

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

RPX CORPORATION,
Petitioner,

v.

VIRTUAL IMMERSION TECHNOLOGIES LLC,
Patent Owner.

PTAB Case No. IPR2018-00464

Patent No. 6,409,599

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 6,409,599**

TABLE OF CONTENTS

	Page
I. INTRODUCTION	1
II. MANDATORY NOTICES	2
A. Real Party-in-Interest	2
B. Related Matters.....	2
C. Counsel and Service Information.....	3
III. CERTIFICATION OF GROUNDS FOR STANDING	4
IV. OVERVIEW OF CHALLENGE AND RELIEF REQUESTED	4
V. BRIEF DESCRIPTION OF TECHNOLOGY	5
A. Overview of the '599 Patent.....	5
1. Alleged Problem	5
2. Summary of the Alleged Invention of the '599 Patent	6
B. The Challenged Claims	9
VI. OVERVIEW OF THE PRIMARY PRIOR ART REFERENCE - RITCHEY (EX. 1003)	12
VII. LEVEL OF ORDINARY SKILL IN THE ART	15
VIII. CLAIM CONSTRUCTION	15
A. “performer” and “participant”	16
B. “immersive virtual reality environment”	19
IX. THE UNPATENTABILITY OF CLAIMS 1-9	20
A. Ground 1: Claims 1, 2, 8, and 9 Are Obvious over Ritchey	20
1. 1 [Preamble]: “A system which interacts with participants and performers, said system comprising:”	20
2. 1[a]: “an immersive virtual reality environment”	21
3. 1[b]: “at least one performer input device, in electronic communication with said immersive virtual reality environment”	23

TABLE OF CONTENTS

(continued)

	Page
4. 1[c]: “at least one participant input device in electronic communication with said immersive virtual reality environment”	26
5. 1[d]: “at least one performer output device in electronic communication with said immersive virtual reality environment”	29
6. 1[e]: “at least one participant output device in electronic communication with said immersive reality environment”	31
7. 1[f]: “wherein at least one live performer interacts with at least one participant and said immersive virtual reality environment”	32
8. 1[g]: “wherein said immersive virtual reality environment includes a live or prerecorded video image of said at least one live performer and audio communication between said at least one live performer and said at least one participant, or between said at least one participant and said at least one live performer, or both;”	35
9. 1[h]: “wherein said at least one participant interacts with said at least one live performer and said immersive virtual reality environment, thereby resulting in an experience which is in part controlled by said at least one participant and said at least one participant input device.”	39
10. 2[a]: “The system of claim 1 wherein said immersive virtual reality environment further comprises: at least one processing device; system data; output data; and a network”	40

TABLE OF CONTENTS
(continued)

Page

11.	2[b]: “said network connecting said processing device, said at least one performer input device and said at least one performer output device, and said at least one participant input device and said at least one participant output devices in electronic communication, thereby transmitting said system data and said output data to said at least one live performer and said at least one participant.”	42
12.	8[Preamble]: “A system which interacts with participants and performers, said system comprising:”	46
13.	8[a]: “an immersive virtual reality environment, said immersive virtual reality environment further comprising: at least one processing device; system data; output data; and a network;”	46
14.	8[b]: “at least one performer input device in electronic communication with said immersive virtual reality environment;”	46
15.	8[c]: “at least one participant input device in electronic communication with said immersive virtual reality environment;”	46
16.	8[d]: “at least one performer output device in electronic communication with said immersive virtual reality environment;”	47
17.	8[e]: “at least one participant output device in electronic communication with said immersive virtual reality environment;”	47

TABLE OF CONTENTS

(continued)

Page

18.	8[f]: “wherein at least one live performer interacts with at least one participant and said immersive virtual reality environment, and said immersive virtual reality environment includes a live or prerecorded video image of the performer and audio communication between said at least one live performer and said at least one participant, or between said at least one participant and said at least one live performer, or both;”	47
19.	8[g]: “wherein said at least one participant interacts with said at least one live performer and said immersive virtual reality environment, thereby resulting in an experience which is in part controlled by said at least one participant and said at least one participant input device;”	48
20.	8[h]: “said network connecting said processing device, said at least one performer input device and said at least one performer output device, and said at least one participant input device and said at least one participant output device in electronic communication, thereby transmitting said system data and said output data to said at least one live performer and said at least one participant, and”	48
21.	8[i]: “said network connecting said immersive virtual reality environment and said at least one participant input device and said at least one participant output device across the Internet.”	48
22.	9[Preamble]: “A method of providing interactive communications between participants and performers comprising the steps of:”	49
23.	9[a]: “(a) providing an immersive virtual reality environment”	49
24.	9[b]: “(b) providing at least one performer input device in electronic communication with said immersive virtual reality environment”	49

TABLE OF CONTENTS

(continued)

	Page
25. 9[c]: “(c) providing at least one participant input device in electronic communication with said immersive virtual reality environment”	49
26. 9[d]: “(d) providing at least one performer output device in electronic communication with said immersive virtual reality environment”	50
27. 9[e]: “(e) providing at least one participant output device in electronic communication with said immersive virtual reality environment”	50
28. 9[f]: “(f) having at least one live performer interact with at least one participant and said immersive virtual reality environment, by including with said virtual reality environment a live or prerecorded video image of said at least one live performer and audio communication between said at least one live performer and said at least one participant, or between said at least one participant and said at least one live performer, or both;”	50
29. 9[g]: “(g) having at least one participant interact with at least one such live performer and said immersive virtual reality environment, thereby resulting in an experience which is in part controlled by said at least one participant and said at least one participant input device.”	51
B. Ground 2: Claims 3, 4 and 5 Are Obvious Over Ritchey and Goldfarb.....	51
1. 3[a]: “The system of claim 2 wherein said at least on[e] participant output device further comprising: at least one seat; at least one virtual reality display; and at least one participant audio device”	51
2. 3[b]: “said at least one participant input device further comprising: at least one hand-held keypad and at least one participant microphone”	53

TABLE OF CONTENTS

(continued)

	Page
3. 3[c]: “said at least one performer output device further comprising: at least one live video image of the participant; and at least one speaker, said speaker transmitting said at least one participant microphone input to said at least one live performer”	54
4. 3[d]: “said performer input means further comprising: at least one live video image of said at least one live performer; and at least one performer microphone”	54
5. 3[e]: “wherein said at least one participant views said output data from said immersive virtual reality environment and said live video image of said at least one live performer through said at least one virtual reality display and provides feedback to said immersive virtual reality environment through said at least one hand-held keypad and said at least one participant microphone.”	55
6. 4: “The system of claim 3 wherein said output data further comprises: graphical images; and audio data.”	56
7. 5: “The system of claim 4 wherein said seat further comprises: a rumble seat, said rumble seat providing sound and movement to said at least one participant.”	56
C. Ground 3: Claim 6 Is Obvious Over Ritchey, Goldfarb, Tompkins, and Seligmann.....	57
1. 6[Preamble]: “The system of claim 5”	58
2. 6[a]: “wherein said processing device further comprises: at least one control computer; at least one audio processor; at least one audio switcher; at least one video processor; and at least one video switcher; wherein”	58
3. 6[b]: “said at least one control computer processes and distributes data from said at least one performer input device and said at least one performer output device and said at least one participant input device and at least one participant output device”	67

TABLE OF CONTENTS

(continued)

	Page
4. 6[c]: “said at least one audio processor processes said at least one participant microphone input, said at least one performer microphone input, and said audio data in accordance with said system data of said at least one control computer”	69
5. 6[d]: “said at least one audio switcher switches at least one participant microphone input, at least one performer microphone input, and said audio data in accordance with said system data of said at least one control computer”	71
6. 6[e]: “said video processor processes said live video image of the participant, said live video image of the performer, and said graphical images in accordance with said system data of said at least one control computer; and”	73
7. 6[f]: “said video switcher switches said live video image of said at least one live performer with said graphical data in accordance with said system data of said at least one control computer”	75
8. 6[g]: “thereby selectively providing said graphical images, said audio data, and said live video image of said at least one live performer in said at least one virtual reality display, and selectively providing said at least one participant microphone input, said at least one performer microphone input, and said audio data to said at least one participant audio output device.”	76
D. Ground 4: Claim 7 Is Obvious Over Ritchey, Goldfarb Tompkins, Seligmann, and Leahy	76
1. 7[Preamble]: “The system of claim 6 said immersive virtual reality environment further comprising:”	77
2. 7[a]: “a control station”	77
3. 7[b]: “said control computer further comprising: a registration computer”	78

TABLE OF CONTENTS
(continued)

	Page
4. 7[c]: “said system data further comprising: participant information”	79
5. 7[d]: “wherein said at least one participant registers participant information into said registration computer for interactive use in said immersive virtual reality environment.”	80
X. CONCLUSION	81
EXHIBIT LIST	83

TABLE OF AUTHORITIES

Page

CASES

<i>Lockheed Martin Corp. v. Space Sys./Loral, Inc.</i> , 324 F.3d 1308 (Fed. Cir. 2003)	11
--	----

STATUTES

35 U.S.C. § 102(b)	11, 55
35 U.S.C. § 102(e)	49, 56, 74
35 U.S.C. § 103	4

OTHER AUTHORITIES

37 C.F.R. § 42.100(b)	14
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I. INTRODUCTION

Virtual reality (“VR”) systems generate realistic images, sounds and other sensations that simulate a viewer’s physical presence in a virtual world or imaginary environment. A person using virtual reality equipment can look round, move around and interact with virtual features or items as if they were in the real world. Over the past 30 years, manufacturers, academic institutions, and government agencies have been focused on developing virtual reality systems from the early, highly specialized medical, flight simulation and military training efforts to providing VR capabilities to the general population in the form of gaming and entertainment. By the 1990s, numerous virtual reality systems allowed viewers within the virtual environment to not only talk with one another but to interact with the immersive environment itself.

The claims of the ’599 Patent describe and claim this exact and well-known system. The purported invention has a July 1999 priority date and admittedly relies on virtual reality, computer graphics and teleconferencing technologies that were pervasive at that time, including allowing audio communication between a performer and participant and combining live video with computer-generated images such as a virtual environment and avatars. Indeed, the only point of novelty that they asserted was providing a live or prerecorded image of a live performer within an immersive environment and enabling two-way audio

communication between the performer and a participant. But that approach was well-known both generally and in the virtual reality field specifically.

II. MANDATORY NOTICES

A. Real Party-in-Interest

RPX Corporation (“RPX”) is the sole real party-in-interest in this proceeding. RPX has not communicated with any client about its intent to contest the validity of the ’599 Patent, the preparation of this petition, or the filing of this petition. RPX has complete control over all aspects of this proceeding and is responsible for all costs and expenses associated with this proceeding.

B. Related Matters

Patent Owner Virtual Immersion Technologies LLC (“Virtual Immersion”) has asserted the ’599 Patent in litigation in the following pending cases:

Parties	Case No.	Court	Filing Date
Virtual Immersion Technologies LLC v. AltspaceVR Inc.	1:17-cv-00838	D.Del.	June 27, 2017
Virtual Immersion Technologies LLC v. Boeing Co.	1:17-cv-00840	D.Del.	June 28, 2017
Virtual Immersion Technologies LLC v. Silver VR Technologies, Inc.	1:17-cv-00842	D.Del.	June 28, 2017
Virtual Immersion Technologies LLC v. Twentieth Century Fox Film Corporation	1:17-cv-01539	D.Del.	October 31, 2017

Virtual Immersion Technologies LLC v. Caterpillar Inc.	1:17-cv- 01540	D.Del.	October 31, 2017
Virtual Immersion Technologies LLC v. Deere & Company	1:17-cv- 01541	D.Del.	October 31, 2017
Virtual Immersion Technologies LLC v. Ford Motor Company	1:17-cv- 01542	D.Del.	October 31, 2017

C. Counsel and Service Information

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Petitioner consents to electronic service. Service on and communications to the above attorneys can be sent to: PCVirtualImmersionIPR@perkinscoie.com. A Power of Attorney for Petitioner is being filed concurrently. Petitioner respectfully requests permission to file Motions for *Pro Hac Vice* Admission for Philip Kim and Adam Hester.

III. CERTIFICATION OF GROUNDS FOR STANDING

The '599 Patent issued in 2002 and qualifies for *inter partes* review. Petitioner is not barred or estopped from seeking review of claims 1–9 of the '599 Patent on the grounds identified herein.

IV. OVERVIEW OF CHALLENGE AND RELIEF REQUESTED

Petitioner challenges patentability of claims 1–9 of the '599 Patent and asks the Board to cancel those claims under 35 U.S.C. § 103 because they were obvious over the following references:

Ground	References ¹
1	Claims 1, 2, 8, and 9 are obvious over Ritchey (Ex. 1003)
2	Claims 3–5 are obvious over Ritchey and Goldfarb
3	Claim 6 is obvious over Ritchey, Goldfarb, Tompkins, and Seligmann
4	Claim 7 is obvious over Ritchey, Goldfarb, Tompkins, Seligmann, and Leahy

None of the references relied on in Grounds 1–4 were before the Examiner during the original examination of the '599 Patent. The Petitioner also relies on the accompanying declaration of expert Dr. Craig Rosenberg (Ex. 1002).

¹ For full citations, please see the Exhibit List at the end of this Petition.

V. BRIEF DESCRIPTION OF TECHNOLOGY

The '599 Patent claims a system and method for enabling communication between a performer and a participant in an immersive virtual reality environment. The basic concepts and technologies involved in the system were well known prior to the filing of the '599 Patent.

A. Overview of the '599 Patent

The '599 Patent issued from U.S. Patent Application No. 09/617,388, which was filed on July 17, 2000 and claims the benefit of provisional application No. 60/144,492, filed on July 19, 1999. (Ex. 1001 at Title Page.) The patent was originally assigned to Ham on Rye Technologies, Inc. The '599 Patent has since been assigned to Virtual Immersion Technologies, LLC, a patent assertion entity.

1. Alleged Problem

In its Background of the Invention, the '599 Patent describes virtual reality entertainment systems that provide participants with various degrees of interaction and communication with others in a computerized environment. For example, in some VR systems, participants are represented as avatars and control their avatar using basic input mechanisms such as handheld input devices or electromagnetic body tracking devices. (Ex. 1001 at 1:46–53). In other entertainment systems, participants are entertained by enhanced or pre-recorded performers on stage or through television or cinema. (*Id.* at 2:5–10.) In yet other immersive entertainment

systems, two-way communication allows conversation between a computer-controlled host and an individual or participant. (*Id.* at 2:14-16.)

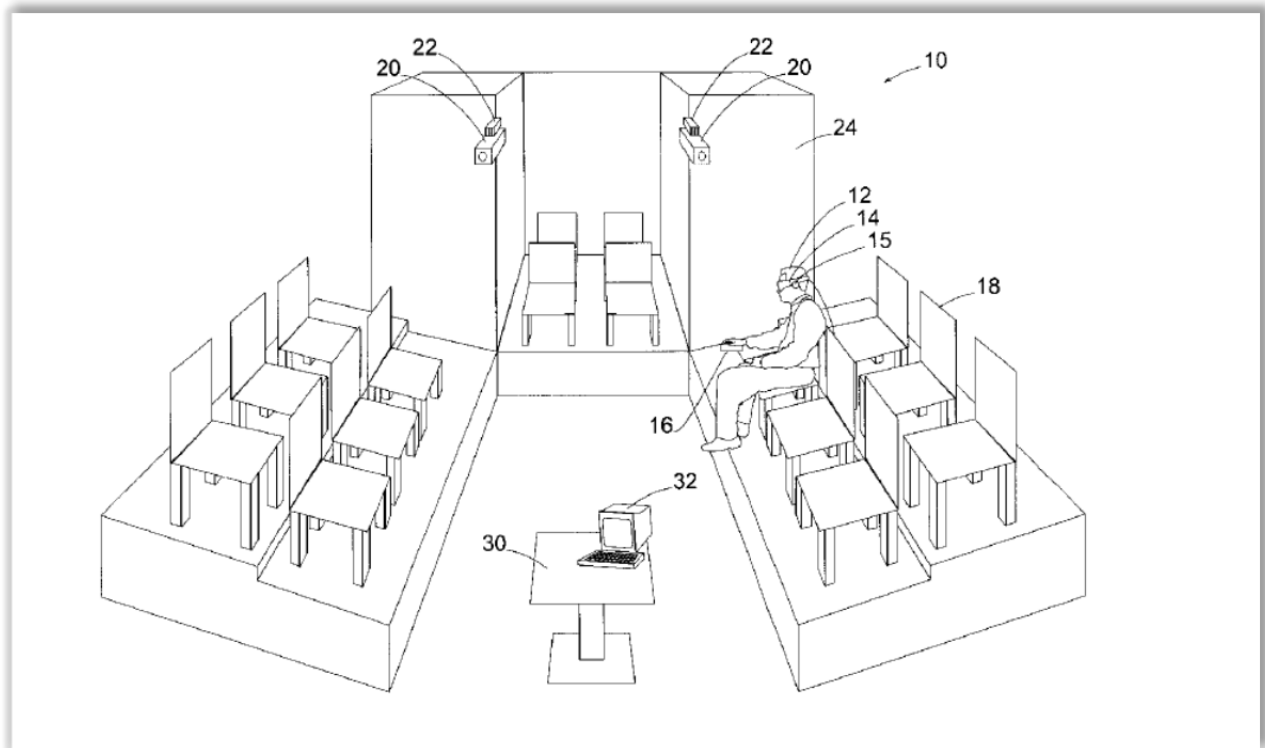
While these early systems provided various degrees of immersive entertainment, they were allegedly unable to provide an immersive experience that allowed a live performer in the VR environment to talk with participants in the same environment. (*Id.* at 2:40-44.) In other words, the virtual reality based entertainment systems did not provide “three-way immersive interactive communications amongst and between: (1) participants; (2) an immersive environment; and (3) live and/or pre-recorded performers.” (*Id.* at 2:55-57.)

