

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,

Petitioner,

v.

SONOS, INC,

Patent Owner.

Case No. IPR2026-00131
U.S. Patent No. 10,966,025

DECLARATION OF DR. DAVID ANDERSON

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I. INTRODUCTION

1. I have been retained by Google LLC (“Petitioner”) as an independent expert consultant in this proceeding before the United States Patent and Trademark Office.

2. I am over 21 years of age and, if I am called upon to do so, I would be competent to testify as to the matters set forth herein.

3. I understand that this proceeding involves U.S. Patent No. 10,966,025 (“the ’025 patent,” EX-1001). The application for the ’025 patent was filed October 31, 2019, and is part of a long chain of continuations of U.S. applications:

- No. 16/128,443 filed on September 11, 2018
- No. 14/629,937 filed on February 24, 2015
- No. 14,299,874 filed on June 9, 2014
- No. 13/083,499 filed on April 8, 2011.
- The chain continues through a series of continuations-in-part:
- No. 13/013,740 filed on January 25, 2011,
- No. 11/853,790 filed on September 11, 2007.

4. Finally, those applications claim priority to U.S. provisional application No. 60/825,407 filed on September 12, 2006. EX-1001, Cover Page.

5. I have been asked by Petitioner to provide my opinion on whether the claims of the ’025 patent would have been obvious to a person of ordinary skill in

the art. In performing my analysis, I have been asked to assume that the priority date of the '025 patent is January 25, 2011. My opinions are set forth below.

6. Throughout this declaration, I refer to specific pages, figures, and/or line numbers of various exhibits. These citations are illustrative and are not intended to suggest that they are the only support for the propositions for which they are cited.

II. SUMMARY OF OPINIONS

7. This declaration considers claims 1-4, 7-10, and 12-23 of the '025 patent. Below, I set forth the opinions I have formed, the conclusions I have reached, and the bases for these opinions and conclusions. I believe the statements contained in this declaration to be true and correct to the best of my knowledge.

8. Based on my experience and knowledge of the art at the time of the applicable priority date, it is my opinion that claims 1-4, 7-10, and 12-23 of the '025 patent would have been obvious based on the asserted grounds that I discuss below.

Ground	Claim(s) Challenged	35 U.S.C. §	Reference(s)
1	1, 3-4, 7-10, 12-14, 16, 18, 21	103	Litbak and Seydoux
2	2, 17, 19-20, 22-23	103	Litbak, Seydoux, and Palmer
3	12	103	Litbak, Seydoux, and Holm
4	15	103	Litbak, Seydoux, and Lee

9. I am being compensated for my time at my normal hourly rate. My compensation is in no way contingent upon the nature of my findings, the presentation of my findings in testimony, or the outcome of this proceeding.

III. QUALIFICATIONS AND BACKGROUND

10. I believe that I am well qualified to serve as a technical expert in this matter based upon my qualifications, discussed in detail below.

11. I am competent to write this declaration.

12. I am an independent consultant. All of my opinions stated in this declaration are based on my own personal knowledge and professional judgment. In forming my opinions, I have relied on my knowledge and experience in the fields of networking and network-based systems, such as consumer audio systems, and on the documents and information referenced in this declaration. I am over 18 years of age and, if I am called upon to do so, I am competent to testify as to the matters set forth herein.

13. In formulating my opinions, I have relied upon my training, knowledge, and experience in the relevant art. Provided as Exhibit 1004 is a copy of my current curriculum vitae, which details my education and experience, and a list of all other cases in which, during the previous four years, I testified as an expert at trial or by deposition. The following provides a brief overview of some of my experience that is relevant to the matters set forth in this declaration.

14. I am a professor in the School of Electrical and Computer Engineering at the Georgia Institute of Technology (“Georgia Tech”) in Atlanta, Georgia. I have been a professor at Georgia Tech since 1999. In 2009 I served as a visiting professor in the Department of Computer Science at Korea University in Seoul, South Korea.

15. I received my Ph.D. in Electrical and Computer Engineering from Georgia Tech in 1999. I received my B.S. and M.S. in Electrical Engineering from Brigham Young University in 1993 and 1994, respectively.

16. In my employment prior to Georgia Tech as well as in my subsequent studies and research, I have worked extensively in areas related to the research, design, and implementation of speech and audio processing systems. In 1983-1987 and again in 1989-1991 I worked as an embedded systems developer for industrial control equipment and my responsibilities included developing low-level code and protocols for communicating between interconnected systems. Prior to my employment at Georgia Tech, I also developed prototype real-time audio systems for Sonic Innovations in 1993-1994, and various real-time audio processing systems for consulting clients from 1995-1999.

17. As a professor at Georgia Tech, I have taught graduate and undergraduate level courses at Georgia Tech on the implementation of signal processing and embedded systems. For example, I have taught courses on multi-media processing and systems (covering topics including standards and methods for

multi-channel and networked multimedia), software design, computer architecture and operating systems, real-time signal processing systems, applications of signal processing (covering topics in audio processing and communications systems), speech recognition systems, statistical machine learning, machine learning for speech, pattern recognition, and adaptive signal processing systems. I also designed and teach a course on signal processing in the context of human perception which covers audio standards and audio system design considerations. These courses and my research have covered many topics relevant to the subject matter of the '025 patent and the prior art cited therein.

18. I have served as principal investigator or co-principal investigator in numerous multi-disciplinary research projects including “Blind Source Separation for Audio,” “Audio Classification,” “Auditory Scene Analysis,” “Hearing Aid Audio Processing,” “Speaker Driver Sound Enhancement,” “I-Vector Based Voice Quality,” “Analysis of Voice Exercise Using Signal Processing,” and “Smart Homes for Effective and Safe Remote Work During a Pandemic and Beyond.”

19. I also have extensive experience with the practical implementation of signal processing algorithms, information theory, signal detection, and related topics through my research and consulting. I have published over 200 papers in reviewed journals and conferences and books and book chapters.

20. I am a named inventor on eight patents, including “Speech activity detector for use in noise reduction system, and methods therefor” (U.S. Patent No. 6,351,731), and “Analog audio signal enhancement system using a noise suppression algorithm” (U.S. Patent No. 7,590,250).

21. I was also a co-founder of Ratrix, LLC, a company that developed efficient algorithms for reliable next-generation wireless communications systems.

22. I am a Senior Member of the Institute of Electrical and Electronics Engineers (“IEEE”) and have been a Member since 1991. I am also a Member of the IEEE Signal Processing Society. From 1994 to 2016, I was also a member of the Acoustical Society of America. In 2003, I served as the Co-Chair for the NSF Symposium on Next Generation Automatic Speech Recognition. In 2004, I received the Presidential Early Career Award for Scientists and Engineers, presented by then-President George W. Bush, for my work on ultra-low-power signal processing system design.

IV. MATERIALS CONSIDERED

23. In forming my opinions, I have reviewed the following documents and any other document cited in this declaration.

Exhibit	Description
EX-1001	U.S. Patent No. 10,966,025 (“the ’025 patent”)
EX-1002	Excerpts of File History of U.S. Patent No. 10,966,025

Exhibit	Description
EX-1005	U.S. Patent Application Publication No. 2007/0055399 to Litbak et al. (“Litbak”)
EX-1006	U.S. Patent Application Publication No. 2008/0205664 to Kim et al. (“Kim”)
EX-1007	U.S. Patent Application Publication No. 2009/0279722 to Lin (“Lin”)
EX-1008	U.S. Patent Application Publication No. 2007/0160225 to Seydoux (“Seydoux”)
EX-1009	U.S. Patent Application Publication No. 2007/0223725 to Neumann et al. (“Neumann”)
EX-1010	Excerpts of Steven M. Kaplan, Wiley Electrical and Electronics Engineering Dictionary (2004). (Available at https://ieeexplore.ieee.org/servlet/opac?bknumber=5273107) (“Kaplan”)
EX-1011	U.S. Patent Application Publication No. 2008/0226094 to Rutschman (“Rutschman”)
EX-1012	U.S. Patent Application Publication No. 2009/0214051 to Lockett et al. (“Lockett”)
EX-1013	U.S. Patent No. 7,593,533 to Fincham (“Fincham”)
EX-1014	Infringement Contentions Cover Pleading in <i>Sonos, Inc. v. Google LLC</i> , No. 2:20-cv-00169 (C.D. Cal.)
EX-1015	Agreed Claim Constructions in <i>Sonos, Inc. v. Google LLC</i> , No. 2:20-cv-00169 (C.D. Cal.)
EX-1016	U.S. Patent Application Publication No. 2008/0076389 to Lee et al. (“Lee”)
EX-1017	Excerpts of Marina Bosi & Richard Goldberg, Introduction to Digital Audio Coding and Standards (2003) (“Bosi”)

Exhibit	Description
EX-1018	U.S. Patent No. 5,581,626 to Palmer (“Palmer”)
EX-1019	Excerpts of Gary Davis & Ralph Jones, <i>The Sound Reinforcement Handbook</i> (2nd Ed. 1989) (“Davis”)
EX-1020	U.S. Patent Application Publication No. 2007/0087686 to Holm et al. (“Holm”)
EX-1021	Infringement Contentions for the ’025 Patent in <i>Sonos, Inc. v. Google LLC</i> , No. 2:20-cv-00169 (C.D. Cal.)
EX-1022	Excerpts of File History of U.S. Patent Application No. 11/853,790 (’790 application”)
EX-1023	Excerpts of File History of U.S. Patent Application No. 13/013,740 (’740 application”)
EX-1024	U.S. Patent Application Publication No. 2002/0090912 to Cannon et al. (“Cannon”)

24. I have also relied on my education, experience, research, training, and knowledge in the relevant art, and my understanding of any applicable legal principles described in this declaration.

25. All the opinions contained in this declaration are based on the documents I reviewed and my knowledge and professional judgment. My opinions have also been guided by my understanding of how a person of ordinary skill in the art would have understood the claims of the ’025 patent.

26. I reserve the right to supplement and amend any of my opinions in this declaration based on documents, testimony, and other information that becomes available to me after the date of this declaration.

V. LEGAL STANDARDS

27. I am not a lawyer. My understanding of the legal standards to apply in reaching the conclusions in this declaration is based on discussions with counsel for Petitioner, my experience applying similar standards in other patent-related matters, and my reading of the documents submitted in this proceeding. In preparing this declaration, I have tried to faithfully apply these legal standards to the challenged claims.

28. I have been informed that there are two ways in which prior art may render a patent claim unpatentable. First, I have been informed that the prior art can “anticipate” a claim. Second, I have been informed that the prior art can render a claim “obvious” to a person of ordinary skill in the art. I understand that a claim is patentable if it was not anticipated and would not have been obvious in view of the prior art as of the effective filing date of the patent.

29. I have been informed that a dependent claim is a patent claim that refers back to another patent claim. I have been informed that a dependent claim includes all the limitations of the claim to which it refers.

30. I have been asked to provide my opinions as to whether the cited prior art discloses or would have rendered obvious claims 1-4, 7-10, and 12-23 of the '025 patent from the perspective of a person of ordinary skill in the art at the '025 patent's priority date, which I have been informed to assume is January 25, 2011.

31. I have been informed that in *inter partes* review proceedings, such as this one, the party challenging the patent bears the burden of proving unpatentability by a preponderance of the evidence. I understand that a preponderance of the evidence means "more likely than not."

32. For the purposes of this declaration, I have been asked to provide my opinions on issues regarding unpatentability. I have been informed of the following legal standards, which I have applied in forming my opinions.

A. Level of Ordinary Skill

33. I have been informed that a person of ordinary skill in the art is determined by considering several factors, including the (i) type of problems encountered in the art; (ii) prior art solutions to those problems; (iii) rapidity with which innovations are made; (iv) sophistication of the technology; and (v) educational level of active workers in the field.

34. I have been instructed to assume that a person of ordinary skill in the art is not a specific real individual but rather a hypothetical individual having the qualities reflected by the factors discussed above.

B. Prior Art

35. I have been advised and understand that the information used to evaluate whether an invention was novel and not obvious when made is generally referred to as “prior art.” I understand that prior art includes patents and printed publications that existed before the priority date of the patent. I have been informed and understand that a patent or published patent application is prior art if it was filed before the priority date of the claimed invention and that a printed publication is prior art if it was publicly available before the priority date. I have been informed to assume that the priority date of the ’025 patent is January 25, 2011.

C. Anticipation

36. I have been informed that under 35 U.S.C. § 102, a patent claim is unpatentable for anticipation if the claimed subject matter was patented or described in a printed publication before the effective filing date of the claimed invention. I have been informed that this is referred to as unpatentability by anticipation. I have been informed that a patent claim is anticipated under § 102 if a single prior art reference discloses all limitations of the claimed invention.

37. I understand that a patent claim is anticipated only if each and every element as set forth in the claim is described in a single prior art reference. I also understand that, to be considered anticipatory, the prior art reference does not need to use the same words as the claims or provide as many details as the patent’s

specification; rather, it must only be enabling and describe the claimed invention sufficiently to have placed it in possession of a person of ordinary skill in the field of the invention. I further understand that to be an anticipatory reference, a prior art reference must disclose all elements of the claim arranged or combined in the same way stated in the claim.

38. I also understand that in order for a patent claim to be anticipated, each and every element set forth in the claim must be found, either expressly or inherently, in a single prior art reference, such that a person of ordinary skill in the art could practice the invention without undue experimentation. A claim limitation that is not expressly found in a prior art reference is ‘inherent’ if the prior art necessarily functions in accordance with, or includes, the limitation. It is acceptable to consider evidence outside the prior art reference to determine whether a limitation is necessarily present.

39. I understand that a dependent claim incorporates by reference all elements of the claim from which it depends. For this reason, I understand that if a reference fails to disclose one or more elements of an independent claim, it cannot anticipate any claims that depend from the independent claim.

D. Obviousness

40. I have been informed that for obviousness under 35 U.S.C. § 103, a patent claim is unpatentable if the differences between the subject matter sought to

be patented and the prior art are such that the subject matter as a whole would have been obvious to a person having ordinary skill in the art to which said subject matter pertains at the time the invention was made. I have been informed that this is referred to as unpatentability by obviousness.

41. I have been informed that an obviousness analysis includes the following considerations:

- a. Determining the scope and content of the prior art;
- b. Ascertaining the differences between the prior art and the claims at issue;
- c. Resolving the level of ordinary skill in the pertinent art; and
- d. Considering evidence of secondary indicia of nonobviousness (if available).

42. I have been informed that the relevant time for considering whether a claim would have been obvious to a person of ordinary skill in the art is the time of invention. For my obviousness analysis, counsel for Petitioner instructed me to assume that the date of invention for the challenged claims is January 25, 2011. My opinions would not change if I assumed a later date of invention.

43. I have been informed that a reference may be modified or combined with other references or with a person of ordinary skill in the art's own knowledge if the person would have found the modification or combination obvious. I have also

been informed that a person of ordinary skill in the art is presumed to know all the relevant prior art, and the obviousness analysis may take into account the inferences and creative steps that a person of ordinary skill in the art would employ.

44. I have been informed that whether a prior art reference would have rendered a patent claim obvious is determined from the perspective of a person of ordinary skill in the art. I have also been informed that, while there is no requirement that the prior art contain an express suggestion to combine known elements to achieve the claimed invention, and while a suggestion to combine known elements to achieve the claimed invention may come from the prior art as a whole or individually and may consider the inferences and creative steps a person of ordinary skill in the art would employ, as filtered through the knowledge of one skilled in the art, obviousness grounds cannot be sustained by mere conclusory statements and must include some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.

45. In determining whether a prior art reference could have been combined with another prior art reference or other information known to a person having ordinary skill in the art, I have been informed that the following principles may be considered:

- a. A combination of familiar elements according to known methods is likely to be obvious if it yields predictable results;

- b. The substitution of one known element for another is likely to be obvious if it yields predictable results;
- c. The use of a known technique to improve similar items or methods in the same way is likely to be obvious if it yields predictable results;
- d. The application of a known technique to a prior art reference that is ready for improvement to yield predictable results;
- e. Any need or problem known in the field and addressed by the reference can provide a reason for combining the elements in the manner claimed;
- f. A person of ordinary skill often will be able to fit the teachings of multiple references together like a puzzle; and
- g. The proper analysis of obviousness requires a determination of whether a person of ordinary skill in the art would have a “reasonable expectation of success”—but not “absolute predictability” of success—in achieving the claimed invention by combining prior art references.

46. I have been informed that, when a work is available in one field, design alternatives and other market forces can prompt variations of it, either in the same field or in another. I have been informed that if a person of ordinary skill in the art could have implemented a predictable variation and would have seen the benefit of doing so, that variation is likely to have been obvious. I have been informed that, in many fields, there may be little discussion of obvious combinations, and in these

fields, market demand—not scientific literature—may drive design trends. I have been informed that, when there was a design need or market pressure and there are a finite number of predictable solutions, a person of ordinary skill in the art would have had a good reason to pursue those known options.

47. I have been informed that the law permits the application of “common sense” in examining whether a claimed invention would have been obvious to a person skilled in the art. For example, I have been informed that combining familiar elements according to known methods and in a predictable way may suggest obviousness when such a combination would yield nothing more than predictable results. I understand, however, that a claim is not obvious merely because every claim element is disclosed in the prior art, and that a party asserting obviousness must still provide a specific motivation to combine or modify the references as recited in the claims and explain why one skilled in the art would have reasonably expected to succeed in doing so.

48. I have been informed that there is no rigid rule that a reference or combination of references must contain a “teaching, suggestion, or motivation” to combine references. But I also understand that the “teaching, suggestion, or motivation” test can be a useful guide in establishing a rationale for combining elements of the prior art. I have been informed that this test poses the question as to whether there is an express or implied teaching, suggestion, or motivation to

combine prior art elements in a way that realizes the claimed invention, and that it seeks to counter impermissible hindsight analysis.

49. I am not aware of any evidence of secondary considerations that would support a determination of nonobviousness of the claimed subject matter in the '025 patent.

50. I have been informed that, in an obviousness analysis, prior art must be analogous to the patent being considered. I have been informed that a prior art reference is considered to be analogous, or in the same field of art, if the reference is either (1) in the same field of endeavor as the challenged patent, regardless of the problems the challenged patent and the prior art address; or (2) reasonably pertinent to the particular problem being solved by the challenged patent.

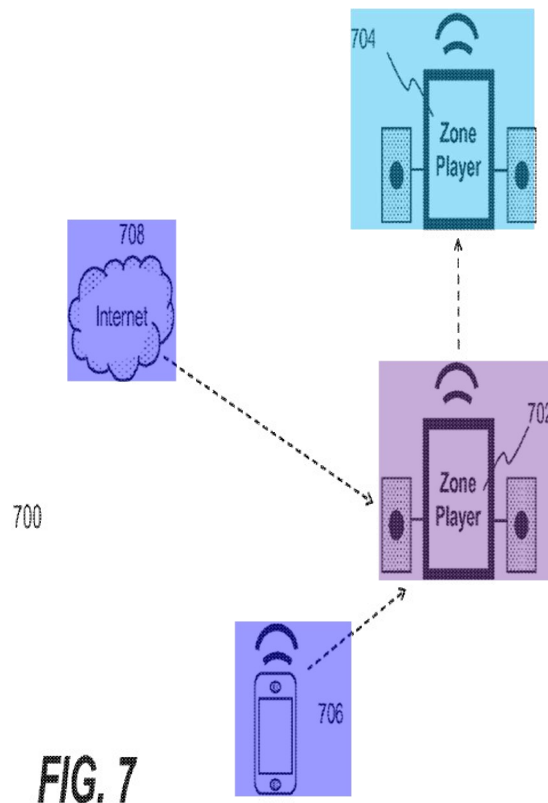
VI. THE '025 PATENT

51. Sonos filed the '025 patent on October 31, 2019, claiming priority to earlier applications. EX-1001, I have been informed to assume the priority date of the '025 is January 25, 2011, for this proceeding.

A. Overview

52. The patent relates to “pairing individual playback devices to create or enhance a multi-channel listening environment.” *Id.*, 2:4-13. Examples of “multi-channel” include “stereo” and “surround sound.” *Id.*, 3:30-37. In one example, [player 702](#) “retrieve[s]” an “audio source” from “[a network](#)” (e.g., the Internet) that

has “left and right sounds channels or tracks (e.g., stereo sound).” *Id.*, 17:54-57, 14:42-48. Instead of having “**player[s] 702** and **704** play[] the same audio content,” they “can be paired to play different channels of the audio source.” *Id.* For example, “**player 702** might play the right channel and **player 704** might play the left channel.” *Id.*, 15:2-9. But, when unpaired, the players may “output audio content in stereo independently from each other.” *Id.*, 14:65-15:2.



Id., FIG. 7, 17:51-62 (annotated).¹

¹ Annotations and emphases added unless otherwise noted.

53. A “[c]ontroller” can issue a “command” to “create” or “disengage the pairing between” “playback devices.” *Id.*, 16:15-28. The “controller” can be “a network-enabled device” (e.g., “smart phone” or “computer”). *Id.*, 18:60-62.

VII. CLAIM CONSTRUCTION

54. I have been instructed that the “intrinsic record” includes the ’025 patent itself, including the claims, description, and figures (EX-1001), and the ’025 patent’s prosecution history, which I understand is the record of proceedings at the U.S. Patent and Trademark Office (“Patent Office”) concerning the patent (EX-1002). I understand that, like the claims and written description, the prosecution history provides evidence to a person of ordinary skill in the art of how the inventor intended their patent to be understood and how the Patent Office understood the patent. I understand that the inventor is permitted to apply a special definition to the terms or to limit the scope of claim terms in their patent claims, which may differ from the term’s plain and ordinary meaning. That special definition or limitation on scope may be provided in the patent’s written description, the patent’s prosecution history, or both.

55. I understand that claim interpretation may also be informed by “extrinsic evidence” (that is, evidence outside of the patent record itself). I have been informed that extrinsic evidence may include dictionaries, technical treatises, and

other materials evidencing the meaning of a claim term and the understanding held by a person of ordinary skill in the art in the relevant time period.

56. I have been informed that the claim constructions listed below have been agreed to for the '025 patent in this case, as copied from EX-1015.

“pair”/“pairing”/“paired”	“configuration involving two or more playback devices that have different playback roles”
“playback device”	“data network device configured to process and output audio”
“network interface”	“physical component of a device that provides an interconnection with a data network”

EX-1015.

57. I have been asked for the purposes of this declaration to apply these constructions and the plain and ordinary meaning of the claim terms as they would have been understood by a person of ordinary skill in the art at the priority date of the '025 patent. It is my opinion that the prior art relied on in the Petition discloses each of these constructions, and the plain and ordinary meaning of all other terms.

VIII. LEVEL OF ORDINARY SKILL

58. In rendering the opinions set forth in this declaration, I have been asked to consider the '025 patent's claims and the prior art through the eyes of a person of ordinary skill in the art (which I may also refer to as "one skilled in the art," "skilled artisan," "POSITA," or similar variations). I have considered factors such as the educational level and years of experience of those working in the pertinent art, the types of problems encountered in the art, the teachings of the prior art, patents and publications of other persons or companies, and the sophistication of the technology.

59. Taking the factors described in the Legal Standards – Level of Ordinary Skill section into consideration, it is my opinion that a person of ordinary skill in the art ("POSITA") at the time of the purported invention would have had the equivalent of a four-year degree from an accredited institution in computer science, computer engineering, electrical engineering, or an equivalent thereof, and approximately four years of professional experience in the fields of networking and network-based systems or applications, such as consumer audio systems, or an equivalent level of skill, knowledge, and experience. Additional education could substitute for professional experience, and significant work experience could substitute for formal education.

60. I met the criteria for a POSITA at the effective filing date of the '025 patent.

IX. OVERVIEW OF PRIOR ART

61. In forming my opinions, I found the following prior art relevant when considering whether the claims of the '025 patent would have been obvious to a person of ordinary skill in the art.

Exhibit	Description
EX-1005	U.S. Patent Application Publication No. 2007/0055399 to Litbak et al. (“Litbak”)
EX-1006	U.S. Patent Application Publication No. 2008/0205664 to Kim et al. (“Kim”)
EX-1007	U.S. Patent Application Publication No. 2009/0279722 to Lin (“Lin”)
EX-1008	U.S. Patent Application Publication No. 2007/0160225 to Seydoux (“Seydoux”)
EX-1009	U.S. Patent Application Publication No. 2007/0223725 to Neumann et al. (“Neumann”)
EX-1010	Excerpts of Steven M. Kaplan, Wiley Electrical and Electronics Engineering Dictionary (2004). (Available at https://ieeexplore.ieee.org/servlet/opac?bknumber=5273107) (“Kaplan”)
EX-1011	U.S. Patent Application Publication No. 2008/0226094 to Rutschman (“Rutschman”)
EX-1012	U.S. Patent Application Publication No. 2009/0214051 to Lockett et al. (“Lockett”)
EX-1013	U.S. Patent No. 7,593,533 to Fincham (“Fincham”)
EX-1016	U.S. Patent Application Publication No. 2008/0076389 to Lee et al. (“Lee”)

Exhibit	Description
EX-1017	Excerpts of Marina Bosi & Richard Goldberg, Introduction to Digital Audio Coding and Standards (2003) (“Bosi”)
EX-1018	U.S. Patent No. 5,581,626 to Palmer (“Palmer”)
EX-1019	Excerpts of Gary Davis & Ralph Jones, The Sound Reinforcement Handbook (2nd Ed. 1989) (“Davis”)
EX-1020	U.S. Patent Application Publication No. 2007/0087686 to Holm et al. (“Holm”)
EX-1024	U.S. Patent Application Publication No. 2002/0090912 to Cannon et al. (“Cannon”)

62. As explained below, in my opinion, claims 1-4, 7-10, and 12-23 of the ’025 patent would have been obvious based on the grounds that I discuss below.

