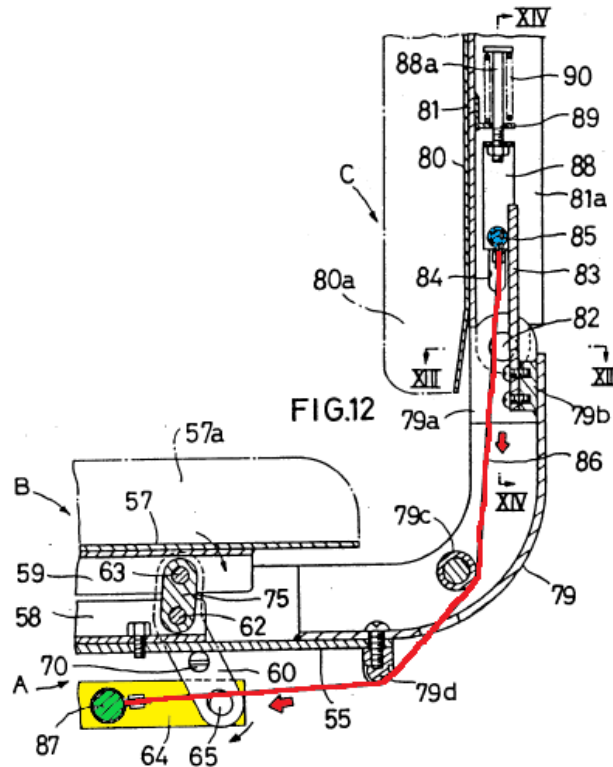
5. **[1.d] an adjusting assembly cooperating between the first component and the at least second component and configured so that as an incident of the force being applied in the first manner changing in magnitude, the force required to be applied in the second manner to reconfigure the apparatus and move the second component relative to the first component changes in magnitude.**

95. In my opinion, Takamatsu '318 discloses an adjusting assembly cooperating between the first component and the at least second component and configured so that as an incident of the force being applied in the first manner changing in magnitude, the force required to be applied in the second manner to reconfigure the apparatus and move the second component relative to the first component changes in magnitude. It is my opinion that Takamatsu '318 discloses this limitation regardless of whether “adjusting assembly” is construed as a means-plus-function claim limitation.

96. First, incident to the force being applied in the first manner changing in magnitude, the force required to move the second component relative to the first component changes in magnitude. In other words, Takamatsu '318 teaches that the “spring constant of the second tilting control springs 83”—which, as discussed above (¶¶90-93), control the tilting of the “chair back C”—is “automatically adjusted to suit the weight of the particular user.” Ex. 1103, 10:24-26.

97. To this end, Takamatsu '318 teaches that contact pins 85 are connected to one end of a “pull band 86” that is connected at its other end to an “operating arm 64” via an “engaging pin 87.” Ex. 1103, 9:59-63. Figure 12, below, shows the

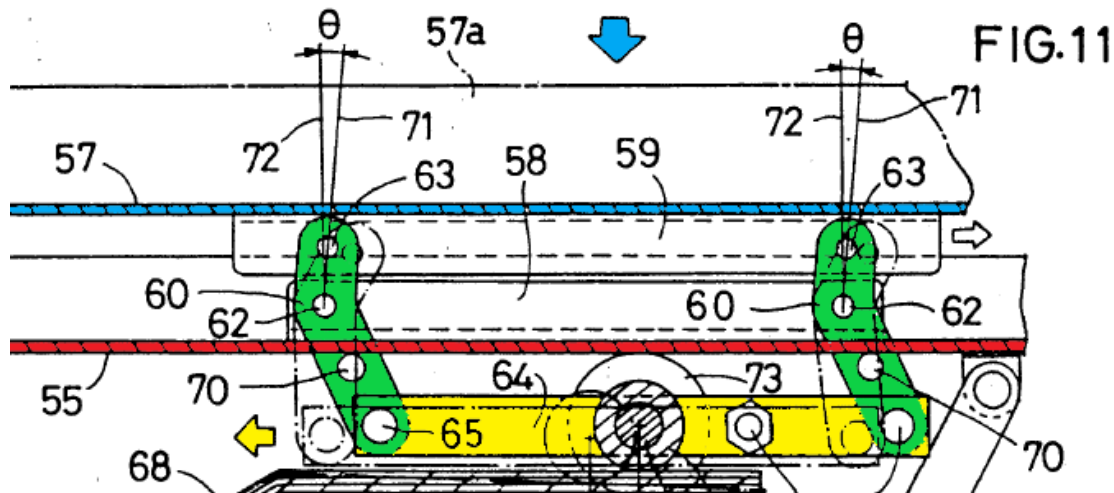
“operating arm 62” in yellow, the “engaging pin 87” in green, the “pull band 86” in red, and the “contact pin 85,” in blue. Ex. 1103, Fig. 12.



Ex. 1103, Fig. 12 (annotated)

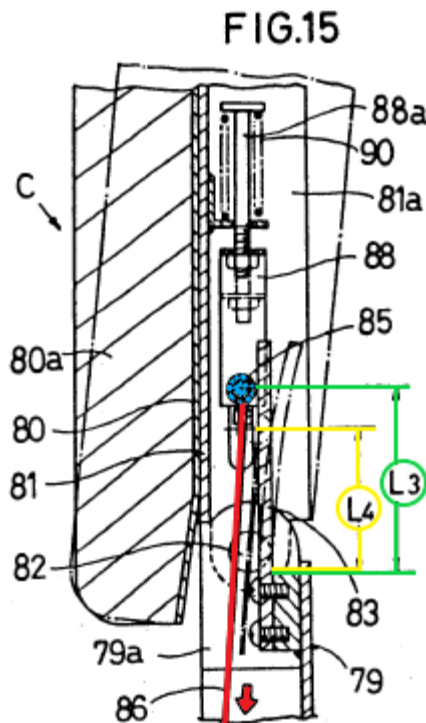
98. When a user sits in the chair, operating arm 62 translates to the left, pulling contact pin 85 down via pull band 86. Specifically, Takamatsu '318 discloses that when the user sits on the “seat B,” the “seat plate 57” displaces downwardly toward the “seat base 55” against the “weight responsive springs 77.” Ex. 1103, 9:19-22. Such downward movement of the “seat plate 57” causes the “bent links 60” to pivot about pins 62, such that the lower ends thereof drive the “operating arm[] 64” forward towards the front of the chair. Ex. 1103, 9:22-25. Figure 11, below,

shows the “seat plate 57” in blue, the “seat base 55” in red, the “bent links 60” in green, the “operating arm 64” in yellow, and the position of the bent links 60 after they have rotated about pins 62 in “phantom lines.” Ex. 1103, Fig. 11; *id.*, 9:25.



Ex. 1103, Fig. 11 (annotated)

99. This translation of the operating arms 64 causes contact pins 85 to move down relative to tilting control springs 83. In particular, “such advancing movement of the operating arm 64 is transmitted through the corresponding pull band 86 to cause the contact pin 85 to move downward against the compression spring 90” a distance that is “generally proportional to the weight of the user.” Ex. 1103, 10:13-24. As a result, “the load supporting span of the second tilting control spring 83 is reduced from an initial value L3 to a new one L4.” Ex. 1103, 10:19-21. Figure 15, below, shows the “pull band 86” in red, the “contact pin 85” in blue, the initial load supporting span L3 in green, and the new load supporting span L4 in yellow. Ex. 1103, Fig. 15.

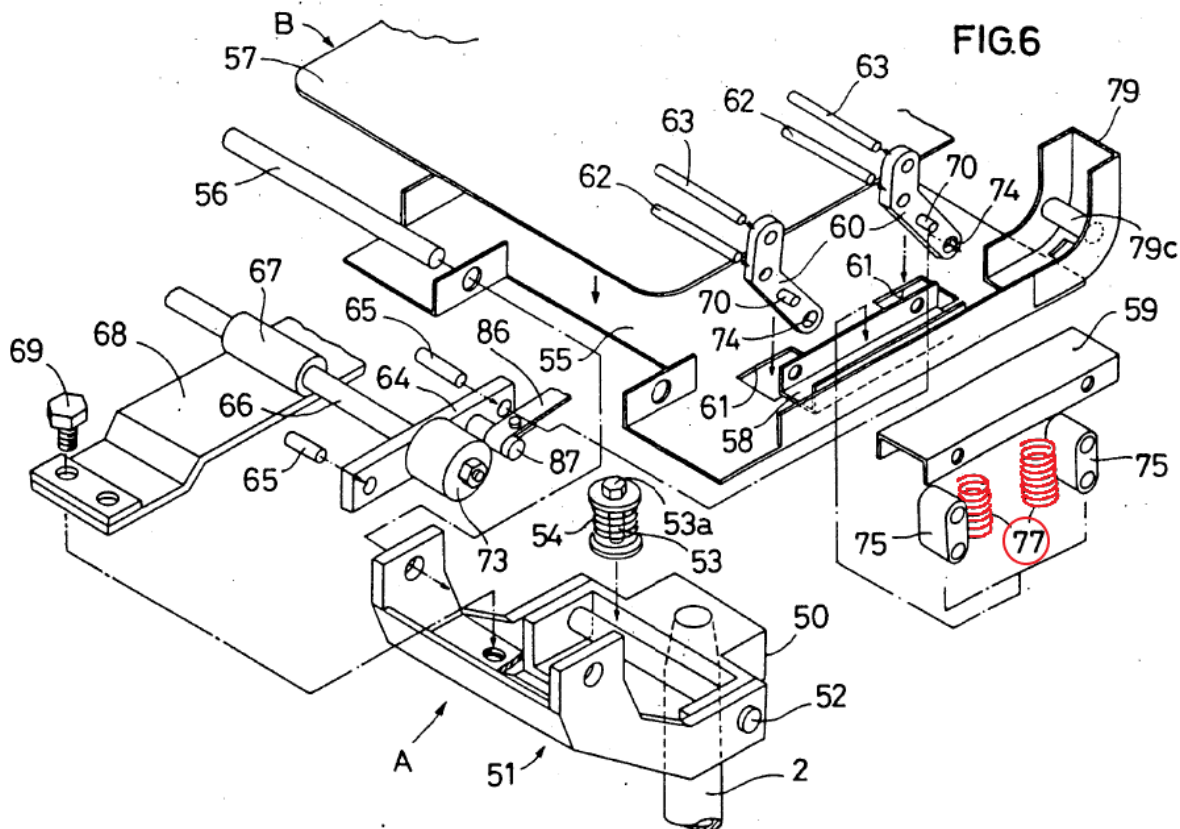


Ex. 1103, Fig. 15 (annotated)

100. This reduction in the “load supporting span of the second tilting control spring 83” (that is, the effective length thereof) increases the amount of force required to elastically deform the spring and to tilt chair back C about pins 82 relative to seat B.

101. Second, in the event that “adjusting assembly” is construed as an MPF claim term, it is my opinion that Takamatsu ’318 discloses the claimed “adjusting assembly.” As discussed above in Section VI.D.1, it is my opinion that “adjusting assembly” is an MPF claim term. Takamatsu ’318 discloses this claim term because it discloses the same or equivalent structures that provide the same function.

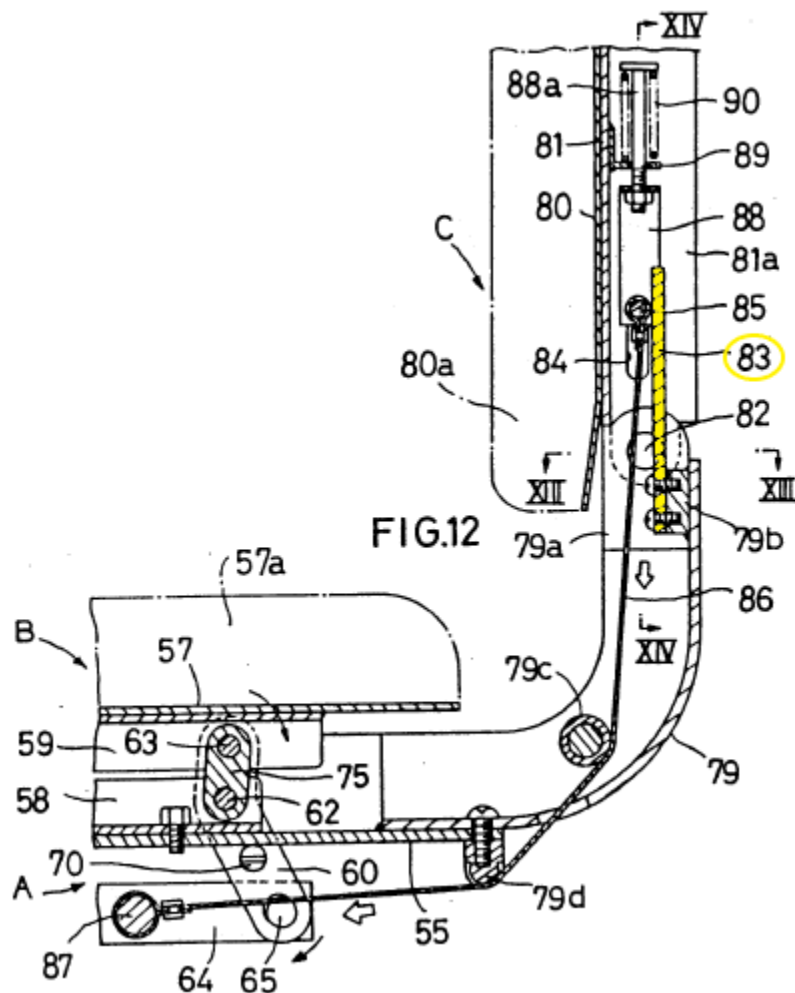
102. As for the weighing springs of the claimed “adjusting assembly,” Takamatsu ’318 discloses “weight responsive compression springs 77” that are the same as the coil spring 33 disclosed in the DeJule ’498 Patent. Ex. 1103, 8:39-43. Figure 6 of Takamatsu ’318, below, shows compression springs 77 in red. Ex. 1103, Fig. 6.



Ex. 1103, Fig. 6 (annotated)

103. As for the tilting springs of the claimed “adjusting assembly,” Takamatsu ’318 discloses “second tilting control plate spring[s] 83” that are the same as leaf spring 19 disclosed in the DeJule ’498 Patent. Ex. 1103, 9:37-40. Figure

12 of Takamatsu '318, below, shows second tilting control plate springs 83 in yellow. Ex. 1103, Fig. 12.



Ex. 1103, Fig. 12 (annotated)

104. Finally, as discussed above (§§96-100) weight responsive compression springs 77 and second tilting control plate springs 83 cooperate to provide the claimed function of “as an incident of the force being applied in the first manner changing in magnitude, the force required to be applied in the second manner to

reconfigure the apparatus and move the second component relative to the first component changes in magnitude.”

105. Therefore, in my opinion, Takamatsu '318 discloses an adjusting assembly cooperating between the first component and the at least second component and configured so that as an incident of the force being applied in the first manner changing in magnitude, the force required to be applied in the second manner to reconfigure the apparatus and move the second component relative to the first component changes in magnitude.

B. DEPENDENT CLAIM 2

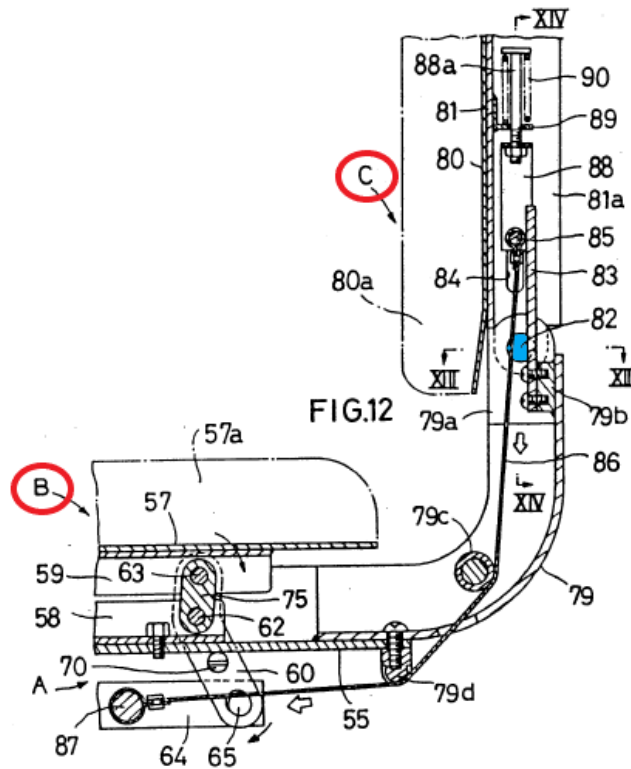
The reconfigurable apparatus according to claim 1 wherein the second component is guided in pivoting movement relative to the first component around an axis.

106. As explained in ¶¶73-105, Takamatsu '318 discloses the limitations of claim 1.

107. In my opinion, Takamatsu '318 discloses wherein the second component is guided in pivoting movement relative to the first component around an axis.

108. As discussed above, Takamatsu '318 discloses that “the chair back C” (the second component), “is tiltable rearward about the pins 82” (an axis), “independently of the tilting of the chair seat B” (the first component). Ex. 1103,

10:6-8. Figure 12, below, depicts “pin 82” in blue, that guides “chair back C” in pivoting movement relative to the “seat B.” Ex. 1103, Fig. 12.



Ex. 1103, Fig. 12 (annotated)

109. Therefore, Takamatsu '318 discloses wherein the second component is guided in pivoting movement relative to the first component around an axis.

C. DEPENDENT CLAIM 3

The reconfigurable apparatus according to claim 1 wherein the reconfigurable apparatus is a piece of furniture.

110. As explained in ¶¶73-105, Takamatsu '318 discloses the limitations of claim 1.

111. In my opinion, Takamatsu '318 discloses wherein the reconfigurable apparatus is a piece of furniture.

112. Takamatsu '318 discloses that “this invention relates generally to chairs for use in offices,” Ex. 1103, 1:6-7, and describes the chair of the embodiment shown in Figures 6-15 as a “rocking chair,” *id.* 7:46-49.

113. A “chair” is a piece of furniture. Therefore, Takamatsu '318 discloses wherein the reconfigurable apparatus is a piece of furniture.

D. DEPENDENT CLAIM 4

The reconfigurable apparatus according to claim 3 wherein the reconfigurable apparatus is a chair in which a user in the operative position is seated, with the first component comprising a seat upon which a user applies the force in the first manner by sitting in the chair.

114. As explained in ¶¶110-113, Takamatsu '318 discloses the limitations of claim 3.

115. In my opinion, Takamatsu '318 discloses wherein the reconfigurable apparatus is a chair in which a user in the operative position is seated, with the first component comprising a seat upon which a user applies the force in the first manner by sitting in the chair.

116. As discussed above, Takamatsu '318 explains that the article of furniture of the embodiment shown in Figures 6-15 is a “rocking chair.” Ex. 1103,

7:46-49. Takamatsu '318 further discloses that the “chair...comprises...a seat B” (the claimed “first component”). Ex. 1103, 7:47-49. Finally, as discussed above (¶¶83-84), a user applies the force in the first manner “when the user sits on the seat B” such that “the seat plate 57 is displaced downward toward the seat base 55 against the weight responsive springs 77.” Ex. 1103, 9:19-22.

E. DEPENDENT CLAIM 5

The reconfigurable apparatus according to claim 4 wherein the at least second component comprises a back rest against which a user seated in the chair leans to exert the force in the second manner to reconfigure the chair.

117. As explained in ¶¶114-116, Takamatsu '318 discloses the limitations of claim 4.

118. In my opinion, Takamatsu '318 discloses wherein the at least second component comprises a backrest against which a user seated in the chair leans to exert the force in the second manner to reconfigure the chair.

119. Takamatsu '318 teaches that the reconfigurable apparatus further “incorporates a chair back C” (the claimed “second component”). Ex. 1103, 9:38. Further, the “chair back C is tiltable rearward about the pins 82 independently of...the chair seat B,” and “[s]uch tilting...is controlled by the second tilting control plate springs 83.” Ex. 1103, 10:6-10. Thus, the force in the second manner is a leaning force that causes chair back C to pivot relative to chair seat B about pins 82.