2. Summary of the Alleged Invention of the ’599 Patent

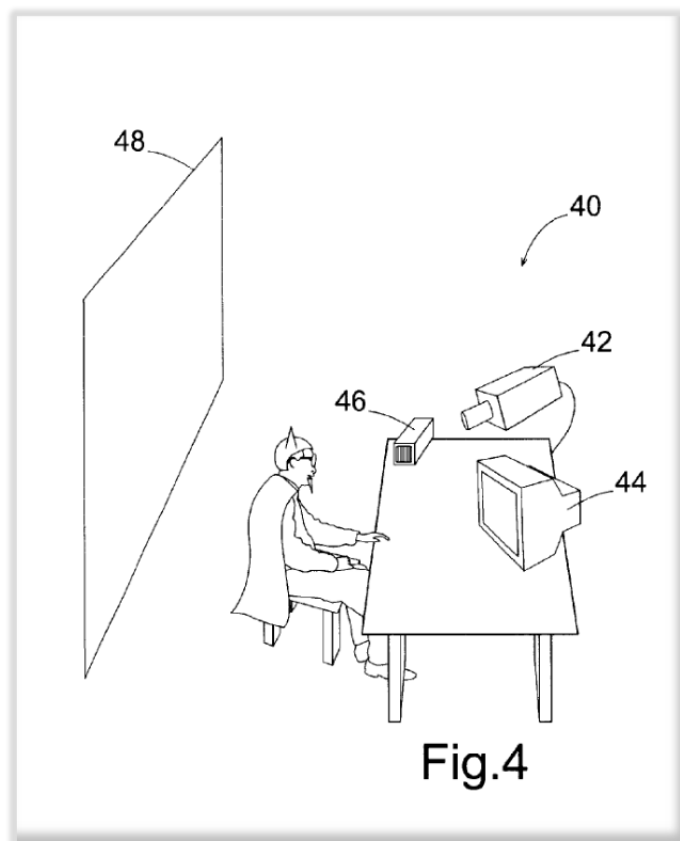
The ’599 Patent purports to address this deficiency using a system of conventional technologies that enable two-way communication between participants and a performer in a virtual reality environment. (Ex. 1001 at 3:10–22, 3:55–65.) The ’599 Patent describes a “Virtual Reality Performance Theatre (VRPT)” wherein participants interact with other participants and directly with the live (or prerecorded) performer in an immersive environment thus allowing the participant to have “a far more personal and unique experience through the use of immersion devices and interactive communication technologies.” (*Id.* at 5:13-17.)

Figure 3 is a system diagram depicting the Virtual Reality Performance Theater (VRPT) 10. The theater 10 includes multiple participants and at least one

live performer. The participants are equipped with immersion devices such as head mounted displays 12, microphones 14, headphones 15 and hand-held input devices 16. (*Id.* at 6:49–64.) Participants view the virtual reality environment through the HMD 12, provide input to the virtual reality system using the hand-held device 16 and hear audio communication with headphones 15. (*Id.*) To supplement the immersive environment, other immersive effects can be implemented such as adding vibration panels to the participant’s seat (*i.e.*, rumble seat). (*Id.* at 6:65–7:5.) Video cameras 20 and microphones 22 allow the live performer to see and communicate with the participants in theater 10. (*Id.* at 7:13-22.)



The VRPT 10 also includes a presenter enclosure 24 where a live host interacts with other participants using various devices. (*Id.* at 7:22–27.) Figure 4 depicts details of the presenter enclosure and shows a live performer viewing and listening to other participants through video monitor 44 and speaker 46, respectively. (*Id.*) While the presenter enclosure 24 is designed to mask the presence of the live performer, stereoscopic video cameras 42 and lighted background 48 capture live images of the performer which are then mixed with graphical data within the VRPT 10 and displayed to the participants. (*Id.* at 7:38-46.) Microphones, audio switches and other teleconferencing hardware enable voice communication between performers and participants. (*Id.* at 9:19–41, 12:32–54.) Like other participants, performers also have keypad and other devices that allow interaction with the immersive environment. (*Id.* at 8:58–64.)



B. The Challenged Claims

This petition challenges claims 1–9 of the '599 Patent. Claim 1 is representative and reads as follows:

1. A system which interacts with participants and performers, said system comprising:
 - [a] an immersive virtual reality environment;
 - [b] at least one performer input device in electronic communication with said immersive environment;
 - [c] at least one participant input device in electronic communication with said immersive environment;

[d] at least one performer output device in electronic communication with said immersive environment;

[e] at least one participant output device in electronic communication with the immersive environment;

[f] wherein at least one live performer interacts with at least one participant and said immersive virtual reality environment;

[g] wherein said immersive virtual reality environment includes a live or prerecorded video image of said at least one live performer and audio communication between said at least one performer and said at least one participant, or between said at least one participant and said at least one live performer, or both; and

[h] wherein said at least one participant interacts with said at least one live performer and said immersive virtual reality environment, thereby resulting in an experience which is in part controlled by said at least one participant and said at least one participant input device.

Additionally, the dependent claims add conventional implementation details such as using speakers, rumble seats, video processors, video switchers, audio processors, audio switchers and control stations to create the immersive virtual reality environment.

The requirements for the participant and performer in independent claims 1, 8 and 9 are nearly identical, with the exception that the “immersive virtual reality environment includes a live or prerecorded video image of said at least one live performer.”² These distinctions, however, do not preclude the possibility of having live or prerecorded video images of the participant. In fact, this possibility is supported in dependent claims and in the specification. (Ex. 1001 at 7:13–22,

² The independent claims also include a “thereby” limitation which merely states a result of prior limitations (*e.g.*, of the participant having “input device in electronic communication with said immersive virtual reality environment”). This thereby clause should not be accorded patentable weight as it merely states a result of limitations in the claim and adding no further substance. *Lockheed Martin Corp. v. Space Sys./Loral, Inc.*, 324 F.3d 1308, 1319 (Fed. Cir. 2003) (“a whereby clause that merely states the result of the limitations in the claim adds nothing to the substance of the claim.”) Moreover, a POSITA would have understood the immersive virtual reality environments’ inclusion of a live or prerecorded video image of the performer to also result in an experience which is in part controlled by the at least one performer and the at least one performer’s input device. Therefore, the “thereby” claims is redundant to the other express limitations in the independent claims. (Ex. 1002 at ¶ 109.)

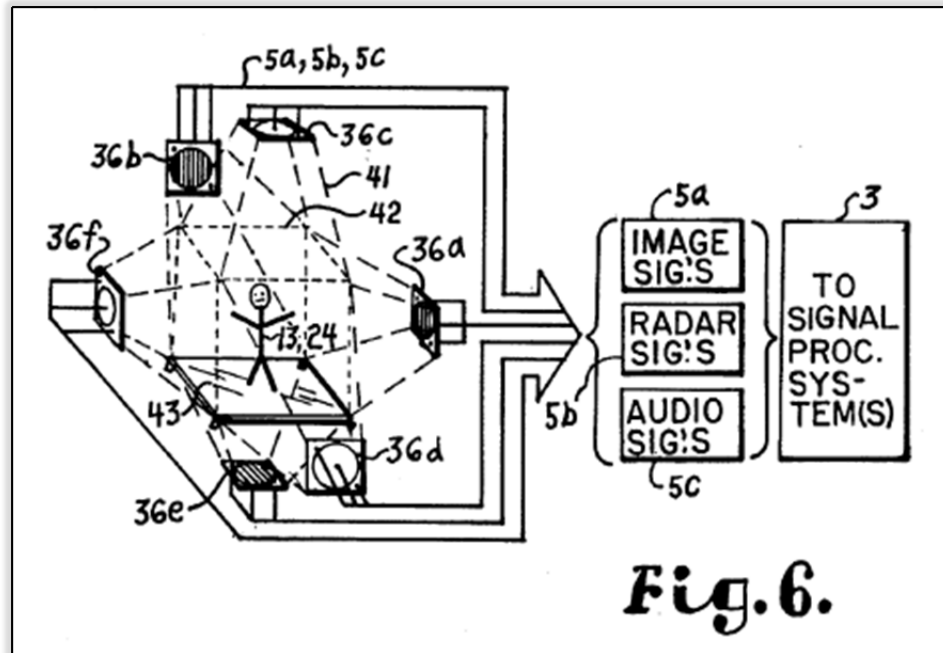
3:10–33.) Importantly and as described below, the performers are all participants and participants can be performers within the immersive environment described in the '599 Patent.

VI. OVERVIEW OF THE PRIMARY PRIOR ART REFERENCE - RITCHEY (EX. 1003)

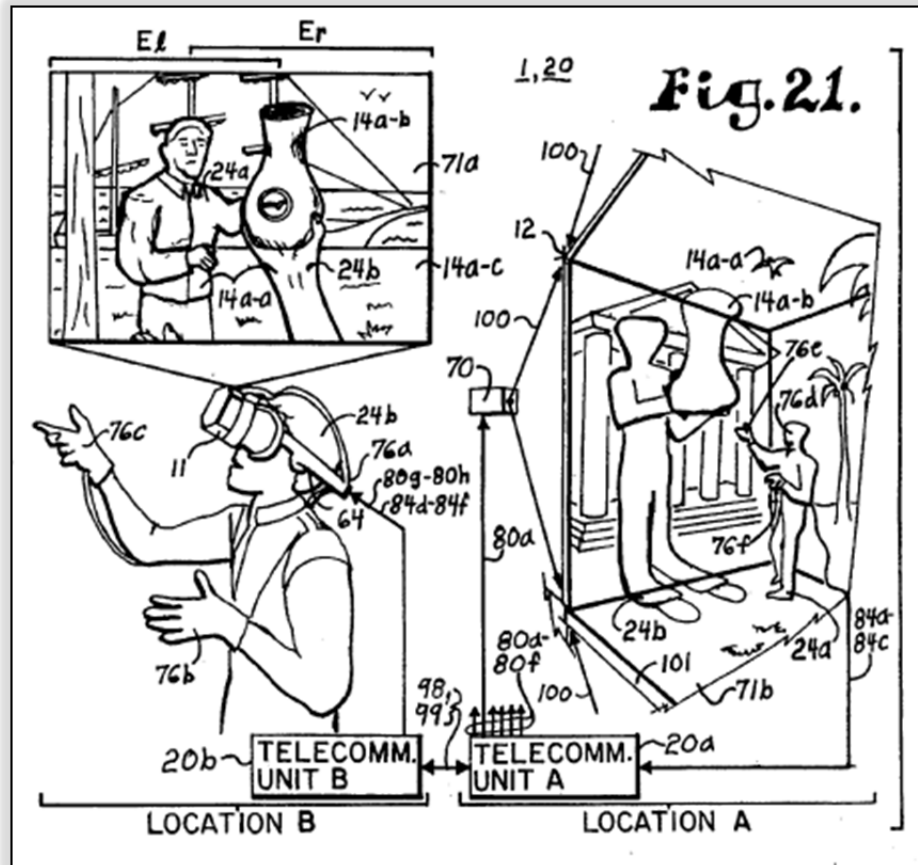
The Ritchey patent issued on February 27, 1996, and is thus prior art to the '599 Patent under at least 35 U.S.C. § 102(b).

Ritchey discloses a virtual reality audio-visual system for use in telepresence applications. Ritchey's system immerses the viewer within a virtual scene using three-dimensional audio/video sensors and outputs, interactive input devices, and telecommunications equipment. (Ex. 1003 at 1:11–19.) The viewer, through the input devices, may manipulate the virtual objects and scenes. (*Id.*) These virtual scenes may include “a single or plurality of live video feeds,” a feature that is especially useful for “image based virtual conferencing.” (*Id.* at 17:4–30.)

Figure 6 discloses an array of sensors that capture the image, shape, and sounds of a subject within its environment. (*Id.* at 10:25–30.)



Ritchey's system processes the sensor outputs and creates a three-dimensional virtual environment. This processing step includes texture-mapping video feeds from the sensor array onto three-dimensional wireframes. (*Id.* at 15:58–16:44.) In addition to feeds from the sensor arrays, “a single or plurality of live video feeds may be transmitted to computer 9...and texture map[ped]... onto predetermined portions of the 3-D wireframe model defined in the computer.” (*Id.* at 17:4–9.) “Real-time texture mapping from a live video feed is especially useful in an image based virtual conferencing system like that described in FIG. 20 and FIG. 21.” (*Id.* at 17:28–30.)



In Figure 21's teleconferencing embodiment, Viewer 24b at Location B dons a head-mounted display ("HMD") to immerse himself into the virtual reality environment. (*Id.* at 8:46–47.) At remote Location A, Viewer 24a is immersed in the environment through a large display. Both viewers are provided interactive input devices (*e.g.*, head and data glove sensors) with which they may manipulate the graphical environment. (*Id.* at 25:20–24, 15:7–9, 19:17–29, 9:27–28.) Ritchey links both viewers' terminals with telecommunications equipment, enabling the transmission of voice, video, and graphics over a network. (*Id.* at 32:22–67.)

VII. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art at the time of the alleged invention (hereinafter, “POSITA”) would have had (a) a bachelor’s degree in electrical engineering, computer engineering, or computer science (or a closely related field) with at least three years of experience working in computer graphics or virtual reality technologies; (b) a master’s degree in electrical engineering, computer engineering, or computer science (or a closely related field) with at least two years of experience working in computer graphics or virtual reality technologies; or (c) a PhD in electrical engineering, computer engineering, or computer science (or a closely related field). (Ex. 1002 at ¶ 42.)

VIII. CLAIM CONSTRUCTION

The Board gives each claim term from an unexpired patent such as the ’599 Patent “its broadest reasonable construction in light of the specification of the patent in which it appears.” 37 C.F.R. § 42.100(b). The broadest reasonable interpretation (“BRI”) for a term explicitly defined in the specification is the definition in the specification, and the BRI for any term not defined in the specification is the plain and ordinary meaning consistent with the specification. *Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1061-62 (Fed. Cir. 2016). Because Patent Owner may seek unreasonably narrow constructions for certain terms in an effort to distinguish the cited art, Petitioner addresses those terms here.

A. “performer” and “participant”

While all independent claims recite a “performer” and a “participant,” it is clear from the intrinsic and extrinsic evidence that there is very little difference between these two elements beyond the claims’ explicit distinctions discussed further below. For the reasons stated below, the broadest reasonable interpretation of a participant is “one who interacts with an immersive virtual reality environment” and the broadest reasonable interpretation of a “performer” is “a participant who is capable of sending a video image of him or herself.”

A “performer” is not explicitly defined in the ’599 Patent while a “participant” is broadly described as someone “who enjoys immersion in a software generated simulation.” (Ex. 1001 at 3:34-38.) The specification goes on to describe the VRPT wherein “performers” and “participants” are treated in much the same way and have largely the same capabilities. For example, both “participants” and “performers” have input and output devices that communicate with the immersive environment. (*Id.* at 3:5-29, claims 1, 8, and 9.) Both “participants” and “performers” communicate via audio and video and interact with the immersive environment. (*Id.*) Finally, both “participants” and “performers” can interact directly with one another via the virtual environment and sense each other’s presence. (*Id.* at 4:58-60.) In fact, the ’599 Patent states that performers are just a type of participant. (*Id.* at 15:5-9.)

This is consistent with the perspective of a POSITA who would have understood that users in a virtual reality environment often take the role of performer and participant depending, for example, on the degree of interactivity with the immersive environment. As such, performers are all participants and participants can be performers. (Ex. 1002 at ¶¶ 53–61.)

The only explicit distinction between a performer and a participant is set forth by the claims which requires that the “immersive virtual reality environment includes a live or prerecorded video image of said at least one live performer.” (*E.g.*, Ex. 1001 at claim 1.) This distinction, however, does not preclude a live or prerecorded video image of the participant. In fact, these possibilities are clearly supported by the specification which states that “[t]he combination of audio/voice, video and graphical inputs and outputs to and from each of the participants, performers and immersive environment creates a synergistic effect which results in an unparalleled entertainment experience.” (*Id.* at 6:18-27.) Moreover, dependent claim 3 recites “at least one live video image of the participant.” (*Id.* at 7:13-22, 3:10-33; Ex. 1002 at ¶ 63.) But given the symmetrical capabilities of performers and participants, what makes an individual in an immersive environment a “performer” in the ’599 Patent is the ability to send a video image of himself or herself.

Indeed, a POSITA would not have understood the '599 Patent as requiring any substantive difference between the roles of a “participant” and “performer,” beyond the claimed requirement that the performer can send a video image. (Ex. 1002 at ¶ 65.) This is further supported by the express goal of the '599 Patent which was to enable a higher degree of interaction in a theater or entertainment experience, thus moving away from actors entertaining audiences and instead providing “three way interactive communication between participants, live and/or pre-recorded performers and an immersive virtual reality environment. (Ex. 1001 at 3:10-21, 5:13-15; *see also id.* at 3:45-50.)

Additionally, the lack of any substantive difference between participants and performers, beyond the capability to send video images, is also supported by numerous examples of how the VRPT can be used. (Ex. 1002 at ¶¶ 56, 61.) The '599 Patent specification repeatedly suggests using the claimed VRPT system in an educational environment. (Ex. 1001 at 7:13-22, 13:62-65, 15:43–44.) In such a scenario, both the teachers and students would interact within an immersive virtual reality environment while a video image of the teacher is sent to the students. Of course, with the proper hardware, a video image of a student could be sent within the immersive environment to the teacher or other students. In such a scenario, the teacher is a performer when he/she sends a video image and the student can change from participant to performer upon sending a video of him or

herself. Importantly, the '599 Patent contemplates this exact situation and describes the VRPT as allowing “for almost unlimited scale-up of the number of participants, both audience and performers.” (*Id.* at 15:5-6.)

Based on the above, the broadest reasonable interpretation of a participant is “one who interacts with an immersive virtual reality environment.” The broadest reasonable interpretation of a “performer” is “a participant who is capable of sending a video image of himself or herself.”

B. “immersive virtual reality environment”

All independent claims recite the term “immersive virtual reality environment.” (*Id.* at 1:34-41, 4:61-64.) The patentee acted as its own lexicographer in defining various portions of the term, and the intrinsic evidence along with the extrinsic evidence from the time of alleged invention results in the following definition of the term “immersive virtual reality environment”: “a computer generated graphical environment wherein a participant is ‘immersed’ within the environment so as to provide to the participant a sensation of being physically located within the graphical environment, such that a 25-degree diagonal field of view is provided no more than 10 feet from the viewer.” (*Id.* at 1:34-41, 4:61-64; Ex. 1002 at ¶¶ 66–69).

IX. THE UNPATENTABILITY OF CLAIMS 1-9

As shown below, claims 1–9 are unpatentable because they are obvious over the identified prior art.

A. Ground 1: Claims 1, 2, 8, and 9 Are Obvious over Ritchey

Ritchey discloses or renders obvious every limitation of claims 1, 2, 8, and 9.

1. 1 [Preamble]: “A system which interacts with participants and performers, said system comprising:”

Ritchey discloses a virtual reality/telepresence audio-visual system that creates a virtual environment that supports multiple participants. Ritchey’s system employs an array of sensors to capture a subject (*i.e.*, “performer”) and environment. The sensor data is processed to create a three-dimensional model, which is displayed to a viewer (*i.e.*, “participant”).³

Viewers “operat[e] interactive computer input devices to affect the manipulation of the virtual object and scenes.” (Ex. 1003 at 1:14–16.) These input sources “may be operated as an input source 2 or as part of the participants

³ Like the ’599 Patent, Ritchey uses the terms “user” and “viewer” as synonyms for “participant,” generally to distinguish aspects of visually observing the virtual environment. (*See, e.g.*, Ex. 1001 at 1:33-40, 4:22-28, 4:61-64, 6:38-48, 7:24-27, 8:7-9; Ex. 1003 at 4:63-65, 14:17-19.) Accordingly, this Petition uses the terms interchangeably.

interactive input system 10.” (*Id.* at 15:7–9.) Indeed, like the system described by the ’599 Patent, Ritchey’s system creates an interactive virtual reality environment that supports multiple viewers, some of whom are depicted as a live video image (and thus “perform”) within the environment. (Ex. 1002 at ¶¶ 74–75.)