X. THE CHALLENGED CLAIMS ARE UNPATENTABLE BASED ON THE PRIOR ART

A. Ground 1: Claims 1, 3-4, 7-10, 12-14, 16, 18, and 21 Would Have Been Obvious Over Litbak and Seydoux.

1. Litbak (EX-1005)

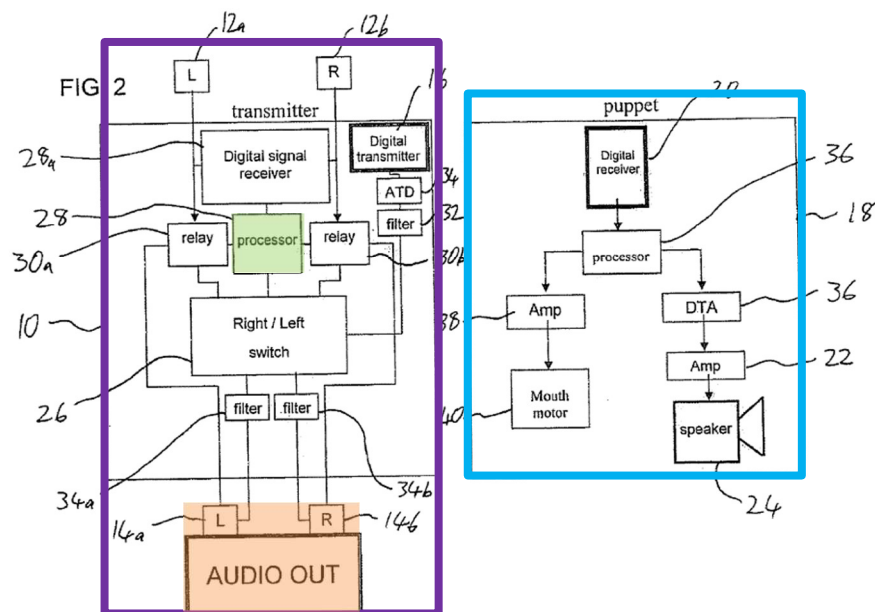
63. Litbak relates to “audio and audio-visual entertainment systems” that “alternately direct[] an input audio signal to an audio output and to a remote puppet.”

Litbak, Abstract, [0012]-[0013], [0029], [0034], [0039].

64. Litbak discloses an “audio switching arrangement” including a “processor” and “Left” and “Right” “Audio Out” “speaker[s].” Litbak, [0029],

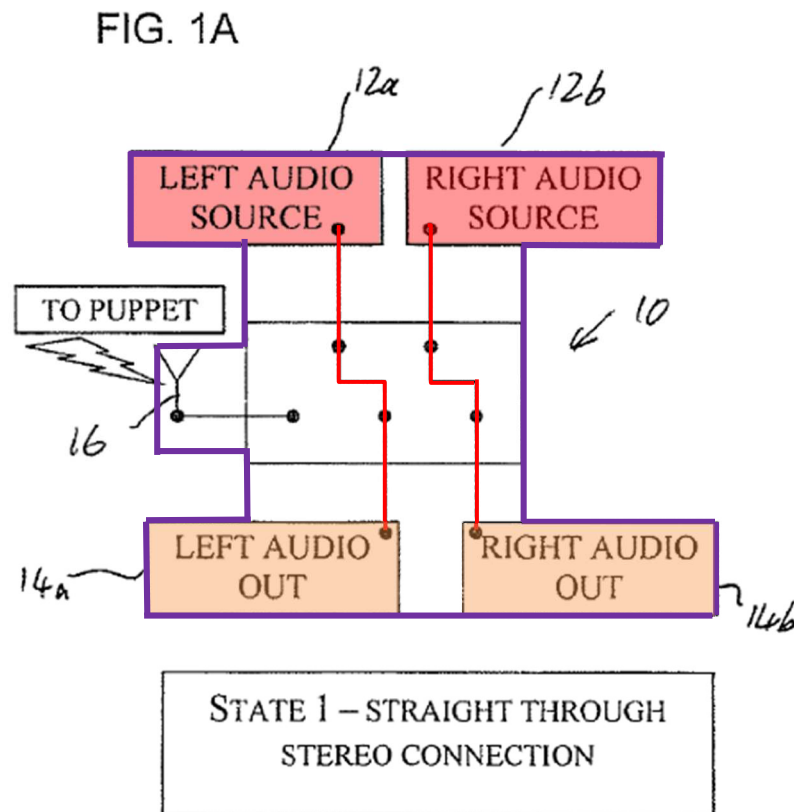
[0040], FIGs. 1A-1B, 2. The “**arrangement**” receives “audio programming” and an “actuation signal” from sources, such as a “wide area communication network (“WAN”)” or “computer.” *Id.*, [0029], [0039], [0041]-[0042]. The “**arrangement**” has different operating states: (1) output “stereo” audio when operating alone, or (2) output only one “stereo input[]” while “transmit[ing]” the other “stereo input[]” to a “**puppet**” for output. *Id.*, [0023]-[0026], [0029], [0045]-[0046]. Litbak’s figures illustrate “the common case of stereo audio,” but Litbak is “equally applicable” “to multiple track ‘surround’ audio systems with four or more tracks.” *Id.*, [0058].

65. The “actuation signal” provides the “**processor**” with “an indication of [the] currently required state.” Litbak, [0049]-[0053].



Litbak, FIG. 2.

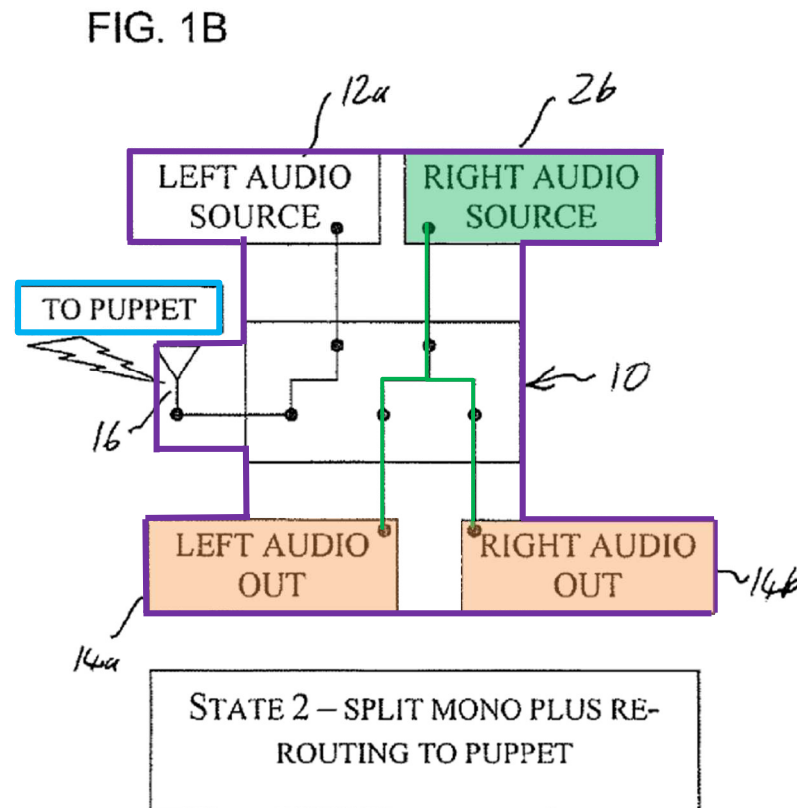
66. The “**arrangement**” then switches between two states. Litbak, [0029], [0049]-[0053]. In the “**straight-through state**,” two “**stereo inputs**” go to the arrangement’s “**corresponding stereo output[s]**.” Litbak, [0023]-[0026], [0029], [0033], [0047], [0061], FIGs. 1A-1B.



Litbak, FIG. 1A.

67. In the “**diverted state**,” the “first of the stereo inputs is diverted to the transmitter for transmission to the remote **puppet**” and only the “**second of the stereo**

inputs is directed to both of the stereo outputs.” Litbak, [0023]-[0026], [0029], [0033], [0047], [0061], FIGs. 1A-1B.



Litbak, FIG. 1B.

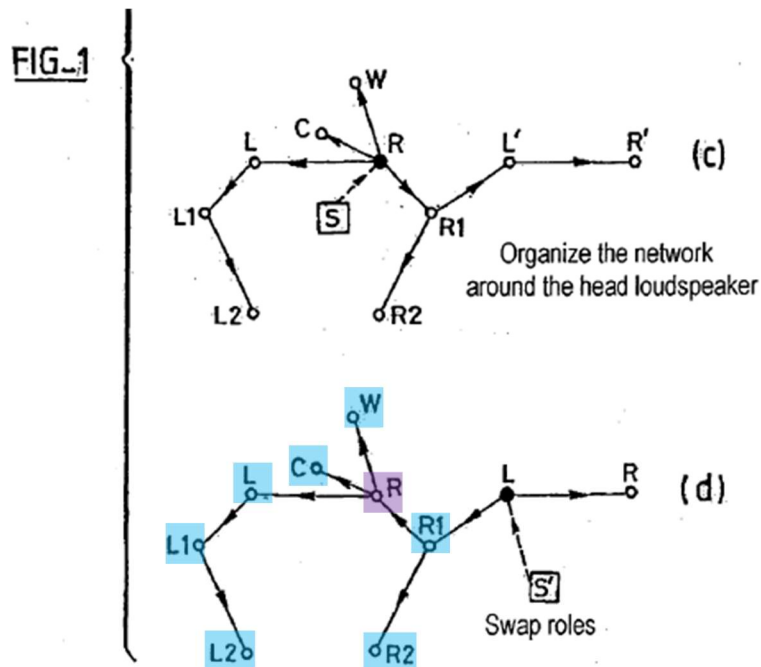
68. When a “channel is diverted” and transmitted to the “puppet,” it is output via the “puppet” “speaker.” Litbak, [0045], [0061].

69. In my opinion, like the '025 patent, Litbak is in the technical field of speaker systems and controlling audio playback. *Compare* EX-1001, 1:39-58, 2:4-14, *with* Litbak, [0002], [0012]-[0013], [0039].

2. Seydoux (EX-1008)

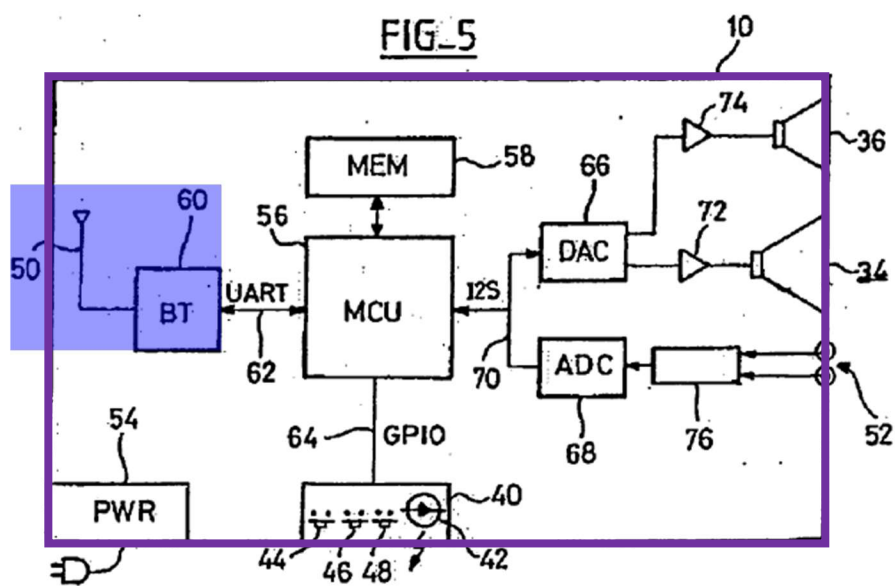
70. Seydoux “relates to a system for distributing audio signals between a plurality of active loudspeakers.” Seydoux, [0001].

71. Seydoux’s “network of loudspeakers” includes “central front channel C,” “left and right side front channels L and R,” “side surround channels L1 and R1,” “rear satellites L2 and R2, and a woofer W.” Seydoux, [0045], [0056].

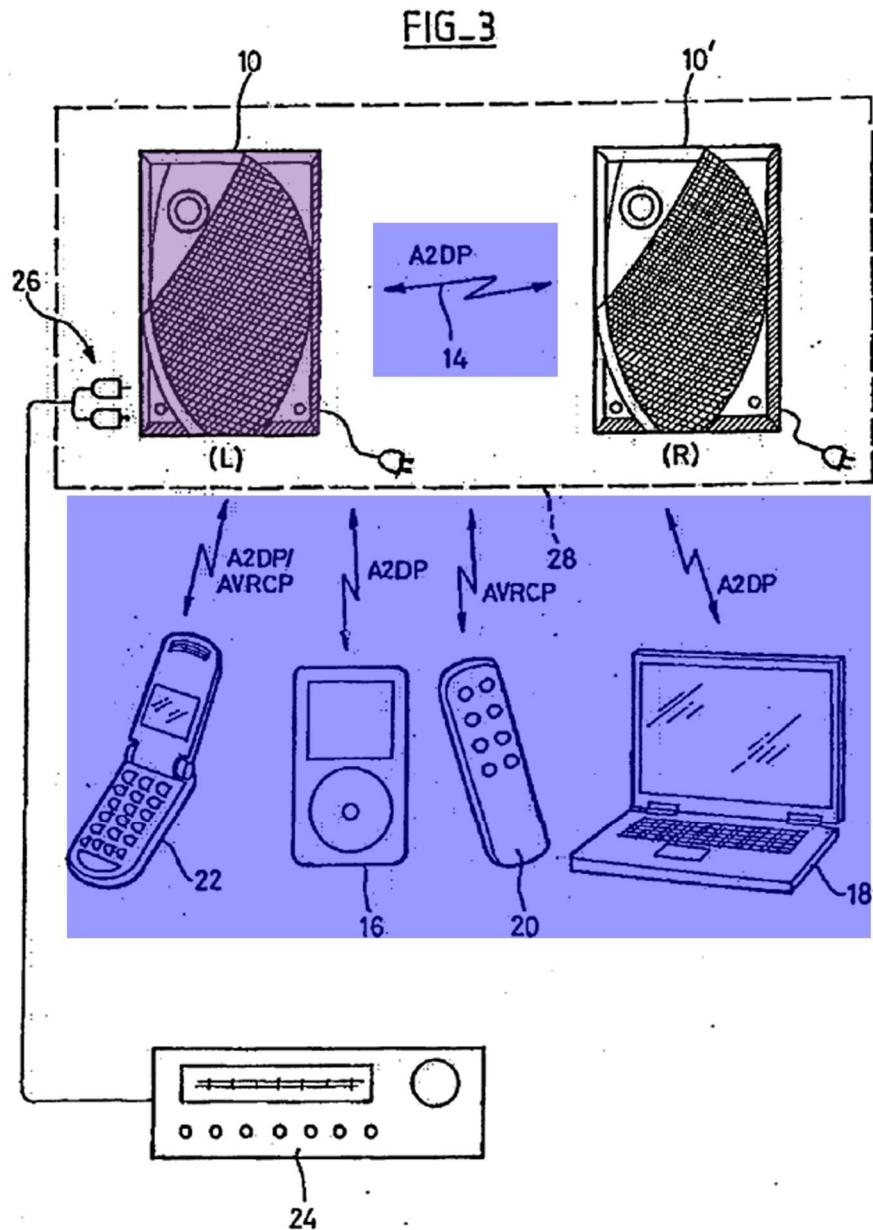


Seydoux, FIG. 1 (excerpted).

72. Seydoux’s “loudspeaker” includes a “Bluetooth module” which “establish[es] connections with all of the other loudspeakers of the system,” “audio sources,” and/or “remote controls.” Seydoux, [0149], [0152], [0154].



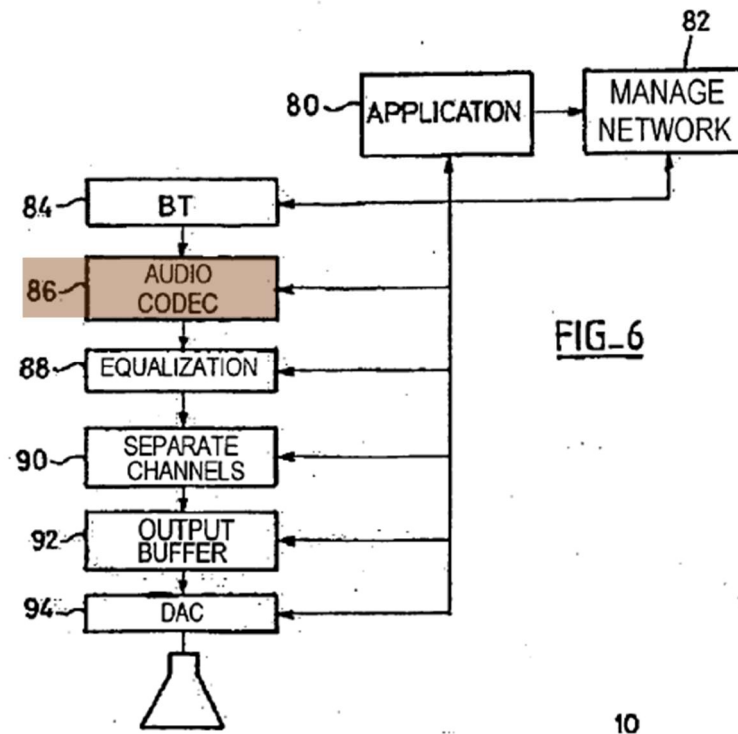
Seydoux, FIG. 5.



Seydoux, FIG. 3.

73. Seydoux discloses additional features to facilitate playback of audio channels. For example, an “audio codec” for “separating the various channels of the multichannel audio stream: right and left channels, front and back channels.” Seydoux, [0160]. Seydoux also discloses “time-shift means” that “compensat[es] the

differences between the relative transfer delays” between loudspeakers. Seydoux, [0037], [0133].



Seydoux, FIG. 6.

74. In my opinion, like the '025 patent, Seydoux is in the technical field of speaker systems and controlling audio playback. *Compare* EX-1001, 1:39-58, 2:4-14, *with* Seydoux, [0001], [0003], [0025]-[0027].

3. Independent Claims

a. Claim 1

75. In my opinion, Litbak teaches most of claim 1, including an “arrangement” (playback device) that outputs audio signals through a “speaker” and a “puppet” (another playback device) which wirelessly receives audio signals from

the “arrangement” for output via the “puppet” “speaker.” Litbak, [0047], [0061]. Although Litbak’s exemplary embodiment discusses two playback devices, the “arrangement” and “puppet,” Litbak “equally” applies to “‘surround’ audio systems.” Litbak, [0058]. This makes sense because it was well-known that two playback device stereo systems, like Litbak’s “arrangement” and “puppet,” would have been expanded to include more playback devices in surround sound systems.

76. In the exemplary embodiment, Litbak’s “arrangement” receives “audio programming” and an “actuation signal” (pairing instruction) instructing the “arrangement” to switch between the “straight-through” (unpaired) and “diverted” (paired) states. Litbak, [0039], [0047], [0061]. Prior to pairing, Litbak’s “arrangement” outputs “stereo” two-channel audio in the “straight-through” state (first processing), and after pairing the “arrangement” outputs one-channel audio in a “diverted” state (second processing) while the “puppet” wirelessly receives and outputs the other audio channel. Litbak, [0023]-[0026], [0047], [0061].

77. But Litbak omits implementation details for several conventional components and features. For example, Litbak’s “arrangement” and “puppet” communicate using “standard items” from “common wireless household communication systems,” but Litbak leaves out basic network implementation details. Litbak, [0059]. It provides a process for switching and processing audio, but it leaves out the details of how those processes are executed. And the “arrangement”

also receives the “actuation signal” via a “network,” but Litbak does not describe the network connected source. Litbak, [0039]-[0042]. But in my opinion, these implementation details were well-known in the loudspeaker art.

78. Seydoux discloses a wireless playback device—its “loudspeaker”—describing these conventional off the shelf components and features, and they would have been obvious to include in Litbak’s playback devices. Seydoux, [0154]. Several years before the ’025 patent’s priority date, “[m]odern audio equipment include[d] an ever-increasing content of digital circuitry for processing and transmitting audio signals.” Seydoux, [0002]. To facilitate wireless communication, Seydoux includes a “Bluetooth module” for communication with “other loudspeakers,” “audio sources,” and “remote controls.” Seydoux, [0154]. In my opinion, including and implementing this in Litbak’s “arrangement” and “puppet” would have resulted in conventional short-range communication and Litbak’s “arrangement” determining that it was paired with the “puppet” both (1) when it “derives” the “actuation signal” (Litbak, [0047], [0049]) and (2) after performing the “mutual authentication”

Seydoux discloses to make Bluetooth connections between loudspeakers (Seydoux, [0079], [0091]-[0092]).²

79. To facilitate user control, Seydoux teaches a Bluetooth “remote control” for sending control signals to the “loudspeaker.” Seydoux, [0149]. In my opinion, connecting Litbak’s “arrangement” with Seydoux’s “remote control” using a Bluetooth network would have enabled the “arrangement” to receive its “actuation signal” via a network. Seydoux, [0149]; Litbak, [0039]-[0041].

80. To facilitate “audio signal processing” and decoding the audio stream suggested by Litbak, Seydoux discloses “software modules” for use with a “master central processing unit (MCU)” and “memory.” Seydoux, [0154], [0158]-[0160]. In my opinion, this would have been obvious to include in Litbak’s “arrangement” and “puppet” because “[m]odern audio equipment include[s] an ever-increasing content of digital circuitry for processing ... audio signals” and standard digital audio formats (e.g., MPEG) used compressed audio signals. Seydoux, [0002]; Litbak, [0047]; Bosi, 9, 5.

² This overview summarizes the trivial nature of combining Litbak and Seydoux. In the Grounds below I explain the fulsome motivations to combine and expectations of success in detail.

81. And, to facilitate outputting full range frequencies, Seydoux also provides implementation details for multiple speaker drivers (“base/medium” and “tweeter”), which in my opinion would have been obvious to implement in Litbak’s “arrangement” and “puppet” to ensure proper high-quality output of the audio signal. Seydoux, [0151]; Litbak, [0047].