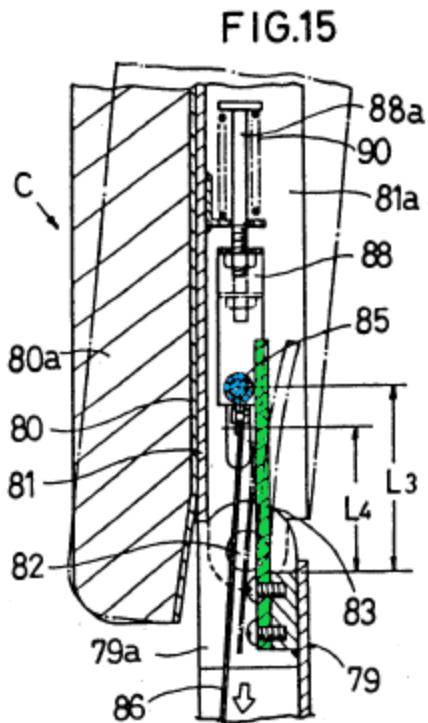
F. DEPENDENT CLAIM 6

The reconfigurable apparatus according to claim 5 wherein the adjusting assembly comprises a spring assembly that is configured to exert a force that resists movement of the at least second component relative to the first component and that varies as the magnitude of the force applied in the first manner varies.

120. As explained in ¶¶117-119, Takamatsu '318 discloses the limitations of claim 5.

121. In my opinion, Takamatsu '318 discloses wherein the adjusting assembly comprises a spring assembly that is configured to exert a force that resists movement of the at least second component relative to the first component and that varies as the magnitude of the force applied in the first manner varies.

122. As discussed above (¶103) the claimed “adjusting assembly” includes “second tilting control plate springs 83” that controls the “tilting of the chair back C.” Ex. 1103, 10:8-12. In other words, control plate springs 83 resist movement of chair back C relative to chair seat B: when a user bears his or her back against “chair back C,” the “contact pin[s] 85” bear against the “second tilting control plate springs 83” such that they are elastically deformed and the “chair back C” rotates relative to the “seat B” about “pins 82.” Ex. 1103, 10:6-12. Figure 15 depicts the “contact pin 85” in blue and the “second control plate spring 83” in green. *Id.*, Fig. 15.

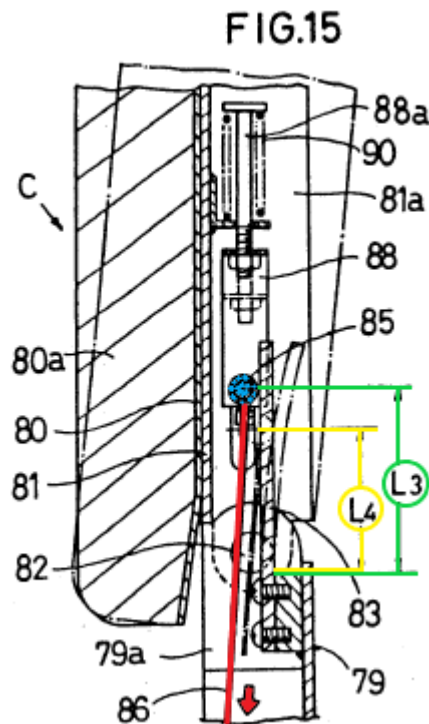


Ex. 1103, Fig. 15 (annotated)

123. Moreover, the force against tilting of chair back C provided by second tilting control plate springs 83 varies as the magnitude of the force applied in the first manner varies. In other words, the “spring constant of the second tilting control springs 83” is “automatically adjusted to suit the weight of the particular user.” Ex. 1103, 10:24-26.

124. As discussed above, Takamatsu ’318 teaches that when the user sits on the “seat B,” the “seat plate 57” displaces downwardly toward the “seat base 55” against the “weight responsive springs 77.” Ex. 1103, 9:19-22. Such downward movement of the “seat plate 57” causes the “bent links 60” to pivot such that their

lower ends and the “operating arms 64” move towards the front of the chair. Ex. 1103, 9:22-25. In turn, “pull band 86” causes “contact pin 85 to move downward against the compression spring 90,” such that “the load supporting span of the second tilting control spring 83 is reduced from an initial value L3 to a new one L4.” Ex. 1103, 10:13-21. Figure 15, below, depicts “pull band 86” in red, the “contact pin 85” in blue, the initial load supporting span L3 in green, and the new load supporting span L4 in yellow.



Ex. 1103, Fig. 15 (annotated)

125. As discussed above, this reduction in the load supporting span of the second tilting control spring 83 increases the amount of force required to pivot chair back C relative to seat B.

126. Therefore, in my opinion, Takamatsu '318 discloses wherein the adjusting assembly comprises a spring assembly that is configured to exert a force that resists movement of the at least second component relative to the first component and that varies as the magnitude of the force applied in the first manner varies.

G. DEPENDENT CLAIM 7

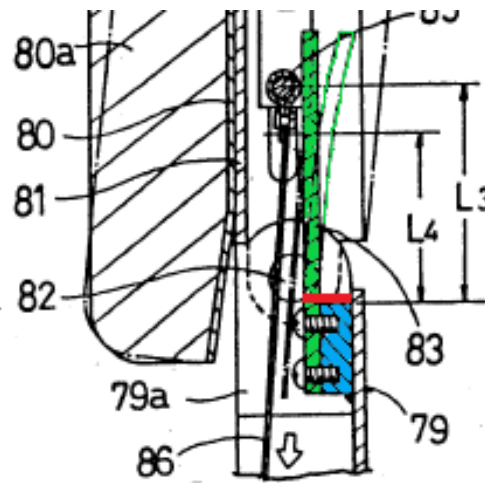
The reconfigurable apparatus according to claim 6 wherein the spring assembly comprises a leaf spring with a length that is bendable about a fulcrum location and the adjusting assembly and at least second component are configured so that as the force applied in the first manner changes in magnitude an effective length of the leaf spring changes.

127. As explained in ¶¶120-126, Takamatsu '318 discloses the limitations of claim 6.

128. In my opinion, Takamatsu '318 discloses wherein the spring assembly comprises a leaf spring with a length that is bendable about a fulcrum location and the adjusting assembly and at least second component are configured so that as the force applied in the first manner changes in magnitude an effective length of the leaf spring changes.

129. As explained above (¶122), the spring assembly comprises “second tilting control plate spring 83,” which is a leaf spring with a length.

130. Second tilting control plate spring 83 is bendable about a fulcrum location. Takamatsu '318 teaches that the “second tilting control plate spring 83” is “bolted at its lower end to the upper end of each back support post 79 via a spacer.” Ex. 1103, 9:55-57. Takamatsu '318 further discloses that “the second tilting control plate springs 83” are “elastically deformed” (or bent) “upon pivoting of the chair back.” Ex. 1103, 10:6-12. As shown in Figure 15 below, tilting control plate springs 83 (green) bend about a fulcrum point (red bar), which is located at the top of the “spacer” (blue) to which tilting control plate springs 83 are fastened. Ex. 1103, Fig. 15.



Ex. 1103, Fig. 15 (annotated)

131. And, as explained above (§§96-100), the adjusting assembly and second component are configured so that the effective length of tilting control plate spring 83 changes when the force applied in the first manner changes in magnitude. In short, “when the seat B is pressed downward under the weight of the user” (i.e. the force

applied in the first manner), the “contact pin 85 [] move[s] downward” and, as a result, “the load supporting span of the second tilting control spring 83 is reduced from an initial value L3 to a new one L4.” Ex. 1103, 10:13-21. This reduction in the “load supporting span of the second tilting control spring 83” is a change in the effective length thereof.

H. DEPENDENT CLAIM 8

The reconfigurable apparatus according to claim 1 wherein the adjusting assembly is configured so that an increase in magnitude of the force applied in the first manner causes an increase in magnitude of the force applied in the second manner required to reconfigure the apparatus.

132. As explained in ¶¶73-105, Takamatsu '318 discloses the limitations of claim 1.

133. In my opinion, Takamatsu '318 discloses wherein the adjusting assembly is configured so that an increase in magnitude of the force applied in the first manner causes an increase in magnitude of the force applied in the second manner required to reconfigure the apparatus.

134. As discussed above, Takamatsu '318 teaches “when the seat B is pressed downward under the weight of the user...the contact pin 85 [] move[s] downward” and, as a result, “the load supporting span of the second tilting control spring 83 is reduced from an initial value L3 to a new one L4.” Ex. 1103, 10:13-21.

In this way, “the spring constant of the second tilting control springs 83 is automatically adjusted to suit the weight of the particular user.” Ex. 1103, 10:22-26.

135. This reduction in the load supporting span of the second tilting control springs 83 as a result of a weight force on seat B increases the amount of force required to pivot chair back C relative to seat B. As Takamatsu ’318 explains, the “spring constant of the...second tilting control spring means **increases** as the weight [of the user sitting in the seat] **increases**.” Ex. 1103, 3:23-25 (emphasis added); see *id.*, 6:2-5 (explaining that “reducing the effective length of [a] plate spring...increase[s] the spring constant thereof”).

I. DEPENDENT CLAIM 9

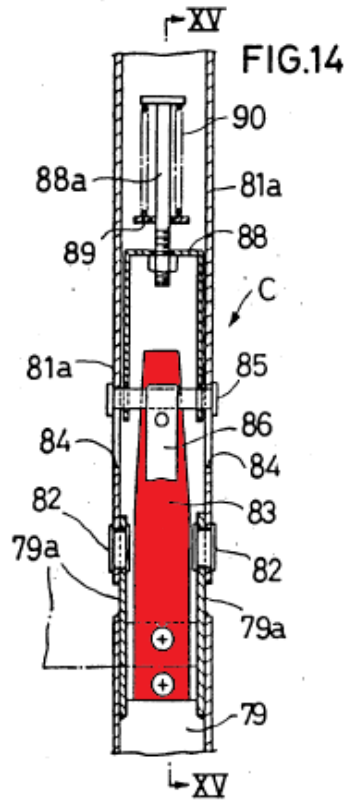
The reconfigurable apparatus according to claim 7 wherein the leaf spring has a cross-sectional shape as viewed orthogonally to its length that is non-uniform over at least a portion of the length of the leaf spring.

136. As explained in ¶¶127-131, Takamatsu ’318 discloses the limitations of claim 7.

137. In my opinion, Takamatsu ’318 discloses wherein the leaf spring has a cross-sectional shape as viewed orthogonally to its length that is non-uniform over at least a portion of the length of the leaf spring.

138. As explained above (¶129) the leaf spring is the second tilting control plate spring 83. Takamatsu ’318 discloses that “the second tilting control plate spring

83 for the chair back C is...made to have a progressively reducing width toward its free end.” Ex. 1103. 10:46-54. Figure 14, below, depicts the “second tilting control plate spring 83” in red. Ex. 1103, Fig. 14.



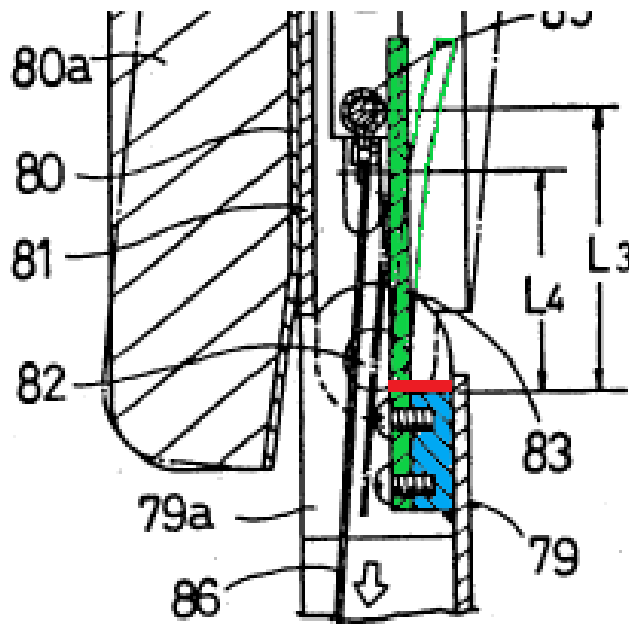
Ex. 1103, Fig. 14 (annotated)

139. Thus, the cross-sectional shape of second tilting control plate spring 83 is non-uniform over at least a portion of its length when viewed orthogonally.

J. DEPENDENT CLAIM 10

The reconfigurable apparatus according to claim 6 wherein the spring assembly comprises a plurality of leaf springs each with a length that bends around a fulcrum location.

143. And, as discussed above (§130), second tilting control plate springs 83 bend about a fulcrum location: each “second tilting control plate spring 83, which extends vertically, is bolted at its lower end to the upper end of each back support post 79 via spacer.” Ex. 1103, 9:55-57. As shown in Figure 15 below, the fulcrum location (red bar) is the top of the spacer (blue), about which second tilting control plate spring 83 (green) bends. Ex. 1103, Fig. 15.



Ex. 1103, Fig. 15 (annotated)

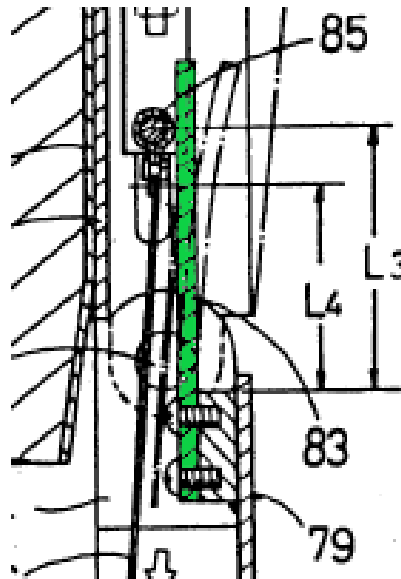
K. DEPENDENT CLAIM 14

The reconfigurable apparatus according to claim 6 wherein the spring assembly comprises at least one leaf spring.

144. As explained in §§120-126, Takamatsu '318 discloses the limitations of claim 6.

145. In my opinion, Takamatsu '318 discloses wherein the spring assembly comprises at least one leaf spring.

146. As discussed before (§122), the spring assembly comprises “second tilting control plate springs 83,” which is a leaf spring. A partial view of Figure 15, below, depicts second tilting control plate 83 in green. Ex. 1103, Fig. 15.



Ex. 1103, Fig. 15 (annotated)

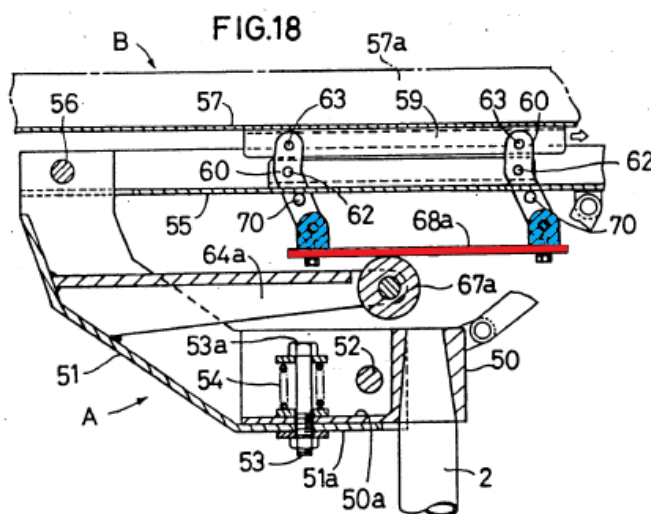
L. DEPENDENT CLAIM 15

The reconfigurable apparatus according to claim 14 wherein the at least one leaf spring has a length and spaced supported ends and the apparatus further comprises an actuating component that is configured to bear against the one leaf spring between the spaced supported ends to resist movement of the at least second component as the force is applied in the second manner with a magnitude that reconfigures the apparatus.

147. As explained in ¶¶144-146, Takamatsu '318 discloses the limitations of claim 14.

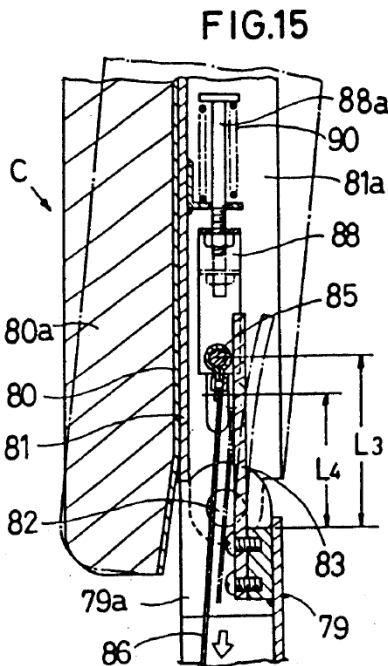
148. In my opinion, Takamatsu '318 discloses wherein the at least one leaf spring has a length and spaced supported ends and the apparatus further comprises an actuating component that is configured to bear against the one leaf spring between the spaced supported ends to resist movement of the at least second component as the force is applied in the second manner with a magnitude that reconfigures the apparatus.

149. Takamatsu '318 discloses the concept of “a beam supported at both ends,” which “provides a highest spring constant when a load applying point is located at the longitudinal center of the beam.” Ex. 1103, 11:7-10. This configuration is depicted below in Figure 18, wherein the “beam” is in red and the supports at both ends are in blue. Ex. 1103, Fig. 18.



Ex. 1103, Fig. 18 (annotated)

150. Takamatsu '318 teaches that this concept is applicable to the second tilting control springs 83 for the chair back C. Ex. 1103, 11:22-24. In particular, Takamatsu '318 explains that “each second tilting control spring 83 shown in Figs. 14 and 15...may be modified to be vertically movable with its **both ends supported**, whereas the contact pin 85 may be modified to assume a fixed position,” and that “the pin 85 may support a contact roller”—an actuating component—“which comes into rolling contact with the second tilting control spring.” Ex. 1103, 11:24-30 (emphasis added). Figure 15 is shown below for reference. Ex. 1103. Fig. 15.



Ex. 1103, Fig. 15

151. As explained above (¶¶90-93), second tilting control plate springs 83 resists movement of chair back C relative to seat B: “tilting of the chair back C is controlled by the second tilting control plate springs 83.” Ex. 1103, 10:6-10. Thus,

Takamatsu '318 discloses wherein the at least one leaf spring has a length and spaced supported ends and the apparatus further comprises an actuating component that is configured to bear against the one leaf spring between the spaced supported ends to resist movement of the at least second component as the force is applied in the second manner with a magnitude that reconfigures the apparatus.

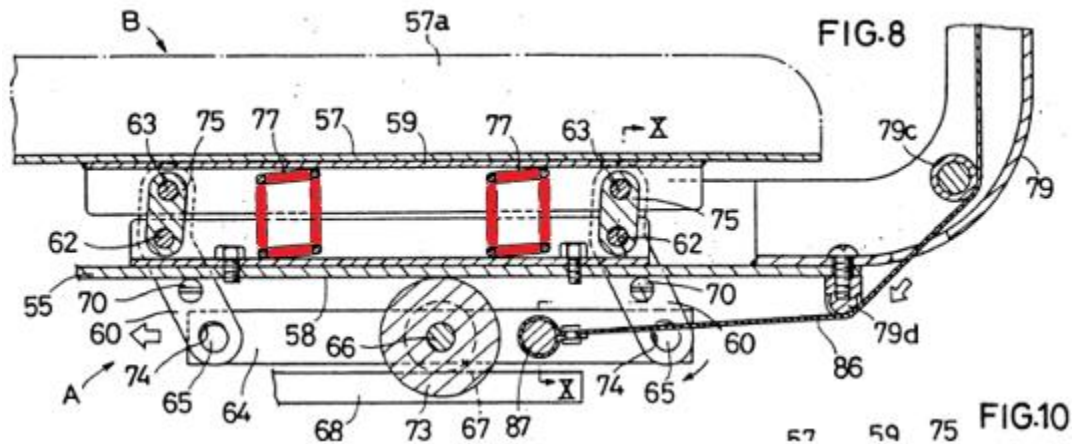
M. DEPENDENT CLAIM 19

The reconfigurable apparatus according to claim 4 wherein the seat is configured to move vertically relative to the frame with the first force applied in the first manner with a magnitude that reaches a predetermined level.

152. As explained in ¶¶114-116, Takamatsu '318 discloses the limitations of claim 4.

153. In my opinion, Takamatsu '318 discloses wherein the seat is configured to move vertically relative to the frame with the first force applied in the first manner with a magnitude that reaches a predetermined level. In other words, a “predetermined” weight force must be applied to the seat for it to move vertically relative to the frame.

154. Takamatsu '318 discloses that “when the user sits on the seat B, the seat plate 57 is displaced downward toward the seat base 55 against the weight responsive springs 77.” Ex. 1103, 9:19-22. Figure 8, below, shows the “weight responsive springs 77” in red. Ex. 1103, Fig. 8.



Ex. 1103, Fig. 8 (annotated)

155. A “predetermined” magnitude of force is required to compress springs 77 and move the seat downward (i.e. vertically).