In Ritchey’s embodiments, all viewers interacting in the virtual world (i.e., participants) are also performers, because the viewers are capable of sending video images of himself or herself. (Ex. 1003 at 32:45–52, Fig. 21; *infra* Section **Error! Reference source not found..Error! Reference source not found..Error! Reference source not found..** (limitation 1[g]).) Thus, even in Ritchey’s embodiments describing communication between two viewers, multiple participants and multiple performers are disclosed because both viewers are participants and performers.

2. 1[a]: “an immersive virtual reality environment”

As detailed above, an “immersive virtual reality environment” should provide immersion within a computer-generated environment and provide a greater than 25-degree diagonal field of view no more than 10 feet from a viewer.

Both of Ritchey’s embodiments provide immersion within a computer-generated environment. (Ex. 1002 at ¶¶ 77–78.) Ritchey’s system renders and presents to its viewers a three-dimensional computer-generated model that contains “3-D beings, objects, and scenes.” (Ex. 1003 at 2:15.) And whether the viewer

experiences Ritchey's virtual environment through an HMD or large display, Ritchey's system "generate[s] the effect to the participant that he or she is within the computer-generated environment." (Ex. 1003 at 16:40–42; Ex. 1002 at ¶ 78.)

Although Ritchey does not explicitly mention a "25-degree diagonal field of view no more than 10 feet from a viewer," several of Ritchey's embodiments render obvious this requirement. For example, the head-mounted displays ("HMDs") disclosed in Ritchey provide a greater than 25-degree diagonal field of view no more than 10 feet from a viewer. (Ex. 1003, fig. 21; Ex. 1002 at ¶ 78.) By experiencing the virtual environment through the HMD, "the viewer is immersed in a highly interactive and realistic computer simulation." (Ex. 1003 at 8:66–67.) Ritchey also discloses other devices that render obvious "[providing] a greater than 25-degree diagonal field of view no more than 10 feet from a viewer." For example, much like the '599 Patent, Ritchey discloses a large display assembly. (Ex. 1003 at 8:47–51.) This large display assembly may "enclose[] the participants head, upper body, or entire body." (*Id.* at 34:46–35:10.) Thus, either embodiment of Ritchey discloses an "immersive virtual reality environment" as defined by the '599 Patent because both embodiments disclose a display that has a "greater than 25 degree diagonal field of view [and that] is provided no more than 10 feet from the viewer." (Ex. 1001 at 4:63–64.)

Thus, Ritchey renders obvious the claimed “immersive virtual reality environment” in accordance with the lexicographical definition of the claim term.

3. 1[b]: “at least one performer input device, in electronic communication with said immersive virtual reality environment”

The '599 Patent describes “performer input devices” as audio sensors, video sensors, and a keypad. (Ex. 1001 at 8:9–11.) Indeed, the '599 Patent discloses that audio and video sensors are used to record a live image of a performer, and the performer’s keypad is used to input commands into the VRPT computer system. (*Id.* at 7:32–36.) Ritchey discloses at least these same input devices in communication with an immersive virtual reality environment and thus meets the limitations of claim 1[b].

Specifically, Ritchey discloses an array of sensors that captures “[a]coustical, shape, and image signatures” of a subject. (Ex. 1003 at 10:28–30.) Figure 1 (annotated) below illustrates Ritchey’s system and depicts audio (green), shape (blue), and image (red) inputs. These “[i]nput means 6, 7, and 8 include a plurality of respective sensors that are positioned to record geographic and geometric subjects.” (*Id.* at 7:45–49.)

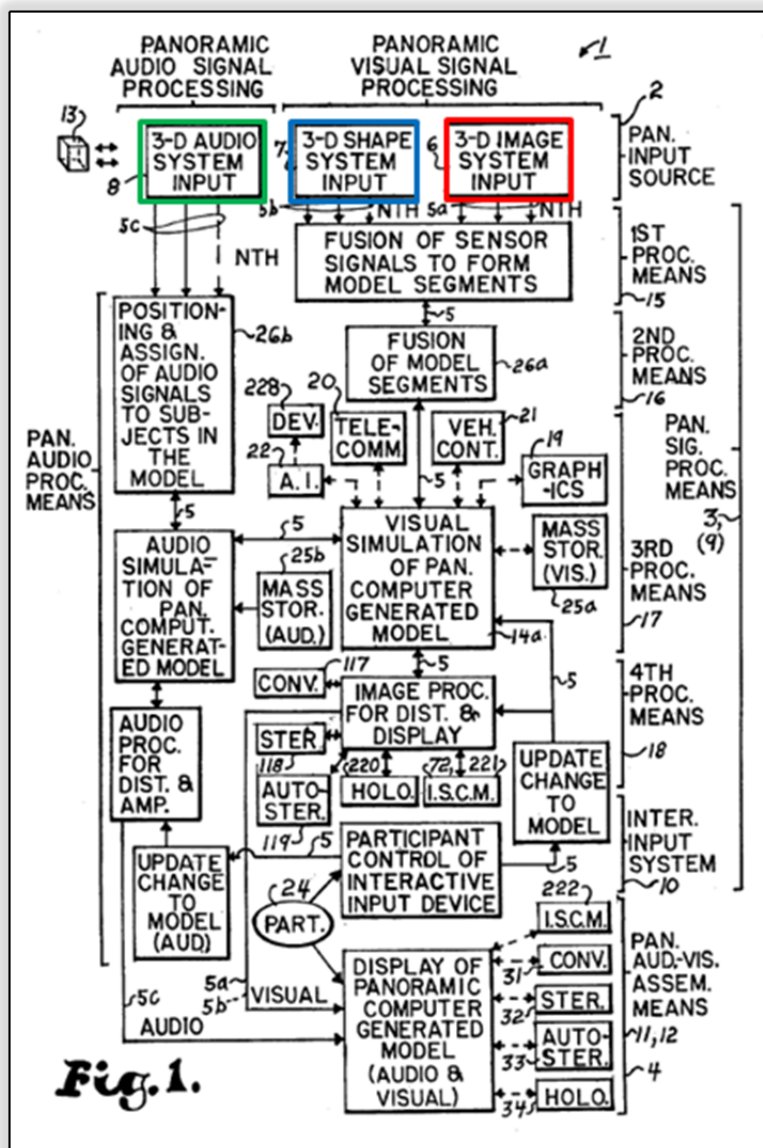
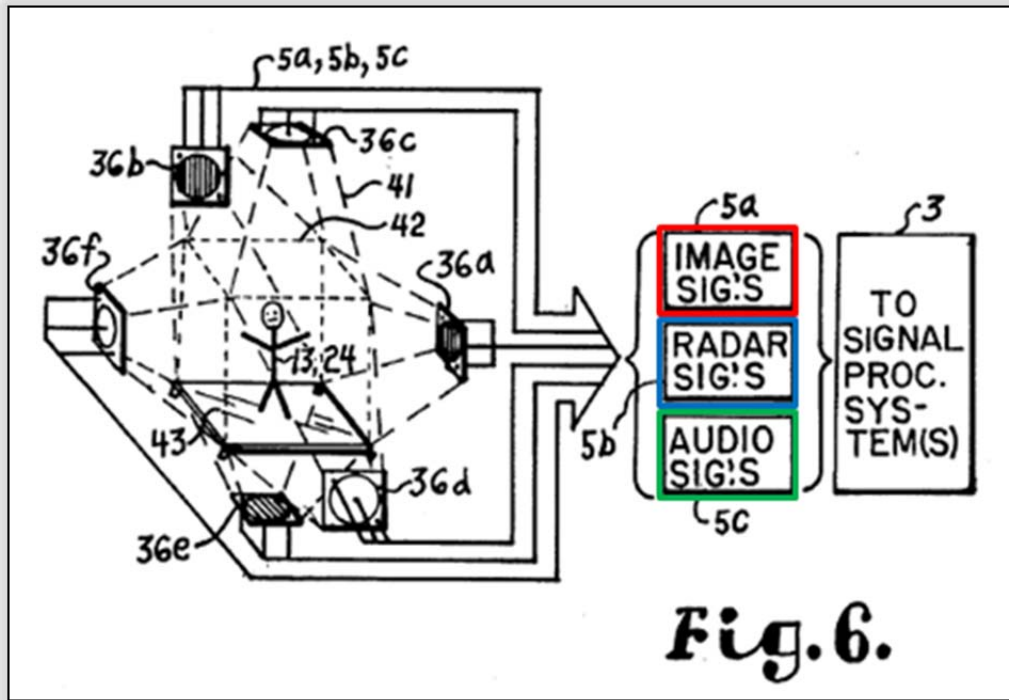


Figure 6 (annotated) below further illustrates the array of image (red), shape/radar (blue), and audio (green) sensors positioned around a subject, all of which are input devices.



Ritchey’s signal processing systems create a virtual environment based on the data recorded by the sensors. As Ritchey describes, its sensor array captures and records the “imagery, shape, and audio signatures” of the subject, and this recorded input is “then translated and represented in the computer generated world.” (Ex. 1003 at 24:39–41; Ex. 1002 at ¶¶ 80–82.)

The ’599 Patent also discloses keypads used by performers to communicate with the immersive environment. So does Ritchey. Specifically, Ritchey describes “viewer interaction devices” such as keyboards or graphics input device (*e.g.*, trackball, position sensing system, voice recognition system) that enable communication with the system environment. (Ex. 1003 at 15:2–7, 19:23–26.) These interaction devices are connected to Ritchey’s system “as an input source 2

or as part of the participants interactive input system 10,” and the viewer uses the input devices “to manipulate the virtual beings, objects, and scenes within the virtual environment.” (*Id.* at 15:7–9; 18:55–56; 16:10–15.) For these reasons, Ritchey discloses limitation 1[b]. (Ex. 1002 at ¶¶ 80–82.)

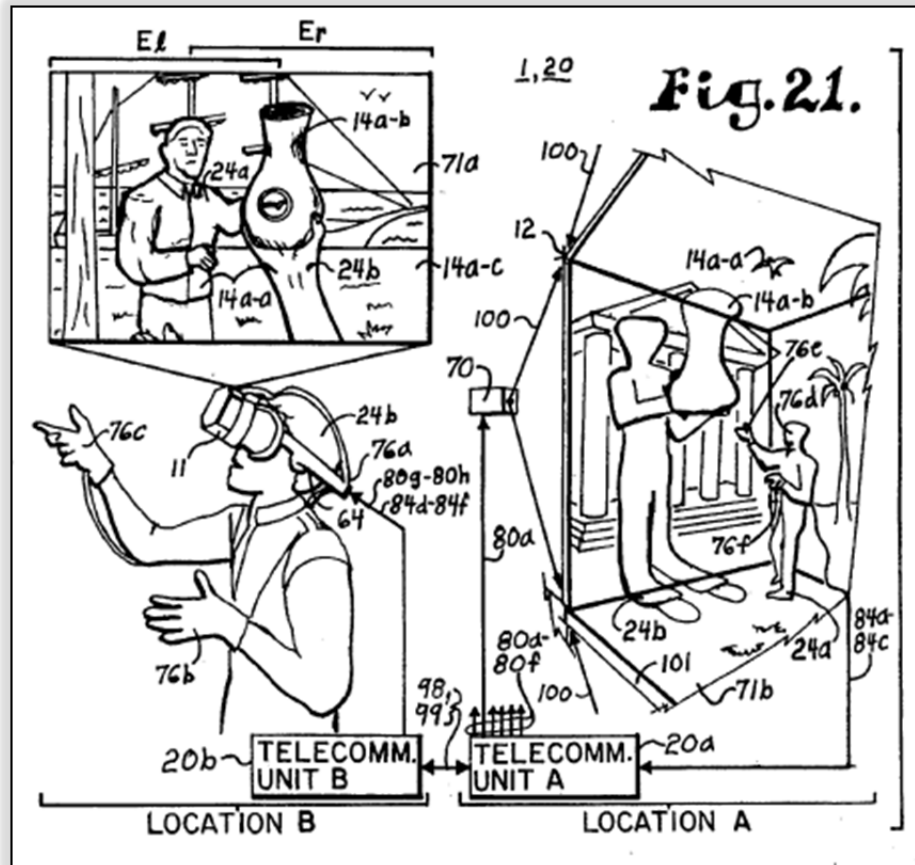
4. 1[c]: “at least one participant input device in electronic communication with said immersive virtual reality environment”

Because “performer” and “participant” are properly construed as being distinguished, if at all, solely by the claim language, Ritchey’s disclosure of “performer input device” also meets claim 1[c]’s requirement for a “participant input device”. Moreover, the ’599 Patent describes both the participant input and performer input devices as video sensors, audio sensors, and hand-held input devices. (Ex. 1001 at 7:13–17, 8:7–35, 8:59–61; Ex. 1002 at ¶ 83.)

As described with respect to claim 1[b], Ritchey discloses various audio, shape, and image sensors and “viewer input devices”, all of which are input devices that provide electronic communication with the immersive virtual reality environment. (Ex. 1003 at 24:39–4, 15:2–9, 16:10–15, 18:55–56, 19:23–26, 24:39–4.) For these reasons, Ritchey discloses limitation 1[c].

As described in claim construction, the ’599 Patent distinguishes “performers” from “participants” based on the claim requirement that the “immersive virtual reality environment includes a live or prerecorded video image”

of a performer. The claims certainly do not preclude a participant from being able to send video images of himself. (Ex. 1001 at claim 3, 7:23–36, Fig. 1.) But to the extent that the Board finds that the terms “performer” and “participant” require an asymmetry of video sending capabilities (*i.e.*, the performer can send and a participant cannot send video images), such an asymmetry would have been obvious to implement in view of Ritchey. (Ex. 1002 at ¶¶ 84–88.) Although Figure 21 of Ritchey discloses a symmetric system in which video images of viewers are transmitted to the remote terminal, a POSITA would have found it obvious to omit video and shape capture devices at Location B so that Viewer B’s image is not displayed to Viewer A. (*Id.* at ¶¶ 84–87.)



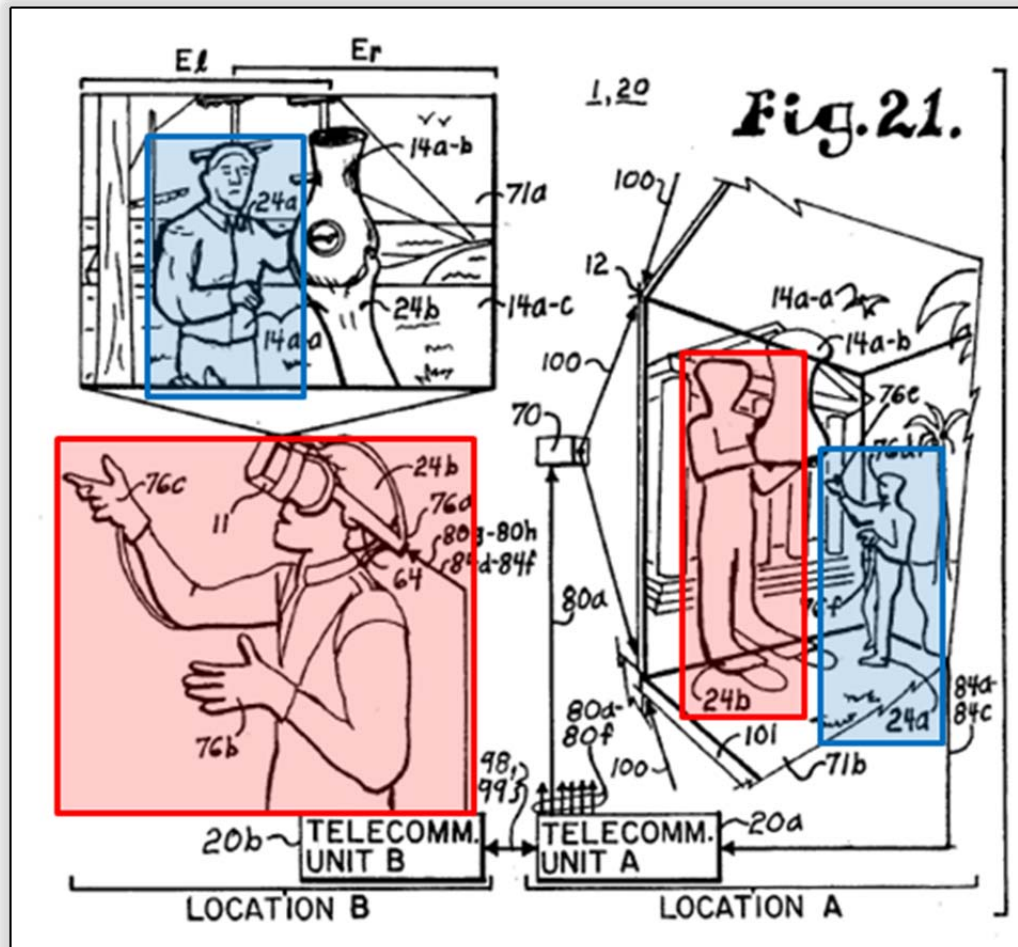
Omitting video and shape sensors at one location, thus creating an asymmetric system, would yield numerous advantages and without losing the ability of Viewer B to interact with Viewer A or with the immersive virtual reality environment. Not only would omitting video capture sensors reduce the system's cost, but omitting video and shape data would also greatly reduce bandwidth requirements. (Ex. 1002 at ¶ 84.) These benefits would have been especially attractive to a POSITA when adapting Ritchey to specific applications for which virtual teleconferencing systems were used at the time of the '599 Patent's alleged invention. (Ex. 1001 at 5:18–24 (describing various “activities related to

communication of ideas and concepts to an audience”).) For example, adapting Ritchey to be used for “teaching and lecturing” would not necessarily require that the students’ video and shape data be transmitted to the instructor, and thus omitting the students’ video and shape sensors would greatly reduce the cost of the system and bandwidth requirements of the supporting network. (Ex. 1002 at ¶ 86.) Further, Ritchey has at least one embodiment for a type of telepresence that does not appear to have (or require) video of the participant. (Ex. 1001 at 33:43-48.) Thus, although the claims do not preclude the “participant” transmitting video images of himself, to the extent that the Board construes the ’599 Patent as this requiring asymmetry, Ritchey would have rendered the asymmetry obvious.

5. 1[d]: “at least one performer output device in electronic communication with said immersive virtual reality environment”

Ritchey discloses numerous performer output devices that communicate with the immersive virtual reality environment. First, Ritchey discloses output displays that depict the computer-generated world model as well as other viewers who are participating in the virtual environment. (Ex. 1003 at 14:59–60.) These devices display “shapes and imagery,” and may include “actual live 13 or prerecorded modeled 14 beings, objects, or scenery modeled at remote locations.” (*Id.* at 32:50–52.)

For example, Figure 21 (annotated) depicts Viewer B (red) at Location B, Viewer A (blue) at Location A, and each viewer’s respective output displays. Each viewer’s view depicts the scenery of the remote location, and includes a model or a feed of the other viewer at their remote location.