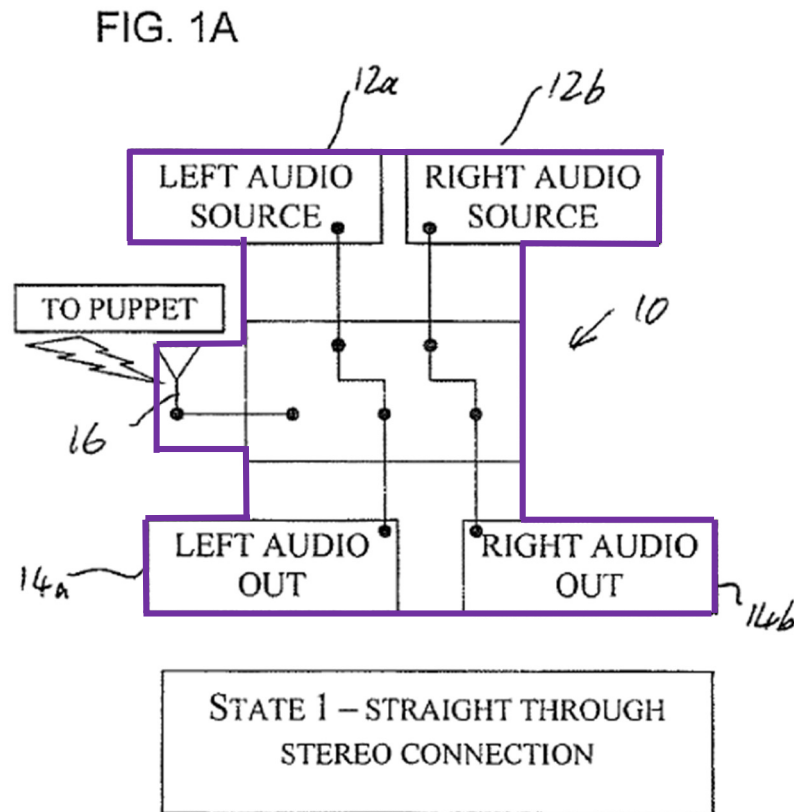
82. In my opinion, simply including these off-the-shelf features of Seydoux’s “loudspeaker” in Litbak’s “arrangement” and “puppet” (playback devices (e.g., Bluetooth modules, software audio processing, speaker drivers), as connected to Seydoux’s “remote control,” for their intended purposes would have rendered claim 1 obvious. Seydoux, [0149]; Litbak, [0047]. Using these known features according to their known functions would have predictably resulted in Litbak’s “arrangement” and “puppet” playback devices operating as standard remote controlled audio equipment as known in the art.

i. [1preamble]: “A **playback device comprising:”**

83. In my opinion, Litbak discloses [1preamble] because it discloses “an **audio switching arrangement**”³ (playback device) that outputs an audio signal. Litbak, [0029], FIGs. 1A-1B, 2, [0024]-[0026], [0033], [0046]-[0047], [0055],

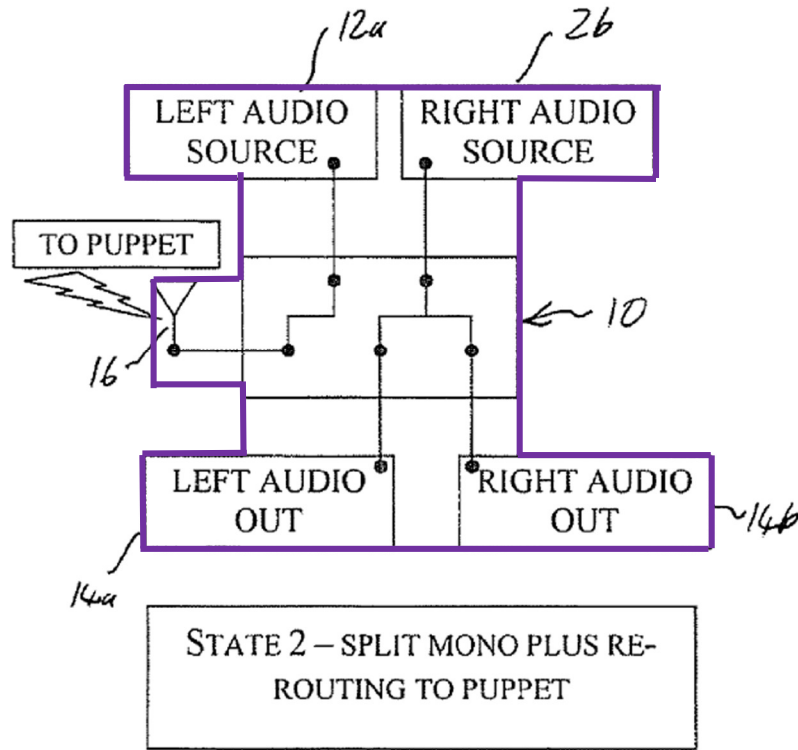
³ Referred to as the “arrangement” hereafter.

[0061]. The “arrangement 10,” including its input and output devices, discloses a playback device, which is collectively referred to as the arrangement.

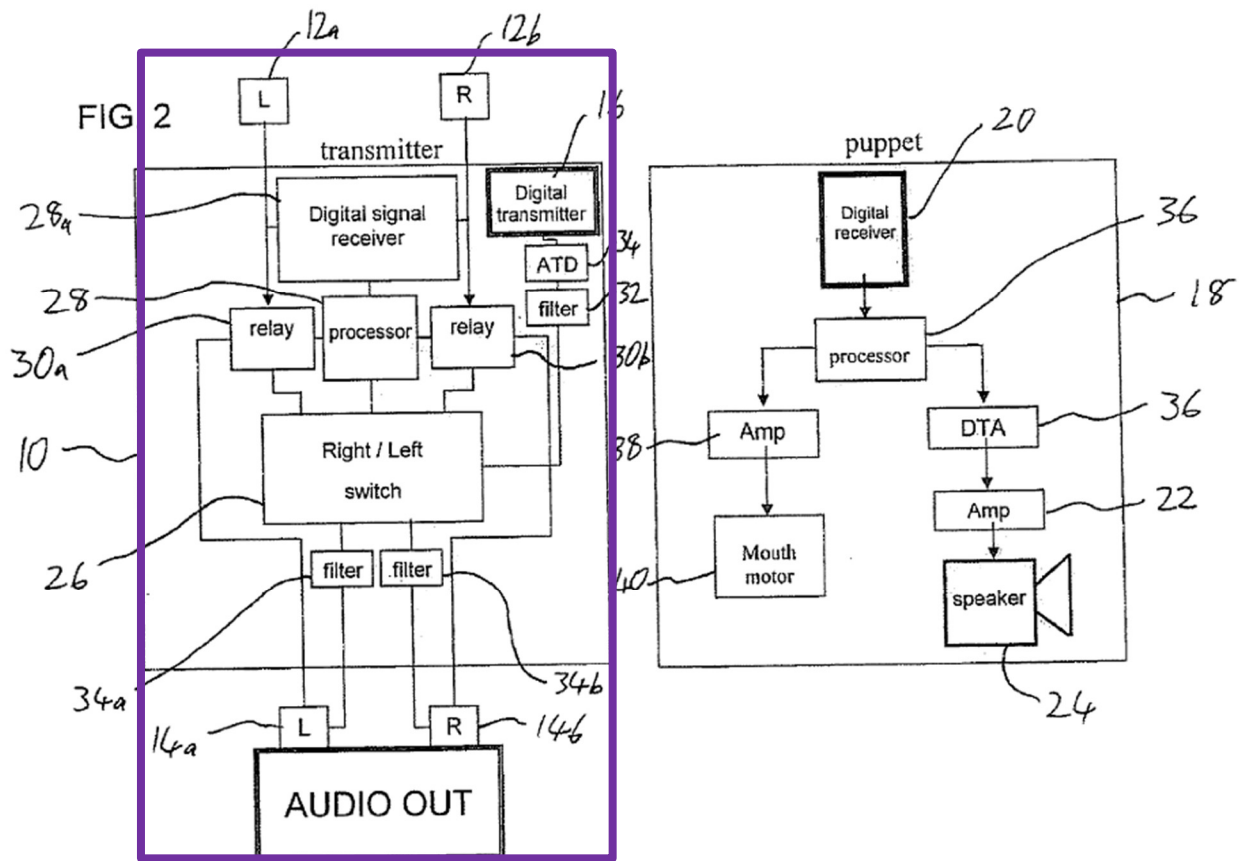


Litbak, FIG. 1A.

FIG. 1B



Litbak, FIG. 1B.

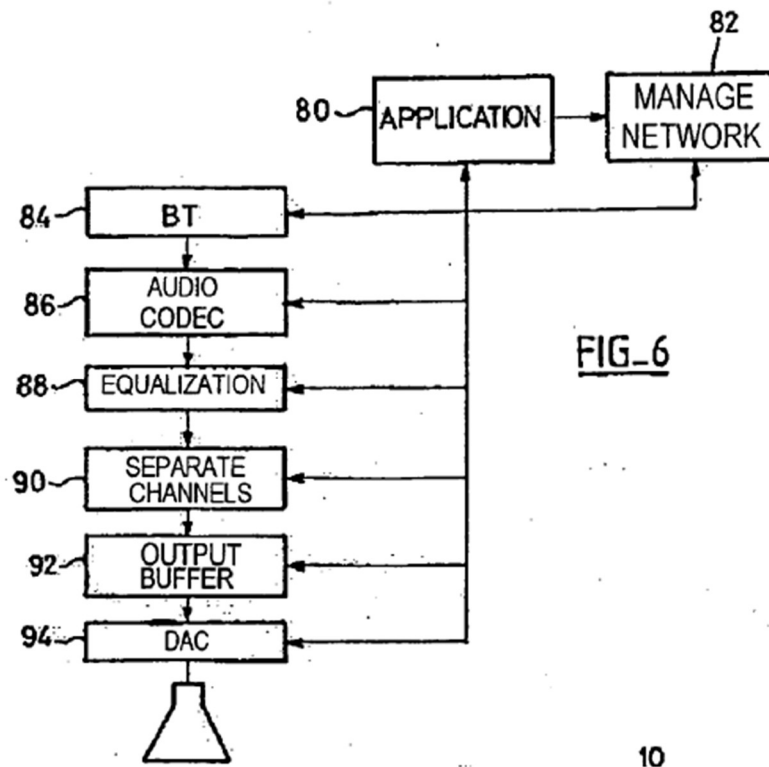


Litbak, FIG. 2.

84. In my opinion, Litbak's arrangement discloses a "playback device" ("data network device configured to process and output audio") because the arrangement is connected to a "network" (*infra* Ground 1, [1ai], [1b]) and has "audio outputs" to output audio via a "speaker" (*infra* Ground 1, [1aii], [1d]-[1e]), as explained below. EX-1015. Litbak's arrangement also **processes** "audio programming" because "[o]n receipt of electrical signals from audio inputs 12a and 12b, digital signal receiver 28a **monitors** for the predefined actuation signal." Litbak, [0025], [0039], [0061]; *infra* Ground 1, [1d]-[1e]. Litbak's "arrangement" also

applies “***filtering*** techniques” to “the audio content” to “remove the actuation signals from the output from electronic switch 26 to audio outputs 14a and 14b.” Litbak, [0029], [0034], [0042], [0048], [0057], FIG. 2. A POSITA would have understood that “monitoring” or “filtering” describes processing audio.

85. In my opinion, a playback device also would have been obvious over Seydoux because Litbak’s “arrangement” is connected to a Bluetooth “network” (*infra* Ground 1, [1ai], [1b]) to process audio using “software modules” and output the audio via a “speaker” (*infra* Ground 1, [1aii]). Litbak, [0039]-[0042]; Seydoux, [0158]-[0159]. Seydoux’s software “modules” are for “audio signal processing,” and Seydoux’s “audio stream is processed” by the “software modules” of Figure 6. Seydoux, [0158]-[0159]; *infra* Ground 1, [1aiv].



Seydoux, FIG. 6.

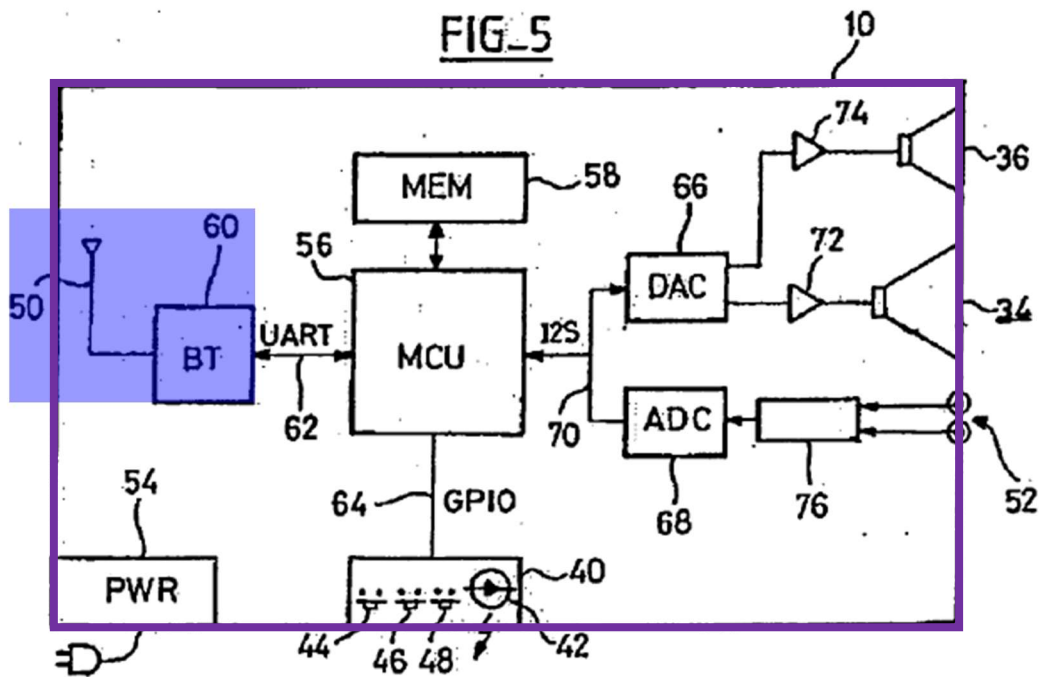
86. In my opinion, a POSITA also would have been motivated to implement Seydoux's audio processing software modules in Litbak's arrangement (*infra* Ground 1, [1aiii]-[1aiv], Litbak, [0047]-[0048]) because operations "performed by software" "advantageously" are "very inexpensive," do "not require[e] any specific hardware components," avoid the "risk of degrading sound quality," and allow playback devices to adapt equalization response curves. Seydoux, [0157]. In my opinion, audio processing was well-known, routine, and conventional practice because "[m]odern audio equipment includes an ever-increasing content of digital circuitry for processing ... audio signals." Seydoux,

[0002]. In my opinion, a POSITA would have reasonably expected to succeed because it would have used known features according to their known functions (software audio processing) to achieve predictable results (Litbak's arrangement processes audio).

ii. [1ai]: “a network interface configured to receive audio data over a network;”

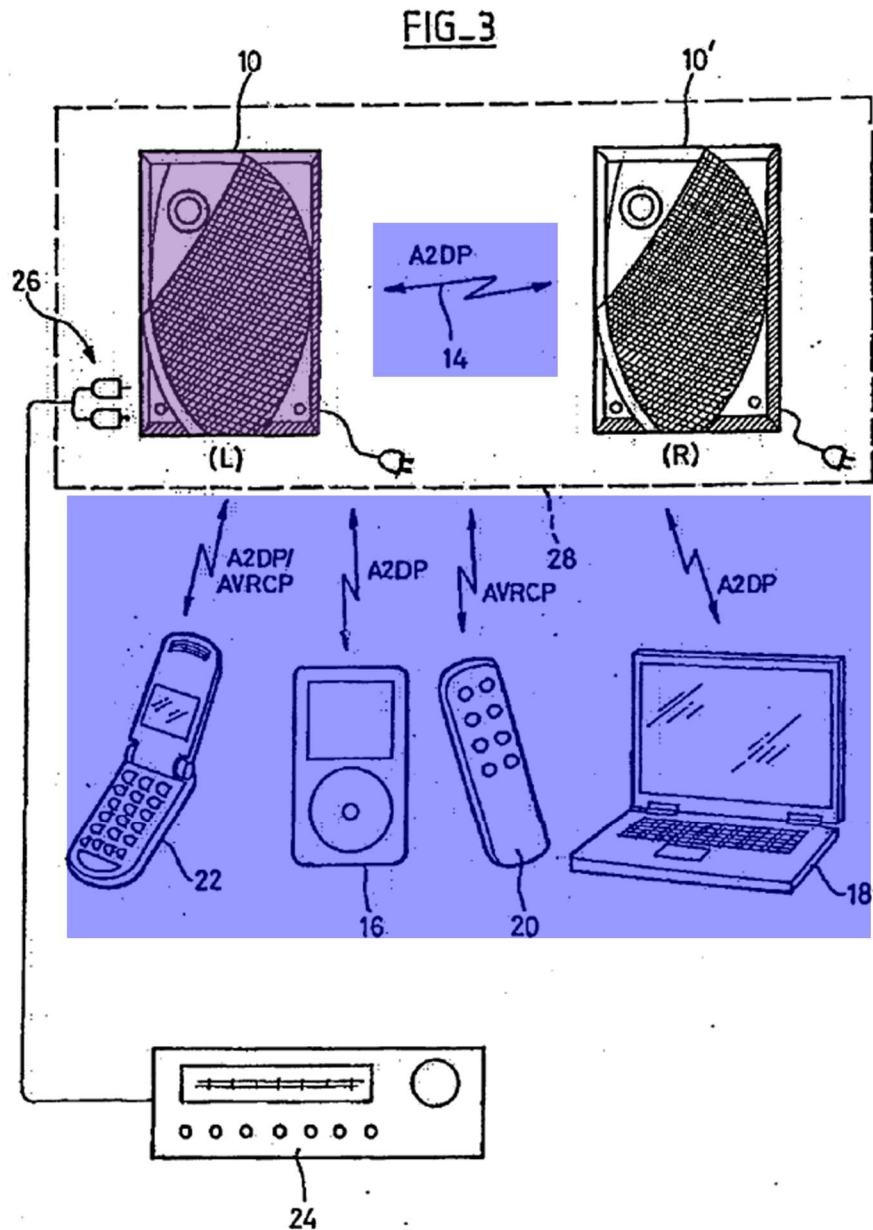
87. In my opinion, element [1ai] would have been obvious in view of the Litbak and Seydoux. Litbak at least suggests that the “arrangement” includes a network interface configured to receive audio data over a network because it is a “wireless household communication system[]” configured to receive “audio programming” (audio data) over a “wide area communication network (WAN).” Litbak, [0029], [0039], [0059]. In my opinion, it would have been obvious to include Seydoux's “Bluetooth module” in Litbak's “arrangement” to enable it to receive audio and control signals from conventional household controllers over a network. *Id.*; Seydoux, [0154].

88. Seydoux's “loudspeaker” includes “a Bluetooth module 60 connected to [an] antenna,” which discloses a network interface because “[t]he Bluetooth module serves to establish connections with all of the other loudspeakers,” “audio sources,” and “remote controls.” Seydoux, [0152]-[0154].



Seydoux, FIG. 5.

89. The loudspeaker's "Bluetooth module" receives audio data over the Bluetooth network because it couples with "various peripherals, e.g. a digital music player" which "transmit[s] an audio stream to the system." Seydoux, [0149], [0127] ("audio streams ... are received and processed by the head loudspeaker"); [0141], [0154], [0164].



Seydoux, FIG. 3.

90. In my opinion, Seydoux's "Bluetooth module" meets the construction of "physical component of a device that provides an interconnection with a data network" because it is a physical component that connects to the "Bluetooth" network. Seydoux, [0152]-[0154]; EX-1015.

91. Litbak expressly teaches the goal of network connectivity because the “arrangement” receives “audio programming” over a “wide area communication network.” Litbak, [0029], [0039], [0059]. In my opinion, a POSITA would have recognized that Litbak’s “components are standard items” used in “common wireless household communication systems” and implement “standard short-range wireless transmission technology similar to that used in conventional wireless speakers.” Litbak, [0036], [0059]. In my opinion, a POSITA would have sought standard household short-range wireless communication techniques for implementation in Litbak’s “arrangement,” i.e., Bluetooth. *Id.*

92. In my opinion, a POSITA would have been motivated to include Seydoux’s “Bluetooth module” in Litbak’s arrangement because “Bluetooth” is “most advantageous[.]” Seydoux, [0058]-[0060], [0154]. “Bluetooth technology is particularly advantageous” because it is “universal,” includes “numerous functions,” and there are “numerous components specifically designed for implementing it, which also have the advantage of being inexpensive.” *Id.* Bluetooth also advantageously allows playback control using standard household devices such as “a digital music player,” “laptop computer,” or “Bluetooth-enabled combined mobile telephone and digital music player.” Seydoux, [0149], [0024], [0059].

93. In my opinion, a POSITA would have reasonably expected success in implementing such a scheme because Bluetooth was a well-known, conventional,

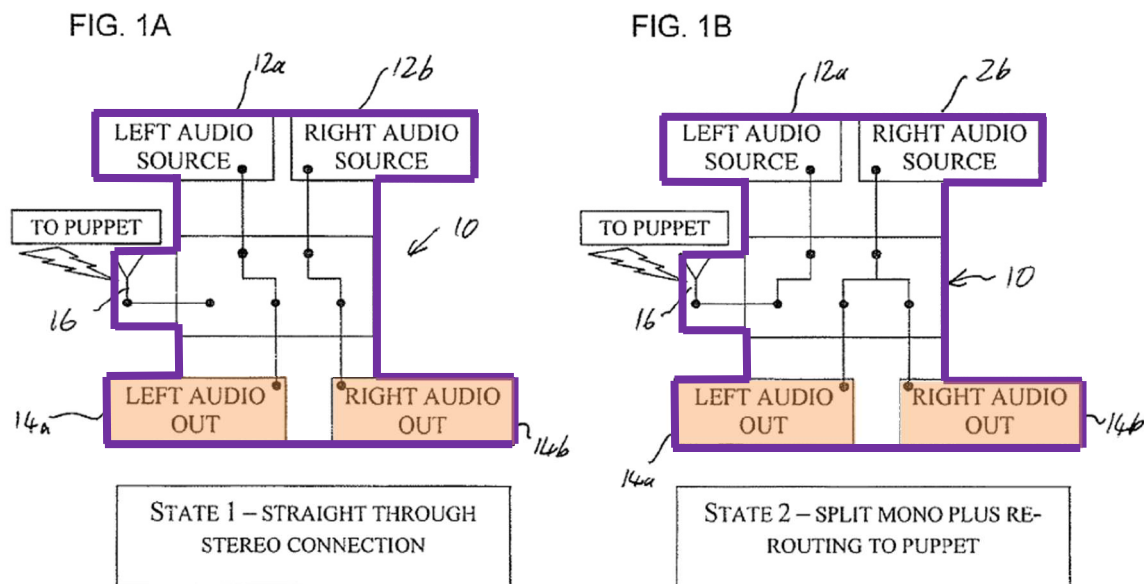
and routine protocol, as explained above. Seydoux, [0058]-[0061]; Lockett, [0097]. Bluetooth also supports “transmitting encoded multichannel audio streams of high quality” and would have been compatible with Litbak’s audio transmission purposes. *Id.* Litbak’s “components” are “standard items” from “common wireless household communication systems,” and Litbak implement “standard short-range wireless transmission technology similar to that used in conventional wireless speakers,” which in my opinion a POSITA would have understood meant compatibility with standard household wireless communication networks like Bluetooth. Litbak, [0059], [0036]. In my opinion, implementing such a scheme in Litbak’s system would employ known features according to their known functions (conventional Bluetooth module) to achieve predictable results (Litbak’s arrangement receives its audio programming transmitted over a Bluetooth network, as in Seydoux). *Id.*

iii. [1aii]: “one or more speaker drivers configured to output audio based on the audio data;”

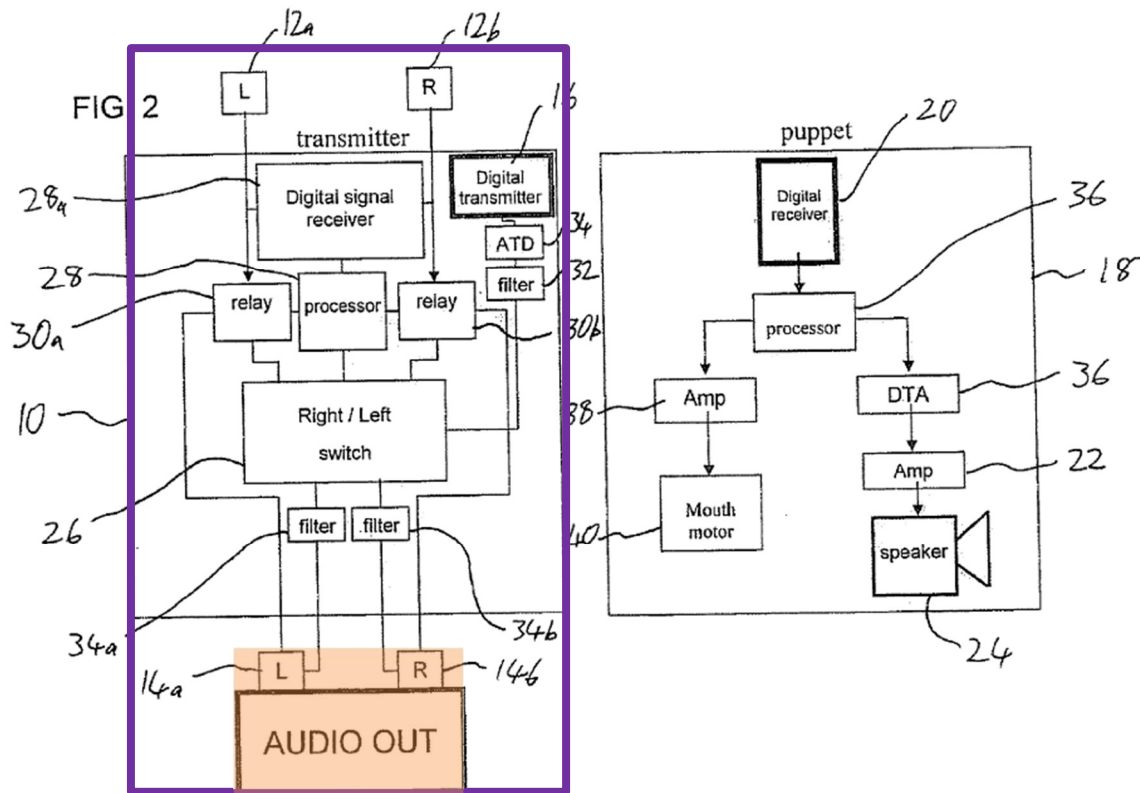
94. In my opinion, element [1aii] would have been obvious over Litbak and Seydoux because Litbak’s “arrangement” includes an “Audio Out” which “output[s]” an “audio signal” “through a speaker” “to generate desired audio content” (configured to output audio based on the audio data). Litbak, [0029], [0033], [0037] (“speaker of the entertainment system”), [0040], [0047], FIGs. 1A-

1B, 2. Seydoux provides implementation details of “base/medium” and “tweeter” speaker drivers which would have been obvious to include in Litbak’s arrangement. Seydoux, [0151].