N. DEPENDENT CLAIM 20

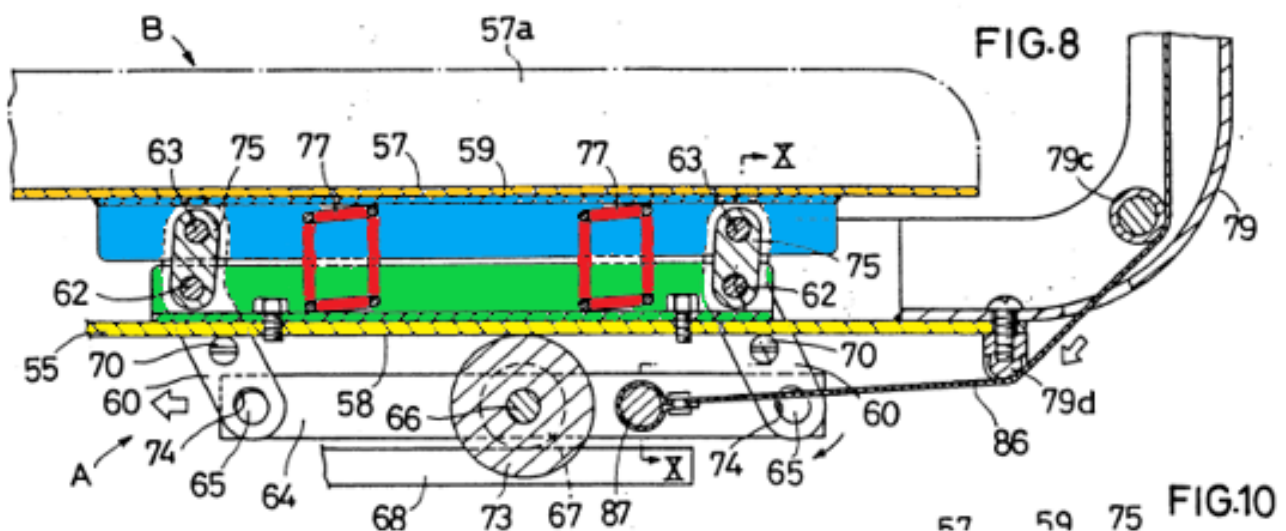
The reconfigurable apparatus according to claim 1 wherein the apparatus further comprises a supporting biasing assembly that normally biasably urges the seat upwardly relative to the frame.

156. As explained in ¶¶73-105, Takamatsu ’318 discloses the limitations of claim 1.

157. In my opinion, Takamatsu ’318 discloses wherein the apparatus further comprises a supporting biasing assembly that normally biasably urges the seat upwardly relative to the frame.

158. Takamatsu ’318 teaches that “seat B,” which is the first component, includes and is connected to a “seat plate 57.” Ex. 1103, 7:66-8:2. The “seat plate

57” is also movably connected to a “seat base 55” via “upper channel members 59” that extend downwardly from “seat plate 57” and “lower channel members 58” extend upward from the “seat base 55.” Ex. 1103, 8:4-11. Takamatsu ’318 teaches that “weight responsive compression springs 77 are interposed between each lower channel member 58 and the corresponding upper channel member 59” and, thus, that “the upper channel member 59 is always urged away from the lower channel member 58.” Ex. 1103, 8:39-44. Thus, seat B is biasably urged upwardly relative to the frame. Figure 8, below, depicts the “weight responsive compression springs 77”—the biasing assembly—in red, the “upper channel member 59” in blue, the “lower channel member 58” in green, the “seat plate 57” in orange, and the “seat base 55” in yellow. Ex. 1103, Fig. 8.



Ex. 1103, Fig 8 (annotated)

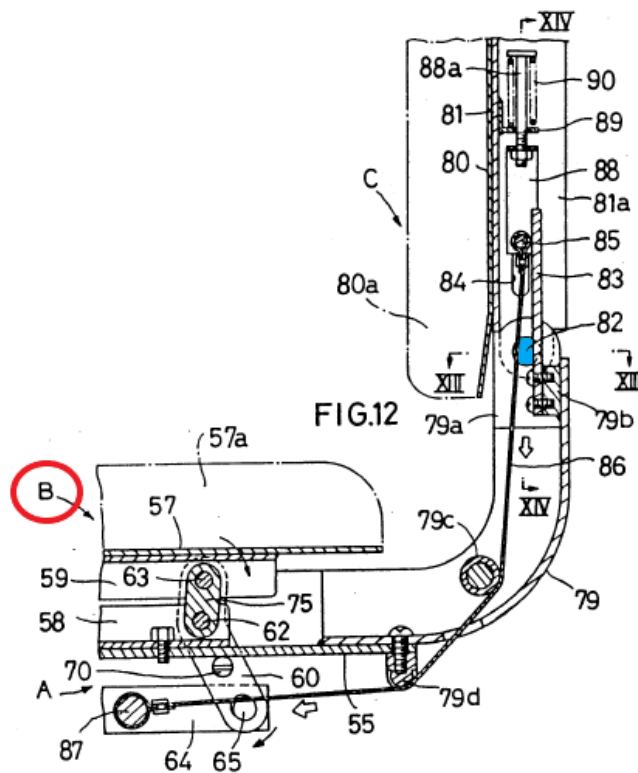
O. DEPENDENT CLAIM 21

The reconfigurable apparatus according to claim 2 wherein the axis is spaced from the first component.

159. As explained in ¶¶106-109, Takamatsu '318 discloses the limitations of claim 2.

160. In my opinion, Takamatsu '318 discloses wherein the axis is spaced from the first component.

161. As explained above (¶¶79, 108) the first component is seat B, and the axis is horizontal pins 82. As shown in Figure 12 below, horizontal pins 82 (blue) are spaced from seat B (red). Ex. 1103, Fig. 12.



Ex. 1103, Fig. 12 (annotated)

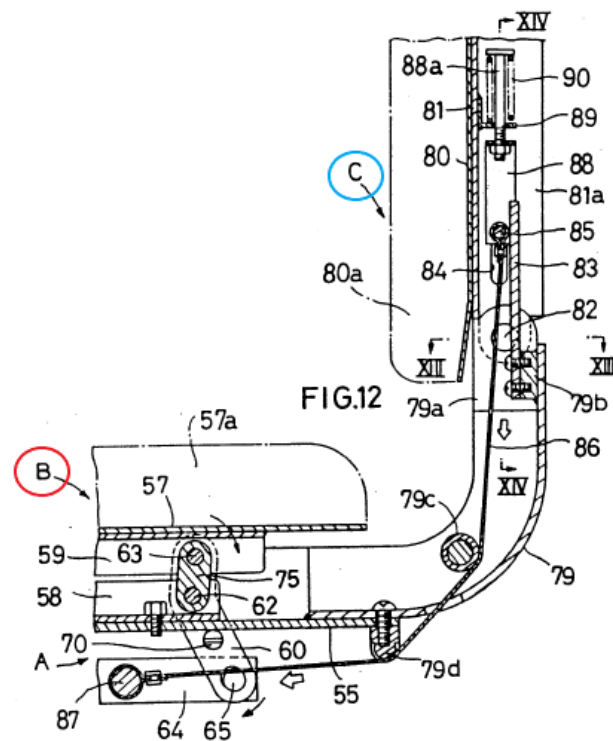
P. DEPENDENT CLAIM 22

The reconfigurable apparatus according to claim 5 wherein the back rest is spaced from the seat.

162. As explained in ¶¶117-119, Takamatsu '318 discloses the limitations of claim 5.

163. In my opinion, Takamatsu '318 discloses wherein the backrest is spaced from the seat.

164. As explained above (¶¶116, 119) seat B is the seat, and chair back C is the backrest. As shown in Figure 12 below, chair back C (blue) is spaced from the seat B (red). Ex. 1103, Fig. 12.



Ex. 1103, Fig. 12 (annotated)

IX. TAKAMATSU '372 ANTICIPATES CLAIMS 1 AND 18

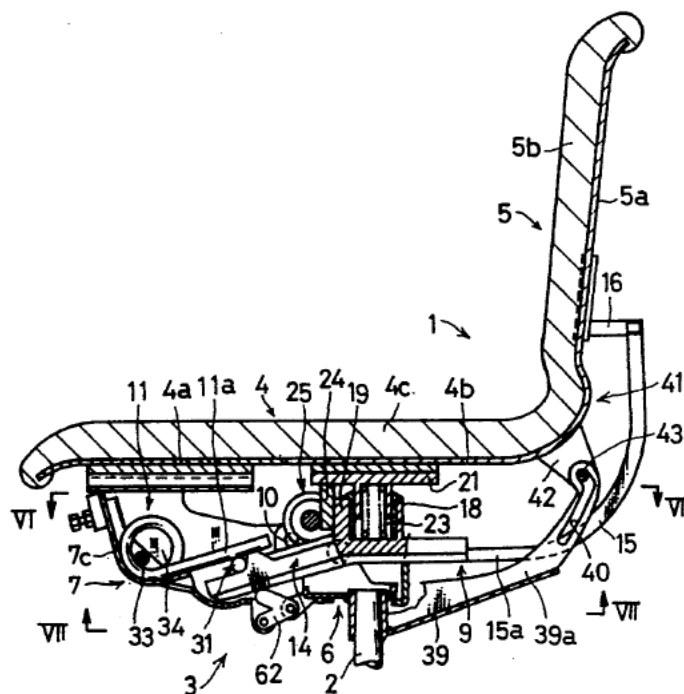
165. For reasons that I will address in more detail below, it is my opinion that Takamatsu '372 anticipates claims 1 and 18.

A. INDEPENDENT CLAIM 1

1. **[1] A reconfigurable apparatus for supporting at least part of a user's weight with the user in an operative position with respect to the reconfigurable apparatus, the reconfigurable apparatus comprising:**

166. In my opinion, Takamatsu '372 discloses a reconfigurable apparatus for supporting at least part of a user's weight with the user in an operative position with respect to the reconfigurable apparatus.

167. Takamatsu '372 discloses that it is "an object of the present invention to provide a chair tilting control assembly which is capable of automatically adjusting the tilting support ability of the tilting control spring or springs and which is further capable of holding the thus adjusted tilting support ability at least at the time of rearwardly tilting seat back." Ex. 1104, 1:51-57. In other words, Takamatsu '372 discloses a chair, which is an apparatus for supporting at least part of a user's weight with the user in an operative position, that is reconfigurable. Figure 2, below, depicts an embodiment of the reconfigurable apparatus for seating a user. Ex. 1104, Fig. 2.

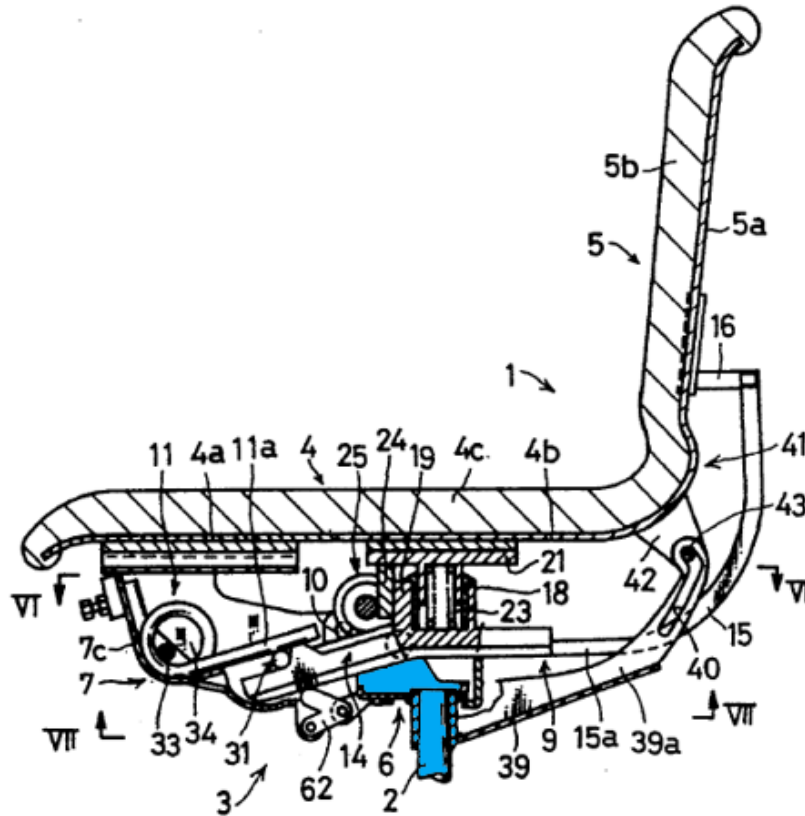


Ex. 1104, Fig. 2

2. [1.a] a frame,

168. In my opinion, Takamatsu '372 discloses a frame.

169. Takamatsu '372 discloses that the chair includes “support device 3 [which] comprises a fixed frame 6 attached to the upper end of the chair leg post 2.” Ex. 1104, 4:6-9. Figure 2, below, depicts the “fixed frame 6” and the “chair leg post 2” in blue. Ex. 1104, Fig. 2.



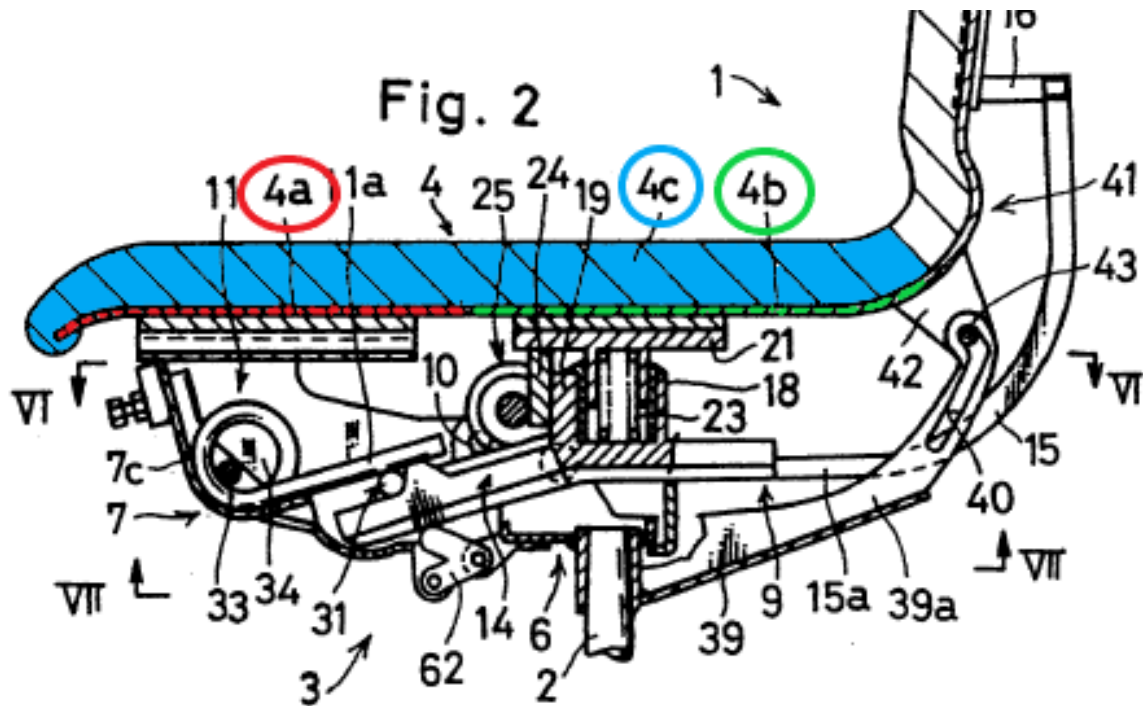
Ex. 1104, Fig 2 (annotated)

170. In my opinion, the “fixed frame 6” and the “chair leg post 2” comprise the claimed “frame.”

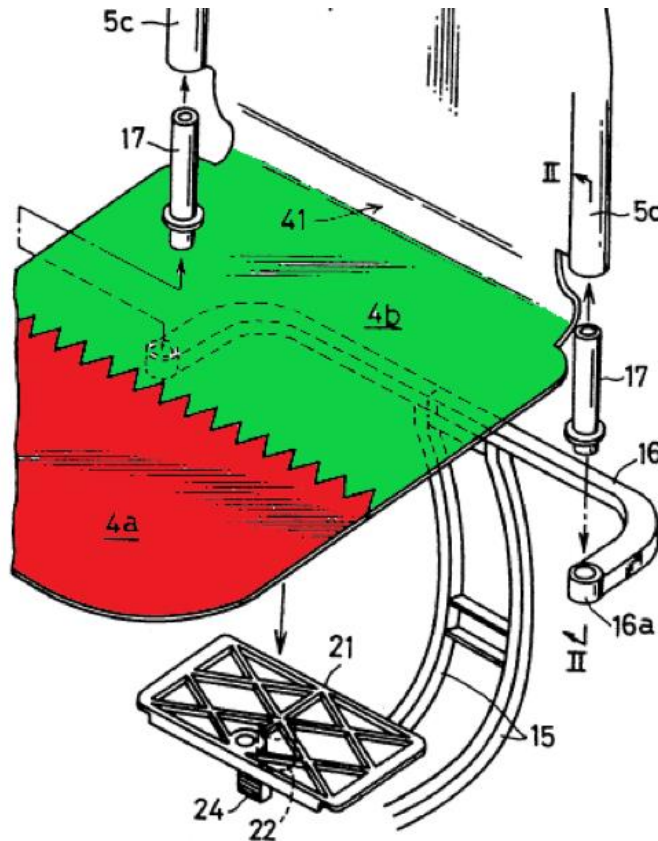
3. [1.b] a first component on the frame upon which a force is applied by a user in a first manner as an incident of the user assuming the operative position,

171. In my opinion, Takamatsu '372 discloses a first component on the frame upon which a force is applied by a user in a first manner incident to the user assuming the operative position. As discussed above in Section VI.D.2, it is my opinion that a PHOSITA would understand “a first component on the frame” to mean “a first component supported directly or indirectly by the frame.”

172. Takamatsu '372 discloses a first component indirectly supported by the frame. Takamatsu '372 explains that the “seat 4 [is] mounted on the support device 3.” Ex. 1104, 3:57-58. In particular, “seat 4 includes a seat front carrier plate 4a, a seat tail carrier plate 4b, and a seat cushion 4c attached on the respective carrier plates 4a, 4b.” Ex. 1104, 3:60-63. Annotated Figures 2 and 5, below, show the “seat front carrier plate 4a” in red, the “seat tail carrier plate 4b” in green, and the “seat cushion 4c” in blue (Fig. 2 only). Ex. 1104, Fig. 2; Fig 5.



Ex. 1104, Fig. 2 (annotated)



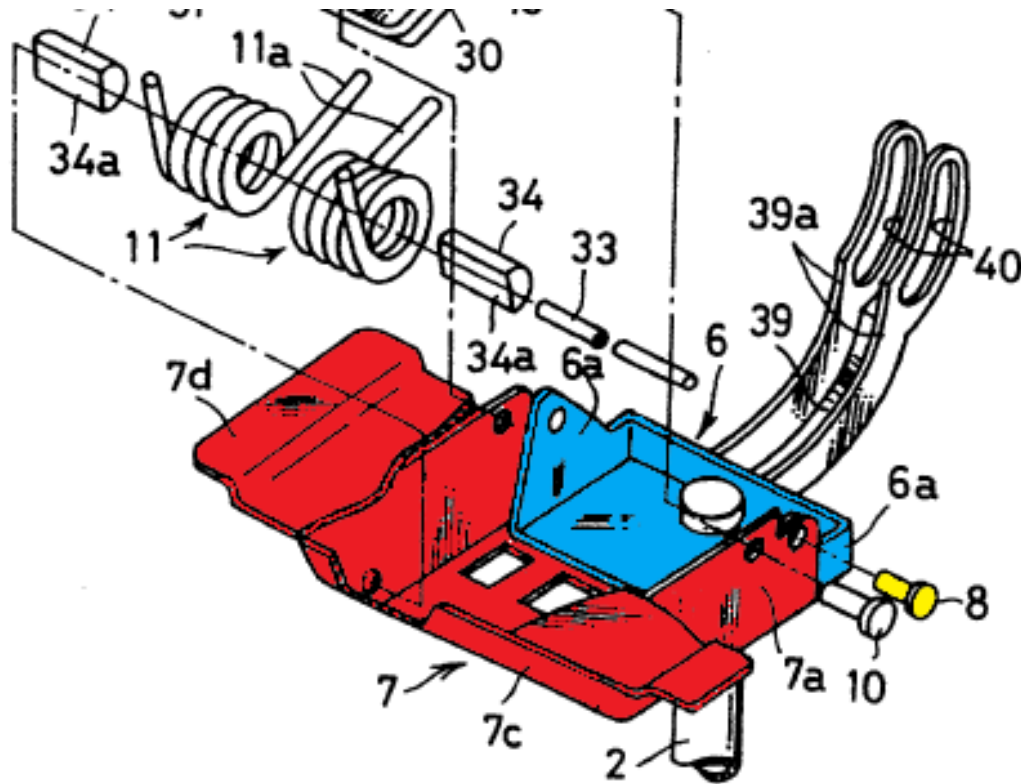
Ex. 1104, Fig. 5 (annotated)

173. The “seat front carrier plate 4a” is the first component.

174. First, seat front carrier plate 4a is indirectly supported by the frame. Takamatsu '372 explains that seat front carrier plate 4a is ultimately attached to a pivotal frame 7 that is attached to fixed frame 6. In particular, “the side flanges 7d of the pivotal frame 7 are attached to a front support plate 38 which, in turn, is attached to the underside of the seat front carrier plate 4a.” Ex. 1104, 6:27-30. Figures 8 and 3, below, show this connection, including the “pivotal frame 7” in red, the “front support plate 38” in blue (Fig. 8 only), and the “front carrier plate 4a” in green (Fig. 8 only). Ex. 1104, Fig. 8; Fig. 3.