Second, Ritchey's system also outputs audio signals to the viewer's headphones or to speakers that are distributed around the viewer. (Ex. 1003 14:23–30, 14:40–50, 14:51–53.) Much like the display devices described above, the audio output corresponds with objects and events depicted within the world

model, and may include voice from viewers depicted within the remote location. (*Id.* at 32:45–47; Ex. 1002 at ¶¶ 89–91.)

The '599 Patent describes a similar set of performer output devices including performer audio, video, and graphical data, which includes a video and audio feed of the participants. (Ex. 1001 at 3:23–33, 7:23–36.) Because Ritchey also provides its viewers with audio, video, and graphical outputs of the virtual environment, which includes a video and audio feed of viewers at the remote location, Ritchey discloses the “at least one performer output device in electronic communication with said immersive virtual reality environment” recited in claim 1[d]. (Ex. 1002 at ¶ 91.)

6. 1[e]: “at least one participant output device in electronic communication with said immersive reality environment”

Because “performer” and “participant” are properly construed as being distinguished, if at all, solely by the claim language, Ritchey’s disclosure of “performer output device” also meets claim 1[e]’s requirement for a “participant output device.” Moreover, the '599 Patent describes the participant output device as an HMD and/or large display assembly. (Ex. 1001 at 4:64–5:3.) Ritchey discloses these output displays too. (Ex. 1003 at 8:45–47.) The '599 Patent also describes “audio delivery devices” that includes participant headphones or

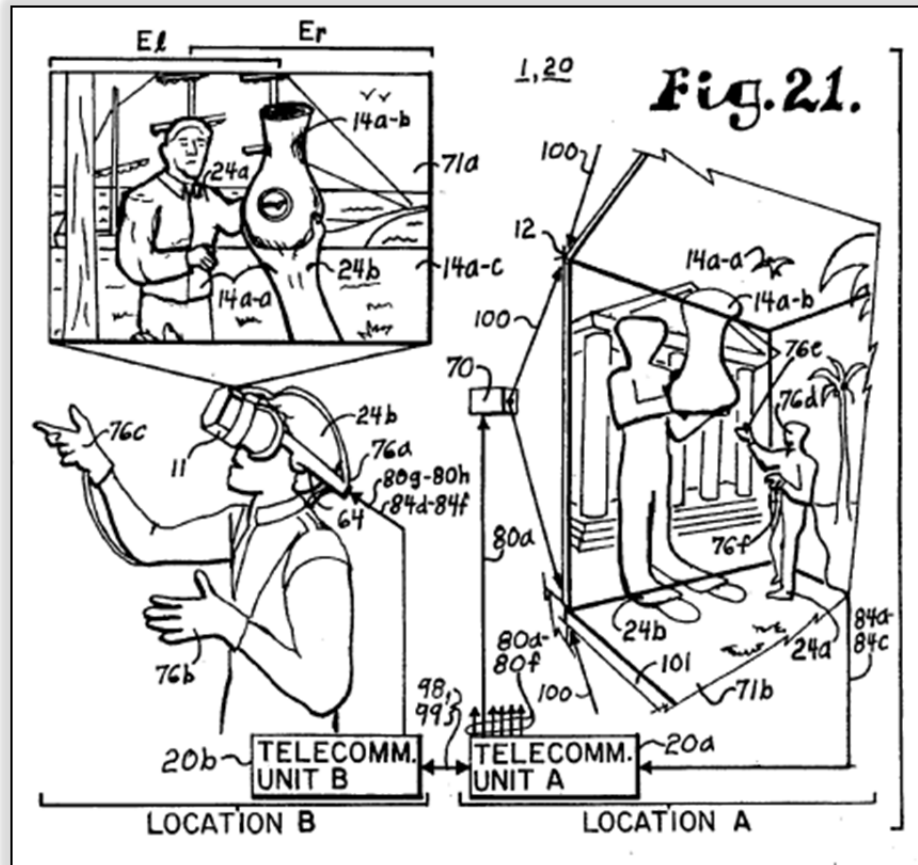
speakers, both of which are disclosed by Ritchey. (Ex. 1001 at 9:39–43; Ex. 1003 at 14:23–30, 14:40–53; Ex. 1002 at ¶ 92.)

7. 1[f]: “wherein at least one live performer interacts with at least one participant and said immersive virtual reality environment”

Claim 1[f] requires two types of interaction including (1) a live performer *interacting* with a participant and (2) a live performer *interacting* with the immersive virtual reality environment.

“wherein at least one live performer interacts with at least one participant”

Ritchey discloses a virtual reality teleconferencing system that connects two or more terminals over a network. (Ex. 1003 at 32:22–32, Fig. 21.) By doing so, viewers may communicate with remote viewers by video, high-resolution graphics, and/or voice. (Ex. 1003 at 32:45–59; Ex. 1002 at ¶¶ 94–95.) Ritchey’s teleconferencing system also employs live video feeds. (Ex. 1003 at 17:26–30.) While Ritchey describes a symmetrical system in which both a local and remote viewer are equipped with a similar set of input/output devices, as described above in claim construction, the terms “participant” and “performer” only differ in requiring that the performer send his video image. To the extent that the Board finds that the claim precludes the participant from transmitting his video image, as described in limitation 1[c], such an asymmetric system would have been obvious.



Indeed, Ritchey’s system enables viewers at remote locations to communicate information by transmitting voice, video, and graphics data. A POSITA would have understood that the ’599 Patent’s performer-to-participant interaction requires information to be communicated from the performer to the participant. (Ex. 1002 at ¶ 95; Ex. 1005 at 9 (“Applicants do not see in Freeman the concept of voice communication from *a live host to participant*, and *from participant to host*, that is participant-live host interaction”).) Thus, Ritchey enables interaction between viewers (including performers) in at least a similar

manner as disclosed by the '599 Patent, and therefore satisfies the first portion of claim 1[f].

“wherein at least one live performer interacts with . . . said immersive virtual reality environment”

Besides interaction amongst viewers, Ritchey’s system enables viewers (including performers) to interact with the virtual reality environment by “operating interactive computer input devices to affect the manipulation of the virtual objects and scenes defined in the computer.” (Ex. 1003 at 1:14–16, claim 1 (claiming “viewer control means [that] enabl[e] interactive manipulation of said texture mapped virtual images by a viewer”).) For example, while teleconferencing, Ritchey notes that viewers may “pass[] position coordinates to update the position of actual live 13 or prerecorded modeled 14 beings, objects, or scenery modeled at remote locations.” (Ex. 1003 at 32:49–52, 17:44–51.) In addition to visually depicting viewer manipulation of the environment, Ritchey’s environment also provides audible responses to viewer actions. (Ex. 1003 at 24:10–35.)

A POSITA would have understood that the '599 Patent’s performer-to-environment interaction requires the performer be able to input commands that cause some form of audio, video, or graphical reaction from or influence on the virtual reality environment. (Ex. 1002 at ¶ 97; Ex. 1001 at 3:23–29 (“The three-way communication includes, but is not limited to, audio, video, and graphical

input and output data.”).) Indeed, Ritchey discloses a viewer inputting commands to manipulate objects within the virtual reality environment, causing the environment to respond with visual, graphical, or audio data, and thus Ritchey discloses a performer interacting with the immersive environment. Ritchey therefore discloses the second portion of limitation 1[f].

8. **1[g]: “wherein said immersive virtual reality environment includes a live or prerecorded video image of said at least one live performer and audio communication between said at least one live performer and said at least one participant, or between said at least one participant and said at least one live performer, or both;”**

Ritchey discloses the claimed live or prerecorded video image and audio communication of limitation 1[g].

“wherein said immersive virtual reality environment includes a live or prerecorded video image of said at least one live performer”

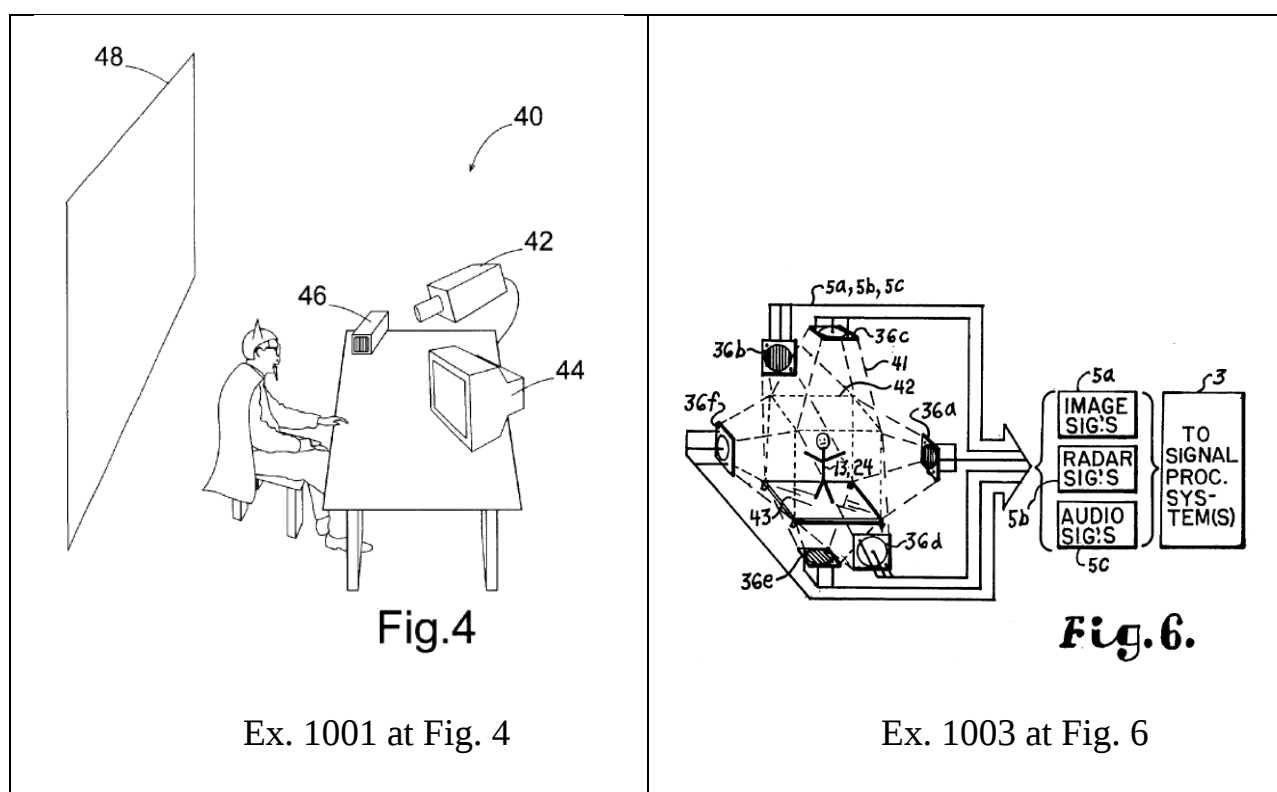
Ritchey discloses an immersive virtual reality environment that includes a live or prerecorded video image of a live performer, who is a participant who is capable of sending a video image of himself or herself. Ritchey’s system employs image, shape, and audio sensors to capture a three-dimensional model of a live subject within its environment. (Ex. 1003 at Fig. 6, 11:31–54.) The video images captured by the sensor array are mapped onto the three-dimensional object created by the shape sensor, and the resulting object is displayed to the viewer, as either prerecorded data or a live feed. (Ex. 1003 at 11:61–64, 17:4-9, 17:4-9; Ex. 1002 at

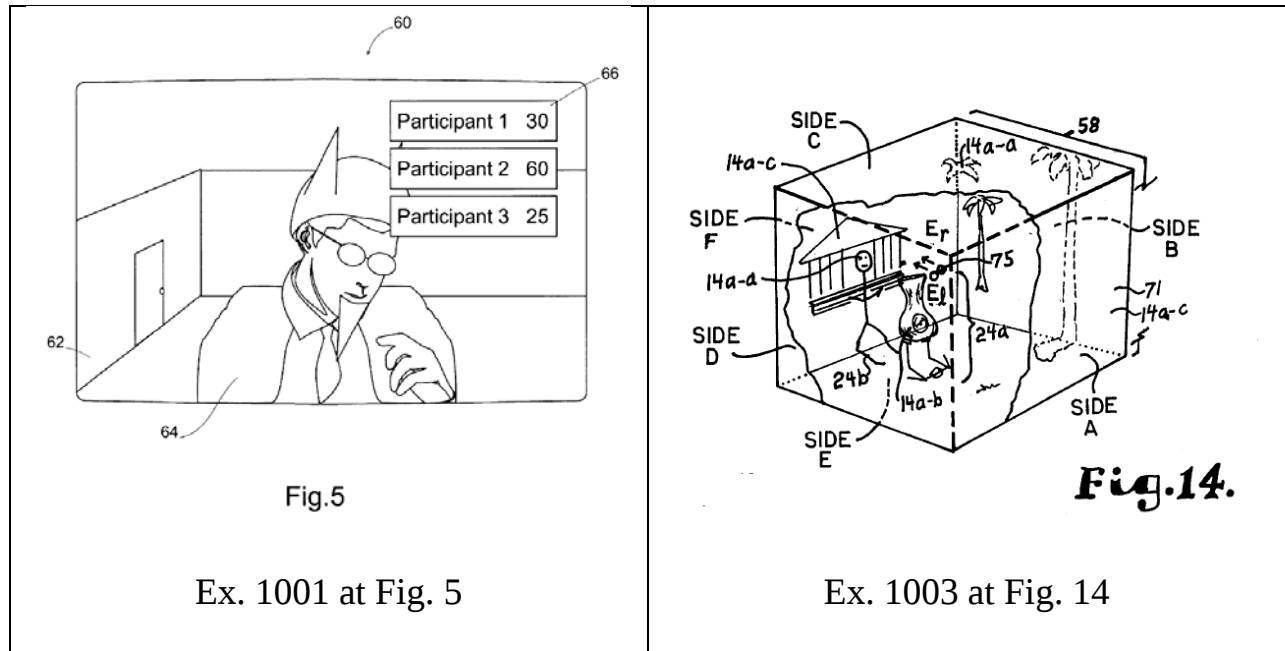
¶¶ 99–100.) In addition to the sensor array, Ritchey’s system also receives as input “a single or plurality of live video feeds,” which are texture mapped onto the three-dimensional model. (Ex. 1003 at 17:4–21.) In other words, although Ritchey’s sensor array captures and creates a three-dimensional environment and subject, Ritchey may also include a live feed of a subject (i.e., a “performer”) from a separate video source that the system displays as part of the computer-generated three-dimensional environment. (Ex. 1003 at claim 7; Ex. 1002 at ¶ 101.) Ritchey’s feature of mapping a live video feed of a performer into the three-dimensional environment “is especially useful in an image based virtual teleconferencing system,” in which viewers interact with others and with the environment. (Ex. 1003 at 17:27–51, Fig. 21.) Because in Ritchey’s virtual teleconferencing system each viewer is also a subject who can send a live video feed of him/herself and that video feed is texture mapped into the environment, the environment therefore “includes a live or prerecorded video image of [the] performer”.

The ’599 Patent employs a similar process and captures the video image of a performer, mixes the image with a virtual reality environment, and then outputs the combined image to the participant. (Ex. 1001 at 7:38–46.) “As shown in FIG. 4 [of the ’599 Patent], stereoscopic video camera 42 captures the live video image of the performer and subsequently sends the corresponding video signal to the system

for processing and mixing with the graphical data within the virtual reality environment.” (*Id.*)

The table below shows the image capturing process (first row) and resulting output (second row) for the '599 Patent on the left and Ritchey on the right. Each system captures the image of a viewer using video cameras, and each processes the video to incorporate the image into a virtual reality environment.





“wherein said immersive virtual reality environment includes . . . audio communication between said at least one live performer and said at least one participant, or between said at least one participant and said at least one live performer, or both”

This limitation is satisfied by any one of three types of communication: performer to participant, participant to performer, or bi-directional. Ritchey discloses audio communication (1) from a performer to a participant, (2) from a participant to a performer, and (3) two-way communication between the participants and performers. Ritchey’s system may be used as a video teleconferencing system to connect two or more viewer terminals. (Ex. 1003 at 32:23–32, claim 22.) In its teleconferencing embodiment, Ritchey employs a telecommunications system to transmit a viewer’s voice to other viewer(s) at remote locations. The viewers’ voices may be transmitted in one-way, two-way, or broadcast modes. (Ex. 1003 at 32:63–67.)

Even if not configured to support video teleconferencing, Ritchey's sensor array contains audio sensors that record sounds from the subject. (Ex. 1003 at 8:25–34, 28:38–49.) Thus, where Ritchey's sensor array records a live being (*i.e.*, a “live performer”), Ritchey enables at least one-way audio communication between the subject and viewer. (Ex. 1002 at ¶¶ 105–06.)

Thus, like the '599 Patent, Ritchey also discloses (1) audio communication from a performer to a participant, (2) audio communication from a participant to a performer and (3) two-way audio communication between the performer and participant (both (1) and (2)). (Ex. 1001 at 3:44–45.) And in combination with the live or prerecorded images of the live subject, Ritchey accordingly discloses the claimed live or prerecorded video image and audio communication of limitation 1[g].

9. **1[h]: “wherein said at least one participant interacts with said at least one live performer and said immersive virtual reality environment, thereby resulting in an experience which is in part controlled by said at least one participant and said at least one participant input device.”**

Ritchey's disclosure of interaction between a live performer and a participant and between a live performer and an immersive virtual reality environment (*see supra* Section **Error! Reference source not found..Error! Reference source not found..Error! Reference source not found..** (limitation 1[f])) similarly discloses the claimed interaction between a participant and a live

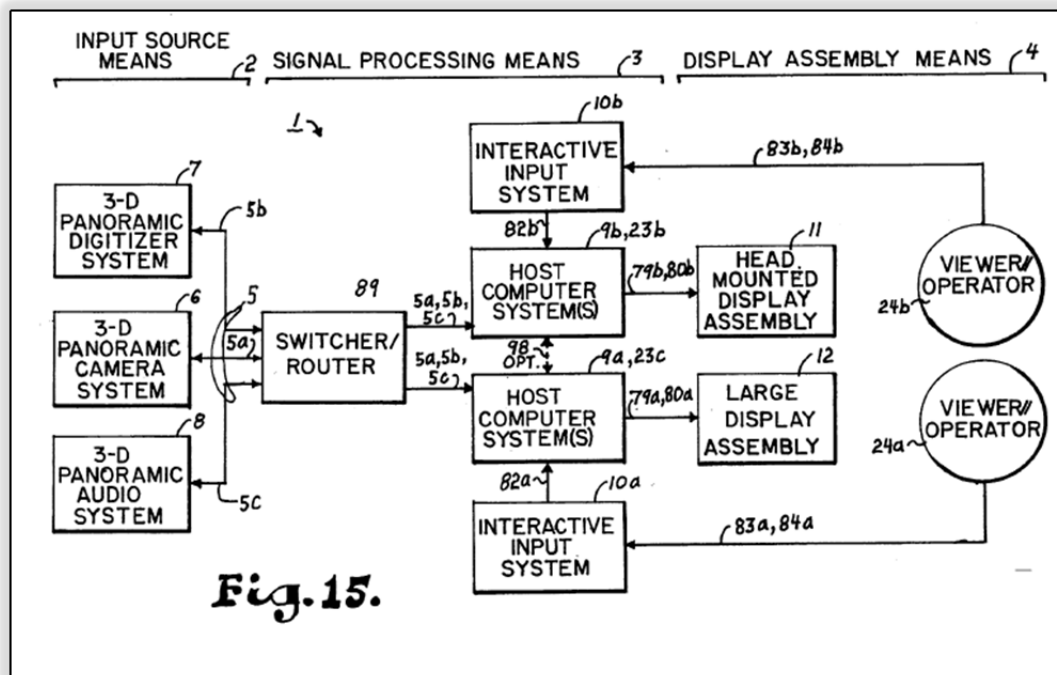
performer and between a participant and an immersive virtual reality environment because each participant is also a performer in Ritchey (*see supra* Section **Error! Reference source not found..Error! Reference source not found..Error! Reference source not found..** (limitation 1[preamble])). And because the participant's interaction affects and manipulates the virtual objects and the scene, the participant's interaction results in an experience that is controlled in part by the participant. (Ex. 1003 at 1:14–16, claim 1; Ex. 1002 at ¶ 108.) Ritchey thus discloses limitation 1[h].