95. Litbak’s “speaker” is configured to output audio based on the audio data because “outputs 14a, 14b,” shown below, output “audio signals” which “can be amplified and output through a speaker to generate desired audio content.” Litbak, [0029], [0033], [0037], [0040], [0047], FIGs. 1A-1B, 2; *infra* Ground 1, [1d]-[1e].

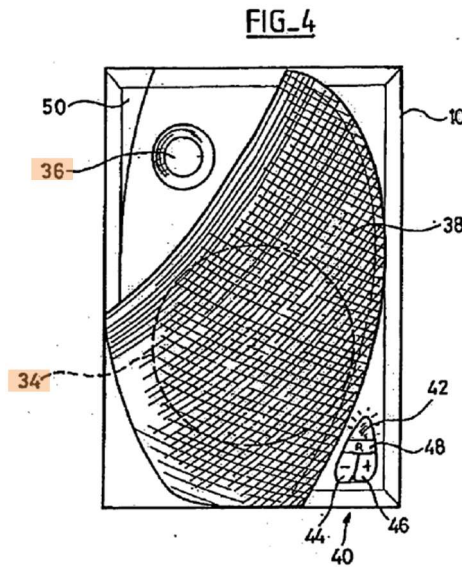


Litbak, FIGs. 1A-1B.

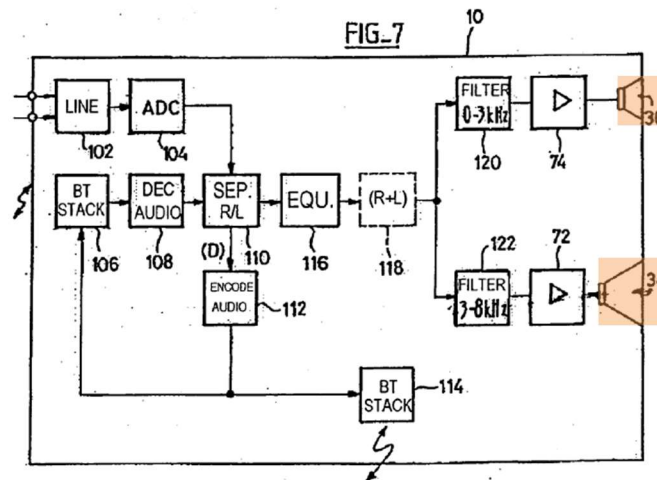


Id., FIG. 2.

96. Seydoux provides implementation details by explaining a “loudspeaker” would have included speaker drivers like a “base/medium range loudspeaker” “34” and a “tweeter” “36” for high frequencies, as illustrated below. Seydoux, [0151], [0156].



Seydoux, FIG. 4.



Seydoux, FIG. 7.

97. In my opinion, a POSITA would have understood Seydoux's "base/medium" and "tweeter" "speaker[s]" each discloses a speaker driver. Seydoux, [0151], [0156]; Kaplan, 7 (defining "driver" as "[a] transducer which converts electrical energy into sound energy, which is then radiated outward to the

surrounding medium,” which is “[a]lso called [a] speaker”). This matches the ’025 patent which describes a “tweeter” and “mid-range driver” in a “five-driver speaker system” and the ’025 patent’s interchangeable use of the terms “speaker” and “driver.” EX-1001, 8:60-9:7 (“the S5 is a five-driver speaker system ... a zone player with speakers is not limited to one with a certain number of speakers (e.g., five speakers as in the S5)”).

98. In my opinion, a POSITA would have been motivated to implement speaker “drivers that reproduce different frequency bands” to “cover most of the audio frequency range.” Davis, 14. In my opinion, a POSITA would have known that “[s]uch systems are referred to as full range loudspeakers.” *Id.* In my opinion, a POSITA would have recognized that without the ability to reproduce the entire frequency range, the playback device would have failed to properly output some audio signals.

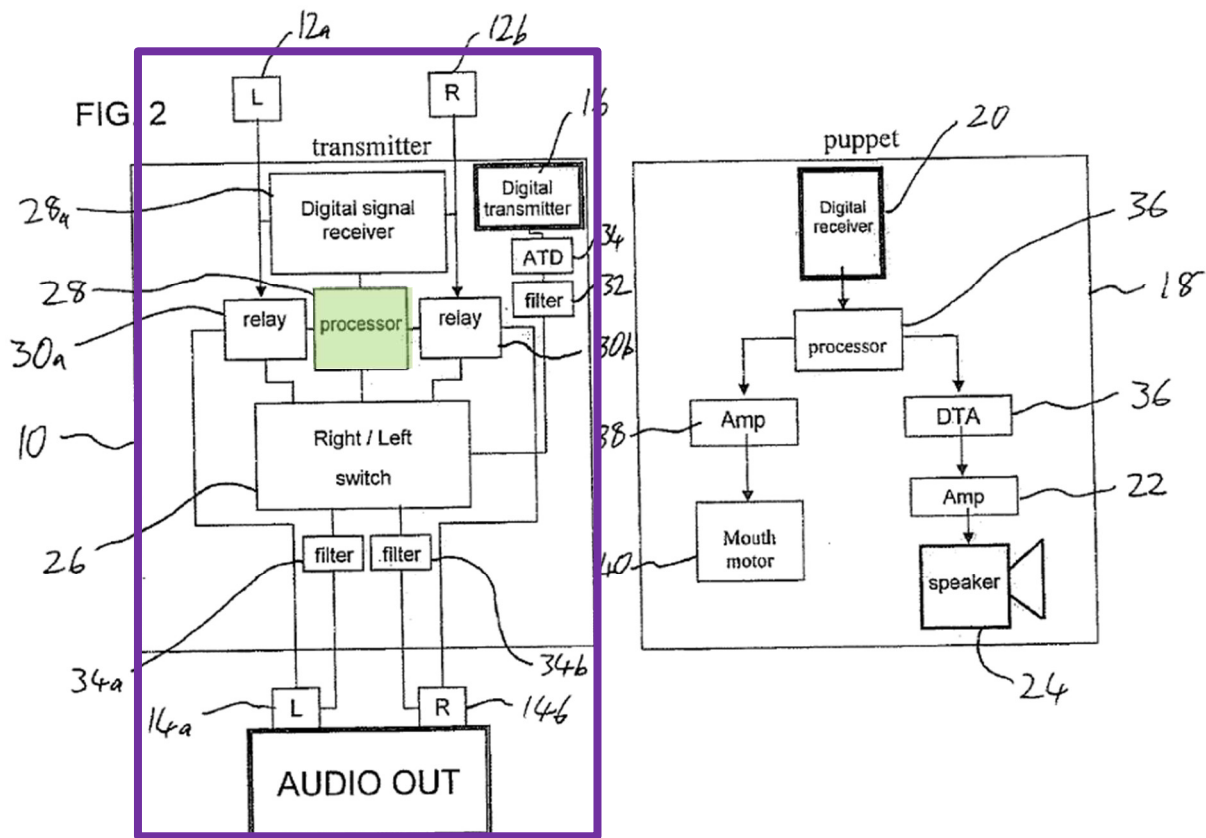
99. Seydoux achieves this advantage because “amplifiers 72, 74” “are connected respectively to the loudspeaker 34 and the tweeter 36” and “the amplifier 72 operat[es] in the 20 hertz (Hz) to 3 kHz band and the amplifier 74 in the 3 kHz-20 kHz band.” Seydoux, [0156]-[0157]. In my opinion, a POSITA would have been motivated to include multiple speaker drivers outputting “separate” frequency “bands,” as in Seydoux, in Litbak’s arrangement to allow it to advantageously produce the full-range of audio frequencies. Seydoux, [0164].

100. In my opinion, a POSITA would have reasonably expected success because “full range systems” were well-known, routine, and conventional. Davis, 14 (explaining that in the art, “[t]wo basic approaches have been taken to the packaging of full range systems”). In my opinion, implementing these speaker drivers in Litbak’s arrangement would have used known features according to their known functions (conventional full-range speakers) to achieve entirely predictable results (Litbak’s arrangement includes multiple speaker drivers that reproduce different frequency bands). *Id.*; Seydoux, [0151], [0156]-[0157], [0164].

iv. [1aiii]: “one or more processors; and”

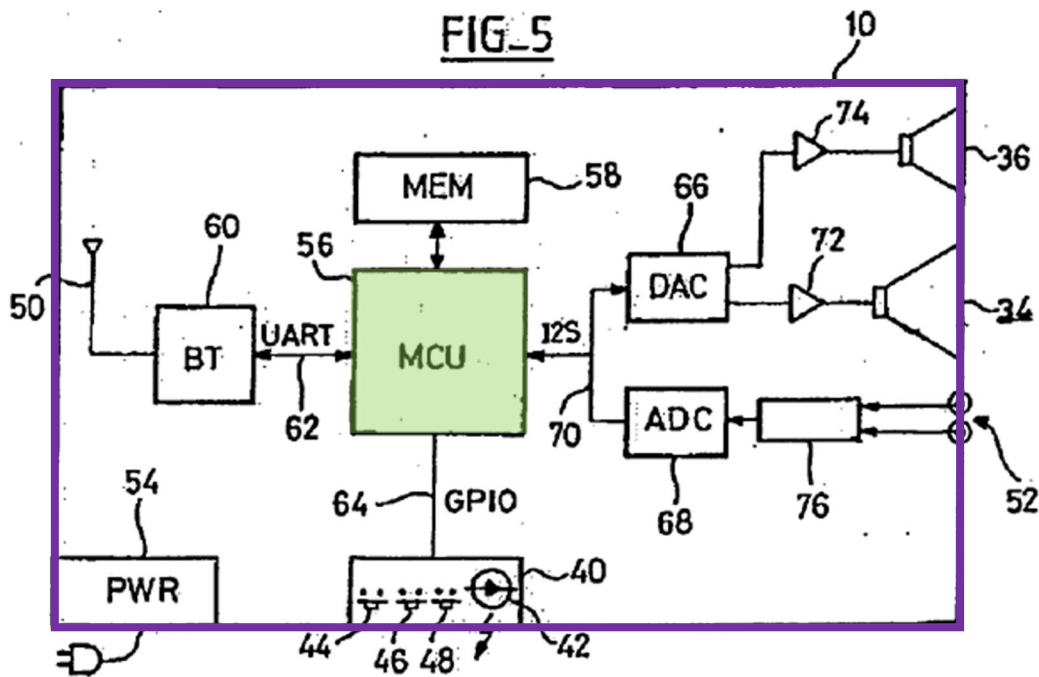
101. In my opinion, element [1aiii] would have been obvious over Litbak and Seydoux.

102. Litbak’s “arrangement” includes “processor 28.” Litbak, [0029], [0047], FIG. 2.



Litbak, FIG. 2.

103. Seydoux’s assembly includes a “master central processor unit (MCU)” which is “associate[] with a memory.” Seydoux, [0154].



Seydoux, FIG. 5.

104. In my opinion, a POSITA would have been motivated to include Seydoux's "MCU" in Litbak's "arrangement" to perform audio processing by executing the "software modules" explained above for [1pre] and thus to achieve the same advantages. *Supra* Ground 1, [1pre]; Seydoux, [0154], [0158]; Litbak, [0012]-[0013]. In my opinion, a POSITA would have reasonably expected success because processors were fundamentally basic computer components and Litbak already includes a "processor," as explained above, such that including Seydoux's would have been straightforward. Litbak, [0029], [0047]. In my opinion, implementing this scheme would have used known features according to their known functions

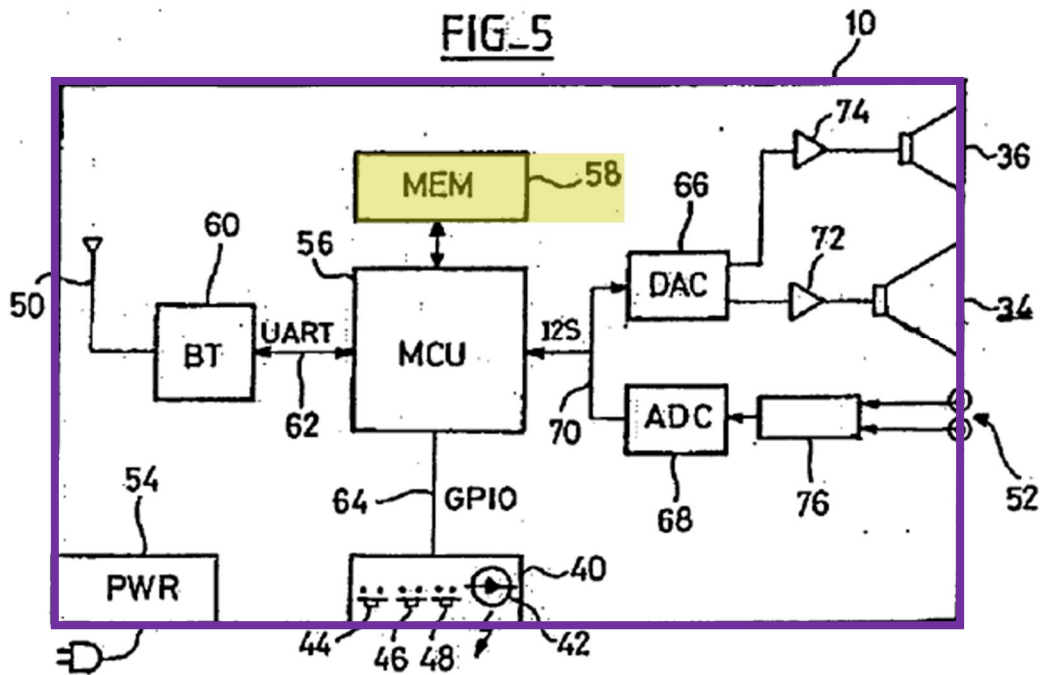
(processor) to achieve predictable results (Litbak's arrangement includes Seydoux's conventional "MCU" to work with Seydoux's "memory" and "software modules").

105. In my opinion, a POSITA would have understood that Litbak's processor and Seydoux's MCU would have been co-processors or combined into a signal processor.

v. [1aiv]: "tangible, non-transitory, computer readable memory comprising instructions encoded therein, wherein the instructions, when executed by the one or more processors, cause the playback device to:"

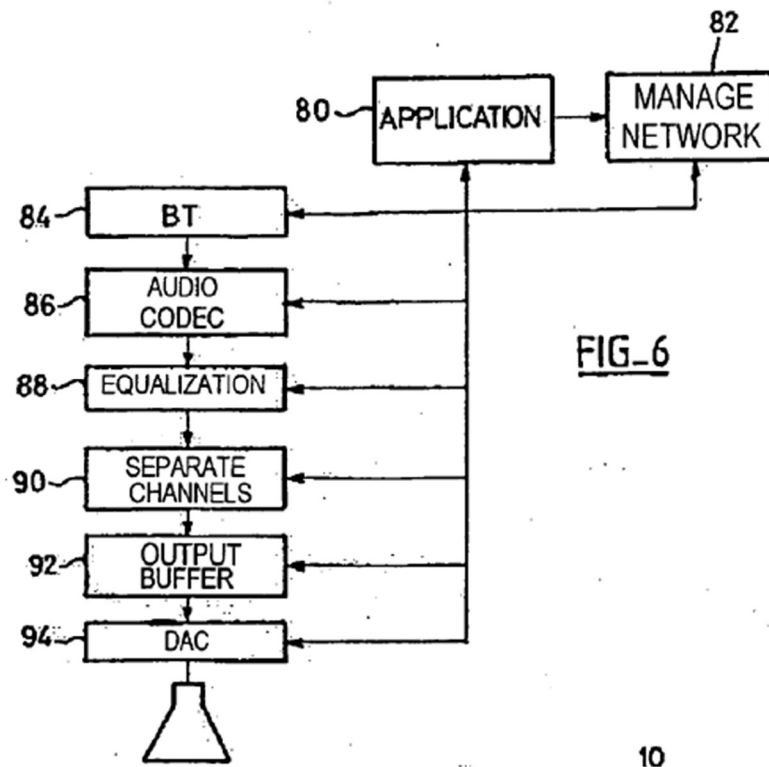
106. In my opinion, element [1aiv] would have been obvious over the Litbak-Seydoux system.

107. Seydoux's "loudspeaker" includes "master central processor unit (MCU) 56 associated with a memory." Seydoux, [0152]-[0154]. The "memory" is a tangible, non-transitory, computer readable memory. *Id.*



Seydoux, FIG. 5.

108. Seydoux’s “software of the loudspeakers” and “various software modules” of Figure 6 disclose instructions encoded in memory. Seydoux, [0087], [0089], [0158]; *supra* Ground 1, [1pre]. Seydoux’s “software modules” are executed by the “master central processor unit (MCU) 56 associated with a memory 58” to cause the claimed steps to occur because the “various logic modules [are] involved in playing back the audio signal.” Seydoux, [0050], [0152]-[0154], [0157]-[0162].



Seydoux, FIG. 6.

109. In my opinion, a POSITA also would have been motivated to implement Seydoux's memory comprising software modules to be executed by a processor to enable Litbak's "arrangement" to control its processes and execute Seydoux's software modules, as discussed above. Litbak, [0024], [0055]; *supra* Ground 1, [1pre], [1aiii]. In my opinion, it was well-known, routine, and conventional practice to use a processor executing instructions stored in memory to control a playback device's processes. Neumann, [0026] ("processor" and "associated memory 102 for executing various applications and functions necessary to operate the wireless loudspeaker device"); Rutschman, [0039], [0041] ("processor

54 controls the overall operation of the primary earpiece” and “execut[es] programming instructions stored in the memory 56 to cause the primary earpiece 12 to perform its functions”), [0041]-[0042].

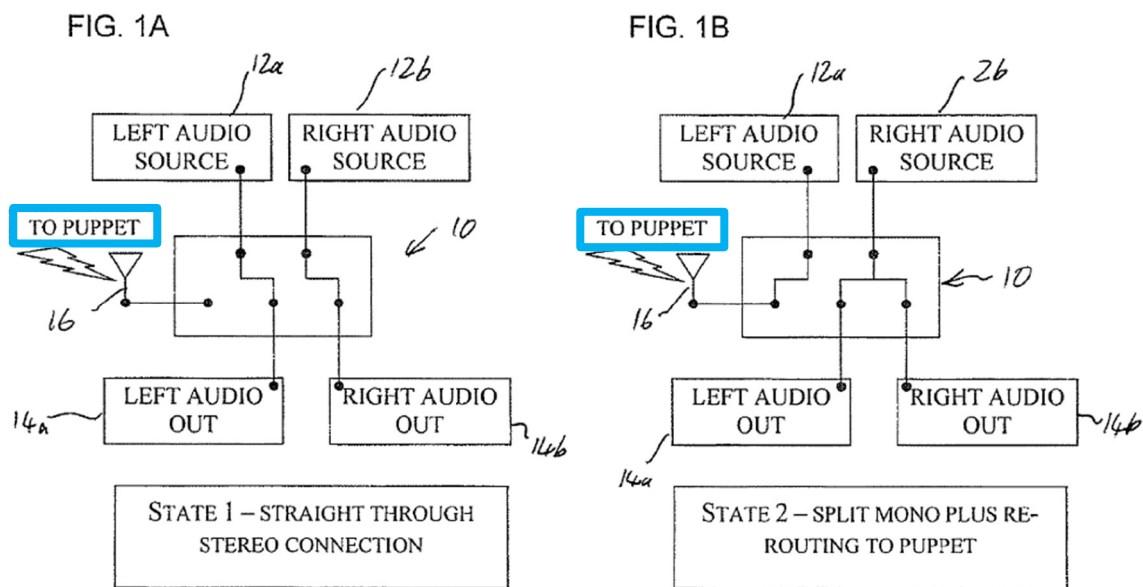
110. In my opinion, a POSITA would have reasonably expected to succeed because Litbak’s “arrangement” is already configured to operate “processor 28” such that including Seydoux’s “memory” to provide the software instructions for Seydoux’s conventional “MCU” in Litbak’s “arrangement” would have used known features according to their known functions (Seydoux’s processor, memory, software instructions, and Litbak’s arrangement which already implements a processor) to achieve predictable results (Litbak’s arrangement include Seydoux’s “MCU” to execute instructions stored in Seydoux’s “memory”). Litbak, [0029], [0047]; Seydoux, [0152]-[0154], [0158].

vi. [1b]: “receive a signal from a **controller over the network**, wherein the signal comprises an instruction for the **playback device** to become **paired** with **one or more other playback devices** such that, **after pairing**, the **playback device** and the **one or more other playback devices** **have different playback roles**; and”

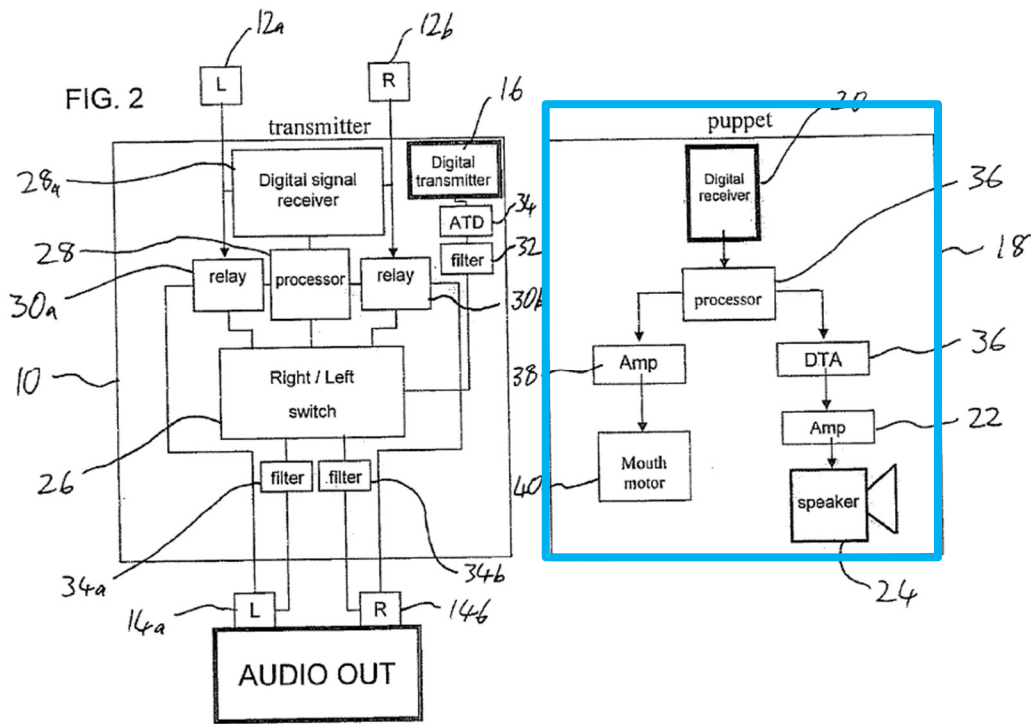
111. In my opinion, element [1b] would have been obvious over Litbak and Seydoux because Litbak’s “**arrangement**” (**playback device**) is configured to receive an “actuation signal” (signal/instruction) over a “network” that instructs the “**arrangement**” to “switch[.]” to “**a diverted state**” (**paired state**) and operate with a “**puppet**” (**one or more other playback devices**). Litbak, [0013], [0024]-[0025],

[0029], [0039], [0045], FIGs. 1A-1B, 2. Seydoux provides implementation details to enable Litbak's "arrangement" to receive its "actuation signal" from a [remote control](#) over a [Bluetooth network](#). *Id.*; Seydoux, [0149].

112. **Other Playback Device:** Litbak's "puppet" is another playback device because it includes "a speaker for outputting the audio content" (Litbak, [0013], [0046], FIG. 2) and "outputs part of an audio track supplied by an audio or audio-visual entertainment system," as shown below. Litbak, [0045].



Litbak, FIGs. 1A-1B.