175. Next, pivotal frame 7 is pivotally connected to fixed frame 6 (part of the claimed “frame”). In particular, Takamatsu ’372 describes that “pivotal frame 7...is pivotable about the first pivots 8 relative to the fixed frame 6.” Ex. 1104, 4:54-

56. Figure 3, below, shows this arrangement, including the “pivotal frame 7” in red, the “pivots 8” in yellow, and the “fixed frame 6” in blue. Ex. 1104, Fig. 3.



Ex. 1104, Fig. 3 (annotated)

176. In short, seat front carrier plate 4a is indirectly supported by the claimed “frame” via pivotal frame 7.

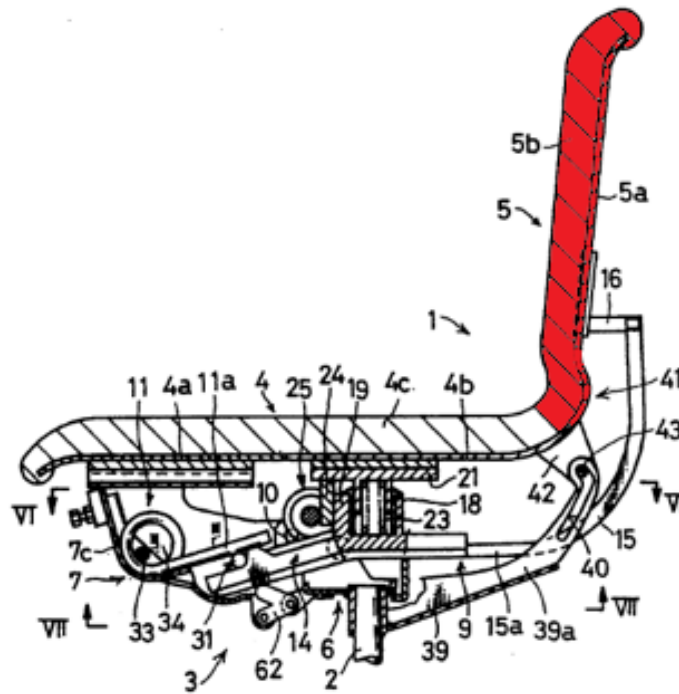
177. Second, a force is applied to seat front carrier plate 4a by a user in a first manner as an incident of the user assuming the operative position. In particular, “when the user sits on the seat 4,” Ex. 1104, 7:13-14,—i.e., the user assuming the operative position—a weight force is applied on seat front carrier plate 4a via cushion 4c.

178. Therefore, in my opinion, Takamatsu '372 discloses a first component on the frame upon which a force is applied by a user in a first manner as an incident of the user assuming the operative position.

- 4. [1.c] at least a second component on the frame that is movable relative to the first component and upon which a force can be applied by a user in the operative position in a second manner to reconfigure the apparatus by moving the at least second component relative to the first component; and**

179. In my opinion, Takamatsu '372 discloses at least a second component on the frame that is movable relative to the first component and upon which a force can be applied by a user in the operative position in a second manner to reconfigure the apparatus by moving the at least second component relative to the first component. As discussed above in Section VI.D.1, it is my opinion that a PHOSITA would understand “a second component on the frame” to mean “a second component supported directly or indirectly by the frame.”

180. Takamatsu '372 discloses a “seat back 5” that is “integral with the seat 4.” Ex. 1104, 3:58-59. Figure 2, below, depicts the “seat back 5” in red. Ex. 1104, Fig. 2.

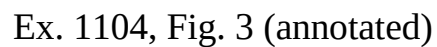


Ex. 1104, Fig. 2 (annotated)

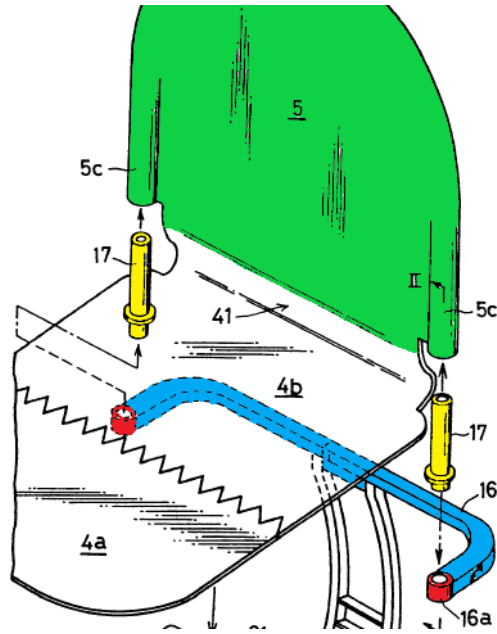
181. Seat back 5 is the “second component.”

182. First, seat back 5 is supported by the frame: Takamatsu '372 teaches that seat back 5 is attached to and pivots with a tiltable member 9, which is pivotally mounted on the frame. Takamatsu '372 explains that “tiltable member 9 includes...a pair of generally L-shaped frame bars 15,” Ex. 1104, 4:35-39, wherein the “upper end of the frame bar 15 is fixed to a horizontal connecting bar 16,” Ex. 1104, 4:60-62. The ends of horizontal connecting bar 16 are provided with “bushes 16a” that receive a “cylindrical member 17” that, in turn, is received in a “cylindrical receptacle 5c of the back carrier plate 5a,” which is part of seat back 5. Ex. 1104, 4:62-5:2. Figure 3, below, shows the “L-shaped frame bars 15” in green, the

183. Figure 5, below, shows the connection to seat back 5, including the “cylindrical member 17” in yellow, the “horizontal connecting bar 16” in blue, the “bushes 16a” in red, and the “cylindrical receptacle 5c,” and the “back carrier plate 5a” in green. Ex. 1104, Fig. 5.

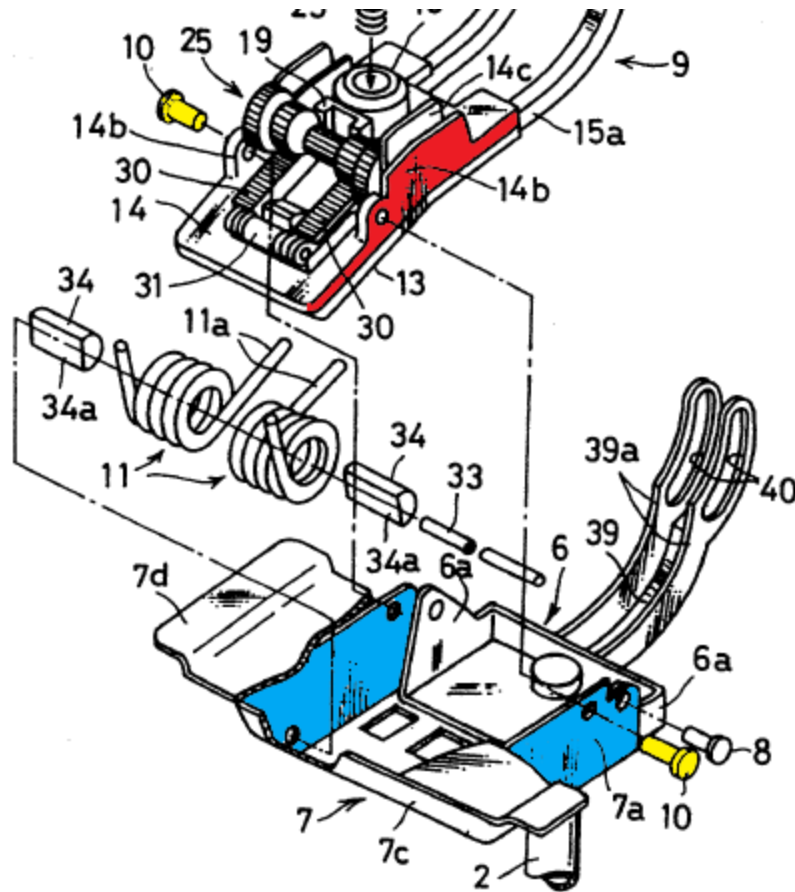


183. Figure 5, below, shows the connection to seat back 5, including the “cylindrical member 17” in yellow, the “horizontal connecting bar 16” in blue, the “bushes 16a” in red, and the “cylindrical receptacle 5c,” and the “back carrier plate 5a” in green. Ex. 1104, Fig. 5.



Ex. 1104, Fig. 5 (annotated)

184. The tiltable member 9, in turn, is pivotally connected to pivotal frame 7. Takamatsu '372 explains that a “mechanism carrier 14” of tiltable member 9 “has a pair of upwardly directed outer side brackets 14b” that are “connected respectively to the side walls 7a of the pivotal frame 7 by the respective second pivots 10.” Ex. 1104, 4:48-53. Figure 3, below, shows the “side brackets 14b” in red, the “side walls 7a” in blue, and the “pivots 10” in yellow.” Ex. 1104, Fig. 3.



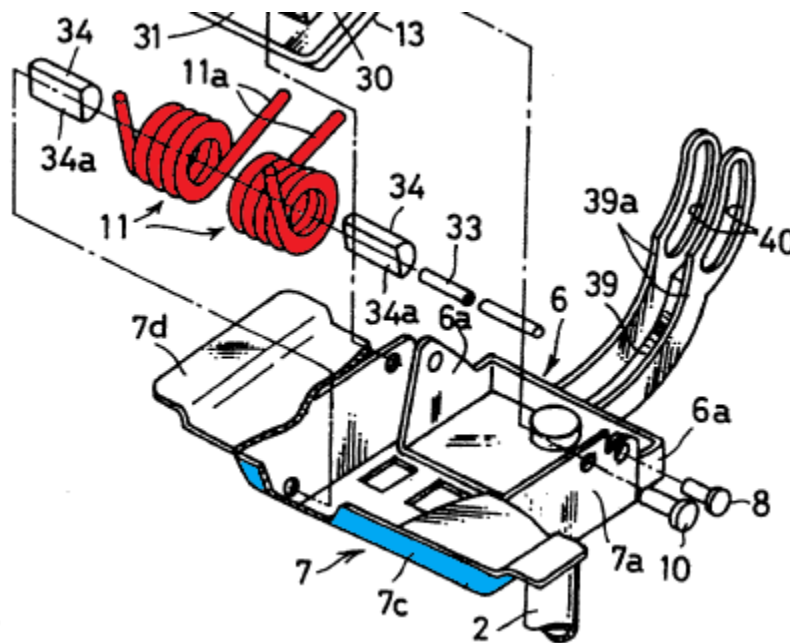
Ex. 1104, Fig. 3 (annotated)

185. As discussed above (§175), moreover, pivotal frame 7 is connected to the fixed frame 6, which is part of the claimed frame: “pivotal frame 7...is pivotable about the first pivots 8 relative to the fixed frame 6.” Ex. 1104, 4:54-56. Thus, seat back 5 is supported by the frame.

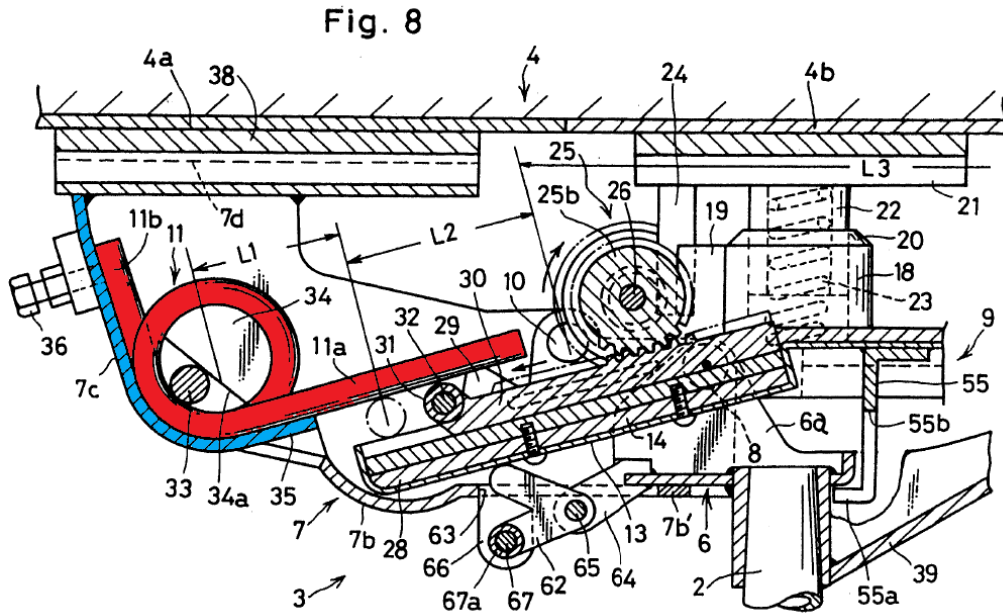
186. Second, seat back 5 is movable relative to seat front carrier plate 4a (the first component), and a force can be applied to seat back 5 in a “second manner” to move seat back 5 relative to seat front carrier plate 4a. Takamatsu ’372 explains that the “seat back” of the invention is “arranged” to “tilt rearwardly,” Ex. 1104, 1:61-

62, and that a “tilting control spring means” is provided for “elastically supporting the seat back against rearward tilting thereof,” *id.*, 1:63-64.

187. To that end, as explained above (§184), tiltable member 9, which pivots with seat back 5, is pivotally mounted to pivotal frame 7 about second pivots 10. The pivoting of tiltable member 9, moreover, “is elastically controlled by a pair of tilting control springs 11,” which are “in the form of [] torsion coil spring[s].” Ex. 1104, 4:27-31. Each tilting control spring 11 has “a load receiving leg 11a and an anchoring leg 11b engaging against the front wall 7c of the pivotal frame 7.” Ex. 1104, 4:32-34. Figures 3 and 8, below, show the “torsion control springs 11” in red and the “front wall 7c of the pivotal frame 7” in blue. Ex. 1104, Fig. 3; Fig. 8.

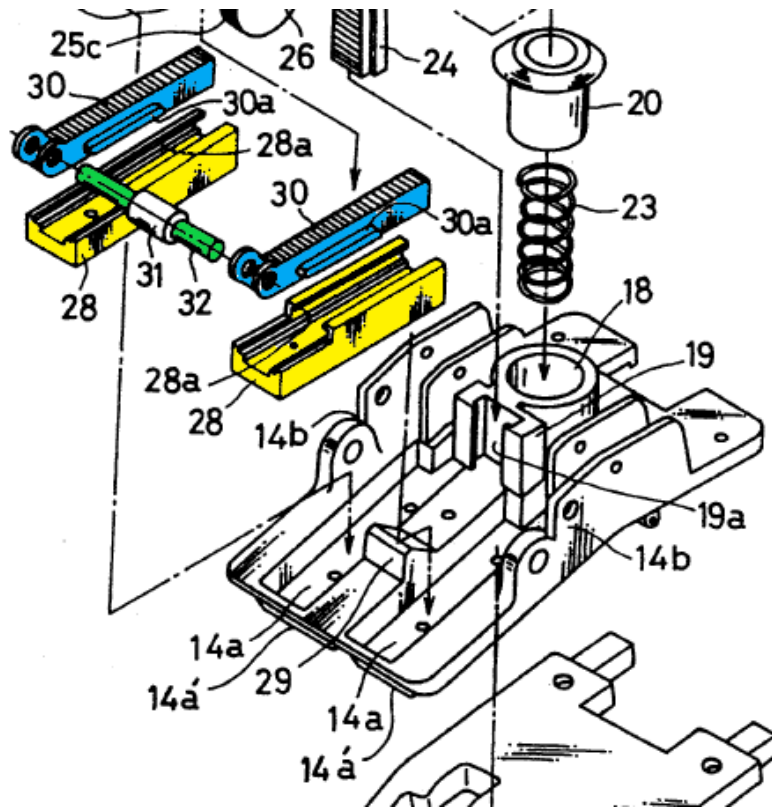


Ex. 1104, Fig. 3 (annotated)

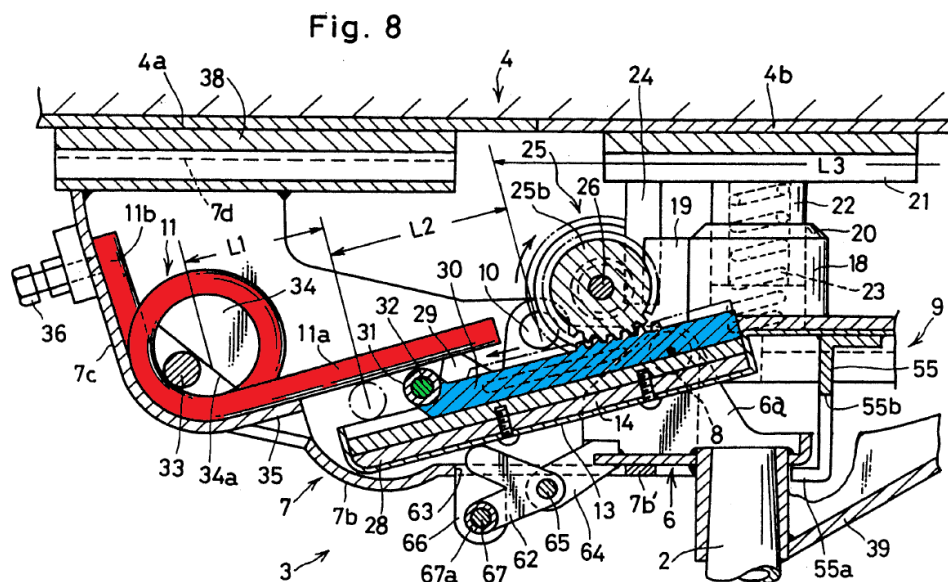


Ex. 1104, Fig 8 (annotated)

188. Tiltable member 9, for its part, bears on the load receiving legs 11a of each tilting control spring via horizontal load applying pin 32. In particular, horizontal load applying pin 32 is “carried by the respective second racks 30,” Ex. 1104, 5:49-52, which are received in “second rack guides 28” disposed on mechanism carrier 14 of tiltable member 9, *id.*, 5:32-35. Figures 4 and 8, below, show “horizontal load applying pin 32” in green, “second racks 30” in blue, “second rack guides 28” in yellow (Fig. 4 only), and “torsion control springs 11” in red (Fig. 8 only). Ex. 1104, Fig. 4; Fig. 8



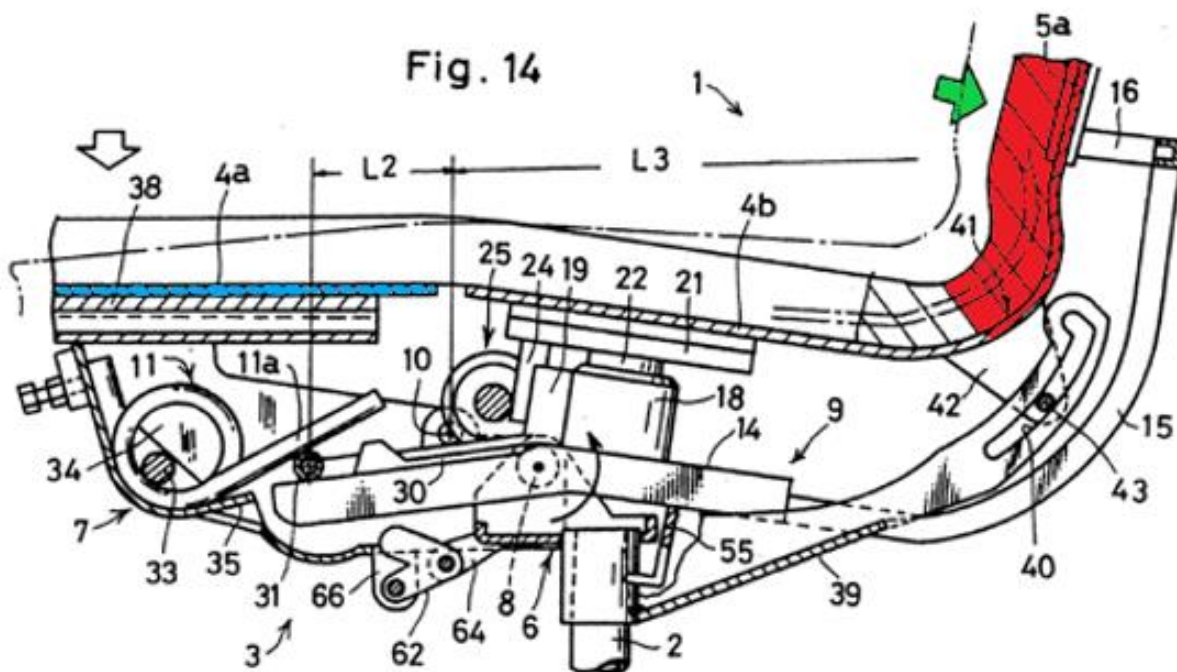
Ex. 1104, Fig. 4 (annotated)



Ex. 1104, Fig. 8 (annotated)

189. The “horizontal load applying pin 32” is also provided with a “load applying roller 31” that directly contacts the “load receiving legs 11a” of the respective control springs 11. Ex. 1104, 5:49-55.