10. 2[a]: “The system of claim 1 wherein said immersive virtual reality environment further comprises: at least one processing device; system data; output data; and a network”

Ritchey discloses or renders obvious the limitations of claim 1 as described above. Ritchey further discloses or renders obvious claim 2[a].

Specifically, Ritchey discloses the claimed immersive virtual reality environment for the same reasons as for limitation 1[a]. Ritchey further describes signal processing means (“at least one processing device”) that processes the inputs from the sensor array and interactive input system, and generates the immersive virtual reality environment. (Ex. 1003 at Figs. 15, 16, 15:52–65, claim 1 (claiming a host computer as a “signal processing means”).) In addition to processing and image generation software, the system stores data representing previously generated models, events, object locations, etc. (“system data”). (Ex.

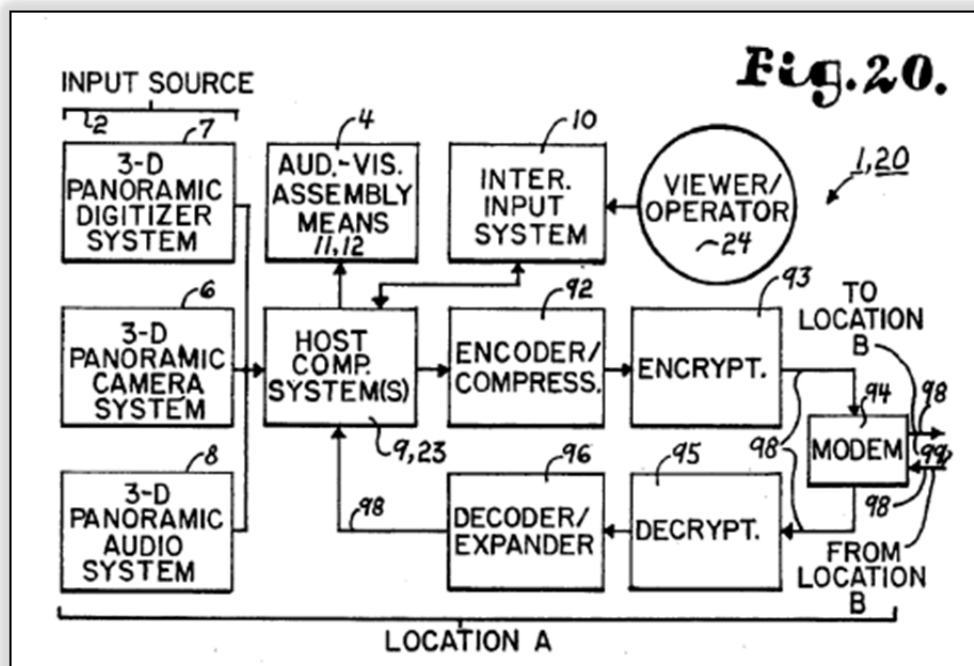
1003 at 16:48–52.) Using the stored system data, the computer generates a world model and outputs audio-visual data of the model (“output data”) to various output devices. Ritchey also describes data that corresponds with events and objects within the world, and like the ’599 Patent’s “system data,” is used to “carry out specific processing tasks.” (Ex. 1001 at 3:66–4:2; Ex. 1003 at 32:49–52, 24:28–31 (describing Ritchey’s audio system as playing pre-recorded sound of vase breaking in response to the action occurring in the world model).) Ritchey further describes transmitting the output data to remote viewers over a network. (Ex. 1003 at 32:22–34, claim 7.)



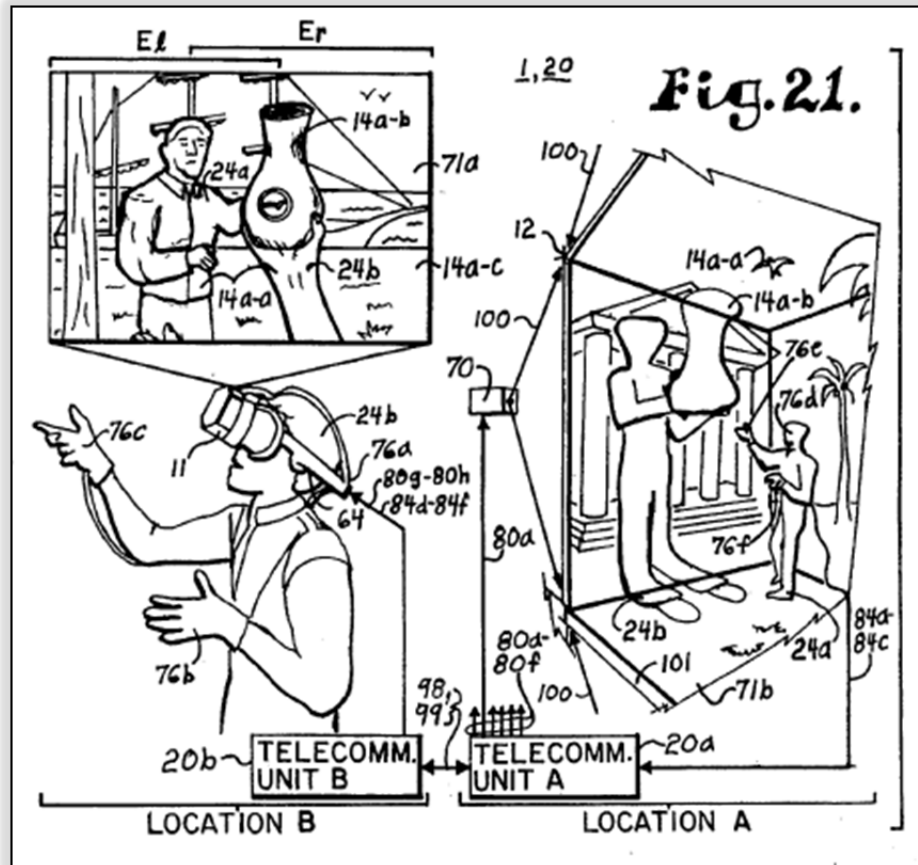
Thus, Ritchey discloses the claimed immersive virtual reality environment that further comprises a processing device, system data, output data, and a network. (Ex. 1002 at ¶ 111.)

11. 2[b]: “said network connecting said processing device, said at least one performer input device and said at least one performer output device, and said at least one participant input device and said at least one participant output devices in electronic communication, thereby transmitting said system data and said output data to said at least one live performer and said at least one participant.”

Ritchey discloses a network that connects the processing device with input and output devices for the performer and the participant. Figure 20 depicts a terminal within Ritchey’s teleconferencing embodiment. The terminal contains a sensor array input source, an interactive input system, and an audio-visual assembly means to display the immersive virtual reality environment.



The terminal is connected to a remote terminal over a digital data telecommunications network. (Ex. 1003 at 32:32–35.) Figure 21 depicts the resulting teleconferencing system.



At each location in Figure 21, the terminal inputs are a sensor array and an interactive input system. The sensor array captures and records the video image of the viewer at the location. (Ex. 1003 at 7:45–49.) The terminal may also have as an input an additional live video feed, which is texture mapped onto an object within the computer-generated model. (Ex. 1003 at 17:4–21; Ex. 1002 at ¶ 114.) The interactive input system enables the viewer to input commands to manipulate the virtual environment. (Ex. 1003 at 15:7–9, 18:55–56, 16:10–15).

The terminal at each location outputs a three-dimensional representation of the “actual live 13 or prerecorded modeled 14 beings, objects, or scenery modeled

at remote locations.” (Ex. 1003 at 32:50–52.) Within the three-dimensional model is a live video feed of the remote viewer. (Ex. 1003 at 17:4–21.)

In addition to data representing the three-dimensional models, Ritchey also describes transmitting system data to both performers and participants within its teleconferencing system. (Ex. 1001 at 4:1–2; Ex. 1002 at ¶¶ 112–13.) For example, a teleconferencing viewer may “pass[] position coordinates” to remote viewer terminals to modify the world model, and this data is transmitted amongst all viewer terminals so they all display the same world model. (Ex. 1003 at 32:49–52; Ex. 1002 at ¶¶ 112–13.) System data representing events within the world may also be transmitted amongst viewer terminals to trigger further processing. (Ex. 1003 at 24:28–35 (describing playing prerecorded audio in response to an event occurring in the world model); Ex. 1002 at ¶¶ 112–13.).

Ritchey’s networked teleconferencing system of Figures 20 and 21 discloses the limitation of 2[b] because the network connects the processing device with the input and output devices of the performer and participant. Ritchey’s network connects viewer terminals and enables transmission of output data representing audio-visual-shape data from a local viewer terminal. In addition, Ritchey’s viewer terminals transmit system data that is used to support specific processing tasks, such as data indicating events (and thus requiring a pre-recorded audio signal to be played) or coordinate updates indicating that an object has been moved.

Ritchey thus transmits system and output data to the performer and to the participant.

12. 8[Preamble]: “A system which interacts with participants and performers, said system comprising:”

Ritchey discloses the preamble of claim 8 for the same reasons as described for claim 1’s preamble.

13. 8[a]: “an immersive virtual reality environment, said immersive virtual reality environment further comprising: at least one processing device; system data; output data; and a network;”

Ritchey discloses claim 8’s immersive virtual reality environment for the same reason as for limitations 1[a] and 2[a]. (Ex. 1002 at ¶ 115.) Both arguments are incorporated in their entirety herein.

14. 8[b]: “at least one performer input device in electronic communication with said immersive virtual reality environment;”

Ritchey discloses claim 8’s performer input device for the same reasons as for limitation 1[b]. (*Id.*) Those arguments are incorporated in their entirety herein.

15. 8[c]: “at least one participant input device in electronic communication with said immersive virtual reality environment;”

Ritchey discloses claim 8’s participant input device for the same reasons as for limitation 1[c]. (*Id.*) Those arguments are incorporated in their entirety herein.

- 16. 8[d]: “at least one performer output device in electronic communication with said immersive virtual reality environment;”**

Ritchey discloses claim 8’s performer output device for the same reasons as for limitation 1[d]. (*Id.*) Those arguments are incorporated in their entirety herein.

- 17. 8[e]: “at least one participant output device in electronic communication with said immersive virtual reality environment;”**

Ritchey discloses claim 8’s participant output device for the same reasons as for limitation 1[e]. (*Id.*) Those arguments are incorporated in their entirety herein.

- 18. 8[f]: “wherein at least one live performer interacts with at least one participant and said immersive virtual reality environment, and said immersive virtual reality environment includes a live or prerecorded video image of the performer and audio communication between said at least one live performer and said at least one participant, or between said at least one participant and said at least one live performer, or both;”**

Ritchey discloses claim 8’s performer-to-participant interaction for the same reasons as for limitation 1[f]. (*Id.*) Ritchey also discloses claim 8’s live or prerecorded video image and audio communication for the same reasons as for limitation 1[g]. (*Id.*) Those arguments are incorporated in their entirety herein.

19. **8[g]: “wherein said at least one participant interacts with said at least one live performer and said immersive virtual reality environment, thereby resulting in an experience which is in part controlled by said at least one participant and said at least one participant input device;”**

Ritchey discloses claim 8’s participant-to-performer interaction for the same reasons as for limitation 1[h]. (*Id.*) Those arguments are incorporated in their entirety herein.

20. **8[h]: “said network connecting said processing device, said at least one performer input device and said at least one performer output device, and said at least one participant input device and said at least one participant output device in electronic communication, thereby transmitting said system data and said output data to said at least one live performer and said at least one participant, and”**

Ritchey discloses claim 8’s network for the same reasons as for limitation 2[b]. (*Id.*) Those arguments are incorporated in their entirety herein.

21. **8[i]: “said network connecting said immersive virtual reality environment and said at least one participant input device and said at least one participant output device across the Internet.”**

Ritchey’s teleconferencing system may interconnect terminals over a digital data telecommunications network. (Ex. 1003 at 32:30–35.) A POSITA at the time of invention would have interpreted this to include the Internet. (Ex. 1002 at ¶ 116.) Thus, Ritchey discloses claim 8’s network.

22. 9[Preamble]: “A method of providing interactive communications between participants and performers comprising the steps of:”

While claim 1 is a system claim and claim 9 is a method claim, both contain similar limitations. Thus, Ritchey discloses or renders obvious claim 9’s preamble for the same reasons as described for claim 1’s preamble. (Ex. 1002 at ¶ 117.) Those arguments are incorporated in their entirety herein.

23. 9[a]: “(a) providing an immersive virtual reality environment”

Ritchey discloses “providing an immersive virtual reality environment” for the same reasons as limitation 1[a]. (*Id.*) Those arguments are incorporated in their entirety herein.

24. 9[b]: “(b) providing at least one performer input device in electronic communication with said immersive virtual reality environment”

Ritchey discloses this limitation for the same reasons as for limitation 1[b]. (*Id.*) Those arguments are incorporated in their entirety herein.

25. 9[c]: “(c) providing at least one participant input device in electronic communication with said immersive virtual reality environment”

Ritchey discloses this limitation for the same reasons as for limitation 1[c]. (*Id.*) Those arguments are incorporated in their entirety herein.

26. 9[d]: **“(d) providing at least one performer output device in electronic communication with said immersive virtual reality environment”**

Ritchey discloses this limitation for the same reasons as for limitation 1[d].

(*Id.*) Those arguments are incorporated in their entirety herein.

27. 9[e]: **“(e) providing at least one participant output device in electronic communication with said immersive virtual reality environment”**

Ritchey discloses this limitation for the same reasons as for limitation 1[e].

(*Id.*) Those arguments are incorporated in their entirety herein.

28. 9[f]: **“(f) having at least one live performer interact with at least one participant and said immersive virtual reality environment, by including with said virtual reality environment a live or prerecorded video image of said at least one live performer and audio communication between said at least one live performer and said at least one participant, or between said at least one participant and said at least one live performer, or both;”**

“having at least one live performer interact with at least one participant and said immersive virtual reality environment”

Ritchey discloses this limitation for the same reasons as for limitation 1[f].

(*Id.*) Those arguments are incorporated in their entirety herein.

“by including with said virtual reality environment a live or prerecorded video image of said at least one live performer and audio communication between said at least one live performer and said at least one participant, or between said at least one participant and said at least one live performer, or both”

Ritchey discloses this limitation for the same reasons as for limitation 1[g].

(*Id.*) Those arguments are incorporated in their entirety herein.

29. 9[g]: “(g) having at least one participant interact with at least one such live performer and said immersive virtual reality environment, thereby resulting in an experience which is in part controlled by said at least one participant and said at least one participant input device.”

Ritchey discloses this limitation for the same reasons as for limitation 1[h].

(*Id.*) Those arguments are incorporated in their entirety herein.

B. Ground 2: Claims 3, 4 and 5 Are Obvious Over Ritchey and Goldfarb

Claims 3, 4, and 5 are rendered obvious by the combination of Ritchey and Goldfarb. Goldfarb’s application was filed on December 8, 1997, and thus qualifies as prior art to the ’599 Patent under at least 35 U.S.C. § 102(e).

1. 3[a]: “The system of claim 2 wherein said at least one[e] participant output device further comprising: at least one seat; at least one virtual reality display; and at least one participant audio device”

Ritchey discloses or renders obvious the limitations of claim 2 as described above. Ritchey further discloses or renders obvious claim 3[a].

For the same reasons as for limitation 1[e], Ritchey discloses a participant output device comprising a virtual reality display and an audio device.

As to a participant output device comprising a seat, the combination of Ritchey and Goldfarb renders this limitation obvious. Ritchey discloses an “expert system” that responds to the viewer’s interaction. (Ex. 1003 at 18:8–25.) Importantly, this expert system interacts with the viewer’s inputs through peripheral devices such as motion simulators, tactile and force feedback devices, or computer actuated devices. (Ex. 1003 at 18:35–37.)

While Ritchey does not explicitly describe a seat as an output device, a POSITA at the time of the invention would have found it obvious to combine the immersive virtual reality environment created by Ritchey’s system with the seat disclosed by Goldfarb. (Ex. 1002 at ¶¶ 119–21.) Both patents are directed to the field of virtual reality, and both patents are directed to immersing the viewer into a virtual environment. (Ex. 1003 at 16:40–42; Ex. 1004 at 5:24–28; Ex. 1002 at ¶¶ 120–21.) Both patents augment the immersive audio-video output with the use of computer actuated and force feedback devices. (Ex. 1003 at 18:35–37; Ex. 1004 at 5:56–60; Ex. 1002 at ¶¶ 119–20.) Because both references are directed at achieving the same end, the combination of Ritchey and Goldfarb renders limitation 3[a] obvious. (Ex. 1002 at ¶ 121.)

2. 3[b]: “said at least one participant input device further comprising: at least one hand-held keypad and at least one participant microphone”

Ritchey discloses a participant input device comprising a participant microphone for the same reasons as for limitation 1[c]. Ritchey also discloses a voice recognition system as an “interactive input system” that may be used by a viewer to input commands into the virtual environment. (Ex. 1003 at 19: 23–26; 20:10–18.) The voice recognition system “includes a microphone 39 worn by the participant,” and the voice signals are converted “into machine language to affect the model 14 of system 1.” (Ex. 1003 at 20:14–31.)

Ritchey also discloses both a keyboard and a hand-held keypad as input devices. (Ex. 1003 at 23:28–37, 14:67–15:3.) While not explicitly listed as a “viewer interaction device,” Ritchey’s hand-held keypad is a “multikey alphanumeric terminal” that enables the viewer to input commands to the system, and thus meets the limitation of a participant input device. (Ex. 1003 at 23:33–37, 15:1.) Furthermore, it would have been obvious to implement a hand-held keypad as a “viewer interaction device” given Ritchey’s disclosure of the other forms of hand-held or hand-operated interactive input devices, which include “data gloves with position, orientation, and flexion sensors.” (Ex. 1003 at 18:56–59; Ex. 1002 at ¶¶ 122–23.)