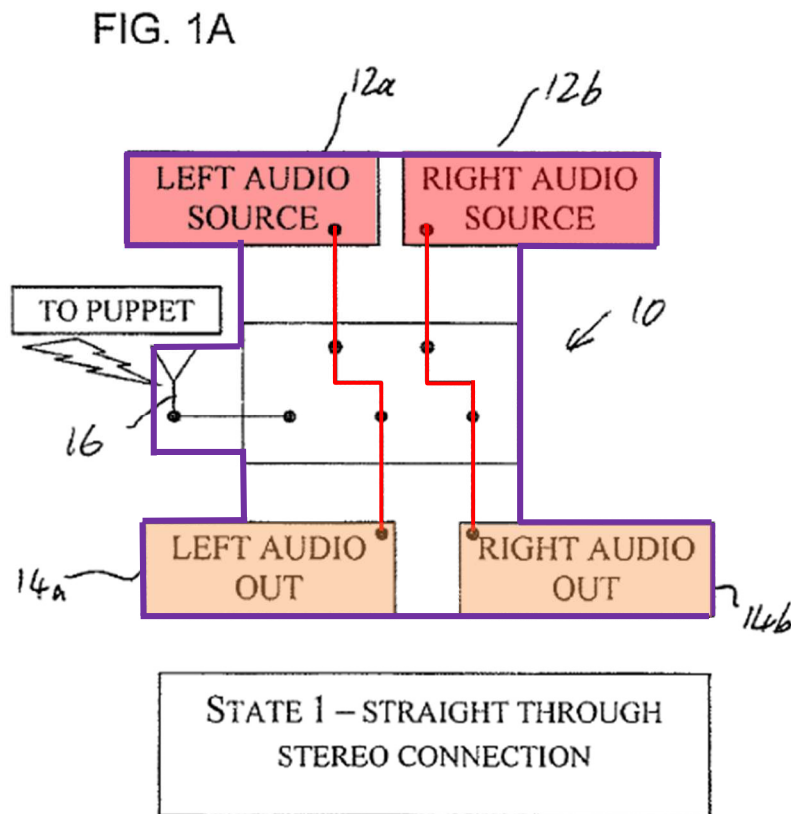


Id., FIG. 2.

113. In my opinion, Litbak's puppet meets the construction of "data network device configured to process and output audio" because it includes "speaker 24 for outputting the audio" (output audio) and a "digital-to-analog converter" (audio processing). Litbak, [0046], [0059], [0061]; EX-1015. In my opinion, it would have been obvious for the puppet to connect to a Bluetooth network (data network), such as Seydoux's Bluetooth network that connects multiple loudspeakers and a controller, as explained below. Seydoux, [0149], [0154]. In my opinion, a POSITA would have been motivated to include and implement Seydoux's audio processing software modules in Litbak's puppet, and reasonably expected success in doing so, for the same reasons explained for the arrangement above in [1pre] and [1aiv]. *Supra*

Ground 1, [1pre], [1aiv]. In my opinion, a POSITA also would have reasonably expected success because Litbak's "puppet 18 includes a processor." Litbak, [0060].

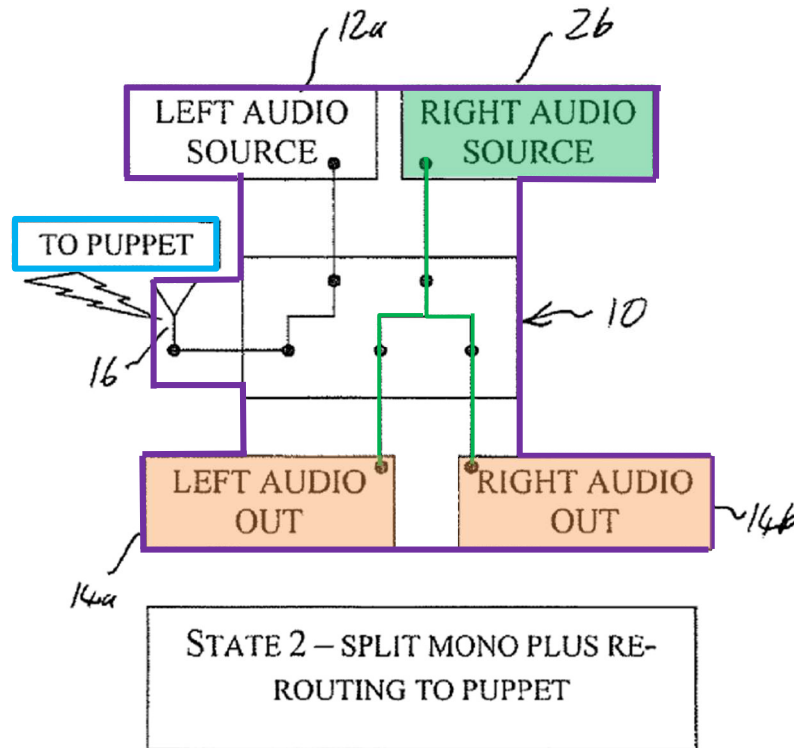
114. **Different Playback Roles After Pairing:** Litbak discloses a "straight-through state" and a "diverted state." Litbak, [0023]-[0026], [0029], [0033], [0047], [0061]. The "**straight-through state**" (also called the "regular audio output state" or "first state") corresponds to an unpaired state because the "**arrangement**" operates without the "puppet" to output two "stereo audio inputs." *Id.* As shown in Figure 1A, "audio signals from audio inputs 12a, 12b are transferred to corresponding **audio outputs 14a, 14b**," and no audio is diverted to the "puppet." *Id.* Output would have been via the **speaker drivers** of the Litbak-Seydoux system, as explained for [1aii]. *Supra* Ground 1, [1aii].



Litbak, FIG. 1A.

115. The “diverted state” (also called the “remote puppet audio state” or “second state”) describes a paired state because the “arrangement” operates with the “puppet.” Litbak, [0023]-[0026], [0029], [0033], [0047], [0061], FIG. 1B. In this state, “the audio signal from a first of the audio inputs is ... transmit[ed] to the puppet while the audio signal from a second of the audio inputs is transferred to both of the audio outputs” of the “arrangement,” thus allowing the “arrangement” and “puppet” to have different playback roles, as Figure 1B below illustrates. *Id.*

FIG. 1B



Litbak, FIG. 1B. The “audio signals” from “audio input[] 12a” (e.g., “Left Audio Source”) are “redirected” and transmitted to “puppet” “receiver 20 for playing via” the puppet’s “speaker 24.” Litbak, [0023]-[0026], [0029], [0033], [0047], [0061], FIG. 1B. The “second audio input 12b” (e.g., “Right Audio Source”) is “split to provide split mono audio to both audio outputs 14a, 14b” of the “arrangement” for playing. *Id.*

116. The “diverted state” is a paired state because Litbak’s “arrangement” and “puppet” assume different playback roles where each device plays a different audio channel from the “stereo inputs” (the “arrangement” plays “[r]ight” channel

and the “puppet” plays “[l]eft” channel). Litbak, [0023]-[0026], [0029], [0033], [0047], [0061], FIG. 1B. This meets the construction of “configuration involving two or more playback devices that have different playback roles” because each playback device plays a different channel. *Id.*; EX-1015. This configuration also matches the ’025 patent’s disclosure. EX-1001, 3:46-54 (“Subsequent to pairing, one playback device is reconfigured to output a first channel (e.g., right channel audio and not left channel audio) and the other playback device is reconfigured to output a second channel (e.g., left channel audio and not right channel audio), *which is different from the first channel*”).

117. **Receive Signal/Instruction:** As discussed above, Litbak discloses that the “arrangement” (playback device) receives an “actuation signal” because “[o]n receipt of electrical signals from audio inputs 12a and 12b, digital signal receiver 28a monitors for the predetermined actuation signal.” Litbak, [0061].

118. The “actuation signal” discloses a “signal” comprising an instruction for the “arrangement” to enter the “diverted state” (become paired) with the “puppet” (another playback device). Litbak, [0013], [0029], [0034]. The “actuation signal” comprises an instruction because it is “for signaling the switching between modes” (i.e., the “straight-through state” (unpaired state) and “diverted state” (paired state)). Litbak, [0013], [0029], [0033]-[0034], [0047], [0049], [0053]-[0055] (“actuation

signal” is “indicative of” the state), [0061]. Thus, the signal instructs the playback device which state to adopt. *Id.*

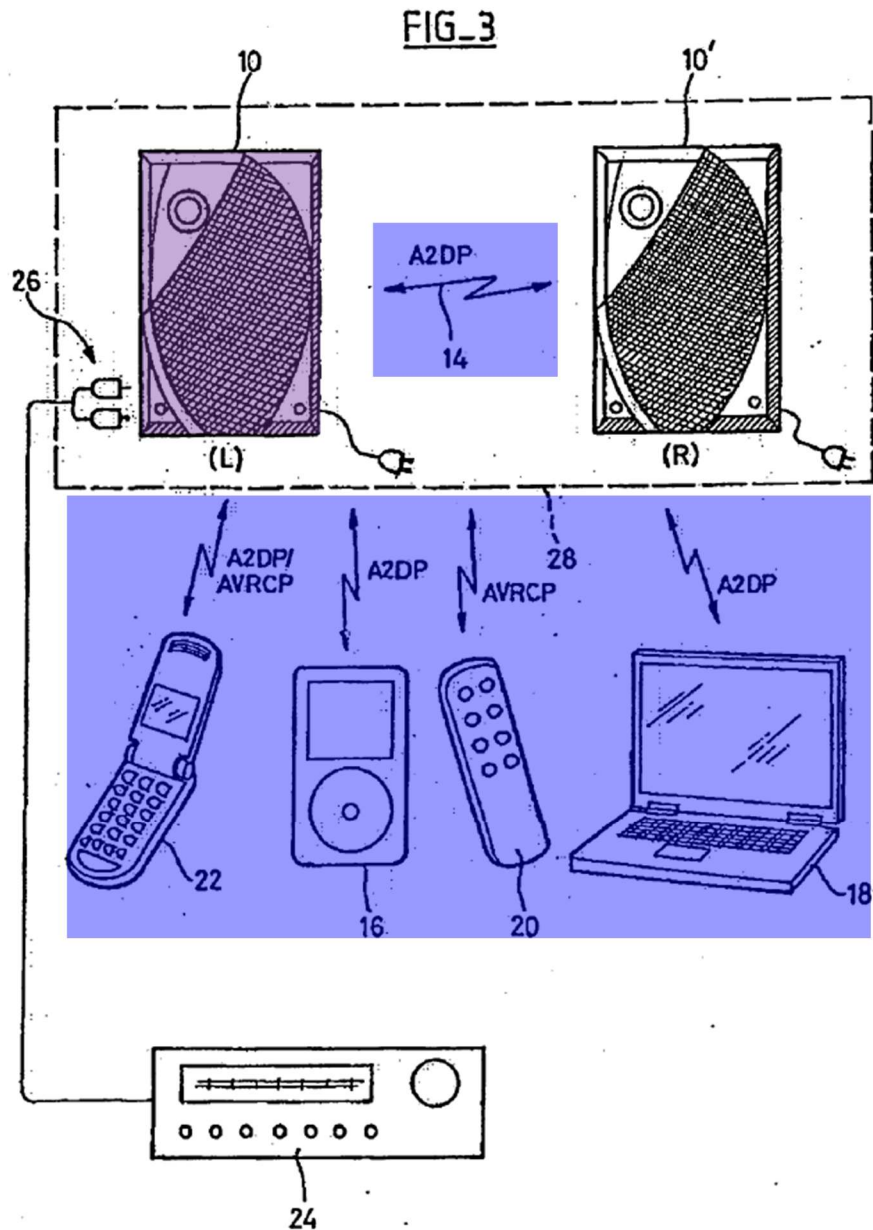
119. The “actuation signal” can be a “digital signal with [a] first code” or “[a] second code” that “identifies” “different states.” Litbak, [0013], [0029], [0049]-[0055]. The processor is “responsive to the first code to switch to, or maintain, the diverted state” and “to the second code to switch to, or maintain, the straight-through state.” *Id.*, [0053]. Alternatively, the “actuation signal” may “correspond[] to a tone at a predefined frequency.” *Id.*, [0048]. The “actuation signal” instructs the “arrangement” because the “processor” is “responsive to” the “actuation signal” to switch to the specified state. *Id.*, [0029], [0049]-[0055].

120. **From a Controller Over the Network:** Litbak at least suggests receiving the “actuation signal” from a controller over the network because Litbak’s “actuation signal” is transmitted together with the “audio programming” (audio data) and “[t]he ‘electrical signal’ which includes the audio signal ... may have an additional signal superimposed upon it, such as the actuation signal.” Litbak, [0039]-[0042]. And as discussed above, Litbak’s “audio programming” is received over a “network,” specifically the “wide area communication network (WAN).” *Id.*

121. Seydoux discloses “control peripherals ... capable of sending both audio signals and control signals, e.g. a Bluetooth-enabled combined mobile telephone and digital music player,” which discloses a controller. Seydoux, [0149],

[0126]-[0127] (“peripheral” is “an audio source” and/or “remote control”). “[T]he commands are received and processed by the head loudspeaker.” *Id.*

122. Seydoux’s “control signals” are received over the same Bluetooth network explained for Ground 1, [1ai] because “[t]he Bluetooth module serves to establish connections ... with peripherals that constitute audio sources and/or remote controls,” as shown in Figure 3. Seydoux, [0059], [0126]-[0127], [0149], [0154]; *supra* Ground 1, [1ai].



Seydoux, FIG. 3.

123. In my opinion, a POSITA would have recognized that Litbak's actuation signal required an originating source and would have been motivated to implement Seydoux's "control peripherals" in Litbak to provide an originating source for the auction signal. Seydoux, [0149], [0126], [0154].

124. In my opinion, a POSITA would have been motivated to use Seydoux's Bluetooth network for the remote control as explained above for Ground 1, [1ai]. *Supra* Ground 1, [1ai]. The Bluetooth network would have allowed for simple wireless control of Litbak's audio arrangement in a home entertainment setting because Bluetooth advantageously allows users to control playback devices using standard household devices such as "a digital music player," "laptop computer," or a "Bluetooth-enabled combined mobile telephone and digital music player." Seydoux, [0149], [0024], [0059].

125. In my opinion, a POSITA would have reasonably expected success in implementing Seydoux's Bluetooth enabled peripheral as a remote control in Litbak's system as explained for Ground 1, [1ai]. *Supra* Ground 1, [1ai]. Bluetooth also includes "profiles providing interoperability for Bluetooth appliances with audio and video control functions." Seydoux, [0059]. In my opinion, implementing this scheme in Litbak's system would employ known features according to their known functions (conventional Bluetooth module) to achieve predictable results (Litbak's arrangement receives its actuation signal transmitted over a Bluetooth network, as in Seydoux). *Id.*

vii. [1c]: “(i) determine that either (a) the **playback device** is **not paired** with the **one or more other playback devices** or (b) that the **playback device** is **paired** with the **one or more other playback devices** such that the **playback device** and the **one or more other playback devices** **have the different playback roles**,”

126. In my opinion, Litbak discloses [1c] because the processor “**derives**” an “**indication**” “**designating**” (**determines**) the required “state,” i.e., “**straight-through state**” (**not paired**) or “**diverted state**” (**paired**). Litbak, [0049]-[0053], [0024]-[0025]. In my opinion, element [1c] also would have been obvious over Litbak and Seydoux because Seydoux discloses “mutual authentication between the loudspeakers.” Seydoux, [0078]-[0079].

127. Litbak’s “processor 28 derives ... an indication of a currently required state of the electronic switch, preferably positively designating either the straight-through or diverted switching state” which “identifies at least three different states.” Litbak, [0019]-[0020], [0024]-[0025], [0047]-[0053], [0061]. The derivation determines the “state” of the “arrangement,” which causes the “processor” to “switch the electronic switch from the straight-through state to the diverted state.” *Id.*

128. As discussed for [1b], the “**diverted state**” corresponds to a **paired state** between the “**arrangement**” (**playback device**) and “**puppet**” (**other playback device**) where the “arrangement” and “puppet” have different playback roles, and the “**straight-through state**” corresponds to an unpaired state. Litbak, [0029], [0033], [0047]; *supra* Ground 1, [1b]. When the “processor 28 derives” “an indication”

“positively designating” the “diverted switching state” (paired state), Litbak’s “arrangement” determines it is paired with the puppet to have different playback roles. Litbak, [0049]-[0053], [0061], [0024]-[0025]. Similarly, when the “processor 28 derives” no “indication” “positively designating” the “diverted switching state” (paired state), for example, either “no actuation signal” or a “second code,” Litbak’s “arrangement” determines that it is not paired with the puppet. *Id.*

129. Moreover, in my opinion, the pairing determination would have been obvious in view of Seydoux which discloses “mutual authentication between the loudspeakers” and a “proximity table” specifying loudspeaker audio channel “role.” Seydoux, [0078]-[0079], [0091]-[0092].

130. Seydoux discloses that using “standard Bluetooth protocols: each loudspeaker configures itself in a ‘discoverable’ mode” and “searches for all of the loudspeakers situated within range.” Seydoux, [0077]. The loudspeaker then exchanges “message[s]” with the other loudspeaker to perform mutual authentication. Seydoux, [0077]-[0079], [0091]-[0092]. Based on this “search ... , each loudspeaker draws up a ‘proximity table’” and “for each of the loudspeakers found, the table comprises ... its ‘differentiation’ ..., i.e. the definition of its specific role (left front, right front, woofer, etc.).” *Id.* Seydoux’s loudspeaker performing “mutual authentication” with another loudspeaker to create a “proximity table” identifying the other loudspeaker’s “specific role” discloses determining (i.e., by

generating the table) that it is paired with the other loudspeaker such that they have different playback roles (i.e., left, right, woofer). *Id.* Similarly, when the other loudspeaker does not appear in the first loudspeaker's "proximity table," the first loudspeaker determines that it is not paired. *Id.*

131. In my opinion, acknowledgements were a well-known concept in communications. In my opinion, a POSITA would have been motivated to combine Seydoux's "mutual authentication" and "proximity table" into Litbak's wireless communication so that Litbak's "arrangement" and "puppet" can determine and track whether they are paired, or acknowledge each other. Litbak, [0026], [0029], [0033], [0047]; Seydoux, [0077]-[0079], [0091]-[0092].

132. As modified, Litbak's "arrangement" would have received the "actuation signal" instructing the "arrangement" to pair with the "puppet" (Ground 1, [1b]), exchanged "message[s]" to perform "mutual authentication" and create a "proximity table" (taught by Seydoux), confirming the pairing was successful so that Litbak's "arrangement" may output audio in the "diverted state" (if paired) or in "stereo" (if not paired). *Id.*

133. In my opinion, a POSITA would have appreciated the benefit of ensuring that a second playback device is paired and ready to receive and output the intended diverted audio channel. Kim, [0070]-[0071] (mobile phone "transmitt[ing]" "stereo audio" "to the headset" when pairing response is

confirmed). For example, in my opinion, a POSITA would have understood that outputting only one channel of a stereo system means “the user will [] not enjoy the full range of high audio quality music.” Lin, [0006]. Stereo systems have “reduced performance” if intended channels are not output, e.g., when the system “operates in mono if the system was a stereo system[] or the surround channels are eliminated.” Seydoux, [0144].

134. Seydoux also teaches that implementing a pairing determination would have reduced error, delay, and unnecessary transmissions in Litbak’s system by confirming a connection existed to transmit audio to the puppet. Seydoux, [0077] (loudspeaker “can establish satisfactory wireless communication” with “loudspeakers situated within range,” and when out of range “the connection [may be] of quality that is inadequate” leading to “excessive” “transmission errors” and “excessive delay”).

135. In my opinion, a POSITA would have reasonably expected success because Litbak uses “standard short-range wireless transmission technology similar to that used in conventional wireless speakers” and Seydoux similarly “most advantageously” implements “Bluetooth.” Litbak, [0036]; Seydoux, [0058]-[0064]; *supra* Ground 1, [1ai] (explaining Bluetooth compatibility between Litbak and Seydoux); Kim, [0022], [0038]-[0039], [0070]. Determining that two devices are wirelessly connected, such as by using an acknowledgement, was also well-known

in communications, including in the playback device context. Kim, [0070]-[0071]; Neumann, [0060] (“first wireless loudspeaker device (100) acknowledges the second wireless loudspeaker device”); Kaplan, 6 (defining “acknowledgement”), 8 (defining “handshaking”). In my opinion, implementing Seydoux’s pairing determination in Litbak’s system would have used known features according to their known functions (transmitting acknowledgement messages over Litbak’s “standard short-range wireless” communication) to achieve entirely predictable results (Litbak’s arrangement determines whether it is paired to the puppet). *Id.*

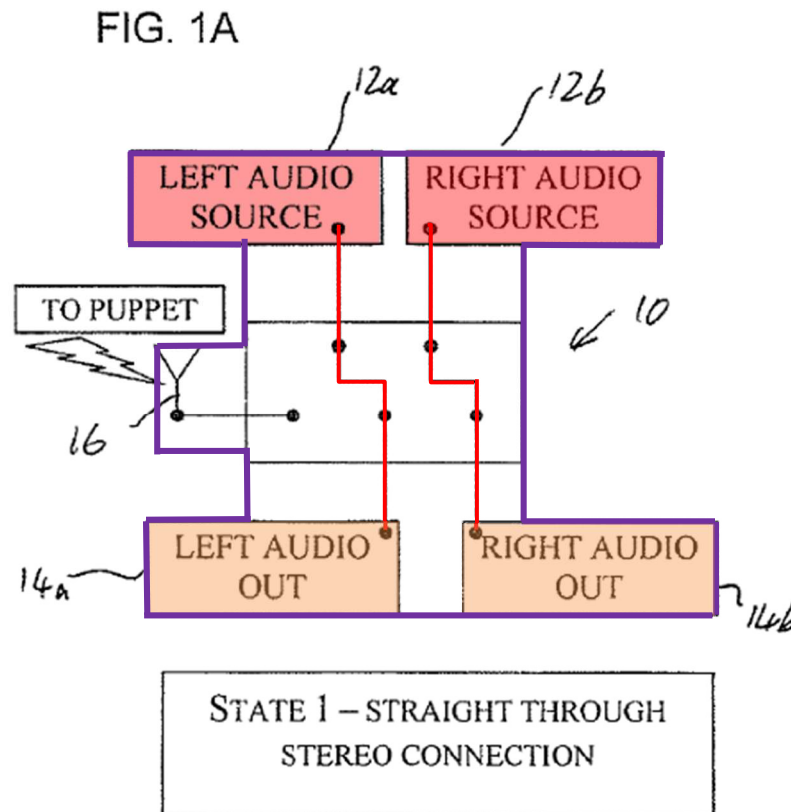
viii. [1d]: “(ii) configure the **playback device** to perform a **first processing of the audio data so as to output two-channel audio** based on the audio data from the one or more speaker drivers after the **playback device** has determined it is not paired with the **one or more other playback devices**, and”

136. In my opinion, Litbak discloses [1d] and element [1d] would have been obvious over the Litbak and Seydoux.

137. As explained in [1c], Litbak alone discloses, and it would have been obvious over Litbak and Seydoux, that the “**arrangement**” (**playback device**) determines it is **not paired** with the “**puppet**” device (**another playback device**). *Supra* Ground 1, [1c]; Litbak, [0025]-[0026], [0033]. After this not paired determination, Litbak’s playback device outputs “**stereo audio**” in the “**straight through state.**” *Id.*

138. Litbak’s “straight-through state” discloses the claimed first processing because “in the absence of the predefined actuation signal an audio signal from each

of the stereo inputs” (two-channel stereo audio) “is transferred to a corresponding stereo output.” Litbak, [0023]-[0026], [0029], [0033], [0047], [0061]. Figure 1A below illustrates the **first processing**, where audio inputs “Left Audio Source” (12a) and “Right Audio Source” (12b) (**two-channel audio**) are output through “**audio outputs 14a, 14b**” in the “**straight-through state**” (unpaired state). *Id.* Output would have been via the **speaker drivers** of the Litbak-Seydoux system, as explained for [1aii]. *Supra* Ground 1, [1aii]; Litbak, [0040].



Litbak, FIG. 1A.

139. This configuration matches the '025 patent which uses a playback device outputting both stereo channels as its example. EX-1001, 3:46-54, 4:44-49

(“the playback device might be configured to output in two-channel or stereo mode, but subsequent to being paired with one or more playback devices might be configured to output a right or left channel”).

140. Litbak discloses processing the “audio programming” (audio data) at least because Litbak discloses selectively routing the channels to output “stereo” (two-channel audio), and matches ’025 patent claim 1 which recites “a first processing of the audio data *so as to* output two-channel audio.” Litbak, [0023]-[0026], [0033], [0039], [0047], [0061]; EX-1001, claim 1.