190. Thus, when a user leans against backrest 5—the force being applied in the second manner—“the load receiving legs 11a of the tilting control springs 11 are elastically raised upward by the load applying roller 31,” and “the tiltable member 9 together with the seat back 5...is tilted rearwardly downward about the second pivots 10, as shown in Fig. 14.” Ex. 1104, 7:31-39. Figure 14, below, depicts “seat back 5” in red after a user has applied a leaning force (green arrow) such that seat back 5 has tilted relative to the “seat front carrier plate 4a” in blue. Ex. 1104, Fig. 14.



Ex. 1104, Fig. 14 (annotated)

191. As shown in Figure 14, the “seat front carrier plate 4a” has remained horizontal while the “seat back 5” has tilted rearwardly. Thus, the second component on the frame is movable relative to the first component as a result of the force applied in the second manner.

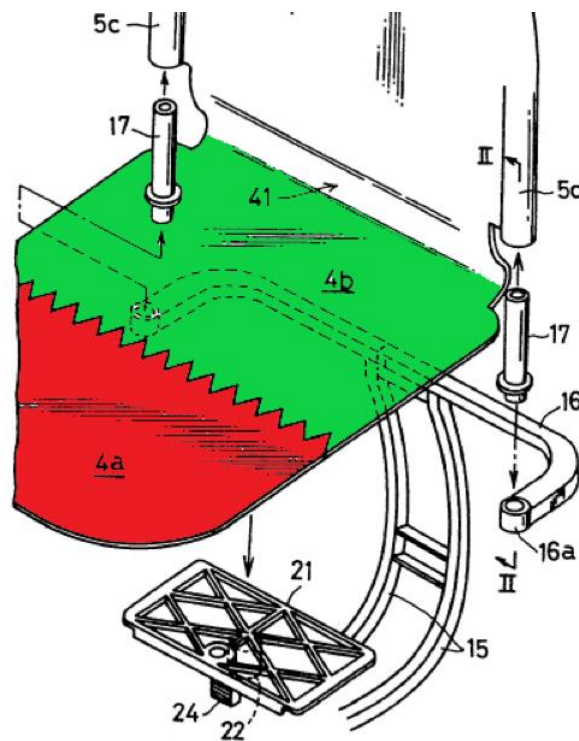
192. Therefore, in my opinion, Takamatsu ’372 discloses at least a second component on the frame that is movable relative to the first component and upon which a force can be applied by a user in the operative position in a second manner to reconfigure the apparatus by moving the at least second component relative to the first component.

5. [1.d] an adjusting assembly cooperating between the first component and the at least second component and configured so that as an incident of the force being applied in the first manner changing in magnitude, the force required to be applied in the second manner to reconfigure the apparatus and move the second component relative to the first component changes in magnitude.

193. In my opinion, Takamatsu ’372 discloses an adjusting assembly cooperating between the first component and the at least second component and configured so that as an incident of the force being applied in the first manner changing in magnitude, the force required to be applied in the second manner to reconfigure the apparatus and move the second component relative to the first component changes in magnitude. It is my opinion that Takamatsu ’372 discloses

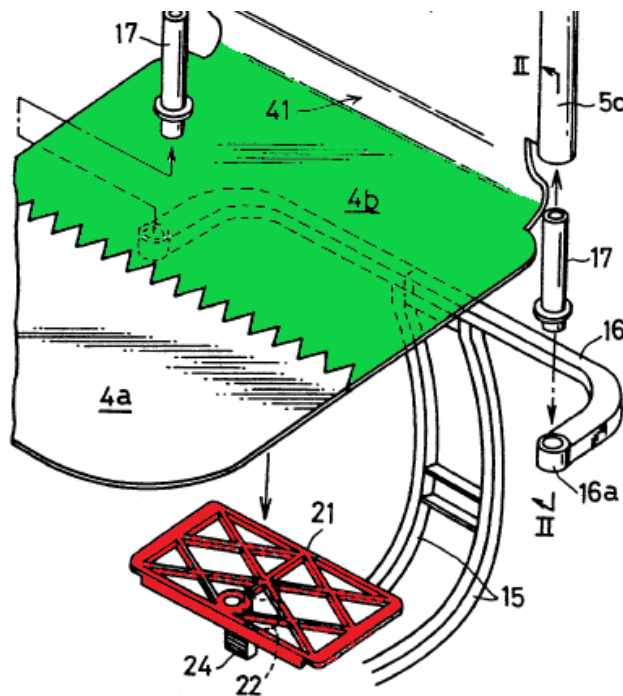
this limitation regardless of whether “adjusting assembly” is construed as a means-plus-function claim limitation.

194. First, as an incident of the force being applied in the first manner changing in magnitude, the force required to be applied in the second manner to reconfigure the apparatus and move the second component relative to the first component changes in magnitude. As explained above, Takamatsu '372 discloses that the “seat 4 includes a seat front carrier plate 4a” and a “seat tail carrier plate 4b” Ex. 1104, 3:60-63. Annotated Figure 5, below, shows the “seat front carrier plate 4a” in red, and the seat tail carrier plate 4b” in green, and that they are connected. Ex. 1104, Fig. 5.



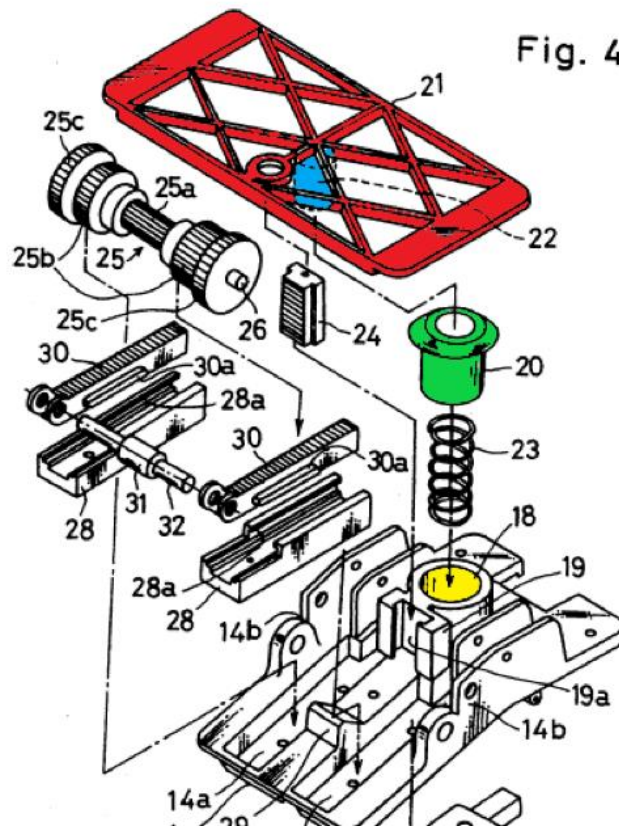
Ex. 1104, Fig. 5 (annotated)

195. As an incident of the force being applied in the first manner changing in magnitude, seat tail carrier plate 4b moves down relative to the frame. To this end, the seat tail carrier plate 4b is attached to a rear support plate 21 that, in turn, is received in mechanism carrier 14 of tiltable member 9. In particular, Takamatsu '372 explains that “a rear support plate 21...is attached to the underside of the seat tail carrier plate 4b.” Ex. 1104, 5:8-10. Rear support plate 21 has a “downwardly directed housing cylinder 22” that is received in “guide bush 20.” Ex. 1104, 5:10-13. Guide bush 20, in turn, is received in “cylindrical boss 18” formed in “mechanism carrier 14,” which forms part of tiltable member 9. Ex. 1104, 5:3-5. Figure 5 depicts the “rear support plate 21” in red and the “seat tail carrier plate 4b” in green. Ex. 1104, Fig. 5.



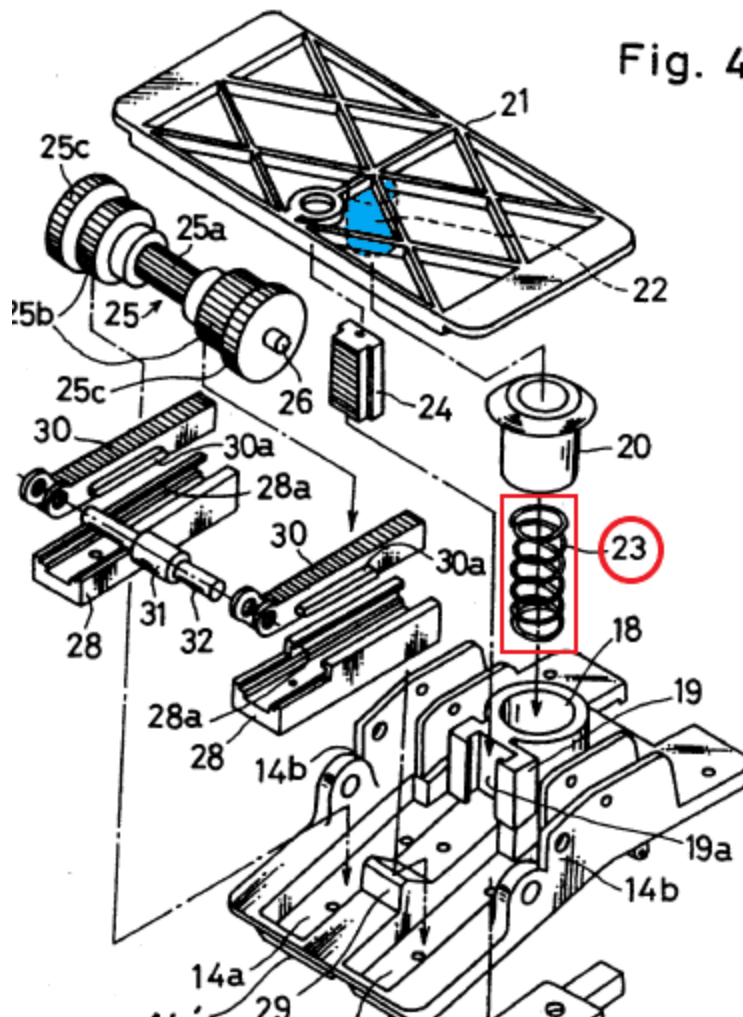
Ex. 1104, Fig. 5 (annotated)

196. Figure 4 depicts the “rear support plate 21” in red, the “downwardly directed housing cylinder 22” in blue, the “guide bush 20” in green, and the “cylindrical boss 18” in yellow. Ex. 1104, Fig 4.



Ex. 1104, Fig. 4 (annotated)

197. Additionally, the “housing cylinder 22 accommodates a weight responsive coil spring 23 resting on the mechanism carrier 14.” Ex. 1104, 5:13-15. Figure 4, below, depicts the “housing cylinder 22” in blue, and the “weight responsive coil spring 23” that it accommodates in red. Ex. 1104, Fig. 4.



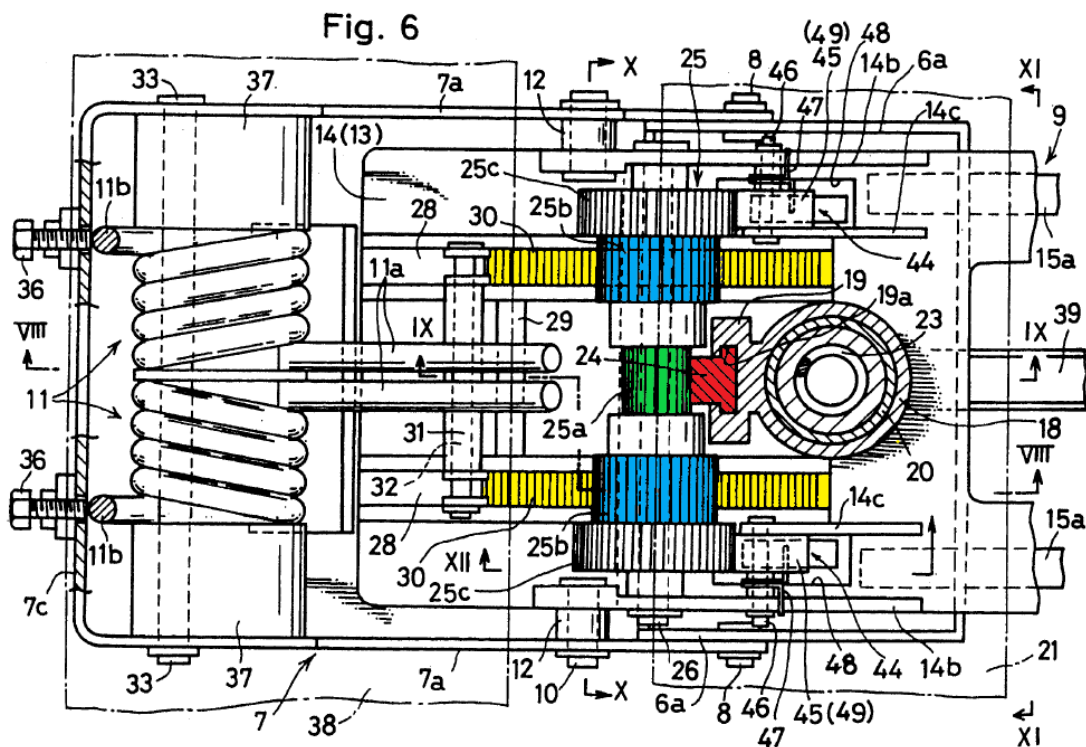
Ex. 1104, Fig. 4 (annotated)

198. Thus, “when the user sits on the seat 4, the seat tail carrier plate 4b of the seat 4 moves downward against the weight responsive spring 23 by an amount substantially proportional to the particular weight of the user.” Ex. 1104, 7:13-17.

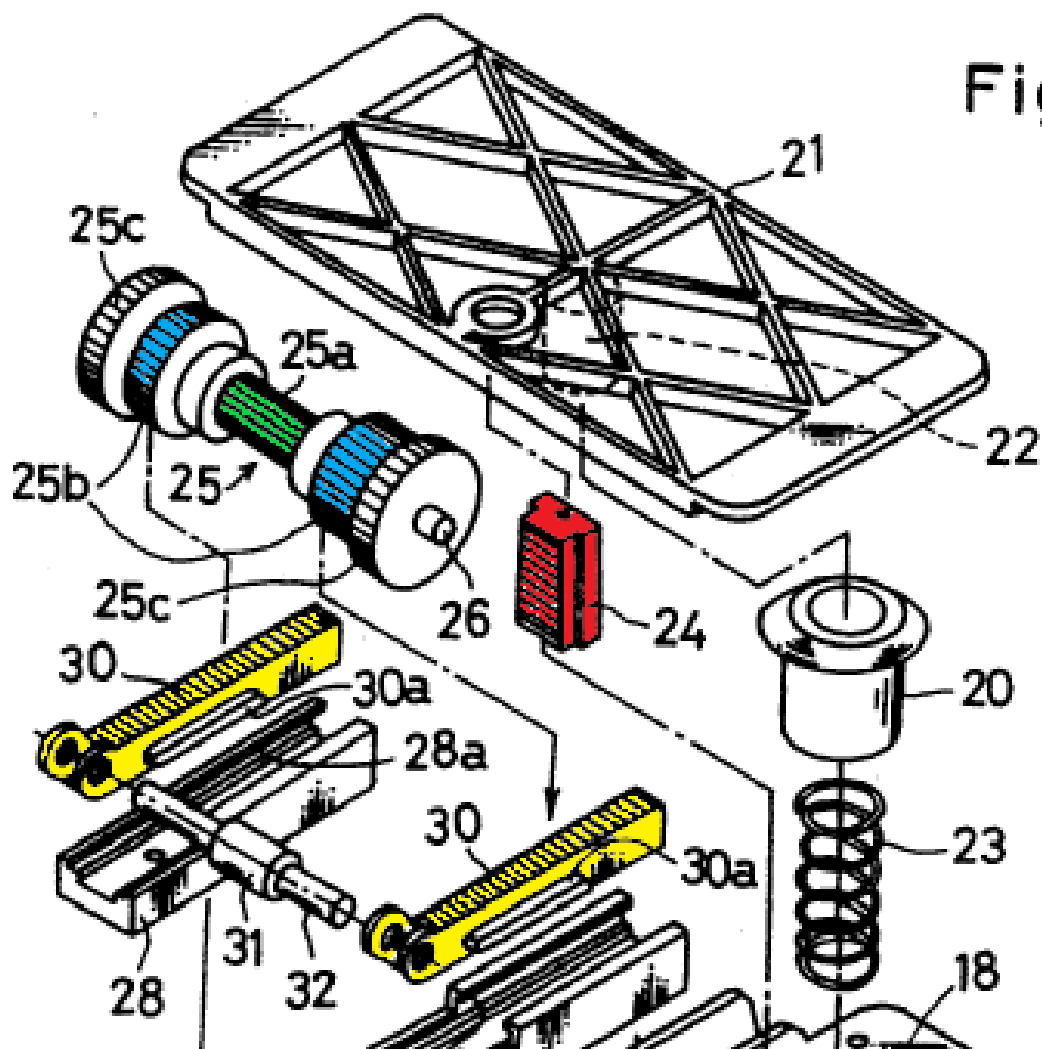
199. This downward movement of seat tail carrier plate 4b increases the amount of force required to tilt seat back 5 (the second component) relative to seat front carrier plate 4a (the first component). To this end, Takamatsu '372 discloses a “first rack 24,” which is part of “rear support plate 21.” Ex. 1 104, 5:19-21. First rack

24 engages with “the first pinion 25a,” which is part of a larger “pinion assembly 25” that is mounted on mechanism carrier 14 of tiltable member 9. Ex. 1104, 5:25-31. Pinion assembly 25 also includes a shaft 26 that supports a pair of “second pinions 25b,” which mesh with the “second rack[s] 30” arranged in “second rack guide[s] 28” disposed on mechanism carrier 14. Ex. 1104, 5:25-37.

200. Figures 6 and 4, below, depict this arrangement, including the “first rack 24” in red, the “first pinion 25a” in green, the “second pinions 25b” in blue, and the “second racks 30” in yellow. Ex. 1104, Fig. 6; Fig. 4.



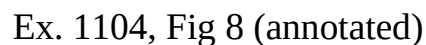
Ex. 1104, Fig 6 (annotated)



Ex. 1104, Fig. 4 (annotated)

201. As discussed above (¶¶188-189), the horizontal load applying pin 32 is “carried by the respective second racks 30.” Ex. 1104, 5:49-55. Thus, when seat tail carrier plate 4b moves down against the force of weight responsive spring 23, horizontal load applying pin 32 is driven toward the center of control springs 11. In particular, the “downward movement of the seat tail carrier plate 4b” causes “downward movement of the first rack 24,” which “engag[es] with the first pinion

202. Figure 8, annotated below, shows how the rotational movement of pinion assembly 25 (yellow-highlighted arrow), driven by downward movement of first rack 24, causes movement of second racks 30 (green-highlighted arrow) and thus load applying pin 32 (colored in red). Ex. 1104, Fig. 8.



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provided by each tilting control spring 11 is automatically adjusted to suit the weight of the user because the load applying pin 32...is displaced relative to the load receiving leg 11a of the spring 11 proportionally to the weight of the user.” Ex. 1104, 7:65-8:4.