3. **3[c]: “said at least one performer output device further comprising: at least one live video image of the participant; and at least one speaker, said speaker transmitting said at least one participant microphone input to said at least one live performer”**

Ritchey describes a performer output device comprising a live video image of the participant and a speaker for the same reasons as for limitation 1[d]. Those arguments are incorporated herein by reference.

4. **3[d]: “said performer input means further comprising: at least one live video image of said at least one live performer; and at least one performer microphone”**

Ritchey describes a performer input means comprising at least one live video image of the performer and at least one performer microphone for the same reasons as for limitation 1[b].

A “performer input *means*” lacks antecedent basis in the claim, and likely is a typographical error by the patentee. The patentee likely intended a “performer input *device*,” consistent with the structure of the other input/output devices in dependent claim 3. But if the Board construes this term to be “performer input *means*,” then this term should be construed as a means-plus-function term, and the structure are those input devices disclosed for a performer input device, as described in limitation 1[b].

5. **3[e]: “wherein said at least one participant views said output data from said immersive virtual reality environment and said live video image of said at least one live performer through said at least one virtual reality display and provides feedback to said immersive virtual reality environment through said at least one hand-held keypad and said at least one participant microphone.”**

Ritchey discloses a participant who views output data from the immersive virtual reality environment and live video image of the performer through a virtual reality display. As described for limitation 1[a] and 1[e], Ritchey discloses that a participant may view an immersive virtual reality environment through a HMD or large display assembly. This immersive virtual reality environment may include a live video image of the performer, which Ritchey discloses for limitation 1[g]. Thus, both Ritchey and the '599 Patent present to the participant a virtual reality display that combines the video inputs from the performer along with the graphical environment. (Ex. 1001 at 4:13–18; Ex. 1002 at ¶ 123.)

Ritchey also describes or renders obvious the participant providing feedback to the environment using a hand-held keypad and microphone. (Ex. 1003 at 20:14–31; Ex. 1002 at ¶ 122.) As described above for limitation 3[b], Ritchey discloses a participant inputting commands using a keypad and microphone to interact with and manipulate the three-dimensional model. Because Ritchey discloses immersing the participant into a virtual reality environment where the

participant may provide feedback using a hand-held keypad and microphone, Ritchey discloses limitation 3[e].

6. 4: “The system of claim 3 wherein said output data further comprises: graphical images; and audio data.”

Ritchey and Goldfarb discloses or renders obvious the limitations of claim 3 as described above. Ritchey further discloses output data comprising graphical images and audio data, and thus Ritchey discloses the wherein limitation of claim 4.

As described in connection with limitation 1[d], Ritchey outputs to viewer devices data that corresponds with objects and beings within the virtual environment. (Ex. 1003 at 9:59–61 (“Imagery and audio signals are transmitted from the visual 15–18 and audio 23 processing means to the audio-visual assembly means 11 or 12.”).) This data includes “shapes and imagery” of the environment, video images of beings and objects within the environment, as well as audio signals that correspond with objects and events within the environment. (Ex. 1003 at 9:14-20, 24:28-31, 7:50–52, 32:45–47.) This output data corresponds with graphical images and audio data, and thus Ritchey discloses the limitation of claim 4 (Ex. 1002 at ¶¶ 125–26).

7. 5: “The system of claim 4 wherein said seat further comprises: a rumble seat, said rumble seat providing sound and movement to said at least one participant.”

Ritchey and Goldfarb discloses or renders obvious the limitations of claim 4 as described above, and also render obvious claim 5.

As described for limitation 3[a], the combination of Ritchey and Goldfarb describes a participant output device that comprises a seat. Goldfarb discloses that its seat contains an integral audio system, with speakers positioned around the seat. (Ex. 1004 at 7:51–57.) In addition to the sound from the speakers, Goldfarb’s seat contains an electromechanical vibrational transducer for tactile signal generation. (Ex. 1004 at 11:54–55; Ex. 1002 at ¶¶ 127–28.)

A POSITA at the time of the invention would have found it obvious to combine the immersive virtual reality environment created by Ritchey’s system with the “rumble seat” disclosed by Goldfarb for the same reasons as for limitation 3[a]. (Ex. 1002 at ¶¶ 119–21, 128.) Accordingly, the combination of Ritchey and Goldfarb disclose a seat that provides sound and movement to the participant, and thus the combination discloses the rumble seat of claim 5.

C. Ground 3: Claim 6 Is Obvious Over Ritchey, Goldfarb, Tompkins, and Seligmann

Claim 6 is rendered obvious by the combination of Ritchey, Goldfarb, Tompkins, and Seligmann. Tompkins issued on December 1, 1987, and thus qualifies as prior art to the ’599 Patent under at least 35 U.S.C. § 102(b). Seligmann’s application was filed on November 5, 1998, and thus qualifies as prior art to the ’599 Patent under at least 35 U.S.C. §102(e).

1. 6[Preamble]: “The system of claim 5”

Ritchey and Goldfarb discloses or renders obvious claim 5 as described above.

2. 6[a]: “wherein said processing device further comprises: at least one control computer; at least one audio processor; at least one audio switcher; at least one video processor; and at least one video switcher; wherein”

Ritchey and Goldfarb in combination with Tompkins discloses or renders obvious a processing device with the claimed components.

“wherein said processing device further comprises: at least one control computer;”

As described against limitation 2[a], Ritchey discloses a host computer that processes the inputs from the sensor array and interactive input system, generates the immersive virtual reality environment, and outputs the output data to the performer and participant output devices. (Ex. 1003 at Figs. 15, 16, 15:52–65.)

Ritchey’s host computer receives input signals captured from the sensor array and input commands from the viewer interaction devices. (Ex. 1003 at 16:26–34, 16:10–11.) The host computer also contains operating system software and image generation applications, as well as data representing beings, objects, and scenes captured in the world model. (Ex. 1003 at 16:6–9, 16:45–50; Ex. 1001 at 4:1–2.) Ritchey’s host computer may also include signal processing means and may be configured to drive the output channels. (Ex. 1003 at 16:5–6; Ex. 1001 at

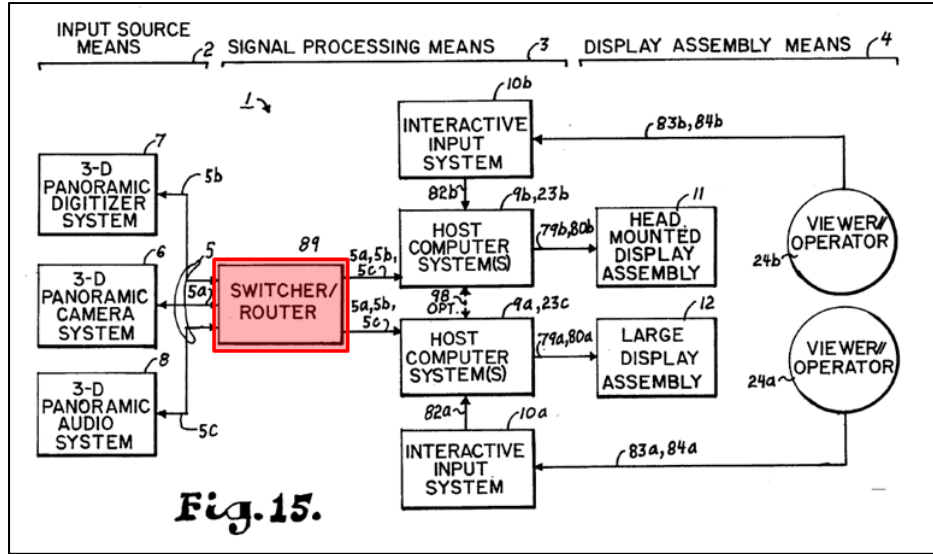
8:41–57.) Ritchey’s host computer performs the same functions as the ’599 Patent’s control computer, and thus Ritchey discloses a processing device that comprises at least one control computer. (Ex. 1002 at ¶ 130.)

“wherein said processing device further comprises: . . . at least one audio processor;”

Ritchey discloses a processing device that contains audio processors. (Ex. 1003 at 13:29–55.) In its 3-D audio input system, Ritchey employs conventional technology available in the art for “3-D audio input, processing, and output.” (Ex. 1003 at 13:45–46; Ex. 1002 at ¶ 132.) The ’599 Patent similarly recites conventional functions for its audio processor and audio system, and thus Ritchey’s disclosure of conventional audio processing devices discloses the claimed audio processor. (Ex. 1002 at ¶ 131; *e.g.*, Ex. 1001 at 11:4–20, 8:51–57.)

“wherein said processing device further comprises: . . . at least one audio switcher;”

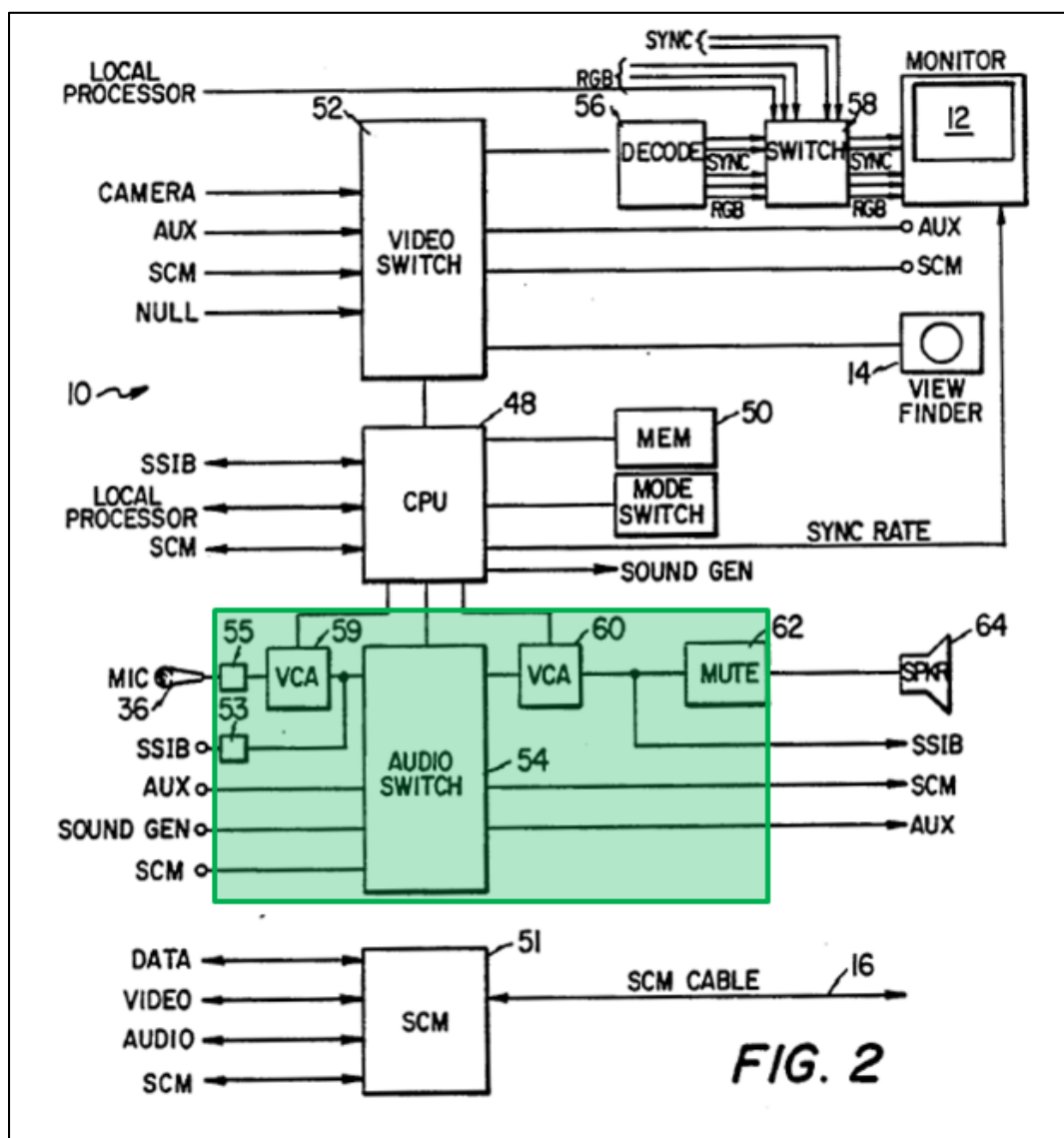
Ritchey and Goldfarb in combination with Tompkins discloses a processing device that further comprises an audio switcher. Ritchey discloses a “[c]onventional signal router/switcher” in Figure 15. (Ex. 1003 at 6:21.) Figure 15 is reproduced below, with the conventional signal switcher annotated in red.



Ritchey's signal switcher receives as an input signals from its 3-D panoramic audio system and thus performs at least audio switching functions with multiple streams of input audio. (Ex. 1003 at 13:25–61 (describing 3-D audio input system as multiple microphones positioned around a subject); Ex. 1002 at ¶ 132.) And because the '599 Patent merely describes conventional audio switching functions, Ritchey's conventional signal router/switcher discloses or at least renders obvious the claimed audio switcher. (Ex. 1001 at 8:51–57; 9:14–17 (describing audio processor and switchers as used to distribute audio signals throughout system); 9:32–37; Ex. 1002 at ¶¶ 131–32.)

In addition to Ritchey's conventional switcher, audio switchers were also described by Tompkins, which is directed to a video conferencing network. Figure 2 of Tompkins is reproduced below, with its audio switches annotated in green. Also highlighted in green are additional components within Tompkins that

provide the same function as described by the '599 Patent's audio switcher. (*E.g.*, Ex. 1006 at 7:61–65, claim 1; Ex. 1002 at ¶ 136.)



Ritchey and Tompkins both describe a video teleconferencing system, and thus a POSITA would have found it obvious to implement the technical details of Tompkins' audio switcher into the virtual reality teleconferencing system of Ritchey. (Ex. 1002 at ¶ 136.) Both Ritchey and Tompkins' systems implement an

audio switcher to manage inputs from multiple audio sources. (Ex. 1003 at Fig. 15; Ex. 1006 at Fig. 2.) Ritchey describes a conventional audio switcher that performs all of the described functions of the '599 Patent's claimed audio switcher. (Ex. 1002 at ¶¶ 131–32.) Tompkins also describes an audio switcher with the same capabilities as those described by the '599 Patent. (Ex. 1002 at ¶ 136.)

“wherein said processing device further comprises: . . . at least one video processor;”

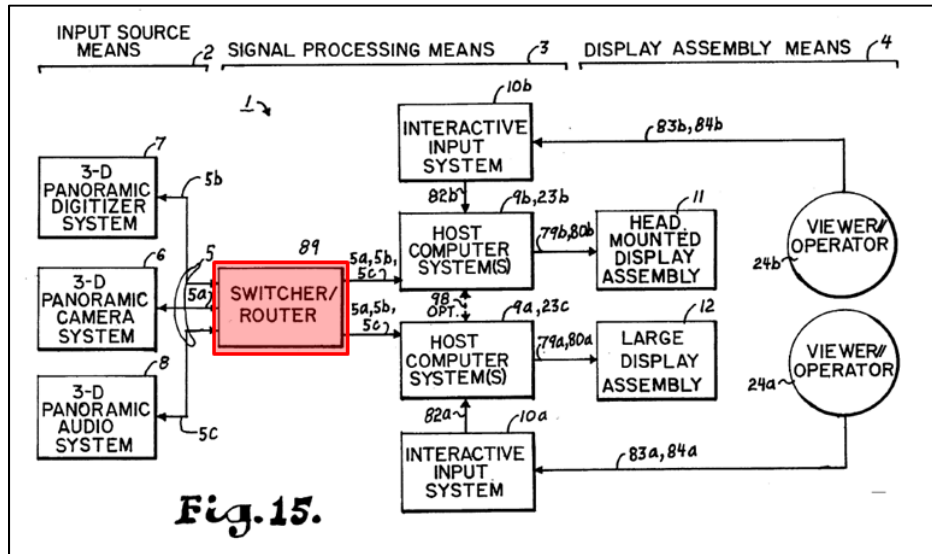
Ritchey discloses a processing device that contains video processors. (Ex. 1003 at 20:57–21:27.) This video processor receives and processes input from the image sensors. (Ex. 1003 at 12:64–13:8.) Like the '599 Patent, Ritchey's video processor creates a virtual environment that contains a video image of a subject (*i.e.*, performer) within the environment. (Ex. 1003 at 21:4–30; Ex. 1001 at 4:2–14; Ex. 1002 at ¶ 134.) Notably, like Ritchey, the '599 Patent merely describes its video processor as performing conventional functions available in the art at the time of alleged invention. (Ex. 1001 at 9:45–49 (“Multiple functions of the mixer are used to provide graphical effects, such as chromakeying of various sources.”); Ex. 1003 at 20:57–61; Ex. 1002 at ¶ 131.)

“wherein said processing device further comprises: . . . at least one video switcher;”

Ritchey in combination with Tompkins and Seligmann discloses a processing device that further comprises a video switcher. Ritchey discloses a

“[c]onventional signal router/switcher” in Figure 15. (Ex. 1003 at 6:21.)

Figure 15 is reproduced below, with the conventional signal switcher annotated in red.



Ritchey’s signal switcher receives as an input signals from its 3-D panoramic video system and thus performs at least video switching functions. (Ex. 1002 at ¶ 132.) Ritchey’s 3-D panoramic camera system contains multiple cameras and live video feeds, and Ritchey’s system uses a conventional router/switcher to direct the multiple video inputs to the processor. (Ex. 1003 at 11:31–65, 17:4–5, 16:30–31 (“[T]he computer may receive and operate on a multiplexed . . . video signal.”); Ex. 1002 at ¶ 132.)