141. Litbak further discloses processing of the “audio programming” (audio data) as explained for [1pre]. *Supra* Ground 1, [1pre]; Litbak, [0039]. And in my opinion, it would have been obvious to implement Litbak’s steps using Seydoux’s software modules to achieve the first audio processing, as explained for [1pre] and [1aiv]. *Supra* Ground 1, [1pre], [1aiv].

ix. [1e]: “(iii) change the configuration of the **playback device by configuring the **playback device** to perform a **second processing of the audio data so as to output one-channel audio** based on the audio data from the one or more speaker drivers after the **playback device** has determined it is paired with the **one or more other playback devices**.”**

142. In my opinion, Litbak discloses [1e] and element [1e] would have been obvious over the Litbak-Seydoux system.

143. As explained in [1c], Litbak discloses, and it would have been obvious over the Litbak-Seydoux system, that the “**arrangement**” (**playback device**)

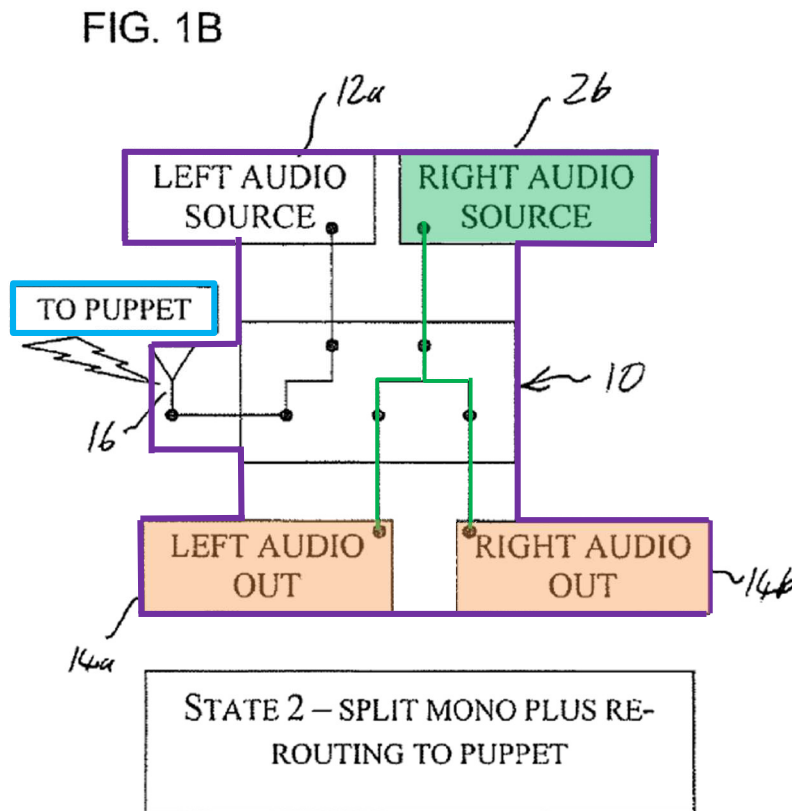
determines that it is paired (e.g., the “processor” “derives” “an indication of” or “identifies” a “state[.]”) with the “puppet” device (another playback device). *Supra* Ground 1, [1c]; Litbak, [0039], [0049]-[0053]. After the “arrangement” confirms it is paired with the “puppet,” Litbak’s playback device changes configuration to output “split mono” audio in the “diverted state” (performs a second processing of the audio data so as to output one-channel audio). *Id.*; Litbak, [0033], [0061], FIG. 1B.

144. As discussed above for [1c], when paired, Litbak’s “arrangement” operates in the “diverted state” (also called the “remote puppet audio state” or “second state”). *Supra* Ground 1, [1c]. As discussed for [1b], when paired, the “arrangement” changes configuration by “actuat[ing] [r]elays 30a and 30b” to enter the “diverted state.” *Supra* Ground 1, [1b]; Litbak, [0055], [0061].

145. Litbak’s “diverted state” discloses a second processing because “on detection of the predefined actuation signal” only one “input from a second of the stereo inputs” (one-channel audio) “is directed to both of the stereo outputs” of the “arrangement.” Litbak, [0023]-[0026], [0029]. The “arrangement” no longer outputs two “stereo inputs,” and instead, the other stereo input is transmitted to the puppet. *Id.*

146. Figure 1B illustrates “Right Audio Source” (12b) is output as “split mono audio” (single-channel audio) through “audio outputs 14a, 14b” in the

“diverted state” (after the playback device determines it is paired). Litbak, [0047], FIG. 1B. The figure shows “audio signals from the second audio input 12b are split to provide split mono audio to both audio outputs 14a, 14b.” Litbak, [0033], [0058], [0061], FIG. 1B.



Litbak, FIG. 1B. In this configuration, Litbak’s “arrangement” outputs one-channel (only “right” channel) audio. Litbak, [0023]-[0026], [0029], [0033], [0040], [0047], [0061], FIG. 1B.

147. This configuration matches the example in the '025 patent the device outputs “right channel audio and not left channel audio” after pairing. EX-1001, 3:46-54, 4:44-47.

148. Litbak discloses a processing of the “audio programming” at least because Litbak discloses selectively routing audio channels to output “split mono” (one-channel audio), and claim 1 recites “a second processing of the audio data *so as to* output one-channel audio.” Litbak, [0023]-[0026], [0033], [0039], [0047], [0061]; EX-1001, claim 1.

149. Litbak further discloses processing of the “audio programming” (audio data) as discussed above for [1pre] and [1d]. *Supra* Ground 1, [1pre], [1d]. Further, in my opinion, it would have been obvious to implement Litbak’s steps using Seydoux’s software modules to achieve the second audio processing, as explained for [1pre], [1aiv], and [1d]. *Supra* Ground 1, [1pre], [1aiv], [1d].

b. Independent Claims 16 and 18

150. In my opinion, independent claims 16 and 18 are unpatentable for the same reasons as claim 1 because they simply repeat a subset of the elements of claim 1, as shown in the table below that highlights the language copied from or that is substantively identical to claim 1. Claims 16 and 18 only differ with respect to their preambles—claim 16 reciting a method performed by a playback device and claim 18 reciting the identical medium recited in element [1aiv]—and swapping the word

receiving for receive. These preambles are disclosed or would have been obvious for the same reasons recited in element [1aiv] and because Litbak discloses a method via the performance of its process.

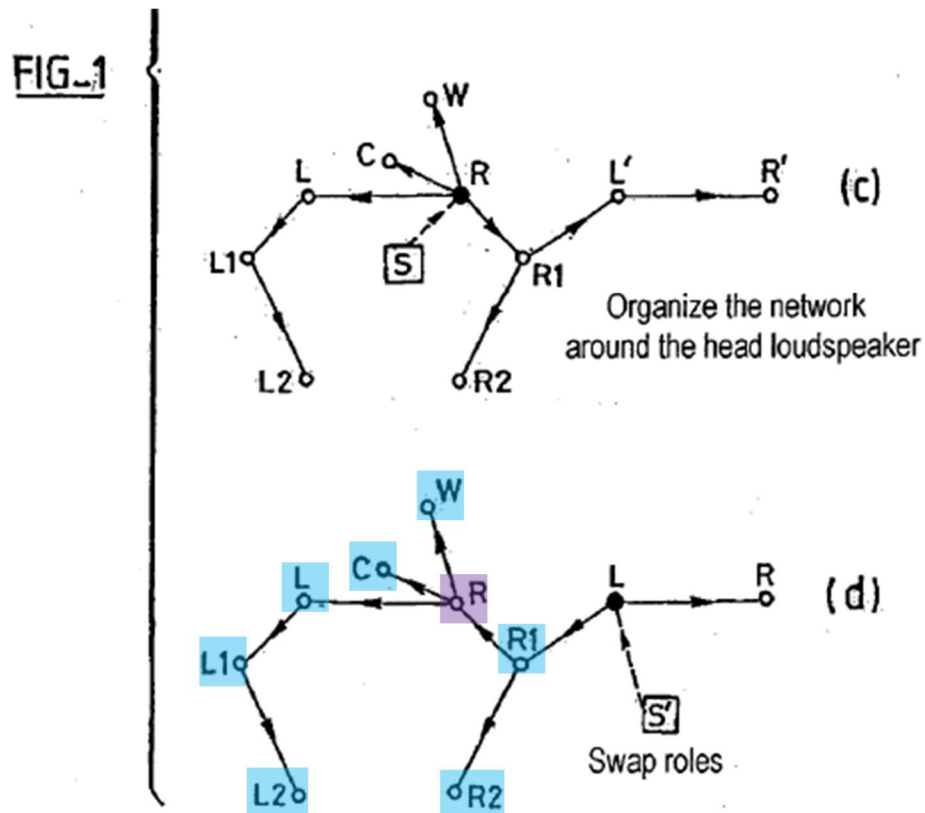
Elements of claim 1	Elements of claims 16 and 18
[1b]	[receive/receiving] a signal from a controller over a network, wherein the signal comprises an instruction for the playback device to become paired with one or more other playback devices such that, after pairing, the playback device and the one or more other playback devices have different playback roles;
[1ai]	[receive/receiving] audio data over the network;
[1c], [1d]	after the playback device has determined it is not paired with the one or more other playback devices, configuring the playback device to perform a first processing of the audio data so as to output two-channel audio based on the audio data from one or more speaker drivers; and
[1c], [1e]	after the playback device has determined it is paired with the one or more other playback devices such that the playback device and the one or more other playback devices have the different playback roles, changing the configuration of the playback device by configuring the playback device to perform a second processing of the audio data so as to output two-channel audio based on the audio data from the one or more speaker drivers.

4. Dependent Claims

- a. **Claim 3: “wherein determining that the playback device is paired with the one or more other playback devices comprises determining that the playback device is paired with two or more other playback devices.”**

151. In my opinion, claim 3 would have been obvious over Litbak and Seydoux. Although Litbak’s exemplary figures show two playback devices, “arrangement” and “puppet,” Litbak expressly applies “equally” to “multiple track ‘surround’ audio systems with four or more tracks.” Litbak, [0012], [0058]. Litbak also suggests the use of “puppets”—i.e., multiple “puppets” (two or more other playback devices). Litbak, [0003], [0010]. In my opinion, it would have been obvious to include additional playback devices in Litbak’s system to realize a surround sound system as taught by Seydoux.

152. Seydoux discloses two or more other playback devices in “‘home cinema’ type installations” such as the “‘7.1’ configuration ... including numerous satellite and surround loudspeakers.” Seydoux, [0003]. “A ‘7.1; configuration thus comprises loudspeakers for the central front channel C, the left and right side channels L and R, the side surround channels L1 and R2, the rear satellites L2 and R2, and a woofer W.” Seydoux, [0056], FIG. 1.

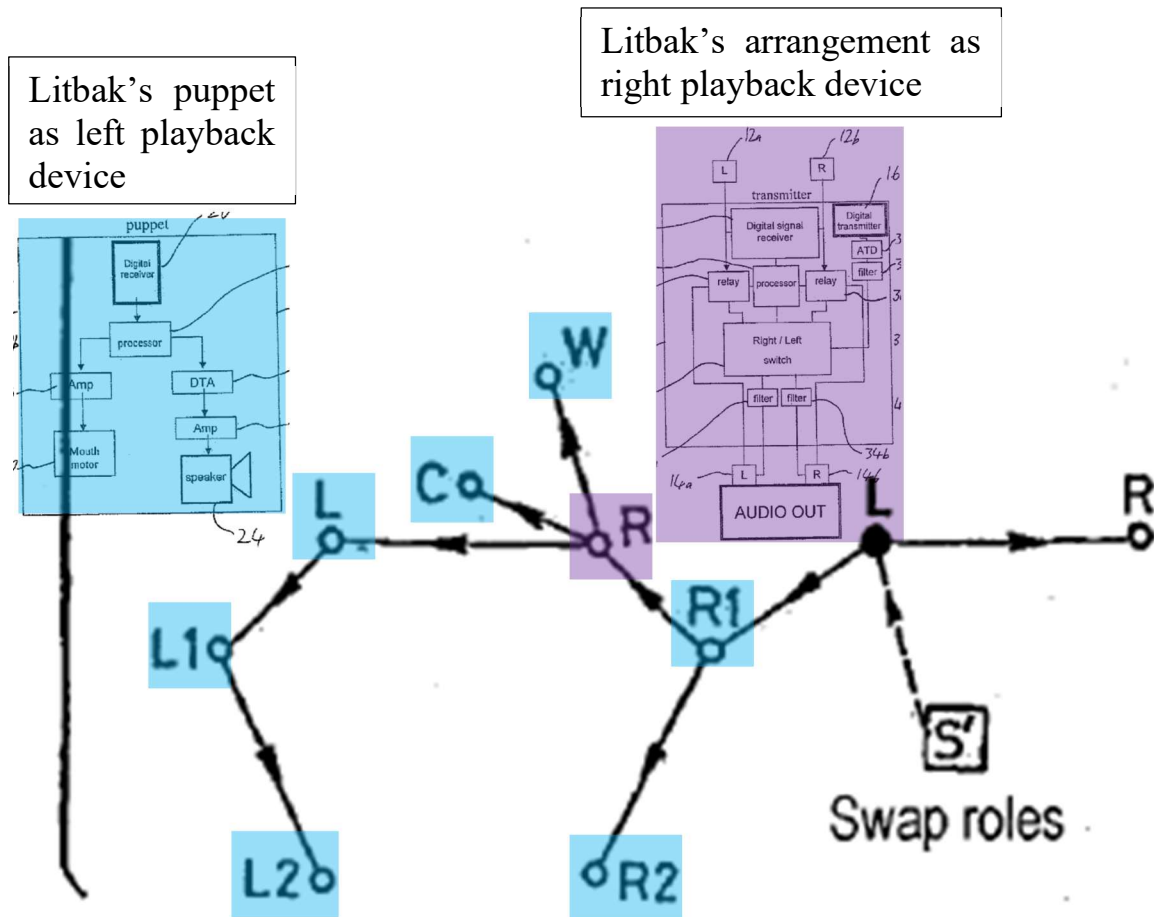


Seydoux, FIG. 1 (excerpted). Seydoux further discloses determining that the playback device is paired with two or more other playback devices because “[w]hen the number of loudspeakers is greater than two, authentication is performed in the same manner between all pairs of loudspeakers present.” Seydoux, [0091].

153. In my opinion, a POSITA would have been motivated to implement additional playback devices in Litbak’s system, beyond the arrangement and puppet, to achieve Litbak’s express goal of a “‘surround’ audio system[.]” (Litbak, [0058]) that is compatible with “[b]asic surround system configurations” and “[e]xisting surround sound recording formats” (Fincham, 1:39-2:62). Two or more additional

playback devices would have been necessary to achieve a “surround” audio system. Seydoux, [0003] (“‘7.1’ configuration” has “additional ‘surround’ side channels”), [0056]; Fincham, 1:39-2:62 (“[b]asic surround system configurations generally include from six to eight speakers” and include the “5.1, 6.1 and 7.1” formats); Lockett [0092], [0094]-[0095], [0099], [0101], [0106].

154. In my opinion, the annotated figure below combines Litbak’s Figure 2 and Seydoux’s Figure 1 to show that, as combined, Litbak’s arrangement and puppet would have served as two playback devices (right and left) in the conventional surround sound system including additional playback devices.



Seydoux FIG. 1 (excerpted) combined with Litbak FIG. 2 (excerpted).

155. Seydoux's Bluetooth network already connects multiple loudspeakers and a controller. *Supra* Ground 1, [1ai], [1b]; Seydoux, [0149], [0154]. In my opinion, a POSITA would have reasonably expected success because implementing this scheme in the Litbak-Seydoux system would have used known features according to their known functions ("basic" speaker configurations and Litbak's or Seydoux's existing pairing determination) to achieve entirely predictable results

(Litbak's arrangement determining it is paired with two or more additional playback devices). *Id.*

156. In my opinion, a POSITA further would have been motivated to determine pairing between Litbak's arrangement and each additional playback device, and reasonably expected success in doing so, to achieve the same advantages discussed above in Ground 1, [1c] for each paired playback device. *Supra* Ground 1, [1c].

- b. Claim 4: “wherein, when the playback device is not paired with the one or more other playback devices, the playback device is configured to output audio based on the audio data via the one or more speaker drivers in a stereo mode, and wherein, when the playback device is paired with the one or more other playback devices, the playback device is configured to output audio based on the audio data via the one or more speaker drivers in a theater mode.”**

157. In my opinion, claim 4 would have been obvious over Litbak and Seydoux. As discussed for [1d], Litbak's “arrangement” transfers both “stereo inputs” to “stereo outputs” (stereo mode) when not paired with the “puppet” (another playback device) to output stereo audio from the one or more speaker drivers. *Supra* Ground 1, [1d]; Litbak, [0023]-[0026]. Outputting “stereo” audio discloses a playback device operating in stereo mode. *Id.*

158. As discussed for claim 3, in view of Seydoux's surround sound system, it would have been obvious that Litbak's “arrangement” pairs with multiple other

playback devices when it operates in a “multiple track ‘surround’ audio system[] with four or more tracks” (theater mode). *Supra* Ground 1, claim 3. In my opinion, a POSITA would have understood operating in a “multiple track ‘surround’ audio system[] with four or more tracks,” especially with “television” or “audio-visual entertainment systems,” discloses a theater mode, as was known in the art. Litbak, [0034], [0039], [0045], [0058]; Fincham, 13:38-43, 14:39-47 (discussing “home theater surround sound system[s]”); Seydoux, [0003] (discussing “‘home cinema’ type installations” like “5.1” and “7.1” “surround” configurations); *supra* Ground 1, claim 3. In this configuration, Litbak’s “arrangement” outputs audio based on the audio data via the one or more speaker drivers (*supra* Ground 1, [1aii]) in a theater mode.

159. This matches the ’025 patent’s description of “television or theater mode” including more than two channels, e.g., “right channel,” “center channel,” and “left channel.” EX-1001, 15:9-13, 15:62-16:2, 15:26-34 (“movie theater setting” including several channels), 18:4-5 (“several tracks” “in television or theater mode”), 18:46-49 (“pairing amongst multiple players” “in a theater-like environment”), 22:29-36.

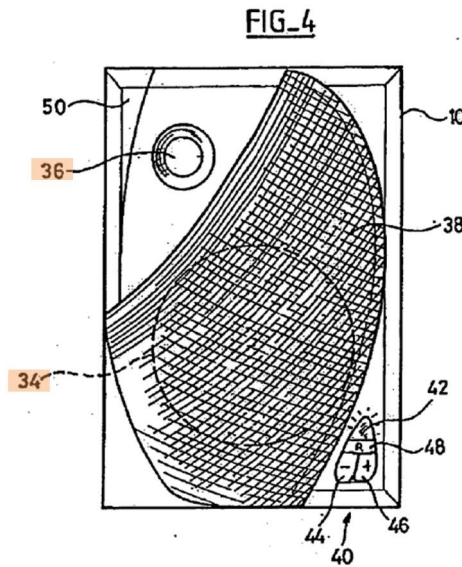
c. Claim 7: “wherein the network is a wireless network.”

160. In my opinion, a wireless network would have been obvious over the Litbak-Seydoux system because Seydoux’s “Bluetooth” network explained for Ground 1, [1ai] and [1b], is a “radio wireless connection.” Seydoux, [0058]-[0059].

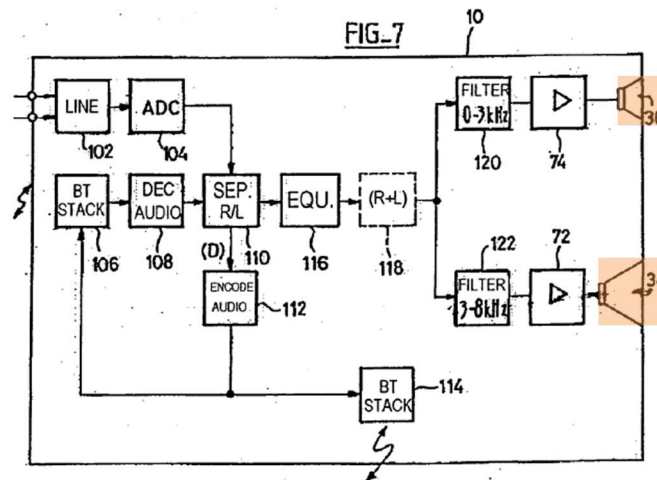
d. Claim 8: “wherein the one or more speaker drivers comprises a plurality of speaker drivers, and wherein the instructions, when executed by the one or more processors, further cause the playback device to: output audio from the plurality of speaker drivers.”

161. In my opinion, claim 8 would have been obvious over Litbak and Seydoux for the same reasons explained above for Ground 1, [1aii] because Seydoux’s “base/medium range loudspeaker 34 and a tweeter [3]6” are each speaker drivers. *Supra* Ground 1, [1aii]; Seydoux, [0151], [0156]. This discloses two (a plurality of) speaker drivers within a single “loudspeaker enclosure” (playback device). *Id.*

162. Audio is output from the plurality of speaker drivers because different frequency “bands [are] reproduced by the respective loudspeakers 34, 36 via the amplifiers 72, 74.” Seydoux, [0164]. “Two digital filters 120, 122 separate the bands” and the “digital filtering may advantageously be performed by software.” Seydoux, [0157], [0162] (“module 90 is a digital filter”), [0164]. This audio output is thus caused by the instructions when executed by the one or more processors. *Supra* Ground 1, [1aiv].



Seydoux, FIG. 4.



Id., FIG. 7.

- e. **Claim 9: “wherein the signal further comprises an instruction for the playback device to play back a particular channel of the audio data.”**

163. In my opinion, claim 9 would have been obvious in view of Seydoux which discloses that “[a] loudspeaker can be differentiated ... by sending specific

messages thereto at the request of the user.” Seydoux, [0070], [0073]. “[D]ifferentiat[ion]” specifies the particular channel played back by each loudspeaker because it is “a function of the audio role[]” for that device, e.g., “right” or “left loudspeaker.” Seydoux, [0069], [0073], [0132] (“differentiation” is “the audio role given to each” loudspeaker). In my opinion, a POSITA would have understood the user used Seydoux’s peripheral for controlling the loudspeaker because it is used to send “control signals” to “control the system ... (select sources, volume, balance, ...).” Seydoux, [0073], [0149]. In my opinion, a POSITA would have understood that Seydoux’s user “request” to set loudspeaker differentiation is an instruction to playback a particular channel of audio. *Id.*

164. As combined, Seydoux’s peripheral would have transmitted the differentiation request to Litbak’s arrangement to indicate which audio channel the arrangement and puppet should playback.

165. In my opinion, a POSITA would have been motivated to implement Seydoux’s user differentiation request in Litbak to advantageously allow the user to move the puppet around the room to assume any playback role (e.g., right, left, rear), rather than being fixed to one physical area of the room. Lockett, [0099], [0105].

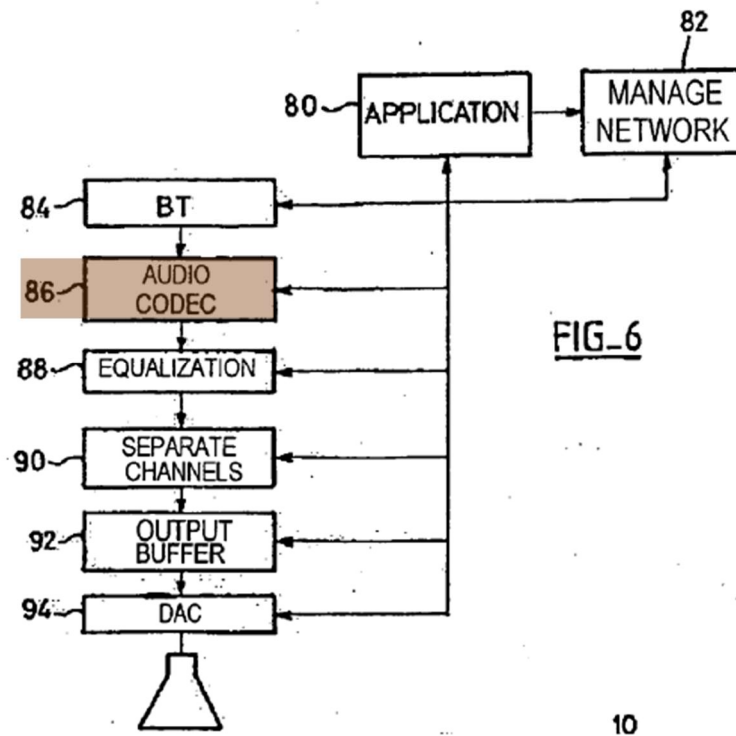
166. In my opinion, a POSITA would have reasonably expected success implementing Seydoux’s peripheral in Litbak as explained for [1b]. *Supra* Ground 1, [1b]. Litbak already teaches that its arrangement “allow[s] diversion of either

audio input to the puppet.” Litbak, [0029], [0058]. In my opinion, implementing this scheme in Litbak would have used known features according to their known functions (Seydoux’s conventional Bluetooth controller and Litbak’s existing ability to divert either audio channel to the puppet) to achieve entirely predictable results (Litbak’s arrangement receives a command from the peripheral to divert a specific audio channel).

f. Claim 10

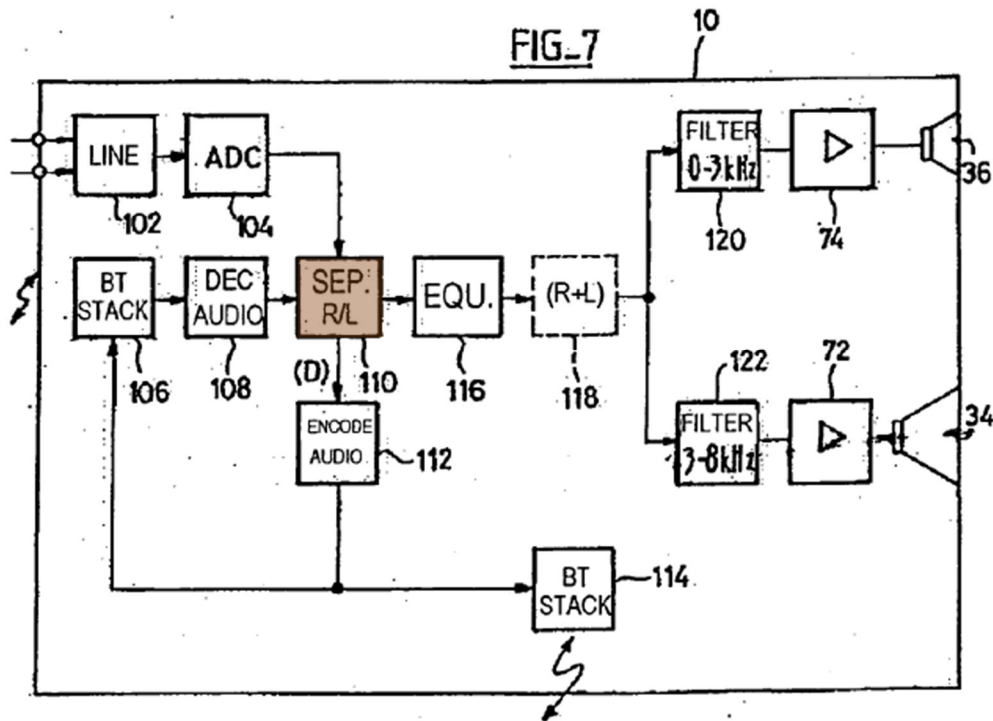
i. [10a] “wherein the playback device is further configured to (i) **separate the audio data into separate audio channels,”**

167. In my opinion, element [10a] would have been obvious over Litbak and Seydoux. Seydoux discloses “module 86” is “an audio codec for decoding the stream” received and “**separating the various channels of the multichannel audio stream**: right and left channels, front and back channels, etc.” Seydoux, [0160], [0164], [0169]. The “multichannel audio stream” is audio data and “separating” the “multichannel audio stream” into “various channels,” such as “right and left channels,” discloses separating the audio data into separate audio channels. *Id.*



Seydoux, FIG. 6.