205. Takamatsu ‘372 further explains this phenomenon as follows:

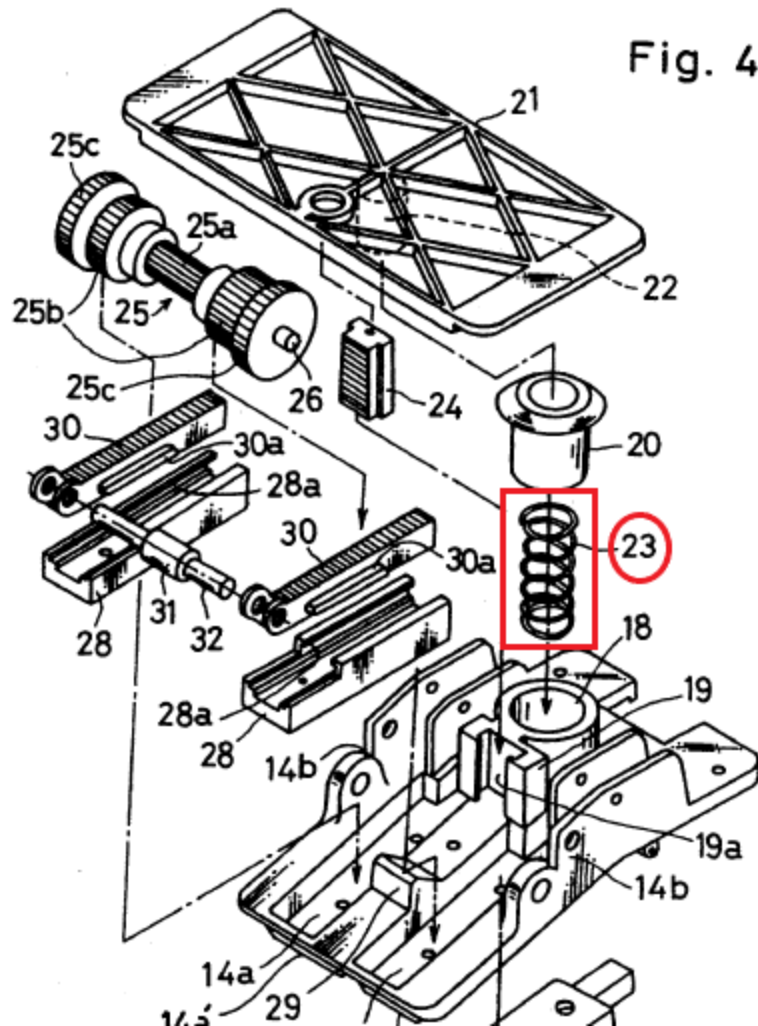
First, the effective length L1...of the tilting control spring 11 reduces progressively as the weight of the user increases, whereas the degree of spring torsion per unit vertical displacement of the load applying pin 32 increases progressively as the effective length L1 reduces. Thus, the tilting control spring 11 provides a larger supportive force for a heavier user than for a lighter user. Secondly, the pivotal arm length L2...of the load applying pin 32, which is defined as the distance between the load applying pin 32 and the second pivots 10, increases progressively as the weight of the user increases, while the vertical displacement of the load applying pin 32 per unit pivotal angle of the tiltable member 9 increases progressively as the pivotal arm length L2 increases. Further, the torsioning degree of the tilting control spring 11 increases progressively as the vertical displacement of the load applying pin 32 increases. Thus, the spring 11 reacts more strongly for a heavier user than for a lighter user. In the third place, the pivotal arm length L3 (FIGS. 8 and 14) of the seat back 5, which is defined as the distance between the seat back 5 and the second pivots 10, is always constant, whereas the pivotal arm length L2 of the load applying pin 32 increases progressively as the weight of the user increases. Further, according to the force balance rule of leverage, when the pivotal arm length L2 of the load applying pin 32 increases, the tilting control spring 11 need only to apply a smaller reaction force to balance with a given weight or force applied to the seat back 5. Thus, the spring 11 can be considered to become stronger for a heavier user than for a lighter user although the spring constant of the spring 11 itself does not change.

Ex. 1104, 8:5-39.

206. Thus, when a user sits on seat 4 (the force being applied in the first manner changing), seat tail carrier plate 4b moves down, causing the translation of load applying pin 32 relative to load receiving legs 11a, which increases the amount of force required to seat back 5 (the second component) relative to seat front carrier plate 4a (the first component). Put another way, “the tilting control spring 11 provides a larger supportive force for a heavier user than for a lighter user.” Ex. 1104, 8:10-12.

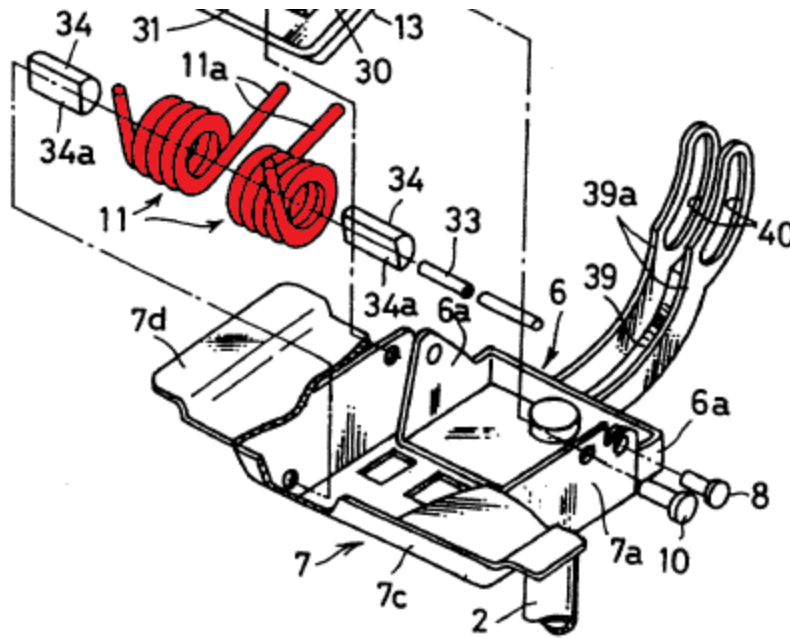
207. Second, in the event that “adjusting assembly” is construed as an MPF claim term, it is my opinion that Takamatsu ’372 discloses the claimed “adjusting assembly.” As discussed above in Section VI.D.1, it is my opinion that “adjusting assembly” is an MPF claim term. Takamatsu ’372 discloses this claim term because it discloses the same or equivalent structures that provide the same function.

208. As for the weighing springs, Takamatsu ’372 discloses a “weight responsive coil spring 23,” Ex. 1104, 5:13-15, that is the same as the coil spring 33 disclosed in the DeJule ’498 Patent. In Fig. 4 of Takamatsu ’372 below, the coil spring 23 is annotated in red. Ex. 1104, Fig. 4.



Ex. 1104, Fig. 4 (annotated)

209. As for the tilting springs, Takamatsu '372 discloses "tilting control springs 11," Ex. 1104, 4:27-29, that are equivalent to leaf spring 19 disclosed in the DeJule '498 Patent. In Figure 8 of Takamatsu '372, reproduced below, the tilting control springs 11 have been colored red. Ex. 1104, Fig. 3.



component and configured so that as an incident of the force being applied in the first manner changing in magnitude, the force required to be applied in the second manner to reconfigure the apparatus and move the second component relative to the first component changes in magnitude.

B. DEPENDENT CLAIM 18

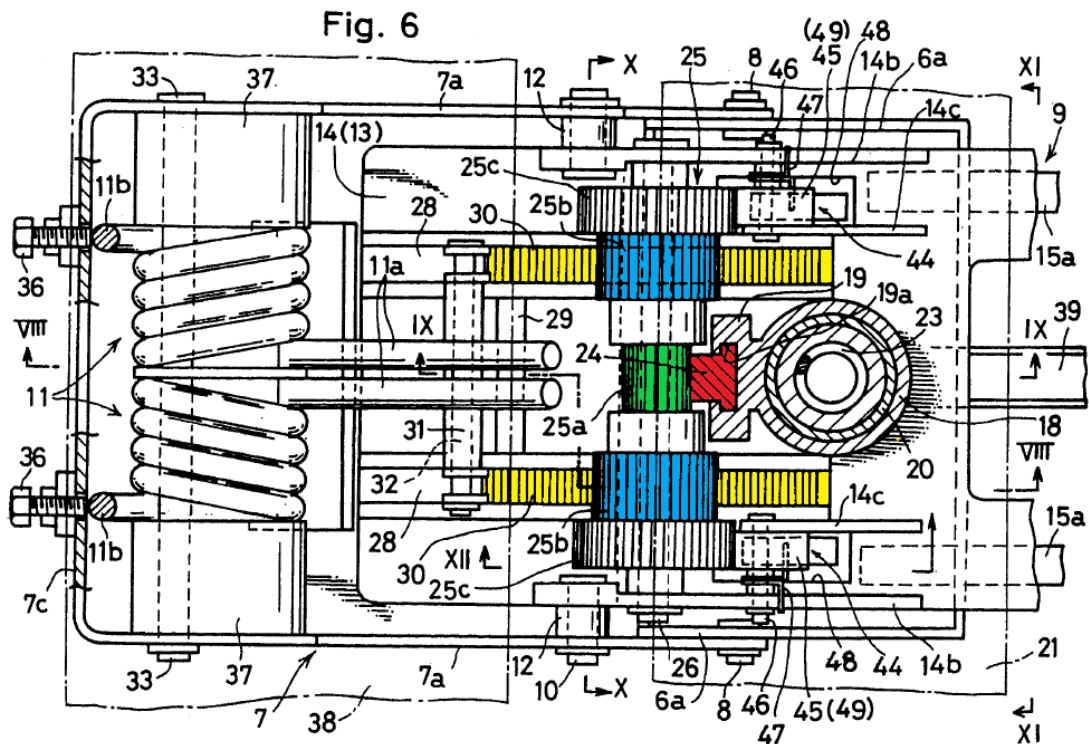
The reconfigurable apparatus according to claim 1 wherein the adjusting assembly comprises cooperating toothed elements that move relative to each other as a magnitude of the force applied in the first manner reaches a predetermined level.

213. As explained in ¶¶166-212, Takamatsu '372 discloses the limitations of claim 1.

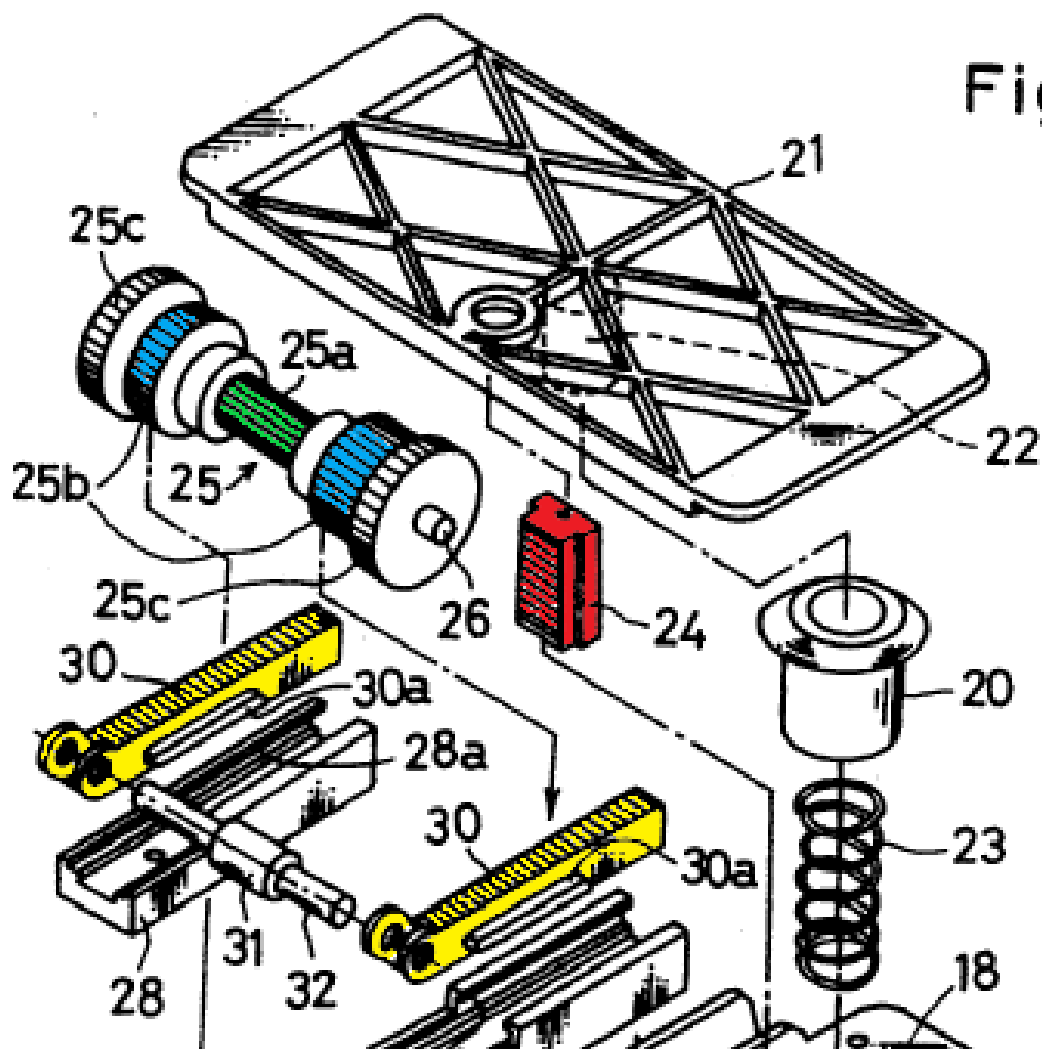
214. In my opinion, Takamatsu '372 discloses wherein the adjusting assembly comprises cooperating toothed elements that move relative to each other as a magnitude of the force applied in the first manner reaches a predetermined level.

215. First, Takamatsu '372 discloses cooperating toothed elements. Specifically, as discussed above (¶¶199-200), Takamatsu '372 discloses a “first rack 24,” which is part of “rear support plate 21.” Ex. 1104, 5:19-21. First rack 24 engages with “the first pinion 25a,” which is part of a larger “pinion assembly 25.” Ex. 1104, 5:25-31. Pinion assembly 25 also includes a shaft 26 that supports a pair of “second pinions 25b,” which are “diametrically larger” than the first pinion 25a. Ex. 1104,

5:25-31. Second pinions 25b, in turn, mesh with a pair of “second rack[s] 30” arranged in “second rack guide[s] 28” disposed on mechanism carrier 14. Ex. 1104, 5:32-37. Figures 6 and 4, below, show these cooperating toothed elements, including the “first rack 24” in red, the “first pinion 25a” in green, the “second pinions 25b” in blue, and the “second racks 30” in yellow. Ex. 1104, Fig. 6; Fig. 4.



Ex. 1104, Fig. 6 (annotated)



Ex. 1104, Fig 4 (annotated)

216. Second, Takamatsu '372 discloses that these toothed elements move relative to each other as a magnitude of the force applied in the first manner reaches a predetermined level. As discussed above (§§201-202), Takamatsu '372 explains that when a user sits in the seat, the “downward movement of the seat tail carrier plate 4b” causes “downward movement of the first rack 24,” which “engag[es] with the first pinion 25a, thereby rotating the pinion assembly 25.” Ex. 1104, 7:17-24.

This rotation of pinion assembly 25 “causes the second racks 30 in mesh with the second pinions 25b to advance with the load applying pin 32,” which is carried by the second racks 30. *Id.*

217. As discussed above (¶198), moreover, Takamatsu '372 explains that “when the user sits on the seat 4, the seat tail carrier plate 4b of the seat 4 moves downward against the weight responsive spring 23 by an amount substantially proportional to the particular weight of the user. Ex. 1104, 7:13-17. In other words, the force applied in the first manner (a user sitting on seat 4) must reach a “predetermined level” in order to compress weight responsive springs such that seat tail carrier plate 4b will move down and cause the toothed elements to cooperate and move relative to each other.

218. Therefore, in my opinion, Takamatsu '372 discloses the adjusting assembly comprises cooperating toothed elements that move relative to each other as a magnitude of the force applied in the first manner reaches a predetermined level.

X. CLAIM 18 IS OBVIOUS IN VIEW OF THE COMBINATION OF TAKAMATSU '318 AND TAKAMATSU '372

219. For reasons I will address in more detail below, it is also my opinion that, at the time of the alleged invention of the DeJule '498 Patent, a PHOSITA would have combined Takamatsu '318 and Takamatsu '372 in a manner that renders claim 18 obvious.

220. Claim 18 depends from independent claim 1 and further recites “wherein the adjusting assembly comprises cooperating toothed elements that move relative to each other as a magnitude of the force applied in the first manner reaches a predetermined level.” Ex. 1101, 14:22-25. As discussed above (¶¶73-105), it is my opinion that Takamatsu '318 discloses the elements of independent claim 1. In addition, as discussed above, it is my opinion that Takamatsu '372 discloses the elements of independent claim 1 (see ¶¶166-212) as well as the elements of claim 18 (see ¶¶213-218), including the recited “cooperating toothed elements” in the form of rack gears and pinion gears.

221. As I explain below, it is my opinion that a PHOSITA would have been motivated to implement the rack and pinion gears disclosed in Takamatsu '372 with the mechanism disclosed in Takamatsu '318 to improve the sensitivity thereof to variations in the weight of the user. Such a combination, moreover, would have been well within the skill of a PHOSITA to achieve, and a PHOSITA would have had a

reasonable expectation of success in making it. Finally, such a combination discloses the elements of claim 18 of the DeJule '498 Patent.

**A. A PHOSITA WOULD HAVE BEEN MOTIVATED TO COMBINE
TAKAMATSU '318 WITH TAKAMATSU '372**

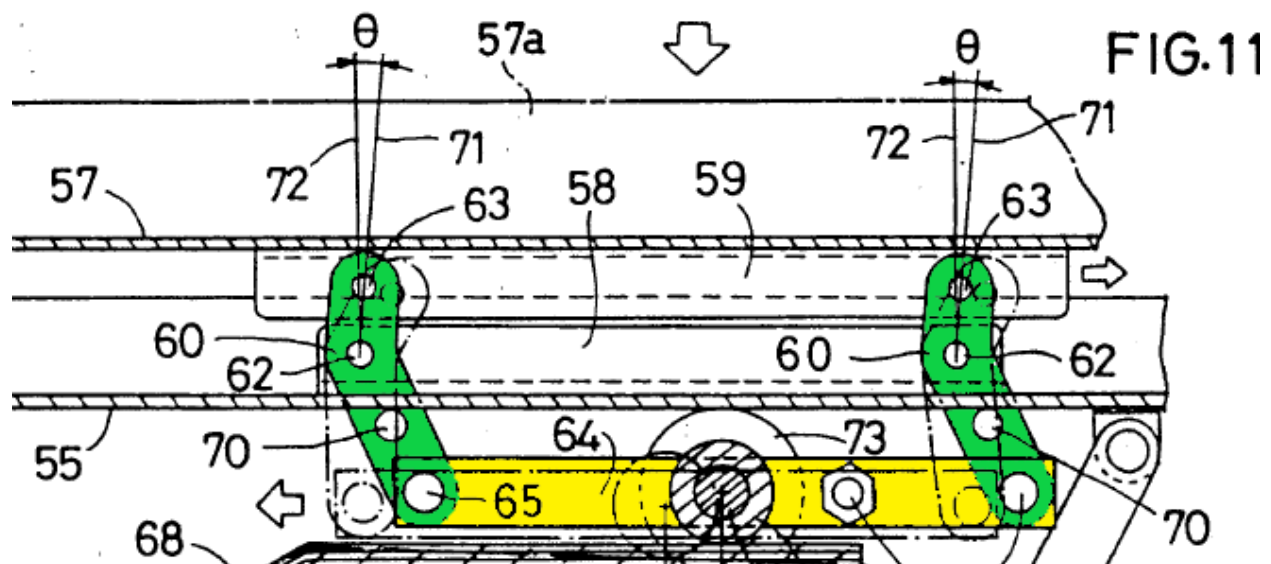
222. In my opinion, a PHOSITA would have been motivated to implement the rack gears and pinion gears disclosed in Takamatsu '372 with the mechanism of Takamatsu '318.

223. Takamatsu '318 and Takamatsu '372 disclose seating mechanisms with the same objective: automatically adjusting the amount of force required to tilt the seat back based on the weight of the user. To do so, both mechanisms operate in a similar fashion: they convert downward movement of the seat into horizontal movement of another component that shortens the effective length of a spring element that controls tilting of the backrest. However, they do so in different ways: Takamatsu '318 converts vertical movement of the seat into horizontal movement of an operating arm using pivoting bent links, and Takamatsu '372 converts vertical movement of the seat into substantially horizontal movement of a load applying pin using rack and pinion gears.