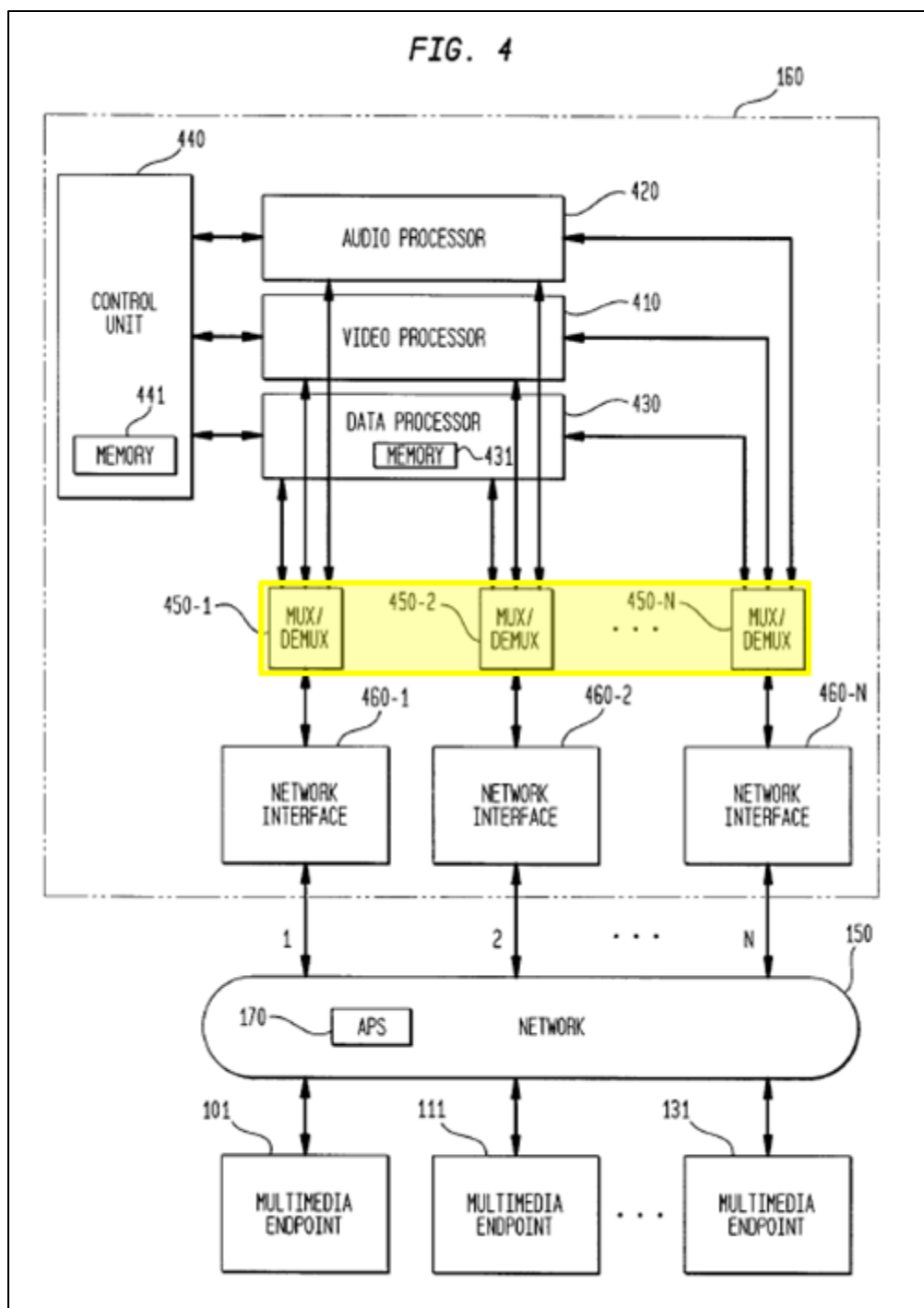
Like the video switcher in Ritchey, the ’599 Patent’s video switcher merely performs traditional video switching functions by well-known, commercially-available technology. For example, the ’599 Patent states that it may use “a Burst

video switcher to direct a variety of signals” to the video processor. (Ex. 1001 at 11:16–17, 9:45–47; Ex. 1002 at ¶ 131.) Accordingly, both Ritchey and the ’599 Patent employ video switchers in their conventional role to direct inputs from multiple video sources to a video processing device. (Ex. 1002 at ¶ 133.)

Seligmann also discloses signal switching performed by components in a networked video conferencing system. Like the ’599 Patent, Seligmann’s multiplexer/demultiplexer is used to transmit video images and graphical data from multiple sources to a video processor. (Ex. 1007 at 3:10–18 (describing video processor as receiving video signals representing each conferee along with input representing conference location and type); *id.* at 9:54–59; Ex. 1001 at 9:45–53.) A POSITA would have found it obvious to implement Seligmann’s multiplexer/demultiplexer into the system of Ritchey and Tompkins to perform the required video switching functions on input data from Ritchey’s multiple image sensors. (Ex. 1002 at ¶ 136–39.) Indeed, Seligmann supplements Ritchey’s conventional signal switcher by providing a video switcher that switches video input from multiple sources along with data representing the environment, thus supplementing the live-video input functions of Ritchey which texture maps a live video feed within a captured or prerecorded environment. (Ex. 1003 at 17:4–21, 18:3–5, 16:45–50; Ex. 1007 at 3:10–18.) Tompkins improves upon Seligmann’s audio switcher by describing an audio switcher that switches between multiple

microphone inputs and computer-generated data, a function necessary to implement Ritchey's event-driven prerecorded-sound playback feature. (Ex. 1003 at 24:10–35; Ex. 1006 at 7:50–52, 10:43–47.) Thus, a POSITA would have combined switchers from both Tompkins and Seligmann with Ritchey to implement a system that performs all functions described in Ritchey. (Ex. 1002 at ¶¶ 138–39.)

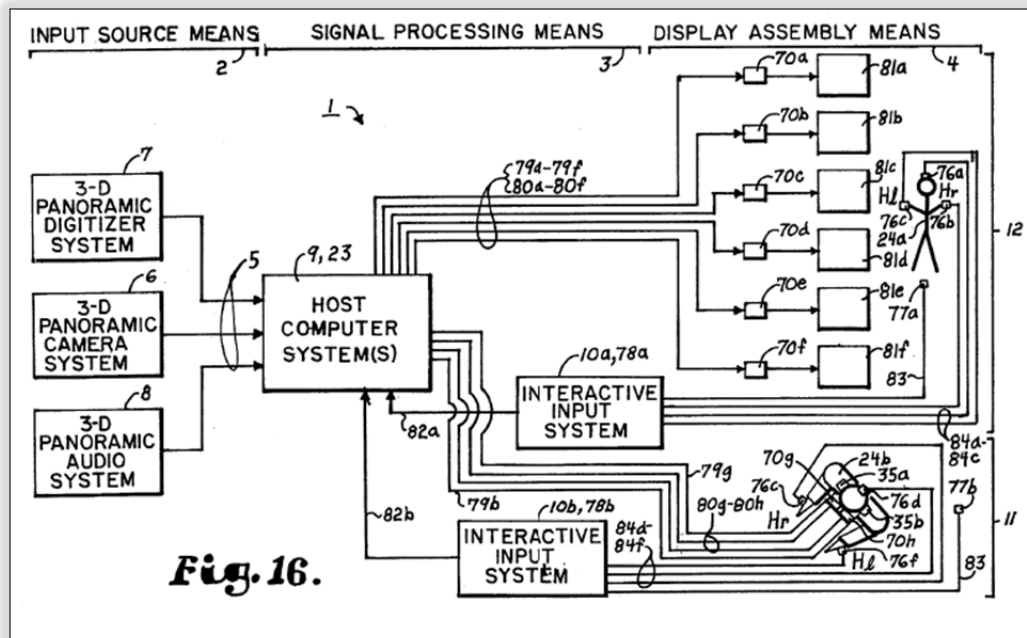
Figure 4 (annotated) is reproduced below, with the relevant components highlighted in yellow.



Thus, Ritchey in combination with Tompkins and Seligmann discloses the claimed video switcher. (Ex. 1002 at ¶ 139.)

3. 6[b]: “said at least one control computer processes and distributes data from said at least one performer input device and said at least one performer output device and said at least one participant input device and at least one participant output device”

As described above against limitation 6[a], Ritchey discloses a host computer. Ritchey’s host computer processes the inputs from the sensor array and interactive input system, generates the immersive virtual reality environment, and outputs the output data to the performer and participant output devices. (Ex. 1003 at Figs. 15, 16, 15:52–65.)

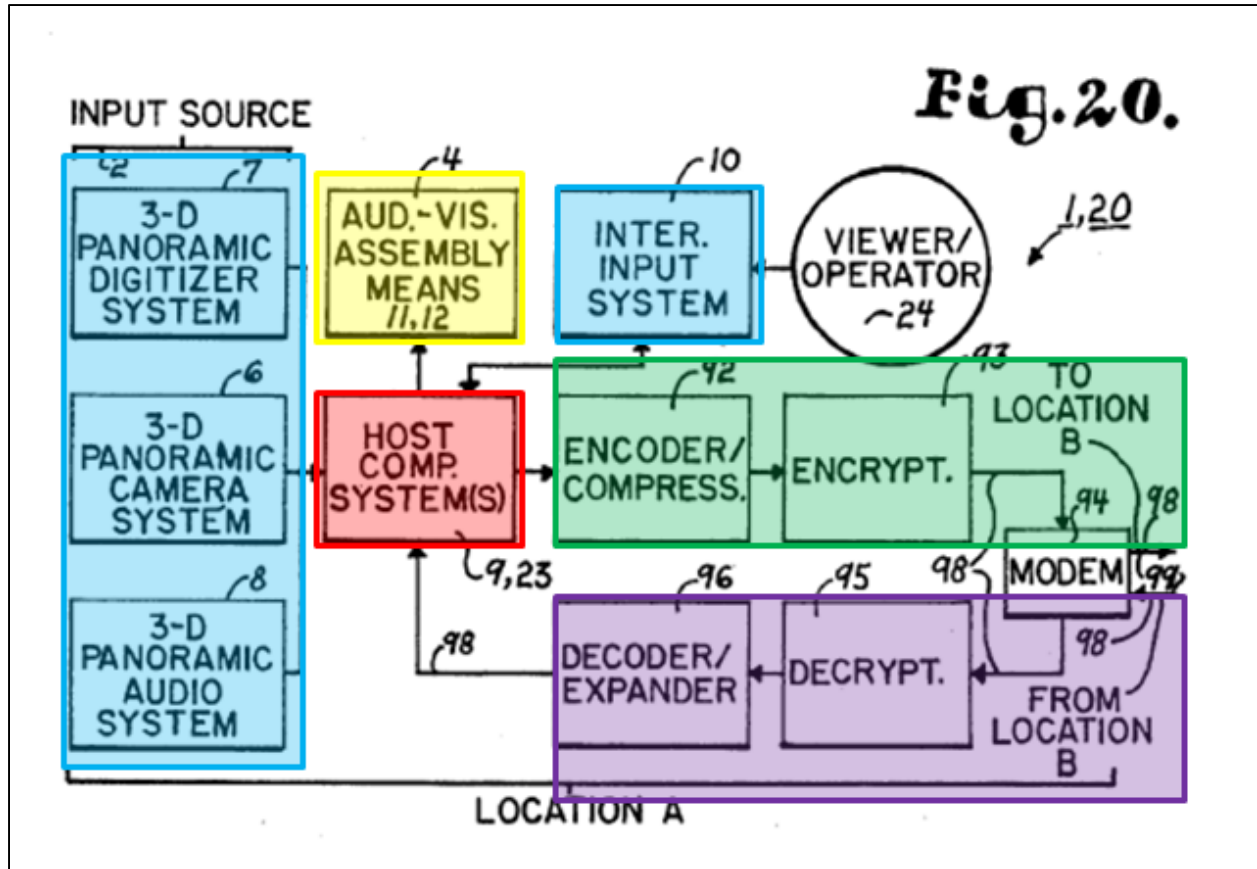


As described above in limitations 1[b] and 1[c], Ritchey’s system processes the input data from the sensor array to form a three-dimensional model of a subject and environment. (Ex. 1003 at 7:55–57; 9:1–14.) The “geometry of the model”

may be manipulated based on viewer input through interactive input devices. (Ex. 1003 at 9:27–28; 18:62–19:16.)

As described above in limitations 1[d] and 1[e], the resulting three-dimensional model is output to audio-visual devices for the various viewers of the system. (Ex. 1003 at 14:59–60.)

Figure 20 (annotated) depicts a local viewer terminal. The host computer is highlighted red, and the control computer processes data from and distributes data to the local viewer's (i.e., “performer”) input and output devices, which are highlighted blue and yellow respectively. (Ex. 1003 at 32:45–52.) The host computer further processes data from and distributes data to the remote viewer's (i.e., “participant”) input and output devices, which are highlighted purple and green respectively. (Ex. 1003 at 32:39–44.)

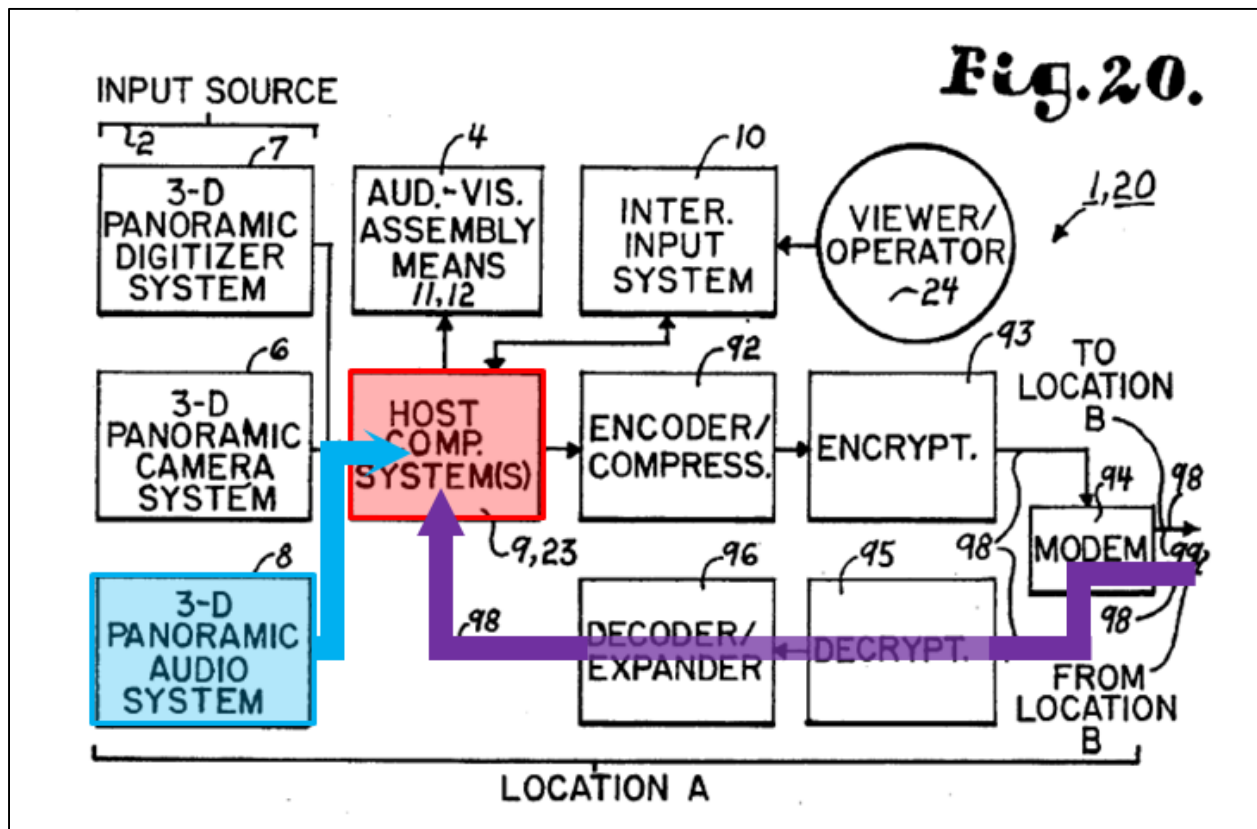


Thus, Ritchey's host computer system discloses claim 6's control computer.

4. 6[c]: "said at least one audio processor processes said at least one participant microphone input, said at least one performer microphone input, and said audio data in accordance with said system data of said at least one control computer"

Ritchey discloses an audio processing system that contains audio processors. (Ex. 1003 at 13:25–61.) The audio processors are connected to microphones within a sensor array that captures and records a subject's audio, video, and shape data. (Ex. 1003 at 31–4, Fig. 3.) And when applied as a teleconferencing system, Ritchey's 3-D panoramic audio system transmits and processes voice data between

viewers at remote locations. (Ex. 1003 at 32:28–67.) As Figure 20 (annotated) below depicts, the host computer (red), which contains the local terminal’s audio processor, processes audio input signals from the local terminal’s audio sensors (blue) along with signals from the remote terminal (purple). (Ex. 1003 at 13:25–14:19, Ex. 1002 at ¶ 135.) The signals from the remote viewer’s terminal includes the remote viewer’s microphone input data. (Ex. 1002 at ¶ 135.) In this regard, Ritchey discloses an audio processor that processes a participant microphone input and a performer microphone input. (Ex. 1002 at ¶ 135.)



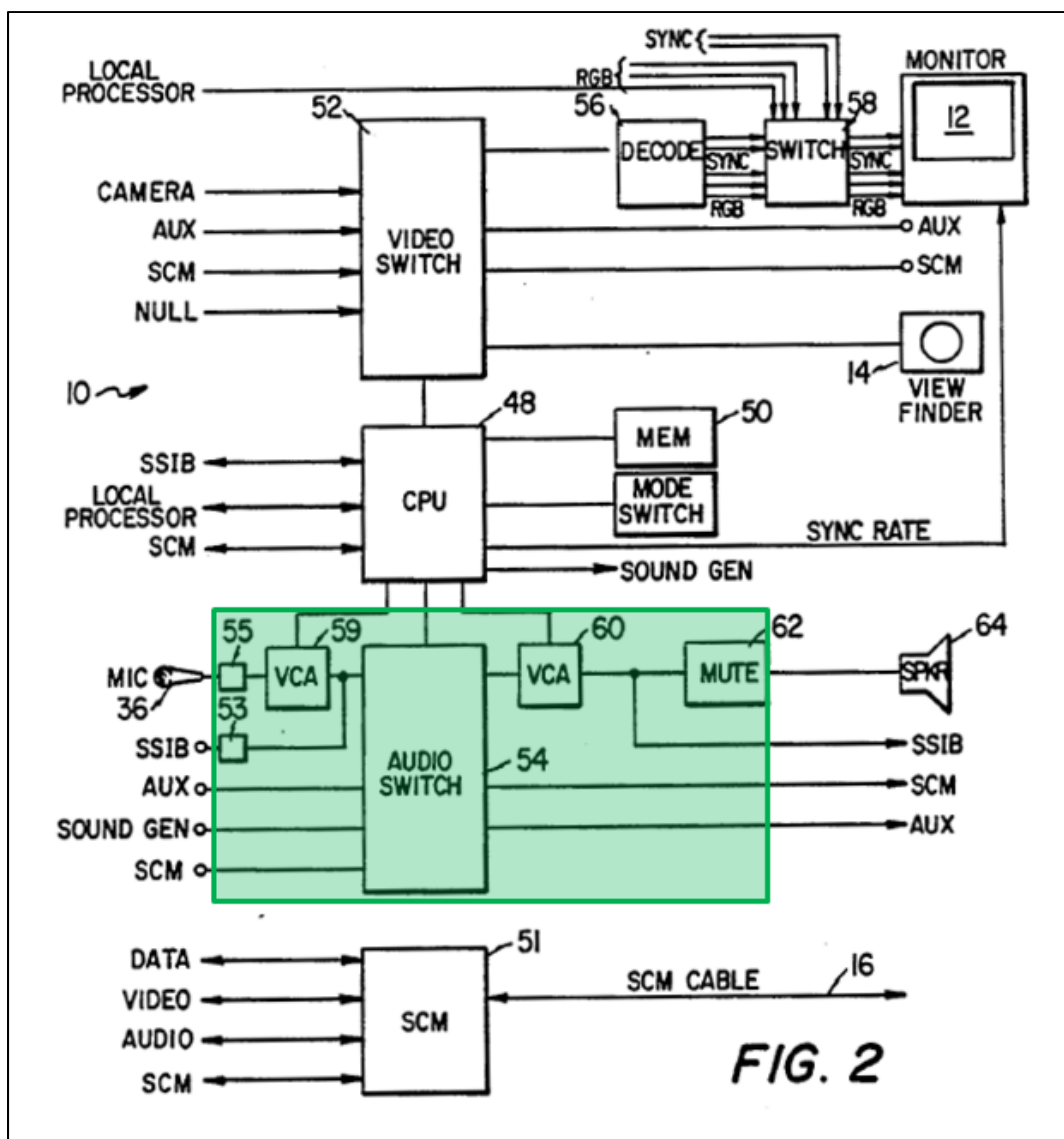
Ritchey’s audio processing system also stores audio data that corresponds with various events that may occur in the environment. (Ex. 1003 at 24:18–35,

8:38–41, 13:55–61.) When an appropriate action occurs, Ritchey’s audio processing system processes the audio data and outputs the signal to the viewer’s audio output device. (Ex. 1003 at 24:28–35.) Thus, in addition to the participant and performer microphone inputs, Ritchey’s audio processor processes audio data.