168. Seydoux's "loudspeaker" similarly includes "block 110 [which] separates the channels, right and left for a two-loudspeaker stereo set," as shown below. Seydoux, [0163]-[0164].



Seydoux, FIG. 7.

169. In my opinion, a POSITA would have understood that Litbak is silent as to separating audio but at least suggests [10a] because the “audio programming” or “broadcast” (audio data) is separated into two separate audio channels, namely “Left Audio Source” and “Right Audio Source,” and Litbak references a “decoder.” Litbak, [0035]-[0039], FIGs. 1A-1B. In my opinion, a POSITA would have understood “Left Audio Source” and “Right Audio Source” are separate audio channels. Litbak, FIGs. 1A-1B, [0058], [0061]. This matches the ’025 patent’s description of “right” and “left” “channel[s]” as separate channels. EX-1001, 18:4-7. The channels are further separated when one “channel is diverted” (Litbak,

[0061]) and “transferred to transmitter 16 for transmitting to puppet 18” (Litbak, [0047]).

170. In my opinion, a POSITA would have been motivated, based on Litbak’s lack of express disclosure, to seek solutions for separating the audio and fulfilling Litbak’s goal of selectively routing audio channels. Moreover, “[t]he need for” high quality “CD-quality audio at lower data rates” was well known. Bosi, 5. In my opinion, a POSITA would have recognized that “joint stereo coding” “reduce[s] the audio coding system data rates.” Bosi, 9, 47. In my opinion, a POSITA would have been motivated to enable Litbak’s “arrangement” to separate encoded stereo “broadcast” “audio programming” to advantageously reduce the data rates associated with transmitting the “audio programming” to the “arrangement.” Litbak, [0029], [0035]-[0039].

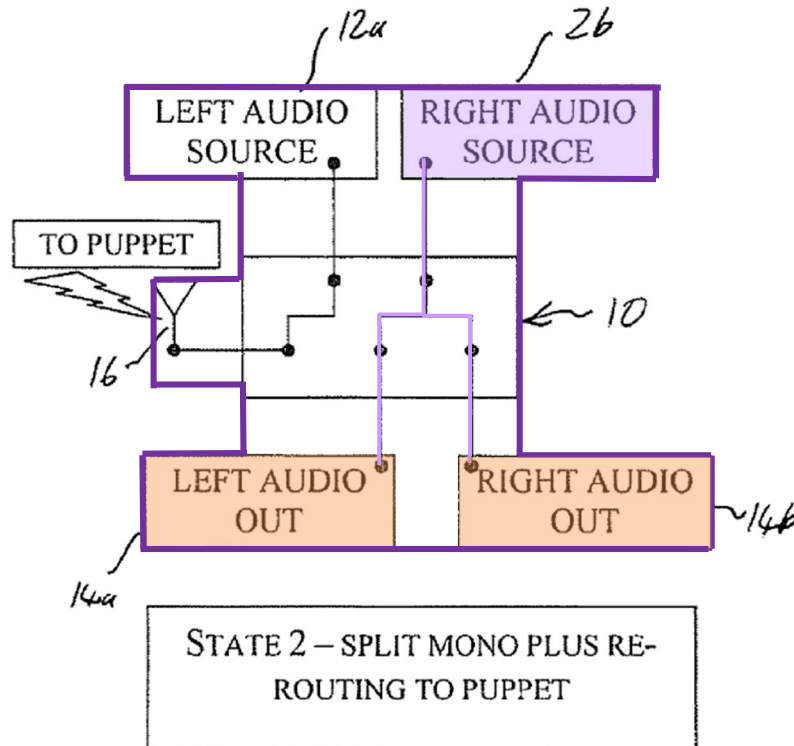
171. In my opinion, a POSITA would have reasonably expected success because Seydoux’s “module 86” “an audio codec for decoding the stream” is among the software modules that would have been obvious to include in Litbak’s arrangement, as discussed for Ground 1, [1pre], [1aiv]. *Supra* Ground 1, [1pre], [1aiv]; Seydoux, [0160], [0164], [0169]. Separating audio into channels was also well-known, routine, and conventional practice, for example, “joint stereo modes” was “described in the [MPEG-1 Audio] standard” and would have been predictable to implement. Bosi, 9, 5.

172. In my opinion, implementing Seydoux's coded stereo audio and decoder in Litbak's system would have used known features according to their known functions (MPEG audio standard and Seydoux's software modules) to achieve entirely predictable results (Litbak's "audio programming" is separated into "right" and "left" channels by Litbak's arrangement). Litbak, [0035]-[0039], [0058], [0061]; Kim, [0059], [0070]-[0071].

ii. [10b] "(ii) output audio based on audio data of at least one separate audio channel from the one or more speaker drivers, and"

173. In my opinion, Litbak discloses [10b] because in the "diverted state," Litbak's "arrangement" (playback device) outputs the "Right Audio Source" audio signal (one separate audio channel) via a "speaker" and the speaker drivers of the Litbak-Seydoux system (one or more speaker drivers), as discussed for [1aii], [1b], and [1e]. *Supra* Ground 1, [1aii], [1b], [1e]; Litbak, [0029], [0033], [0040], [0047], [0061], FIG. 1B. The "Right Audio Source" is a separate channel from the "Left Audio Source," as discussed for [10a]. Litbak, FIG. 1B; *supra* Ground 1, [10a].

FIG. 1B



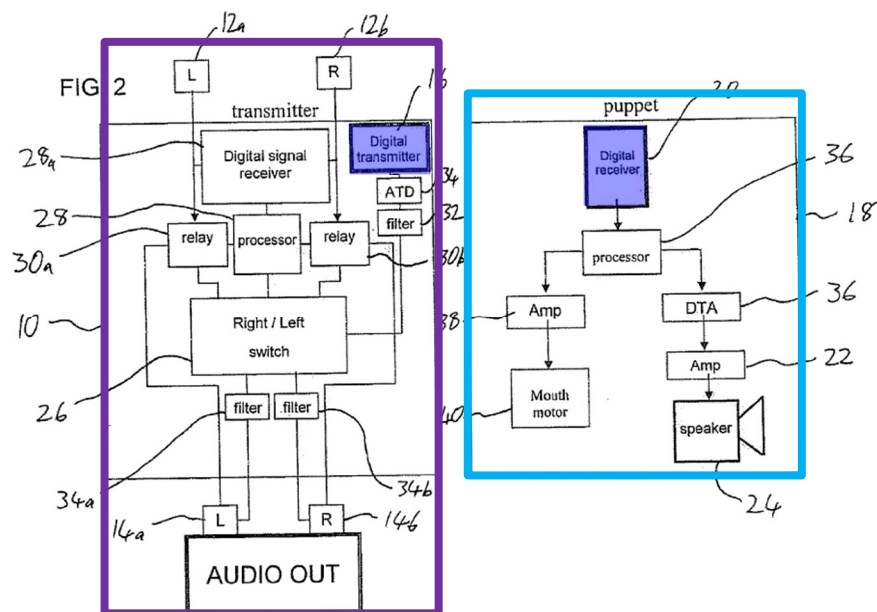
Litbak, FIG. 1B.

iii. [10c] “(iii) **transmit audio data of at least one additional separate audio channel over the network.**”

174. In my opinion, element [10c] would have been obvious over the Litbak-Seydoux system because Litbak discloses “an input from a **first of the stereo inputs**” (**additional separate audio channel**) “is diverted to the **transmitter for transmission** to the remote puppet” (**transmitted over the network**), as discussed for [1b] and [1e]. Litbak, [0026], [0033], [0047], [0061], FIGs. 1B, 2; *supra* Ground 1, [1b], [1e]. In my opinion, it would have been obvious to make this transmission over Seydoux’s

Bluetooth network explained for Ground 1, [1ai] and [1b]. *Supra* Ground 1, [1ai], [1b].

175. The “arrangement” includes “transmitter 16 for transmitting to puppet 18,” and the “puppet” (another playback device) “includes a receiver 20 for receiving a wireless signal from transmitter 16.” Litbak, [0033], [0046]-[0047], FIG. 2.

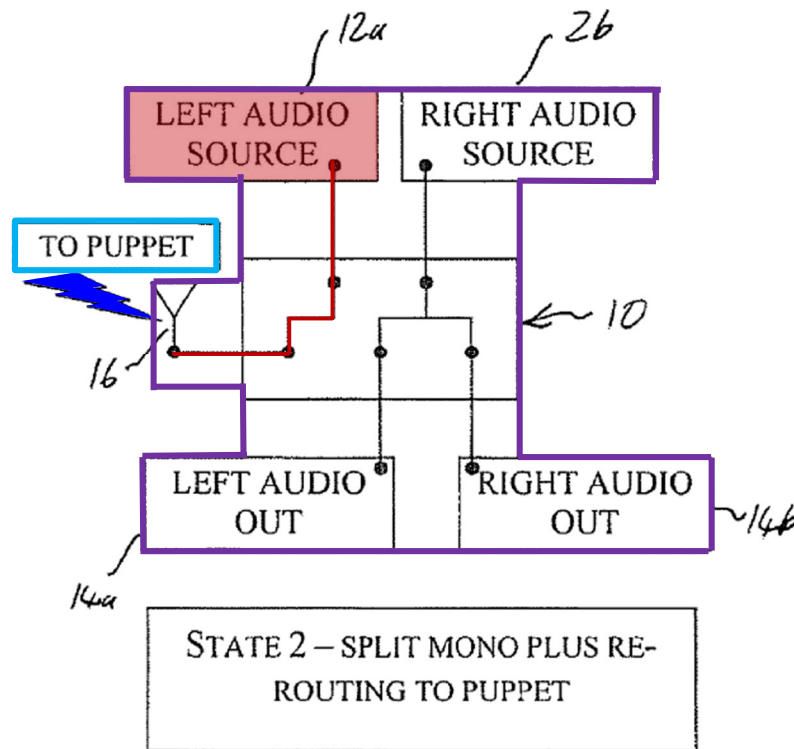


Litbak, FIG. 2.

176. In the “diverted state,” or “second state,” “audio signals from one of the audio inputs 12a are redirected to a transmitter 16 for transmission to a remote puppet,” such as the “Left Audio Source.” Litbak, [0033], [0047], FIG. 1B; *supra* Ground 1, [1e]. The “Right Audio Source” is a separate channel from the “Left Audio Source,” as discussed for [10a]. *Id.*; *supra* Ground 1, [10a]. Thus, as shown

in FIG. 1B, one separate audio channel, here “Left Audio Source,” is connected to transmitter 16 for transmission “To Puppet” over the network. *Id.*

FIG. 1B



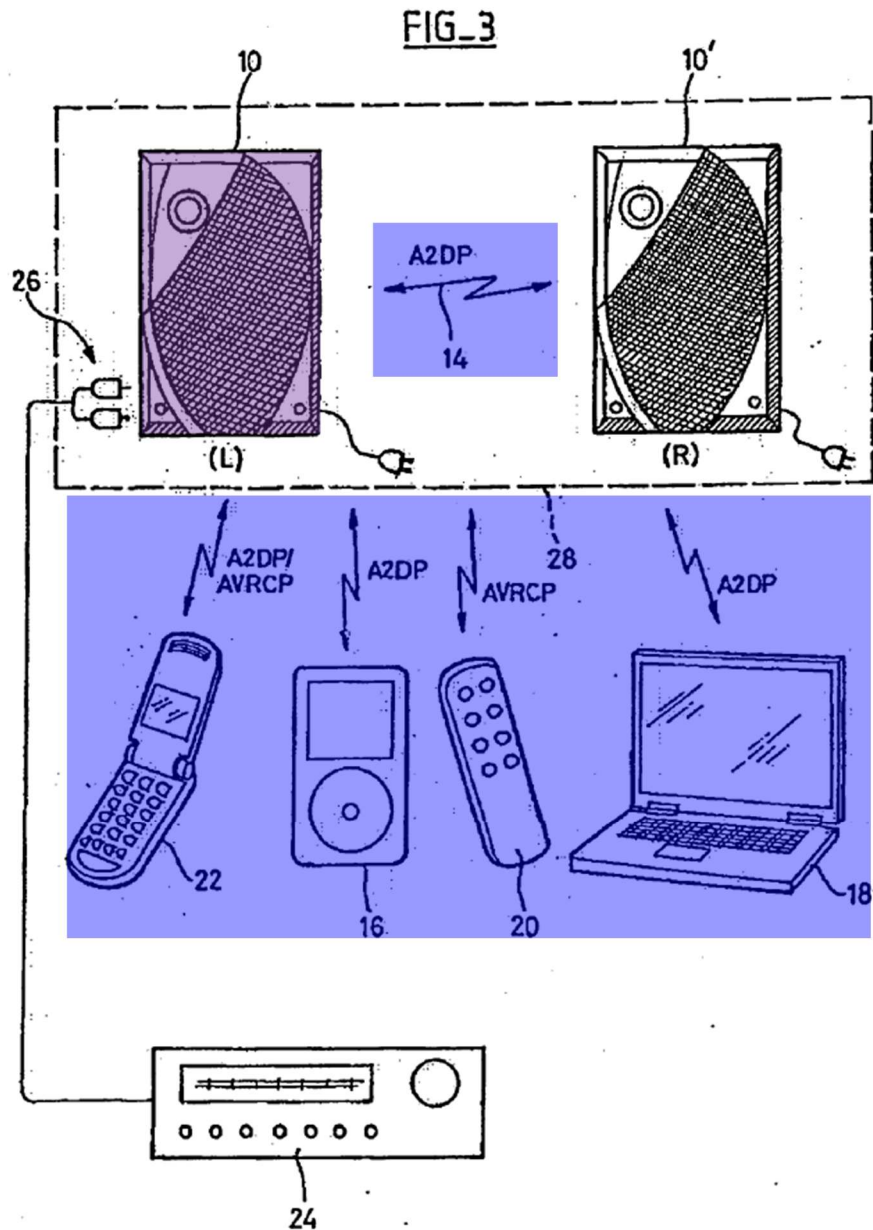
Litbak, FIG. 1B.

177. In my opinion, it further would have been obvious that this transmission from “transmitter 16” to “receiver 20” would have been made over the Bluetooth network explained for [1ai] and [1b]. Litbak, [0033], [0039], [0046]-[0047]; *supra* Ground 1, [1ai], [1b].

178. Seydoux discloses that the same “Bluetooth module serves to establish connections with all of the other loudspeakers of the system, and also with peripherals that constitute audio sources and/or remote controls.” Seydoux, [0154].

Moreover, “loudspeakers” are “interconnected by a wireless link 14,” shown in Figure 3 as an “A2DP” connection, which is a Bluetooth “audio source” profile. Seydoux, [0059], [0126], [0149].

179. Seydoux further discloses that a loudspeaker sends an audio “channel for reproduction by another loudspeaker ... to the other loudspeaker via the Bluetooth stack 114” over Seydoux’s Bluetooth network, thus transmitting audio channels to other loudspeakers over the same Bluetooth network that it receives audio and control signals over, as explained for Ground 1, [1ai] and [1b]. *Supra* Ground 1, [1ai], [1b]; Seydoux, [0164].



Seydoux, FIG. 3.

180. In my opinion, a POSITA would have been motivated to implement Seydoux's Bluetooth network to connect Litbak's arrangement and puppet, and reasonably expected success in doing so, for the same reasons explained for Ground 1, [1ai] and [1b]. *Supra* Ground 1, [1ai], [1b].

g. Claim 12

i. [12a] and [12b]

181. In my opinion, elements [12a] and [12b] are disclosed by Litbak and would have been obvious over the Litbak-Seydoux system for the reasons explained for [10a] and [10b]. *Supra* Ground 1, [10a]-[10b].

ii. [12c] “(iii) transmit the audio data over the network.”

182. In addition to the cited prior art, I have reviewed infringement contentions for the '025 patent. EX-1021. These infringement contentions identify “the audio data” as including “at least the left or right audio channel.” EX-1021 at 12-13. It is my opinion that if “the audio data” of element [12c] is interpreted consistent with these infringement contentions, then Litbak discloses [12c] for the same reasons explained in [10c] because transmitting the “Left Audio Source” discloses “the audio data” of [12c] in the same way it discloses the “audio data of at least one additional separate audio channel” of [10c]. *Supra* Ground 2, [10c]. This is consistent with Patent Owner’s infringement contentions which identify “audio data” as including “at least the left or right audio channel.” EX-1021 at 12-13.

- h. Claim 13: “wherein the instructions, when executed by the one or more processors, further cause the playback device to: receive another signal from the controller over the network, wherein the other signal comprises an instruction for the playback device to separate the pair with the one or more other playback devices.”**

183. In my opinion, claim 13 would have been obvious over Litbak and Seydoux because Litbak’s “arrangement” is configured to switch “in an opposite direction” when it receives a “signal” including a “second code” or at the “termination” of the “actuation signal.” Litbak, [0016], [0029], [0041]-[0042], [0053].

184. As discussed for [1b], Litbak’s “actuation signal” discloses a signal, and it would have been obvious over the Litbak-Seydoux system that this signal is received from the controller over the network. *Supra* Ground 1, [1b].

185. In some embodiments, Litbak’s “arrangement” receives several “actuation signal[s]” including different codes. Litbak, [0029], [0049]-[0053]. As discussed for [1b]-[1c], the “actuation signal” comprises an instruction because it includes a “first code.” *Id.*; *supra* Ground 1, [1b]-[1c]. For the same reasons, the “actuation signal” including a “second code” also comprises an instruction. *Id.* For example, Litbak explains that “[s]ignal processor 28 is configured to be responsive to” “[a] second code to switch to, or maintain, the straight-through state of electronic

switch.” Litbak, [0053], [0050]-[0051] (describing codes for switching pairing states).

186. As discussed for [1c] and [1d], Litbak’s “straight-through state” corresponds to an unpaired state. *Supra* Ground 1, [1c], [1d]. In my opinion, a POSITA would have understood that when the “actuation signal” with the “second code” causes the “arrangement” to “switch to” “the straight-through state,” the pairing with the “puppet” is broken and the “arrangement” no longer transmits audio to the “puppet” for output. Litbak, [0029], [0053], [0019]-[0020]. Thus, the puppet no longer has any playback role, and the arrangement and puppet are not in a “configuration involving two or more playback devices that have different playback roles.” EX-1015. Litbak describes its two states as “regular audio output state” and “remote puppet audio state,” emphasizing only one state operates with the puppet. Litbak, [0029].

187. In my opinion, it would have been obvious to implement these steps as software instructions using Seydoux’s “MCU” in Litbak’s “arrangement.” *Supra* Ground 1, [1aiv].

i. Claim 14:

i. [14a] “wherein the instructions, when executed by the one or more processors, further cause the playback device to: detect a predefined event;”

188. In my opinion, element [14a] would have been obvious over Litbak and Seydoux because Litbak’s “processor 28” is “responsive to” (detects) “the presence of a tone at the predefined frequency” (predefined event). Litbak, [0048]. For example, in one embodiment, the “actuation signal may be an analog signal, typically corresponding to a tone at a predefined frequency.” *Id.* The “processor 28 is configured to be responsive to the presence of tone at the predefined frequency.” *Id.*

189. The “tone” describes a predefined event because it is “at a predefined frequency” that the “processor 28” is “responsive to.” *Id.* The “processor 28” (part of the playback device) detects this “tone” because it “sens[es] the presence of [the] tone” and is “responsive to the presence of tone.” *Id.* For example, Litbak explains “that sensing of the presence of a tone at a specific frequency can be performed using standard electronic components.” *Id.*

190. In my opinion, it would have been obvious to implement these steps as instructions using Seydoux’s “MCU” in Litbak’s “arrangement.” *Supra* Ground 1, [1aiv].

ii. [14b] “and interpret the detected predefined event as an instruction for the playback device to pair with the one or more other playback devices, such that pairing occurs when the predefined event is detected.”

191. In my opinion, element [14b] would have been obvious over Litbak and Seydoux because the “tone at the predefined frequency” constitutes an “actuation signal.” Litbak, [0048].

192. An “actuation signal” to switch to the “diverted state” describes an instruction for the playback device to pair with the one or more other playback devices as explained for [1b]. *Supra* Ground 1, [1b]. Pairing occurs when the “tone” (predefined event) is detected because “[t]he signal processor 28 then typically switches electronic switch 26 between the straight-through state and the diverted state in a first direction” (diverted state, or paired state, is entered) “at an onset of the tone.” Litbak, [0048]. The “diverted state” is the paired state, as discussed for [1c] and [1e]. *Supra* Ground 1, [1c], [1e].

193. In my opinion, it would have been obvious to implement these steps as instructions using Seydoux’s “MCU” in Litbak’s “arrangement.” *Supra* Ground 1, [1aiv].

**j. Claim 21: “wherein changing the configuration of the playback device further comprises one or more of ...
(iii) adjusting a time-delay for the audio data.”**

194. In my opinion, claim 21 would have been obvious over the Litbak-Seydoux system because Seydoux discloses applying “compensating delays”

(adjusting a time-delay for the audio data) “to the appropriate audio stream” when speakers are paired to “compensate for [] time offset[s].” Seydoux, [0133].

195. Seydoux discloses a “time-shift means for applying respective delays to at least some of the audio channel signals suitable for compensating the differences between the relative transfer delays,” which describes a time-delay adjustment made to audio data. Seydoux, [0037], [0133]. Applying such “compensating delays” “to the appropriate audio stream” allows the loudspeakers to “compensate for [] time offset[s].” *Id.*

196. As modified, Litbak’s playback device would have paired with the puppet (*supra* Ground 1, [1b]-[1c], [1e]) then “apply[ed] respective delays to at least some of the audio channel signals” to “compensate for this time offset” (taught by Seydoux) between Litbak’s “arrangement” and “puppet.” Seydoux, [0037], [0133]; Litbak, [0029].