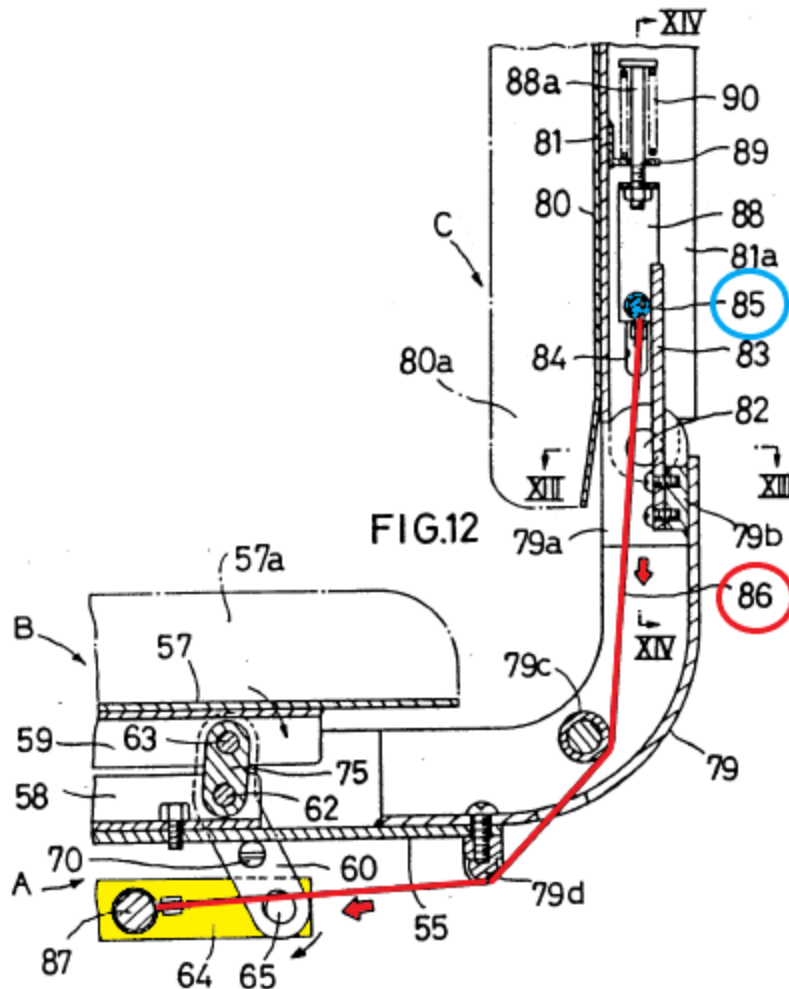
224. In particular, Takamatsu '318 adjusts the amount of force required to tilt chair back C relative to seat B by converting downward movement of seat B into a shorter effective length of the tilting control plate springs 83 that resist tilting of

chair back C. To this end, as discussed above, “when the user sits on the seat B, the seat plate 57 is displaced downward toward the seat base 55 against the weight responsive springs 77,” which “causes the bent links 60 to pivot so that their lower ends are moved forward together with the operating arms 64.” Ex. 1103, 9:19-25. As a result, a “pull band 86,” connected to operating arms 64 on one end and to contact pins 85 on the other, pulls on contact pins 85 and “cause[s] [them] to move downward against [a] compression spring 90” such that “the load supporting span of the second tilting control spring 83 is reduced from an initial value L3 to a new one L4.” *Id.*, 10:13-21.

225. Figures 11 and 12, below, show the pivoting bent links 60 in green (Fig. 11 only), the operating arms 64 in yellow, the pull band 86 in red (Fig. 12 only), and the contact pin 85 in blue (Fig. 12 only). Ex. 1103, Figs. 11, 12.



Ex. 1103, Fig. 11 (annotated)

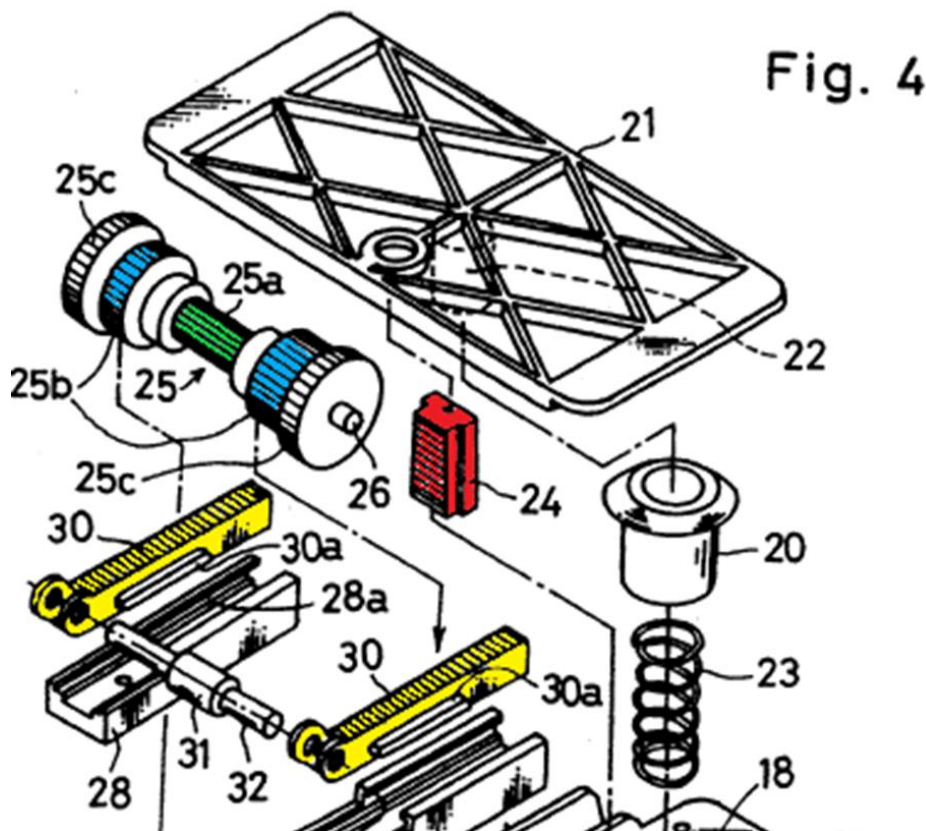


Ex. 1103, Fig. 12 (annotated)

226. In other words, the mechanism of Takamatsu '318 converts downward movement of seat B into horizontal movement of operating arms 64 via the pivoting of bent links 60.

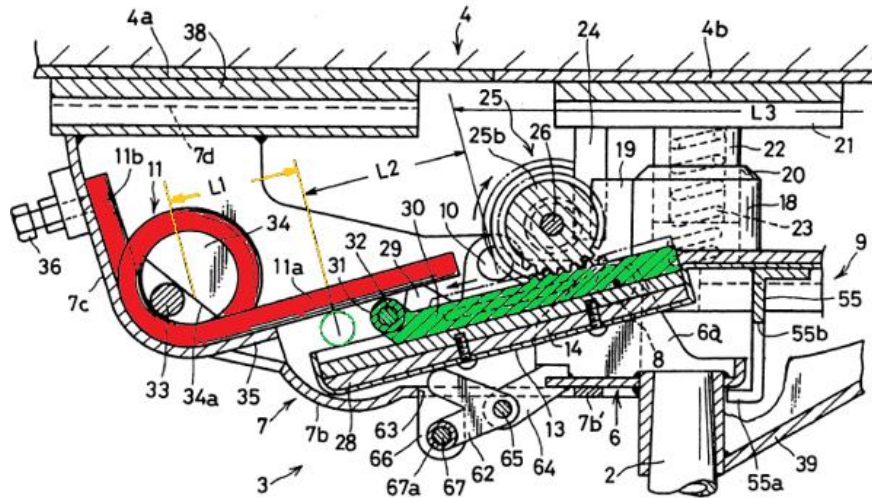
227. As to Takamatsu '372, the mechanism adjusts the amount of force required to tilt seat back 5 by converting downward movement of seat tail carrier plate 4b into a shorter effective length of the load receiving legs 11a of the tilting control springs 11 that resist tilting of seat back 5. To this end, as discussed above,

when the user sits on seat 4, “seat tail carrier plate 4b...moves downward” with a “first rack 24” that “engag[es] with the first pinion 25a, thereby rotating the pinion assembly 25,” which includes second pinions 25b. Ex. 1104, 7:13-21. This rotation “causes the second racks 30 in mesh with the second pinions 25b to advance with the load applying pin 32” such that “the effective length L1 (FIG. 8) of the load receiving leg 11a of each tilting control spring 11...reduces generally proportionally to the weight of the user.” *Id.*, 7:21-30. Figure 4, below, shows the first rack 24 in red, the first pinion 25a in green, the second pinions 25b in blue, and the second racks 30 in yellow. Ex. 1104, Fig. 4.



Ex. 1104, Fig. 4 (annotated)

228. Figure 8, below, shows how the advancement of second racks 30 and load applying pin 32 (both green) shortens the effective length L1 (orange) of the load receiving legs 11a of the tilting control springs 11 (red). Ex. 1104, Fig. 8.



Ex. 1104, Fig. 8 (annotated)

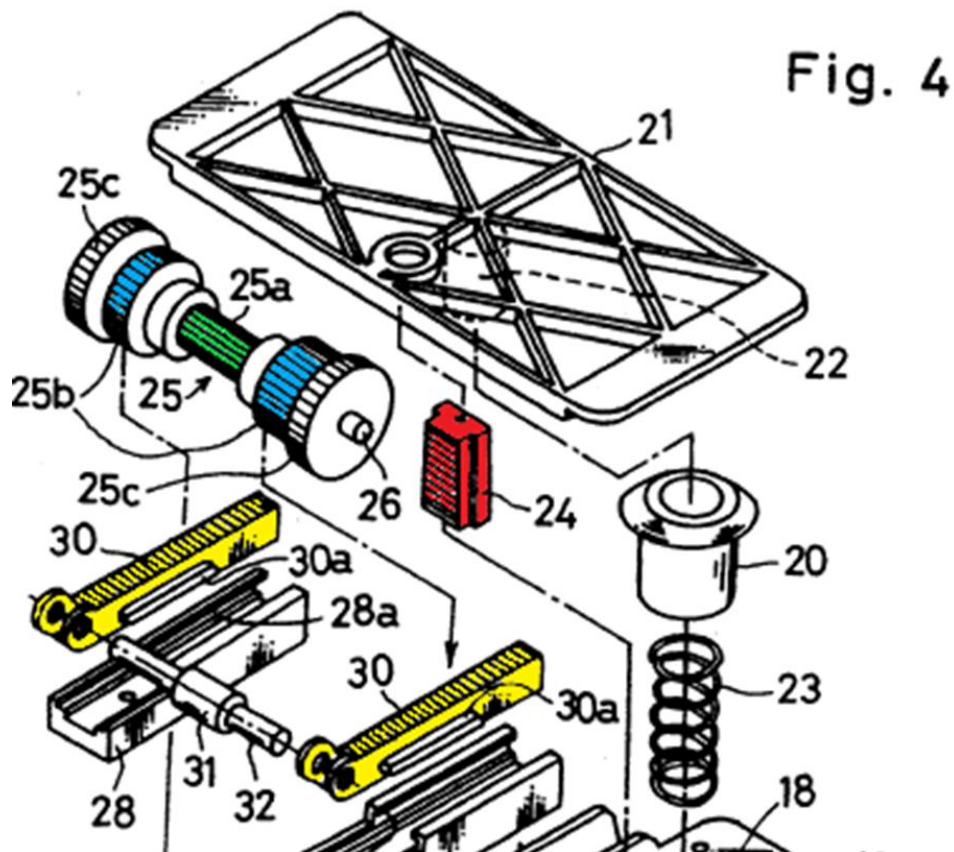
229. In other words, the mechanism of Takamatsu '372 converts downward movement of seat tail carrier plate 4b into substantially horizontal movement of load applying pin 32 via a vertical rack (first rack 24), co-axial pinions gears (first pinion 25a and second pinions 25b), and horizontal racks (second racks 30).

230. In sum, the mechanisms of Takamatsu '318 and Takamatsu '372 both operate to convert vertical movement of one component into horizontal or substantially horizontal movement of another component to reduce the effective length of a spring component. Both mechanisms do so, moreover, to achieve the same objective: automatically adjusting the amount of force required to tilt the backrest based on the weight of the user.

231. Thus, a PHOSITA would have considered and looked to both references when designing a weight-sensitive mechanism for adjusting tilting resistance. In doing so, a PHOSITA would have been motivated to implement the rack gears and pinion gears of Takamatsu '372 with the mechanism of Takamatsu '318.

232. First, a PHOSITA would have been motivated to make this combination in view of the express teachings of Takamatsu '318 and Takamatsu '372. Takamatsu '318 teaches that an “object” of its “invention is to make the automatic adjustment of the spring constant [of tilting control springs] **highly sensitive** to weight variations.” Ex. 1103, 1:64-66 (emphasis added). In other words, Takamatsu '318 teaches that the automatic adjustment of the tilting resistance should be very responsive, or sensitive, to users of different weights.

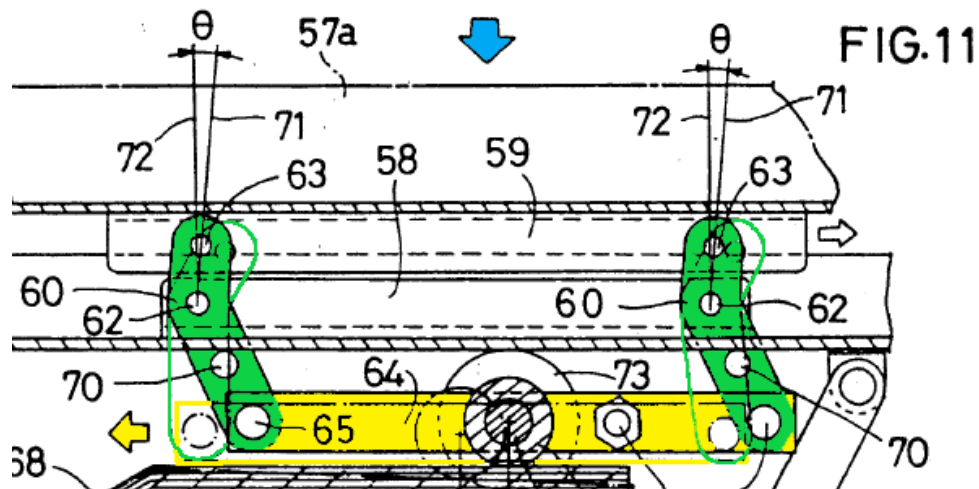
233. A PHOSITA would have recognized that the rack and pinion gears of Takamatsu '372 provide excellent sensitivity to changes in a user's weight. Because of the ratio of the diameters of the second pinions 25b (blue below) to the diameter of the first pinion 25a (green below), even a relatively small downward movement of the seat (and thus rack 24 (red below)) can produce a significant horizontal movement of second racks 30 (and thus load applying pin 32) (yellow below). Ex. 1104, Fig. 4.



Ex. 1104, Fig. 4 (annotated)

234. In other words, even a relatively small variation in the weight of the user can provide a significant change in the tilting resistance (via the shortening of the effective length of the spring component). As Takamatsu '372 explains, “the second pinions 25b...are diametrically larger than the first pinion 25a” such that “the advancing stroke of the second racks 30...can be rendered larger than the downward stroke of the first rack 24.” Ex. 1104, 8:45-52. In this way, “it is possible to **increase the sensitivity** in automatically adjusting the supportive force of the tilting control springs 11 against tilting of the tiltable member 9 (namely, the seat back 5).” *Id.*, 8:52-56 (emphasis added).

235. A PHOSITA would understand, moreover, that the rack and pinion gears of Takamatsu '372 can provide greater sensitivity than the pivoting bent links of Takamatsu '318. Given size constraints on seating mechanisms, the bent links 60 of Takamatsu '318 are not capable of converting a relatively small vertical movement of seat B into a significantly larger horizontal movement of operating arm 64. The “phantom lines” in Figure 11 below, which show the position of the bent links 60 (green below) after seat B moves down, bear this out: the horizontal displacement of operating arms 64 (yellow below) is not significantly larger than the vertical displacement of Seat B. Ex. 1103, Fig. 11; *id.*, 9:19-26.



Ex. 1103, Fig. 11 (annotated)

236. Nor is it feasible to achieve a significantly more sensitive mechanism using bent links. To achieve a meaningfully higher ratio of horizontal displacement to vertical displacement (and thus increased sensitivity), bent links 60 would have to be significantly longer, such that a small vertical movement would result in a large

horizontal displacement. However, a PHOSITA would understand significantly longer bent links are not feasible in seating mechanisms, which must be relatively compact. For instance, Takamatsu '318 explains that one benefit of its mechanism is that it can be “arranged...in a space-saving manner” such that its chair is “relatively compact.” Ex. 1103, 2:51-57. The use of longer bent links 60 would increase the size of the mechanism of Takamatsu '318 such that it is no longer compact.

237. In contrast, a PHOSITA would have understood that the rack and pinion gears of Takamatsu '372 can increase the sensitivity of the mechanism without significantly increasing its size. By increasing the ratio of the diameters of the second pinions 25b to the diameter of the first pinion 25a—either by decreasing the size of first pinion 25a, increasing the size of second pinions 25b, or both—the sensitivity of the mechanism can be significantly increased. Ex. 1104, 8:52-56 (gear ratios “***increase the sensitivity*** in automatically adjusting the supportive force of the tilting control springs 11”).

238. In sum, in view of the express teaching of Takamatsu '318 that it is desirable to increase the sensitivity of the mechanism to users' weight variations, and the express teaching of Takamatsu '372 that its rack and pinion gears increase sensitivity, a PHOSITA would have been motivated to use the rack and pinion gears of Takamatsu '372 with the mechanism of Takamatsu '318.

239. Second, using the rack and pinion gears of Takamatsu '372 with the mechanism of Takamatsu '318 would have merely been a simple substitution of one known element for another to obtain predictable results. As discussed above (§§223-231), the mechanisms of Takamatsu '318 and Takamatsu '372 operate similarly—converting downward movement of a seat into horizontal movement that reduces the effective length of a spring to control tilting of a back—using slightly different elements (pivoting bent links in the case of Takamatsu '318 and rack and pinion gears in the case of Takamatsu '372).

240. The use of rack and pinion gears in seating mechanisms, including weight-responsive seating mechanisms, was well known to a PHOSITA before the date of alleged invention of the DeJule '498 Patent—February 11, 2015. For instance, in addition to Takamatsu '372, the Schmitz '637 reference (Ex. 1105) discloses the use of rack gears and pinion gears in a weight-responsive seating mechanism. In particular, Schmitz '637 discloses a “toothed slide 86, or linear/curvilinear rack or gear” (green below) that cooperates with a “toothed quadrant 87, or rotary gear” (red below) to convert vertical movement of a seat into horizontal movement of a fulcrum to increase the amount of force required to pivot the seat shell and its backrest. Ex. 1105, ¶[0071]; *id.*, Fig. 7e.

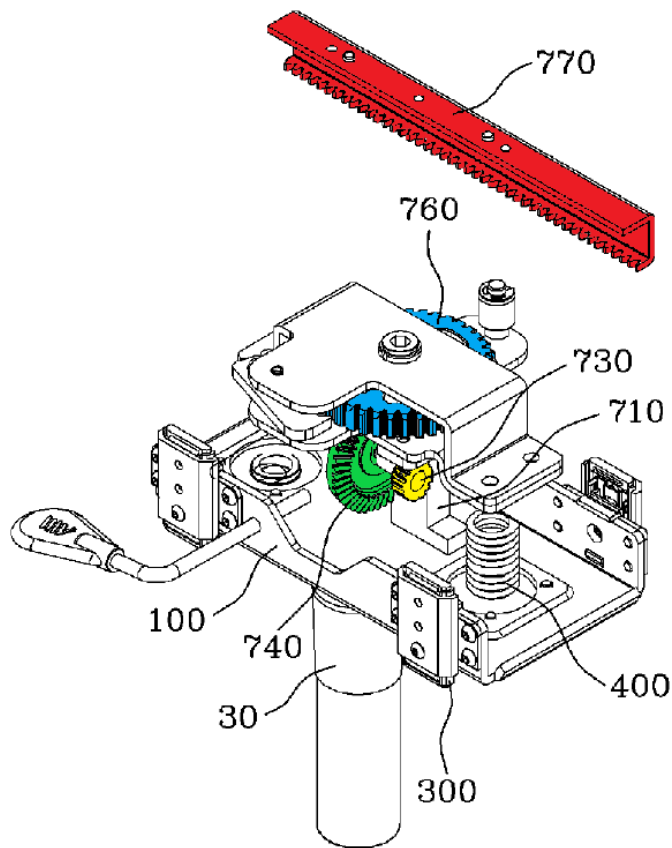
242. Notably, as with Takamatsu '372, Schmitz '637 explains that the use of rack and pinion gears allows for increased sensitivity to weight variations: A “step-up of the weighing movement”—i.e., the vertical displacement of the seat—“takes place in the movement converter 41a”—which is comprised of toothed slide 86 and toothed quadrant 87—such that “even with a small weighing movement, a sensitive setting of the spring mechanism SM”—i.e., the springs that resist pivoting of the seat—“can be carried out on account of the step-up.” Ex. 1105, ¶[0073]. This further supports my conclusion that the express teachings of the prior art would have motivated a PHOSITA to implement the rack and pinion gears of Takamatsu '372 with the mechanism of Takamatsu '318.