Ritchey further discloses that the audio processing system “samples and affects recorded audio data . . . based on control data.” (Ex. 1003 at 13:62–14:7.) This control data is determined by various factors to include the audio source and environment attributes. Thus, the audio processing function is determined based on the stored system data, and Ritchey discloses the limitation of an audio processor that processes microphone inputs and audio data in accordance with system data.

5. **6[d]: “said at least one audio switcher switches at least one participant microphone input, at least one performer microphone input, and said audio data in accordance with said system data of said at least one control computer”**

As described in limitation 6[a], Ritchey in combination with Tompkins discloses a processing device that further comprises an audio switcher. Figure 2 of Tompkins is reproduced below, with its audio switches and related components annotated in green.



Like the '599 Patent, Tompkins' audio switch routes any of its inputs to a selected output. (Ex. 1006 at 7:61–65; *id.* at claim 1 (claiming “switching means for receiving audio . . . information . . . and selectively transmitting said received audio . . . to one or more of the remaining of said audio/video ports”); Ex. 1001 at 9:14–17.) Tompkins' audio switch routes audio data from a local microphone, synthesized sound outputted from the computer (i.e., “Sound Gen”), or received

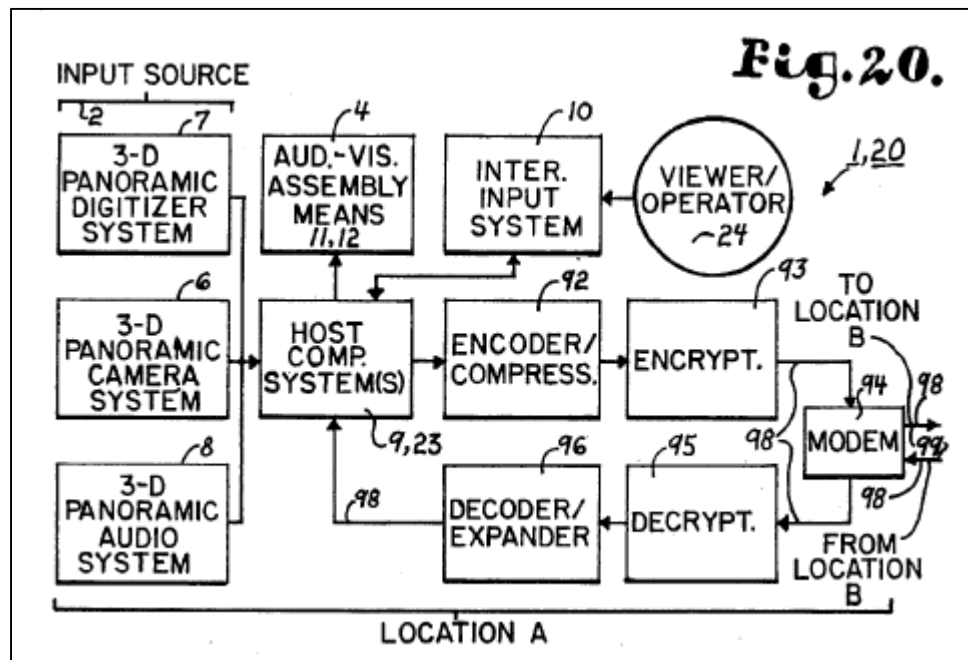
audio from a remote station (i.e., “SCM”). (Ex. 1006 at 7:50–52, 10:43–47.) In other words, Tompkins discloses an audio switcher that switches at least one participant microphone input (i.e., local microphone), at least one performer microphone input (i.e., audio input from SCM), and audio data (i.e., Sound Gen). (Ex. 1002 at ¶ 136.)

Tompkins provides switches that “can selectively disconnect” audio input devices from the circuit. (Ex. 1006 at 7:55–59; Ex. 1001 at 9:32–37.) Tompkins’ system also includes computer-controlled components within the audio circuit that can adjust the gain (i.e., volume) of the input and output audio. (Ex. 1006 at 7:67–8:9; Ex. 1001 at 9:32–37.) Indeed, Tompkins not only discloses an audio switch, but also describes the same computer-controlled functionality described by the ’599 Patent. (Ex. 1002 at ¶ 136.) And because this computer-controlled switcher switches at least one local microphone input, at least one remote microphone input, and audio data, the combination of Ritchey and Tompkins discloses the claimed audio switcher.

6. **6[e]: “said video processor processes said live video image of the participant, said live video image of the performer, and said graphical images in accordance with said system data of said at least one control computer; and”**

Ritchey’s host computer includes a video processor. (Ex. 1003 at 20:57–61.) This video processor receives input from the image sensors within the sensor array

(Ex. 1003 at 12:64–13:8.) When applied as a teleconferencing system, Ritchey's system captures and transmits image data between viewers at remote locations. (Ex. 1003 at 32:28–67, 21:28–37.) In other words, each local terminal's video processor (1) processes the video input of the local viewer to transmit to the remote terminal and (2) processes the incoming signal of the remote viewer from the remote terminal for display to the local viewer. (Ex. 1003 at Fig. 20 (reproduced below).) Thus, Ritchey discloses a video processor that processes live video images of the performer and participant.



In addition to the live video images, Ritchey's video processor processes graphical data that corresponds with objects within and scenes of the environment. (Ex. 1003 at 22:41–45.) The resulting image is further processed in accordance with information stored about the viewer, to include viewer attributes such as

position and orientation. (Ex. 1003 at 22:45–67.) Ritchey thus discloses a video processor that processes live video images of the participant and performer and graphical images in accordance with stored system data.

7. 6[f]: “said video switcher switches said live video image of said at least one live performer with said graphical data in accordance with said system data of said at least one control computer”

As described in limitation 6[a], Ritchey in combination with Seligmann discloses a processing device that further comprises a video switcher. Like the '599 Patent, Ritchey's conventional signal switcher is connected to a sensor array that contains multiple video image sensors. These video image sensors capture a live video image of a subject, and Ritchey's signal switcher “directs inputs from multiple video sources to a video processing device.” (Ex. 1003 at 12:59–67; Ex. 1001 at 11:16–17.) Ritchey's switcher “may be operated to facilitate the reading in of images from a plurality of video sources,” including stored data representing previously stored world models. (Ex. 1003 at 17:10–11, 18:3–5, 16:45–50.)

And as described above in limitation 6[a], Seligmann also disclose a video switcher that directs inputs from multiple video sources to a video processor. Notably, Seligmann's switcher has as its input video signals of a remote conference attendee, along with data that represents the conference environment. (Ex. 1007 at 3:10–18.) Like the '599 Patent, Seligmann's video switcher routes

these signals and data for further processing, generating a display containing video images of remote users within a user-selected location. (Ex. 1007 at 3:19–21.)

Indeed, the combination of Ritchey with Tompkins and Seligmann discloses a video switcher that performs the same functions as disclosed by the '599 Patent and outputs the same, or similar, result. (Ex. 1002 at ¶ 137–39.)

8. **6[g]: “thereby selectively providing said graphical images, said audio data, and said live video image of said at least one live performer in said at least one virtual reality display, and selectively providing said at least one participant microphone input, said at least one performer microphone input, and said audio data to said at least one participant audio output device.”**

As described above, Ritchey’s system provides a virtual reality display and participant audio device that delivers the various output data claimed by claim 6. Specifically, along with Ritchey’s disclosure of limitations 6[a]–6[f], Ritchey’s disclosure of limitations 1[e] and 3[e], which is incorporated herein by reference, describes a participant audio and video output devices. These audio and video output devices, along with Ritchey’s processors and switchers, output the graphical, video, and audio data claimed by limitation 6[f].

D. Ground 4: Claim 7 Is Obvious Over Ritchey, Goldfarb Tompkins, Seligmann, and Leahy

Claim 7 is rendered obvious by the combination of Ritchey, Goldfarb, Tompkins, Seligmann, and Leahy. Leahy’s application was filed on November 12,

1996, and thus qualifies as prior art against the '599 Patent under at least 35 U.S.C. § 102(e).

1. 7[Preamble]: “The system of claim 6 said immersive virtual reality environment further comprising:”

Ritchey in combination with Goldfarb, Tompkins, and Seligmann renders claim 6 obvious for the reasons described above. Claim 7 would have been obvious in view of that combination further in view of Leahy.

2. 7[a]: “a control station”

Ritchey in combination with Leahy renders obvious the claimed control station. The '599 Patent describes the control station⁴ as the area where participants “register[] prior to participating in virtual reality performance theater.” (Ex. 1001 at 7:6–12.) While Ritchey does not explicitly describe the registration process, Leahy discloses users inputting information for use in a virtual reality communications system. (Ex. 1008 at 3:10–15.) Leahy’s users login to a server to register with Leahy’s system, and this process occurs when users initiate their

⁴ While the specification uses the phrase “control *center*” to describe element 30 in Figure 3, the specification uses the phrase control “center” and control “station” interchangeably. (Ex. 1001 at 14:51–55 (“VRPT generally includes participant seating, a presenter enclosure, a control station, and the computer/electrical system . . .”).)

session. (Ex. 1008 at 14:17–18; *id.* at 15:19–22; Ex. 1002 at ¶ 143.) Thus, the combination provides a location where users register prior to participating in the virtual reality environment, and the combination discloses the claimed control station. (Ex. 1002 at ¶¶ 141–42.)

Like Ritchey, Leahy discloses a three-dimensional interactive virtual world. (Ex. 1008 at 2:20–24.) Furthermore, like Ritchey, Leahy further describes a virtual reality communications system. (Ex. 1008 at 2:55–60.) A POSITA would know that access to a virtual reality communications system would preferably have some type of access control (*e.g.*, for enhanced security) and would thus seek to add such a system to Ritchey. (Ex. 1002 at ¶¶ 141, 43.) Thus a POSITA would have found it obvious to incorporate features of the registration system of Leahy into the immersive virtual reality environment of Ritchey, and the combination discloses the claimed control station. (Ex. 1008 at 2:55–60; Ex. 1002 at ¶ 142.)

3. 7[b]: “said control computer further comprising: a registration computer”

The combination of Ritchey and Leahy discloses a control computer comprising a registration computer. Although Ritchey does not explicitly describe a registration computer, Leahy describes a server to which users login to initiate their session. (Ex. 1008 at 14:17–18.) As described below in limitations 7[c] and 7[d], Leahy’s server stores the same type of information for the same purpose as

the '599 Patent's registration computer. The combination of Ritchey and Leahy thus disclose the claimed registration computer. (Ex. 1002 at ¶¶ 143–44.)

**4. 7[c]: “said system data further comprising:
participant information”**

The combination of Ritchey and Leahy discloses system data further comprising participant information. As described above, Leahy's users login to the server to initiate their session. Upon login, the server generates a “user object” and updates its “user state database,” both of which are data stores that the server uses to track and maintain information about the user. (Ex. 1008 at 14:17–18, 15:19–22.)

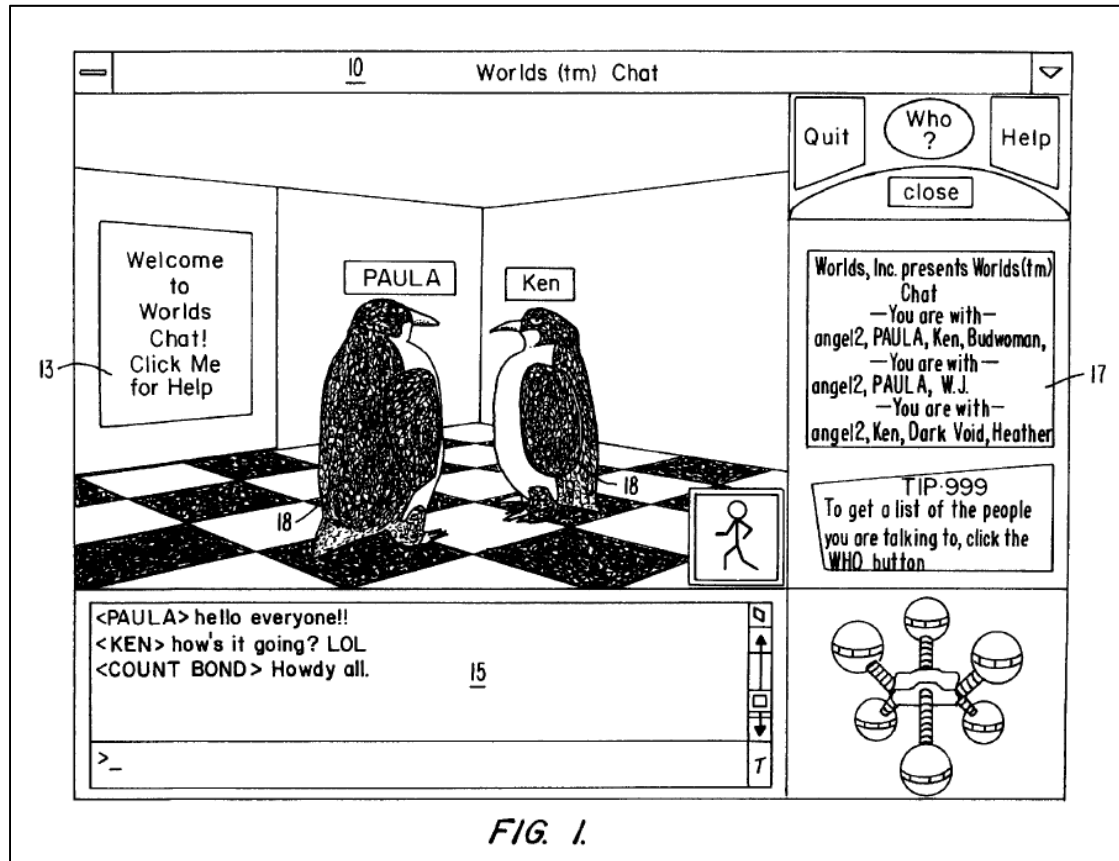
Leahy's server stores the same types of user information as the '599 Patent's registration computer. The stored information includes entries such as the user's selected avatar and the user's label or name. (Ex. 1008 at 6:58–61 (“[U]ser A selects an avatar image and a pointer to the selected image is . . . communicated to server 61”); *id.* at 3:13–15 (display screen includes user-selected avatars and labels/names); *id.* at 10:57–67 (describing server as automatically inserting name of user when broadcasting chat messages to other users).) Leahy's server also stores other relevant information to track the user's session and is not limited in the categories of information it can record. (Ex. 1008 at 15:21–22.) Accordingly, a POSITA would have understood that upon logging in to Leahy's servers, users undergo a registration process in which the user initializes his account to prepare

for the session. (Ex. 1002 at ¶ 143.) Leahy’s server performs the same type of registration as the ’599 Patent’s registration computer, and thus the combination of Ritchey and Leahy disclose a control computer comprising a registration computer. (Ex. 1001 at 7:8–9 (describing registration computer as recording participant’s names).) (Ex. 1002 at ¶ 145–46.)

5. 7[d]: “wherein said at least one participant registers participant information into said registration computer for interactive use in said immersive virtual reality environment.”

The combination of Ritchey and Leahy discloses this limitation. As described above in limitation 7[c], a POSITA would have understood that users logging into Leahy’s server are registering with the system, and Leahy further discloses users registering the same type of “participant information” as in the ’599 Patent. (Ex. 1002 at ¶ 145.) Leahy displays that user information, such as the user’s avatar selection and the user’s name, within its virtual reality environment. (Ex. 1008 at 6:58–61, 7:40–47 (“In rendering a view, client 60 requests the locations, orientations and avatar image pointers of neighboring remote avatars from server 61”); *id.* at 3:7–15 (“Each avatar 18 optionally includes a label chosen by the user. In this example, two users are shown: ‘Paula’ and ‘Ken’, who have chosen the “robot” avatar and the penguin avatar”); *id.* at Fig. 1 (depicted below).) In the combined system, the registered participant in the virtual environment of Ritchey would have the participant’s name floating above his/her

avatar or live or pre-recorded video image in order for others to more easily identify and interact with the registered participant.



The '599 Patent similarly describes displaying participant names within the immersive virtual reality environment. (Ex. 1001 at 7:62–67; 11:28–33.) In other words, the '599 Patent describes the same interactive use of participant information as is disclosed in the combination of Ritchey and Leahy, and the combination of Ritchey and Leahy thus discloses this claim limitation. (Ex. 1002 at ¶¶ 145–46.)

X. CONCLUSION

The Petitioner respectfully requests that the Board institute *inter partes* review and determine that claims 1-9 are unpatentable.

Dated: January 15, 2018

Respectfully submitted,

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EXHIBIT LIST

Petitioner's Exhibits	
Exhibit	Description
Ex. 1001 ("the '599 Patent")	U.S. Patent No. 6,409,599
Ex. 1002	Declaration of Craig Rosenberg in Support of Petition for <i>Inter Partes</i> Review of U.S. Patent No. 6,409,599
Ex. 1003 ("Ritchey")	U.S. Patent No. 5,495,576
Ex. 1004 ("Goldfarb")	U.S. Patent No. 6,075,868
Ex. 1005	December 3, 2001, Amendment and Remarks in Response to Non-Final Office Action
Ex. 1006 ("Tompkins")	U.S. Patent No. 4,710,917
Ex. 1007 ("Seligmann")	U.S. Patent No. 6,330,022
Ex. 1008 ("Leahy")	U.S. Patent No. 6,219,045

CERTIFICATION OF WORD COUNT UNDER 37 CFR § 42.24(d)

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 6,409,599 totals 13,907, excluding the cover page, signature block, and parts exempted by 37 C.F.R. § 42.24(a).

This word count was made by using the built-in word count function tool in the Microsoft Word software Version 2010 used to prepare the document.

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that true copies of the foregoing PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 6,409,599 and supporting materials (Exhibits 1001-1008 and Power of Attorney) have been served in their entirety this 15th day of January 2018 by FedEx® mail delivery service on Patent Owner at the correspondence address for the '599 Patent shown in USPTO PAIR:

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