197. In my opinion, a POSITA would have been motivated to implement Seydoux’s “time” “delays” in Litbak’s system because Seydoux explains that “given the transit times of the data blocks of the audio stream, and also the time offsets that are introduced by using stacks and by the various digital processing applied, the audio streams played back by the various respective loudspeakers in the network might be slightly offset relative to one another.” Seydoux, [0133]. Seydoux’s time delay “advantageously” solves this problem and would have been applicable to

Litbak and Seydoux’s multiple-playback-device system by “applying a delay to compensate for the delays of the channels that would otherwise be in advance relative to the others.” *Id.* This further “ensure[s] that the channels are reproduced perfectly in phase.” *Id.*

198. In my opinion, a POSITA would have reasonably expected success in adding a time delay to the audio signals in Litbak’s system because this was a well-known concept, as evidenced by the prior art. Neumann, [0039] (explaining “one of the wireless loudspeaker devices may temporarily buffer received content to allow content to be delivered from both wireless loudspeaker devices 100,205 simultaneously”); Holm, [0080] (“The synchronizing means may be embodied as a number of delay elements provided to delay the transmission of single audio channels to remote audio playback devices”). In my opinion, implementing this scheme in Litbak would have used known features according to their known functions (audio time delays) to achieve entirely predictable results (Litbak’s arrangement delays audio signals). *Id.*

B. Ground 2: Claims 2, 17, 19-20 and 22-23 Would Have Been Obvious Over Litbak in View of Seydoux and Palmer.

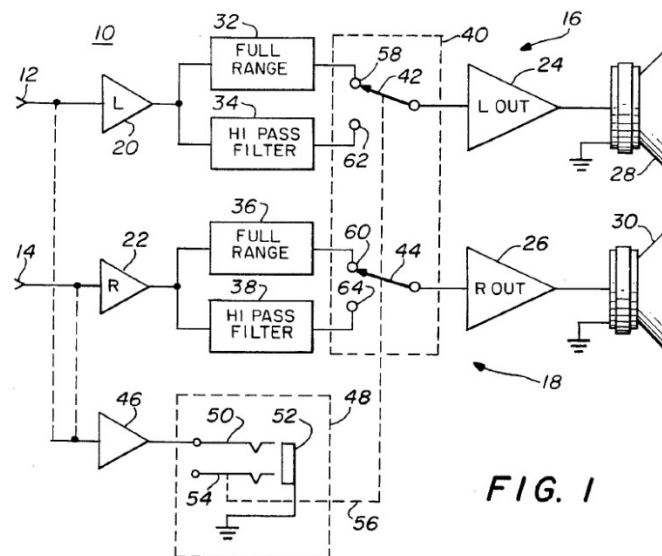
199. Dependent claims 2, 17, 19-20, and 22 change output frequency. Dependent claim 23 is substantively similar to claim 21, except that it further

depends from claim 22. Palmer discloses this feature, and in my opinion, it would have been obvious to include in the Litbak-Seydoux system.

1. Palmer (EX-1018)

200. Palmer relates to “enable[ing] the equalization of loudspeakers to be automatically switched when an optional subwoofer is added to an entry level two-speaker audio system.” Palmer, 1:5-11.

201. Palmer discloses “[a] two speaker audio system,” as shown in Figure 1, to which a subwoofer can be added. Palmer, 3:29-32.



Palmer, FIG. 1.

202. Palmer’s system uses “full range filters,” when the subwoofer is not used (*id.*, 3:46-54) to output “full range frequencies” (*id.*, 4:44-50). When a subwoofer is added, Palmer’s system switches to use “high pass filters” “such that only mid range and high frequencies” are output. Palmer, 4:50-60.

203. In my opinion, like the '025 patent, Palmer is in the technical field of speaker systems and controlling audio playback. *Compare* EX-1001, 1:39-58, 2:4-14, *with* Palmer, 1:5-16.

2. Dependent Claims

- a. Claims 2, 17, and 19: “wherein performing the first processing further comprises utilizing at least a **first one or more pass-filter parameters** such that the playback device becomes configured to output at least a **first range of audio frequencies** based on the audio data from the one or more speaker drivers, wherein performing the second processing further comprises utilizing at least a **second one or more pass-filter parameters** such that the playback device becomes configured to output at least a **second range of audio frequencies** based on the audio data from the one or more speaker drivers, and wherein the **first range of audio frequencies** and the **second range of audio frequencies** are different.”

204. In my opinion, claims 2, 17, and 19 would have been obvious over the Litbak-Seydoux system in view of Palmer which discloses “in one condition” “**full range filters**” (**first pass-filter parameters**) “for **full range operation** are inserted into the circuit path” (**first range of audio frequencies**), and “[i]n [a] second state” “**high pass filters**” (**second pass-filter parameters**) allow the speaker to “operate in the **mid range and high frequency range**” (**different second range of audio frequencies**). Palmer, 2:19-48, 4:13-60.

205. In my opinion, it would have been obvious for the “arrangement” in the Litbak-Seydoux system to implement Palmer’s filter switching when it pairs with a “‘surround’ audio system” including a subwoofer. Litbak, [0058]; *supra* Ground 1, claims 3-4. When unpaired, the arrangement would have performed a first processing that outputs full range frequencies, and after pairing, the arrangement would have performed a second processing leaving low frequency signals for the surround sound system’s subwoofer to output.

206. In Palmer’s “two speaker audio system” “the equalization to those speakers [28 and 30 in FIG. 1] is normally optimized for the full frequency range operation which is commonly 20 Hz-20 kHz,” which discloses a first range of audio frequencies. Palmer, 3:29-32, 3:46-54. “Thus, when the subwoofer ... is unused,” “the audio signal is routed” “such that full range frequencies from filters 32 and 36 are fed” “to the satellite loudspeakers.” Palmer, 4:44-50. The “full range filters 32 and 36” disclose first pass-filter parameters because they are filters that allow the “full range frequencies” to pass through. Palmer, 3:36-39, 3:51-54, 4:44-50.

207. “When the subwoofer” is added, “only mid range and high frequencies (300 Hz-20 kHz) from high pass filters 34 and 38, respectively, are fed through the amplifier” and “to the satellite speakers.” Palmer, 4:13-60. The “mid range and high frequency range” discloses a different second range of audio frequencies from “300 Hz-20 kHz.” *Id.* The “high pass filters 34 and 38” disclose second pass-filter

parameters because they are filters that allow the “mid range and high frequency range” to pass through. *Id.* The “low frequency information in the program material [is] handled by the subwoofer.” Palmer, 1:32-34, 5:6-7.

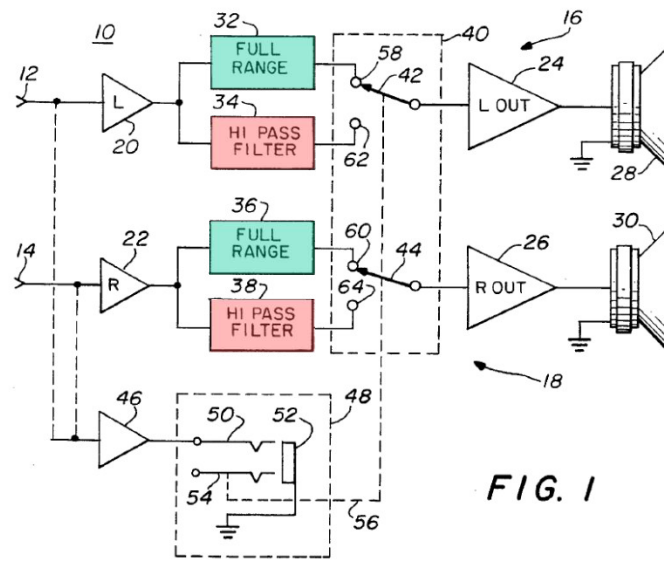


FIG. 1

Palmer, FIG. 1.

208. As discussed for claims 3 and 4, Litbak expressly applies to “‘surround’ audio systems.” Litbak, [0058]; *supra* Ground 1, claims 3-4. In my opinion, a POSITA would have been motivated to implement a “subwoofer” (taught by Palmer) in the “‘surround’ audio system[.]” (Litbak, [0058]) of the Litbak-Seydoux system to achieve “[b]asic surround system speaker configurations” which “typically include[.]” “a sub-woofer.” Palmer, 4:3-6; Fincham, 1:59-2:5; *supra* Ground 1, claims 3-4. For example, in my opinion, a POSITA would have

understood that “[e]xisting surround sound recording formats,” such as “5.1, 6.1, and 7.1,” include a “sub-woofer.” Fincham, 1:39-58.

209. In my opinion, a POSITA would have further been motivated to implement Palmer’s filter switching to advantageously allow the “subwoofer” to handle “the low frequency information in the program” so that Litbak’s playback device does not “needlessly labor to reproduce low frequencies, consume excess power, distort the audio signals, and cause the sound quality to be less than optimum.” Palmer, 1:32-39, 4:3-12.

210. Seydoux’s software modules discussed above for [1pre] and [1aiv] include “module 90 [which] is a digital filter for separating” frequency bands.” Seydoux, [0162]. As combined, the arrangement in the Litbak-Seydoux system would have implemented Palmer’s filter switching as one of Seydoux’s software modules to change the “equalization” of the arrangement when it pairs with a surround audio system including a subwoofer. Palmer, 1:32-34, 3:46-54, 4:44-59, 5:6-7, Litbak, [0029], [0058].

211. In my opinion, a POSITA would have reasonably expected success in combining Palmer’s filter switching into the Litbak-Seydoux system because Litbak already implements “pass filtering techniques,” which are described as “simple.” Litbak, [0042], [0047], [0057], FIG. 2. And Seydoux already implements digital filtering as a software module, as explained above, such that it would have been

straightforward to implement Palmer's filtering as one of Seydoux's existing modules. Seydoux, [0162]. In my opinion, implementing this in the Litbak-Seydoux system would have used known features according to their known functions (pass filtering and known subwoofers) to achieve entirely predictable results (the arrangement switches filtering upon pairing with a subwoofer in the surround sound system). Litbak, [0029], [0042], [0047], [0057]-[0058]; Palmer, 1:32-34, 4:3-12; Seydoux, [0162]; Fincham, 1:59-2:5; *supra* Ground 1, claims 3-4.

b. Claims 20 and 22: “wherein changing the configuration of the playback device further comprises one or more of ... (iii) changing a frequency response of one or more speaker drivers...”

212. In my opinion, claims 20 and 22 would have been obvious over the Litbak-Seydoux system in view of Palmer for the reasons explained for claim 2. *Supra* Ground 2, claim 2. In my opinion, a POSITA would have understood that changing pass filter parameters to output a different range of frequencies from the one or more speaker drivers, as explained for claim 2, also discloses changing a frequency response of one or more speaker drivers, as recited in claim 20. *Id.*

213. In my opinion, a POSITA would have understood “[t]he frequency response of a device describes the relationship between the device’s input and output with regard to signal frequency and amplitude,” and “[i]n its most common usage,

the frequency response describes the usable range of signal frequencies which the device will pass from input to output.” Davis, 5.

214. In my opinion, a POSITA would have understood that when the speaker drivers switch from outputting the “full range frequencies” (Palmer, 4:44-50) to outputting “only mid range and high frequencies” (*id.*, 4:50-60), as explained for claim 2, the frequency response of the one or more speaker drivers changes because a different range of frequencies passes from input to output. *Supra* Ground 2, claim 2. This matches the '025 patent's use of frequency response. EX-1001, 17:2-9.

**c. Claim 23: “wherein changing the configuration of the playback device further comprises one or more of ...
(iii) adjusting a time-delay for the audio data.”**

215. In my opinion, claim 23 would have been obvious over the Litbak-Seydoux-Palmer system. Claim 23 is substantively similar to claim 21, except that it further depends from claim 22. *Compare* EX-1001 claim 21 *with* claim 23. Palmer discloses claim 22 and Seydoux discloses claim 21 as explained above. *Supra* Ground 1, claim 21; Ground 2, claim 22. In my opinion, a POSITA would have been motivated to combine Seydoux's time-delay into the Litbak-Seydoux-Palmer system, and reasonably expected success in doing so, for the same reasons explained for claim 21. *Supra* Ground 1, claim 21. In my opinion, a POSITA would have reasonably expected success in combining Seydoux's time delay into a system

including Palmer because Palmer's filtering would have been performed using Seydoux's processing, as explained above. *Supra* Ground 2, claim 2.

C. Ground 3: Claim 12 Would Have Been Obvious Over Litbak in View of Seydoux and Holm.

216. Dependent claim 12 transmits audio information on the network. Holm discloses this feature, and in my opinion, it would have been obvious to include in the Litbak-Seydoux system.⁴

1. Holm (EX-1020)

217. Holm relates to "a mobile audio playback system capable of playing back multi-channel audio data," as shown in Figure 11. Holm, [0001], [0011].

⁴ I have reviewed infringement contentions for the '025 patent. It is my opinion that if "the audio data" of element [12c] is interpreted consistent with these infringement contentions, then Litbak and Kim alone render claim 12 obvious. *Supra* Ground 1, claim 12.

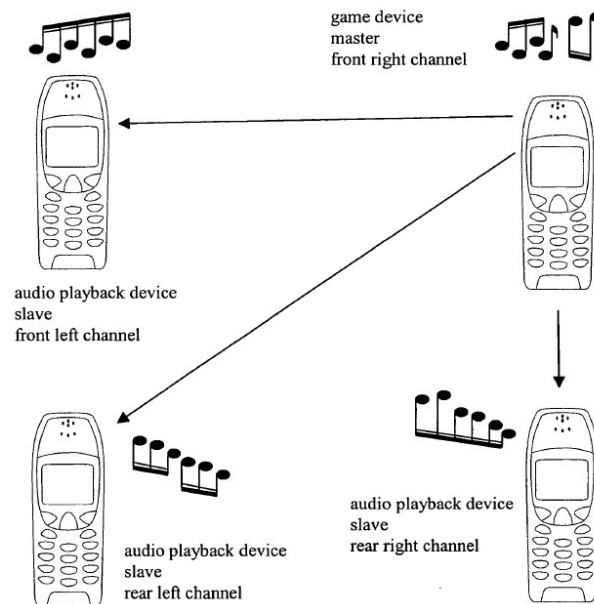


Fig. 11

Holm, FIG. 11; [0128].

218. Holm discloses a “distributed channel generation system, where at each terminal device only one audio output channel is generated.” Holm, [0076]. To achieve this goal, Holm’s first audio playback device “transfer[s] said received multi-channel audio data to at least one second audio playback device.” Holm, [0112]-[0113], FIG. 4.

219. In my opinion, like the ’025 patent, Holm is in the technical field of speaker systems and controlling audio playback. *Compare* EX-1001, 1:39-58, 2:4-14, *with* Holm, [0001]-[0011], [0015]-[0016].

2. Dependent Claims

a. Claim 12

i. [12a] and [12b]

220. In my opinion, elements [12a] and [12b] would have been obvious for the reasons explained for [10a] and [10b] in Grounds 1 and 2. *Supra* Ground 1, [10a]-[10b], Ground 1, claim 10.

ii. [12c] “(iii) transmit the audio data over the network.”

221. In my opinion, to the extent “the audio data” refers to “the audio data” in [12a], element [12c] would have been obvious over the Litbak-Seydoux system in view of Holm.

222. Holm discloses a “distributed channel generation system, where at each terminal device only one audio output channel is generated.” Holm, [0076]. Figure 4 illustrates the steps of “receiving multichannel audio data at said first audio playback device, obtaining first channel audio data from said multi-channel audio data for playback via loudspeakers of said first audio playback device,” and additionally “transferring said received multi-channel audio data to at least one second audio playback device.” Holm, [0112]-[0113], FIG. 4. Transmitting “multi-channel audio data” to additional playback devices discloses transmitting the audio data over the network. *Id.*

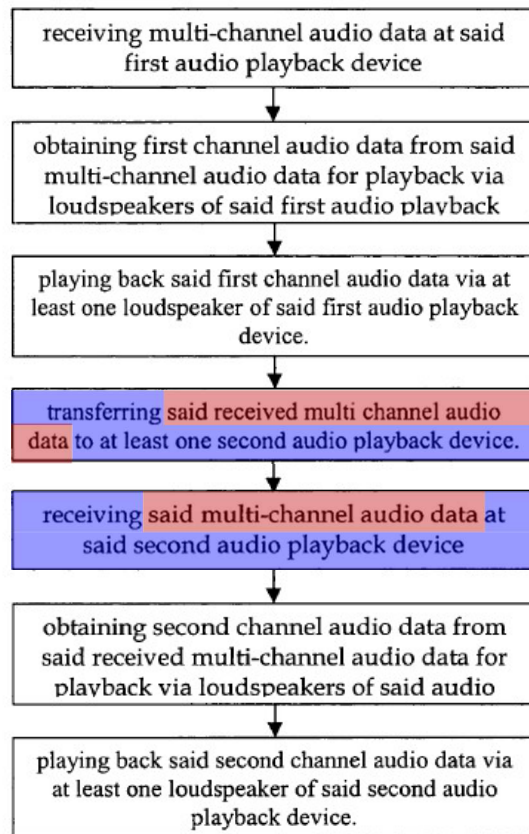


Fig. 4

Holm, FIG. 4.

223. In my opinion, a POSITA would have understood that when Litbak’s arrangement is implemented in “multiple track ‘surround’ audio systems with four or more tracks” (*Supra* Ground 1, claims 3-4; Litbak, [0058]), it would have been computationally burdensome for a single playback device to separate four or more channels for transmission to each of the other playback devices. In my opinion, a POSITA would have been motivated to modify Litbak’s “arrangement” in the Litbak-Seydoux system to transmit the received “audio programming” over the network to offload the computational burden of separating several “surround”

channels. *Id.*; Litbak, [0029], [0037], [0039]. In my opinion, it would have further been obvious to make this transmission over Seydoux's Bluetooth network, as discussed for [10c]. *Supra* Ground 1, [10c].

224. In my opinion, a POSITA would have understood that this configuration taught by Holm advantageously “relieve[s] a single device from [the] task of generating all single audio channels for each one of the connected playback devices.” Holm, [0076]. Holm configuration enables “distributed computing to keep the calculation load for each single device low to prevent that a single device has to take all the load of generating (compressing) and distributing (sending) all audio tracks and additionally being burdened with outputting its own audio track at the same time with the restricted capabilities of a portable device.” *Id.*

225. In my opinion, a POSITA would have reasonably expected success in combining Holm into the Litbak-Seydoux system because it uses routine application of Litbak's existing components (“transmitter 16” in the arrangement) to transmit the data Litbak's “arrangement” already receives (“broadcast” “audio programming”). Litbak, [0029], [0033], [0037], [0039], [0046]-[0047], [0057], [0059], [0061]. In my opinion, implementing this scheme in the Litbak-Seydoux system would have used known features according to their known functions (Litbak's “transmitter”) to achieve entirely predictable results (Litbak's “transmitter” transmits the received “audio programming” over the network). *Id.*

226. In my opinion, a POSITA would have reasonably expected success in combining Holm into the Litbak-Seydoux system because Seydoux and Holm compatibly implement conventional Bluetooth communication. *Supra* Ground 1, [1c]; Holm, [0030] (“The connection to the second audio playback devices ... can be ... short-range connection such as Bluetooth”), [0034]-[0035].

D. Ground 4: Claim 15 Would Have Been Obvious Over Litbak in View of Seydoux and Lee.

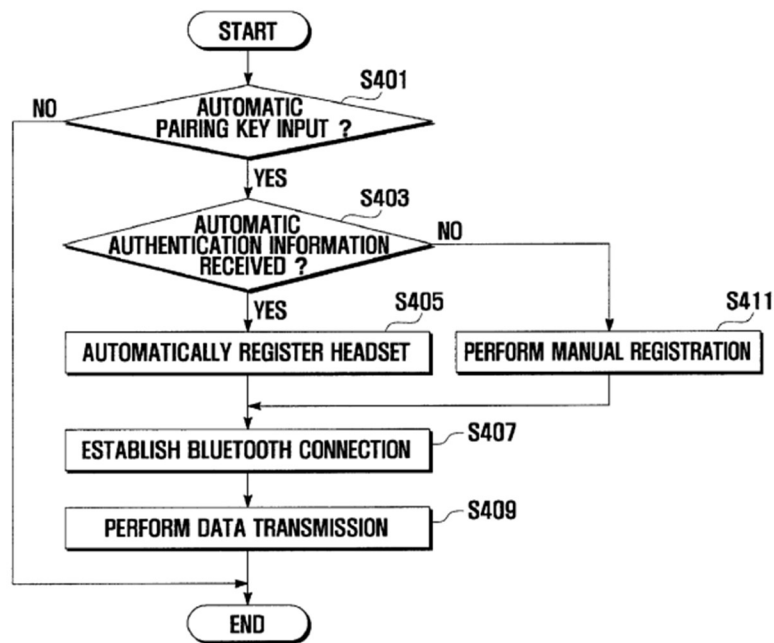
227. Lee discloses transmitting an instruction to pair with a different playback device, and in my opinion, it would have been obvious to include in the Litbak-Seydoux system.

1. Lee (EX-1016)

228. Lee relates to “an automatic pairing method for a Bluetooth®-enabled mobile terminal.” Lee, [0003].

229. Lee discloses that when Bluetooth “automatic authentication information,” which indicates devices “may be automatically paired,” is not timely received, then “manual registration” is performed to input “pairing information (i.e., PIN or passkey necessary for Bluetooth® pairing).” *Id.*, [0050]-[0052], [0059], FIG. 4 (capitalization altered).

FIG. 4



Id., FIG. 4.

230. In my opinion, like the '025 patent, Lee is in the technical field of speaker systems and controlling audio playback. *Compare* EX-1001, 1:39-58, 2:4-14, *with* Lee, [0005]-[0006], [0039]-[0040], [0062].

2. Dependent Claims

- a. **Claim 15: “wherein the instructions, when executed by the one or more processors, further cause the playback device to: receive another signal from the controller over the network, wherein the other signal comprises an instruction for the playback device to pair with a different one or more other playback devices.”**

231. In my opinion, claim 15 would have been obvious in view of the Litbak-Seydoux and Lee.

232. Seydoux discloses “a loudspeaker being added” to the system in an “automatic manner.” Seydoux, [0067]. As combined, in my opinion, a POSITA would have understood that additional playback devices, different from Litbak’s puppet, would have been added to the Litbak-Seydoux surround sound system “automatically.” Seydoux, [0063], [0067]; Litbak, [0058]; *supra* Ground 1, claims 3-4.

233. Lee explains that “pairing information,” like a “PIN or passkey,” is “necessary for Bluetooth® pairing.” Lee, [0006], [0025], [0052]. Although “automatic pairing” between Bluetooth devices is advantageous, if “automatic authentication information” is not timely received, then the “pairing information ... may be input” manually for “manual registration.” Lee, [0007]-[0010], [0050]-[0052], FIG. 4.

234. In my opinion, a POSITA would have understood that Seydoux's peripheral is used for controlling the loudspeaker because it sends "control signals" to "control the system ... (select sources, volume, balance, ...)." Seydoux, [0149]; *supra* Ground 1, claim 9. As combined, Litbak's arrangement would have received Lee's "pairing information" as a signal from Seydoux's peripheral, like the other signals explained for Ground 1, [1b]. *Supra* Ground 1, [1b]; Lee, [0050]-[0052]. In my opinion, a POSITA would have understood that when another loudspeaker, different from Litbak's puppet, was added to the Litbak-Seydoux surround sound system, and when automatic Bluetooth pairing failed, Lee's "pairing information" would have been an instruction for the arrangement to add that additional loudspeaker (different other playback device) such that they have different playback roles because the loudspeakers in Litbak and Seydoux's surround sound system are "differentiated," i.e., they have different audio roles. Lee, [0050]-[0052]; Seydoux, [0067]-[0069], [0092], [0132]; Litbak, [0058]; *supra* Ground 1, [1b]-[1c], claims 3-4; EX-1015.

235. In my opinion, a POSITA would have sought solutions for connecting Bluetooth devices, like the playback devices in the Litbak-Seydoux system. A POSITA would have been motivated to combine Lee's "manual registration," which is manual "Bluetooth® pairing," into the Litbak-Seydoux system as the conventional

failsafe in instances when Seydoux's automatic Bluetooth pairing failed or was not available. Lee, [0025], FIG. 4.

236. In my opinion, a POSITA would have reasonably expected success in combining Lee's "pairing information" into the Litbak-Seydoux system because Bluetooth pairing information was routine, well-known, and conventional. Cannon, [0037] ("if a user wishes to add a new ... BLUETOOTH device ..., piconet pairing is established by mere entry ... of the relatively short and simple passcode or PIN"). In my opinion, this scheme would have used known features according to their known functions (Seydoux's controller and conventional Bluetooth pairing codes) to achieve predictable results (Litbak's arrangement receives a conventional Bluetooth pairing code from Seydoux's controller to pair with a different playback device).

237. In my opinion, a POSITA would have reasonably expected success in combining Lee into a system including Seydoux's Bluetooth mutual authentication because Lee also pertains to the same Bluetooth pairing technology. Lee, [0003]; *supra* Ground 1, [1c]-[1e] (Seydoux).

XI. CONCLUSION

238. For the reasons set forth in Section X, it is my opinion that one skilled in the art would have found claims 1-4, 7-10, and 12-23 of the '025 patent to be obvious.

239. In signing this declaration, I understand that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I acknowledge that I may be subject to cross-examination in this case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

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

Date: November 23, 2025

Respectfully submitted,



Dr. David Anderson