243. As another example, the Lee reference (Ex. 1106) discloses the use of rack gears and pinion gears in a weight-responsive seating mechanism. Lee discloses rack and pinion gears that convert vertical movement of a seat into horizontal displacement of the chair backrest. Although the mechanism of Lee does not adjust resistance to tilting the chair's backrest, a PHOSITA nonetheless would have considered and looked to Lee when designing a weight-sensitive seating mechanism for adjusting tilting resistance.

244. To convert vertical movement of a seat component into horizontal displacement of the backrest, Lee discloses a “vertical rack gear 710” a “pinion gear 730” (yellow below), a “vertical bevel gear 740” (green below), a “horizontal bevel

gear 750,” a “spur gear 760” (blue below), and a “horizontal rack gear 770” (red below). Ex. 1106, ¶[0038]; *id.* Fig. 5; see Ex. 1107, Fig. 5.¹

[Fig. 5]



Ex. 1107, Fig. 5 (annotated)

245. Thus, when the seat moves down against the force of “elastic part 400” (pink above), Ex. 1107, ¶[0032], vertical rack gear 710 drives pinion gear 730, “and its rotational force is transferred to the horizontal bevel gear 750 via the vertical

¹ Because the figures of Lee are low resolution, the annotations are of the figures of the international publication of Lee (Ex. 1107), whose figures are the same.

bevel gear 740,” which causes “the spur gear 760 [to] start rotating,” *id.*, ¶[0039]. In turn, spur gear 760 meshes with horizontal rack gear 770 as it rotates, causing horizontal rack gear, which is attached to the backrest, to translate horizontally. *Id.*, ¶[0040].

246. Thus, a PHOSITA would have considered rack and pinion gears common and well-known components for converting weight-adjusted vertical movement of a seat into horizontal movement of another component. It therefore would have been obvious to a PHOSITA to substitute rack and pinion gears (as taught by Takamatsu ’372) for the pivoting bent links used for the same purpose in Takamatsu ’318, and the results of that substitution would have been predictable: as taught by both Takamatsu ’372 and Schmitz ’637, substituting rack and pinion gears for the pivoting bent links would increase the mechanism’s sensitivity to users of various weights. Ex. 1104, 8:52-56; Ex. 1105, ¶[0073].

247. As discussed below, moreover, making this substitution would have been well within the skill of a PHOSITA at the time of the alleged invention of the DeJule ’498 Patent.

B. A PHOSITA WOULD HAVE HAD A REASONABLE EXPECTATION OF SUCCESS IN COMBINING TAKAMATSU ’318 AND TAKAMATSU ’372

248. In my opinion, a PHOSITA would have had a reasonable expectation of success implementing the rack and pinion gears of Takamatsu ’372 with the

mechanism of Takamatsu '318. Making such a combination would have been well within the skill of a PHOSITA, and it would not interfere with any other aspects of the mechanism of Takamatsu '318.

249. To demonstrate this, I have created a model showing an example of how the rack and pinion gears of Takamatsu '372 might be implemented with Takamatsu '318. This is just one illustrative example; a PHOSITA would have known that the same combination of elements could be implemented in a variety of different configurations to translate vertical loading of a seat into adjustment of the tilting resistance.

250. As shown in Illustrations 1 and 2 below, a vertical rack 75 (akin to first rack 24 of Takamatsu '372) could be mounted to and descend down from the bottom of seat plate 57. In addition, a pinion assembly (akin to pinion assembly 25 of Takamatsu '372) could be pivotally mounted to seat base 55. The pinion assembly could include a first pinion 62 near the center of the assembly and aligned with the vertical rack 75, and larger second pinions 63 near each end of the assembly and aligned with each operating arm 64. Operating arms 64 would be modified to include horizontal rack gears 60 that would mesh with the second pinions 63.

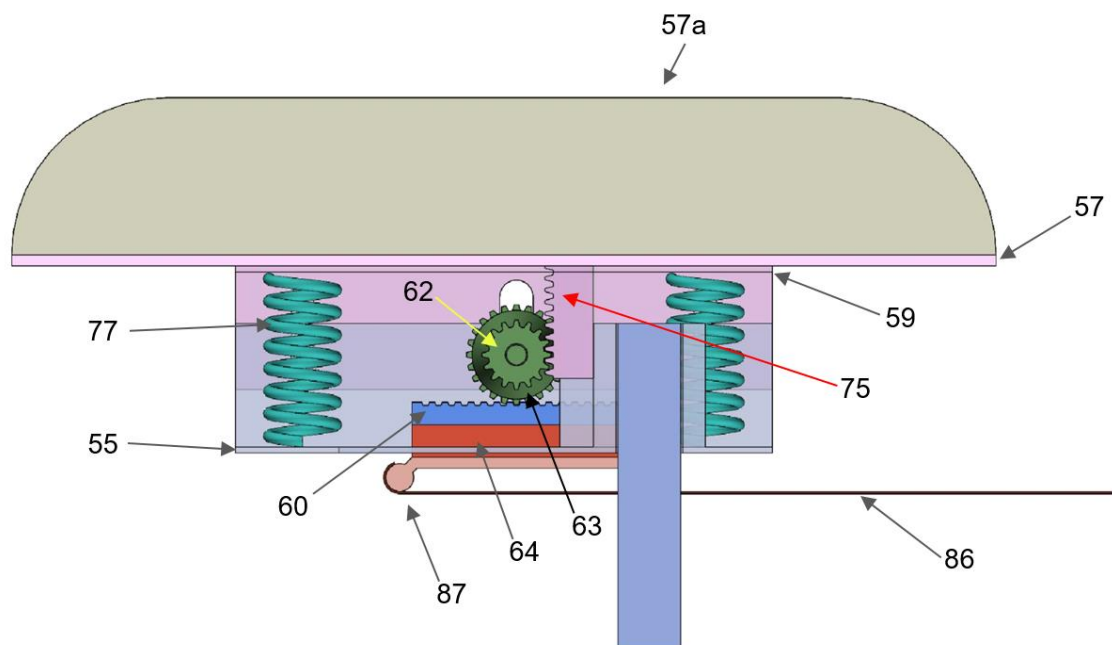


Illustration 1

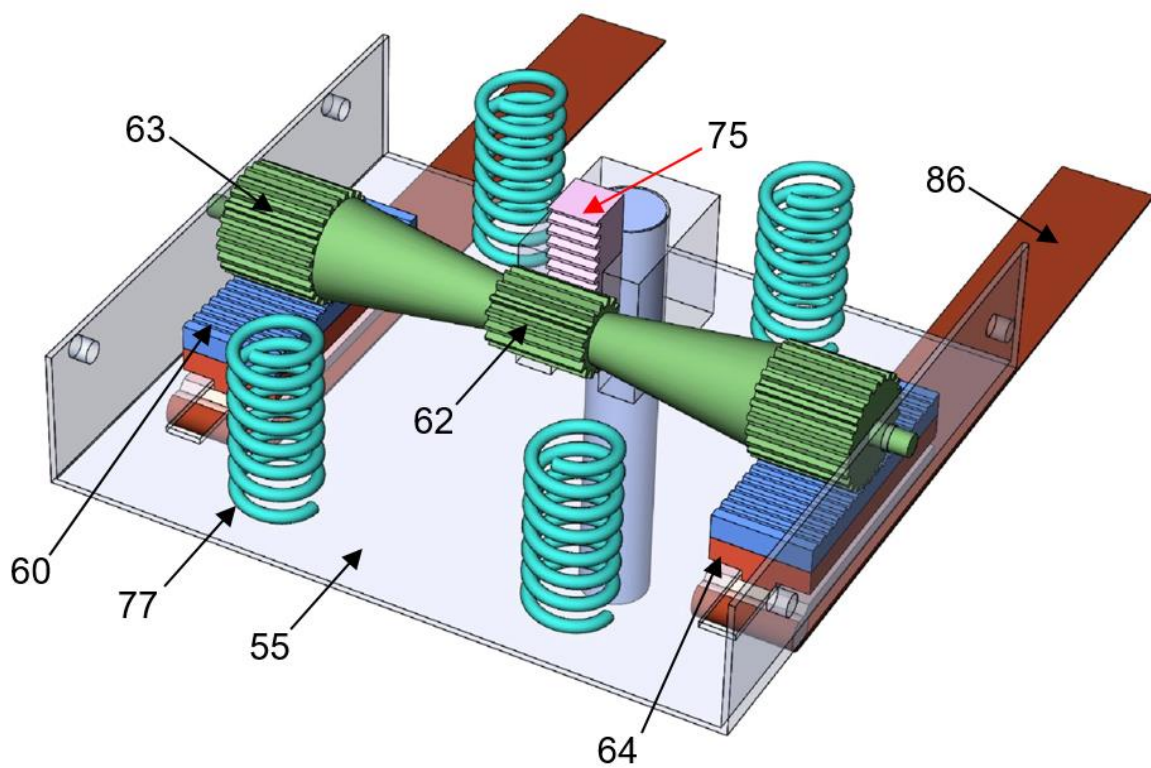


Illustration 2

251. Thus, when seat B moves down against the force of compression springs 77, the vertical rack 75 rotates pinion gears 62 and 63 of the pinion assembly, causing the horizontal racks 60, and thus operating arms 64, to translate horizontally toward the front of the chair. Operating arms 64 pull on pull bands 86 in the same manner as described in Takamatsu '318, causing contact pins 85 to “move downward” such that “the load supporting span of the second tilting control spring 83 is reduced from an initial value L3 to a new one L4” and the force required to tilt chair back C is increase. Ex. 1103, 10:13-26. In other words, the rack and pinion gears provide the same function as the pivoting bent links 60 (converting vertical movement of the seat B into horizontal movement of operating arms 64).

252. Any other minor modifications necessary to implement this combination would likewise be well within the skill of a PHOSITA at the time of the alleged invention of the DeJule '498 Patent. For instance, the structural support provided by bent links 60 could easily be achieved in other ways. As one example, seat base 55 could be provided with vertical side walls outfitted with pins that are received in corresponding slots in vertical sidewalls of seat plate 57, as shown below in Illustrations 3 and 4.

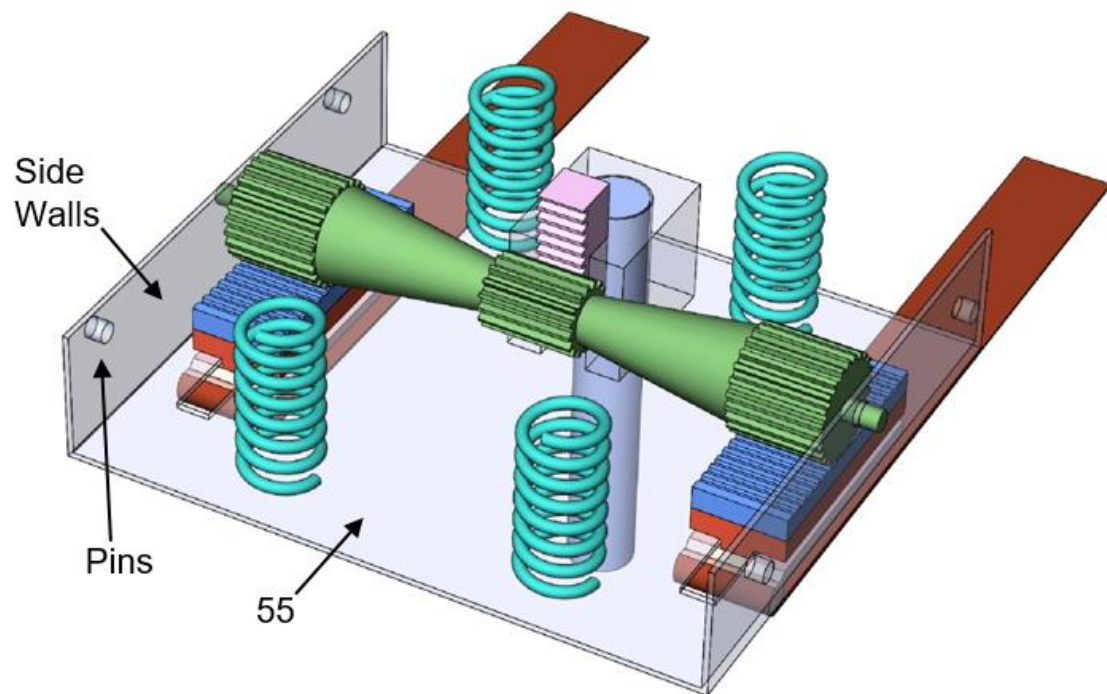


Illustration 3

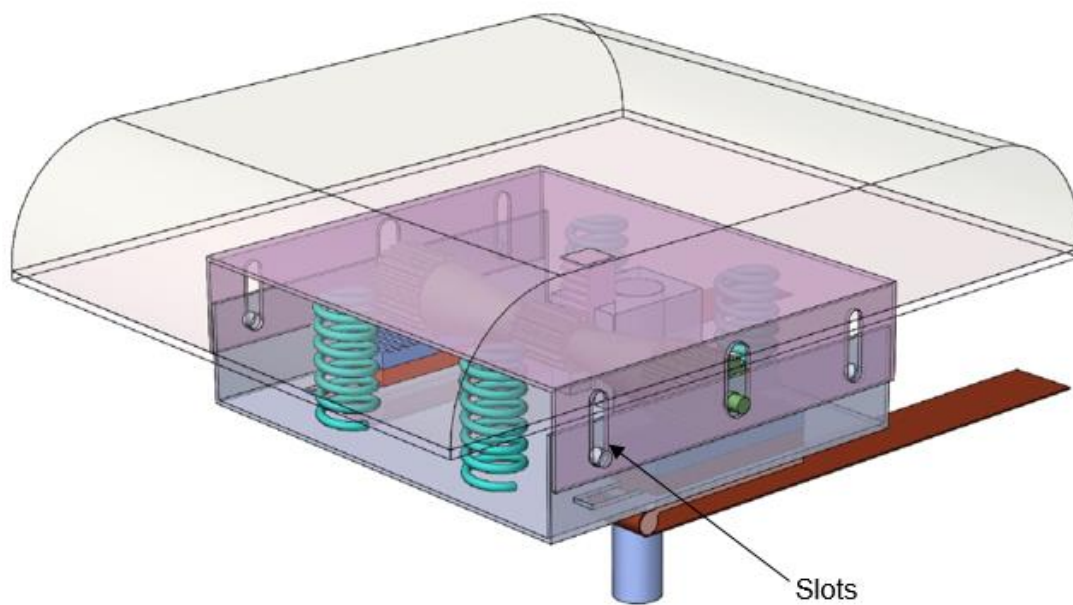
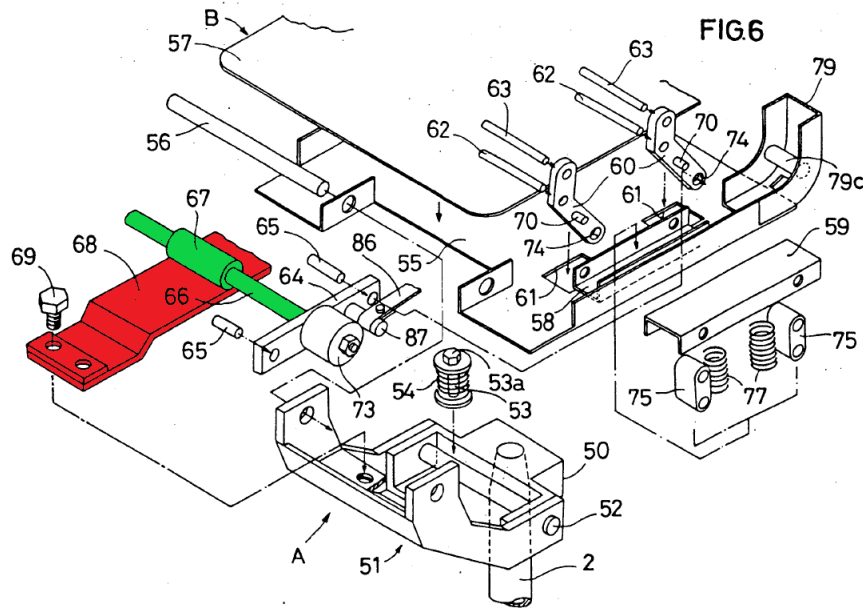


Illustration 4

253. In addition, incorporating the rack and pinion gears of Takamatsu '372 into the mechanism of Takamatsu '318 would not interfere with the operation of other aspects thereof. For instance, operating arms 64 could be designed to carry support shaft 66 and contact roller 67 (green below) for bearing against tilting control plate spring 68 (red below), such that the resistance to tilting of seat B is adjusted based on the weight of the user, as described in Takamatsu '318. Ex. 1103, 8:21-32; *id.*, 9:19-30; *id.*, Fig. 6.



Ex. 1103, Fig. 6 (annotated)

254. As discussed below, moreover, this combination discloses the elements of claim 18 of the DeJule '498 Patent.

C. THE COMBINATION OF TAKAMATSU '318 AND TAKAMATSU '372 DISCLOSES THE ELEMENTS OF CLAIM 18

255. In my opinion, combining the rack and pinion gears of Takamatsu '372 with the mechanism of Takamatsu '318 discloses the elements of claim 18 of the DeJule '498 Patent. Claim 18 depends from independent claim 1 and further recites “wherein the adjusting assembly comprises cooperating toothed elements that move relative to each other as a magnitude of the force applied in the first manner reaches a predetermined level.” Ex. 1101, 14:22-25.

256. As discussed above (¶¶73-105), it is my opinion that Takamatsu '318 discloses the elements of independent claim 1. The combination of Takamatsu '318 and Takamatsu '372 likewise discloses the elements of claim 1. The only difference between Takamatsu '318 and the combination of Takamatsu '318 and Takamatsu '372 is that the combination uses rack and pinion gears instead of bent links 60 of Takamatsu '318. The bent links 60 are not themselves required by claim 1. Thus, the combination of Takamatsu '318 and Takamatsu '372 discloses the elements for claim 1 for all the same reasons as Takamatsu '318.

257. In addition, the combination of Takamatsu '318 and Takamatsu '372 discloses the elements of claim 18. Claim 18 further recites “wherein the adjusting assembly comprises cooperating toothed elements that move relative to each other as a magnitude of the force applied in the first manner reaches a predetermined level.” Ex. 1101, 14:22-25. As discussed above in connection with Takamatsu '372

(¶¶214-218), the rack and pinion gears of Takamatsu '372 disclose this element. Thus, the combination of Takamatsu '318 and Takamatsu '372, which includes the rack and pinion gears of Takamatsu '372, discloses this element for the same reasons.

D. SECONDARY CONSIDERATIONS

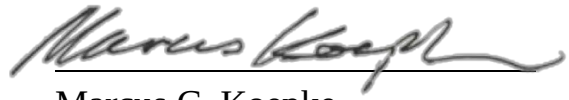
258. Finally, I am not aware of any secondary considerations of non-obviousness that would apply to claim 18 of the DeJule '498 Patent. For instance, based on my review of the prosecution of the '735 Application, which issued as the DeJule '498 Patent, the applicants did not submit any evidence regarding secondary considerations of non-obviousness. I reserve the right to supplement my opinions in the future to respond to any evidence alleging secondary considerations of non-obviousness that Patent Owner may assert.

259. Thus, in my opinion, claim 18 of the DeJule '498 Patent would have been obvious to a PHOSITA at the time of invention in view of the combination of Takamatsu '318 and Takamatsu '372.

XI. ACKNOWLEDGEMENT

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

Executed on September 20, 2023


Marcus C. Koepke