

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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VANGUARD PRODUCTS GROUP, INC., D/B/A VANGUARD PROTEX  
GLOBAL

Petitioner

v.

INVUE SECURITY PRODUCTS, INC.

Patent Owner

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Case No.: IPR2020-00069  
U.S. Patent No. 10,043,358

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**DECLARATION OF ERIC R. PEARSON  
IN SUPPORT OF PATENT OWNER RESPONSE**

**EXHIBIT 2021**

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I, Eric R. Pearson, declare as follows:

1. I have personal knowledge of the facts stated in this declaration. If called to testify under oath, I could and would testify to these facts.

**I. INTRODUCTION**

2. I have been retained by Patent Owner InVue Security Products, Inc. (“InVue”) as a subject matter expert in the present *Inter Partes* Review (“IPR”) of U.S. Patent No. 10,043,358 (“the ’358 patent”) before the Patent Trial & Appeal Board at the U.S. Patent and Trademark Office (IPR2020-00069).

3. I am being compensated in this matter at my standard consulting rate of \$ 500 per hour. My compensation in this matter is not in any way dependent upon the outcome of this proceeding or upon any particular opinion that I provide in this declaration or that I may provide at any point during this proceeding.

4. I understand that this declaration is being presented as part of InVue’s Patent Owner Response to Petitioner Vanguard Product Group, Inc.’s (“Vanguard”) Petition requesting *inter partes* review of the ’358 patent. I have been informed that a review of the ’358 patent was instituted, and InVue has the opportunity to present a Patent Owner Response. I reserve the right to supplement my opinions, as well as the bases for my opinions, expressed in this declaration in light of additional materials, including evidence that may be provided to me after submission of this declaration.

## **II. QUALIFICATIONS AND EXPERIENCE**

5. I have two degrees in Metallurgy and Materials Science: a Bachelor of Science from Massachusetts Institute of Technology (1969) and a Master of Science from Case Western Reserve University (1971).

6. As set forth herein, I have knowledge and experience with applications involving optical communications, the powering of electronic devices, and security devices, including alarms and sensors. I also have knowledge and experience with the design of security devices, including merchandise security devices.

7. I have over 42 years of experience with fiber optics, including their application in optical communications, in varying capacities.

8. My first fiber optic assignment was with Corning Glass Works, now known as Corning Incorporated (1978-1979). In that position, I began as a Senior process engineer and was promoted to co-manager of a four-shift manufacturing operation in the Corning optical waveguide pilot plant. My job involved managing the development of a consistent manufacturing process from an inconsistent process developed by the R&D scientists and engineers. While research and development personnel are happy when a process works once or twice, manufacturing process personnel want the process to work properly every time.

9. My second assignment was with Times Fiber Communications (1979-1981). I was the Plant Manager for both fiber and fiber cable manufacturing. That position required that I design, develop, and co-supervise the building of a manufacturing plant for production of both optical fibers and optical fiber cables. As a result of these first two fiber assignments, I became knowledgeable regarding the optical and physical performance of glass optical fibers and the packaging of fibers into cables to achieve mechanical and environmental performance goals.

10. In 1981, I established my consulting practice. My first major fiber assignment was as Business Manager for Whitmor Waveguides, a division of Whitmor Wire and Cable (1982-1986). In that assignment, I was responsible for: a) design and development of approximately 200 fiber-optic cable and sensor products; b) design of fiber cable manufacturing equipment; c) sales, marketing, and testing of fiber-optic cables; d) establishing a cable assembly facility; and e) developing an optical fiber sensor that functioned by indicating structural bending from transmission power changes that were induced by micro-bending. From my assignments at Times Fiber Communications and at Whitmor Waveguides, I developed an understanding of fiber-optic cable specifications, cable performance during handling, and fiber in a sensor mechanism. These assignments required me to consider and address the effects and remedies of various aspects of fiber bending, such as those likely to occur in embodiments of the '358 patent and

certain references relied upon by Petitioner, including International Publication No. WO 2011/045058 to Brenner (Ex. VPG-1007, “Brenner”). More specifically, this experience provides me with the ability to opine on power losses in fibers and cables during bending.

11. For approximately four years after Whitmor Waveguides, I provided technical and marketing consulting services to companies interested in, or involved in, fiber-optic communications. Starting in 1990 and continuing to the present day, I develop and deliver training programs on fiber optic network design and installation.

12. Some of these assignments included design and delivery of fiber links and networks. Others included designing optoelectronic transmitters and receivers. These assignments expanded my understanding of the processes of conversion of optical to electrical and electrical to optical transmission, processes that are relevant to the transceivers addressed in this proceeding. The processes of signal conversion of optical to electrical, electrical to optical and optical transmission through air and fiber are the same for distances, both short (e.g., a matter of feet) and long (e.g., kilometers). Accordingly, I am qualified and able to opine on the transmission of optical signals in both sensors and transmission links.

13. As part of my experience, I have developed a rudimentary understanding of transmission protocols. These protocols apply to all media of

transmission: electrical, optical, and wireless transmission. The protocols specify the structure of a “packet.” This structure requires encoding of the data within the packet. This encoding can include, as a minimum, the data being transmitted, the source and destination of the data, a method of determining accuracy of the packet. In addition, the encoding can be performed in a manner to provide secure transmission. Secure transmission prevents recovery of the data from an intercepted signal.

14. This experience includes at least six projects involving sensors in security applications, with which I have knowledge and/or experience. These projects include:

Fiber Fence

RS232 Fiber BTU Sensor Link

Patent IPRs Involving Fiber in Security Systems

Fiber Link to Keyboard

OTDR Structural Sensor

Access Control Security System

15. Fiber Fence - Shortly after its introduction 2000-2003, I became knowledgeable of the security system known as the “Fiber Fence Security System.” Created and offered by Fiber Instrument Sales, Oriskany, NY, this system monitors an area enclosed by a fence for protection of merchandise, such as

boats, vehicles, and other large items. This system included a control unit, a sensor fiber cable, and trip sensors attached to both the fence and the sensor. As illustrated by a current catalog (Ex. 2010 at 142-43), this system enables monitoring of up to 10 acres with a circumference of 10 miles. Upon detecting a change in the signal when the trip sensor ‘trips’ and disturbs the signal on the sensor fiber, this system issues an alarm with an approximate location of the disturbance. The disturbance could be caused by shaking of the fence, such as that produced by cutting of or climbing on the fence.

16. RS232 fiber BTU sensor - In the 1980’s, I received an assignment to design and deliver a fiber BTU sensor data link for use in a power generating facility. My memory is that the client was Southern California Edison. The system transmitted data from a BTU sensor at the periphery of the facility to the control room of the facility so that the oxygen to fuel ratio could be adjusted for maximum power output. The signal was of the BTU content of incoming natural gas. At that time, there were no RS232 fiber modems available. I designed and built the electronics to convert the RS232 signal from the sensor to an optical signal at the transmitter and back to RS232 at the receiver.

17. Patent IPRs Involving Fiber in Security Systems - In 2019, I received an assignment to review patents and filings for two IPRs, IPR2019-1209 and



IPR2019-1206. From that assignment, I developed additional understanding of the use of fiber in merchandise security systems.

18. Fiber Link to Keyboard - In the late 1980's or early 1990's, I received an assignment from Ensign-Bickford, a fiber manufacturer, to consult on the development of a fiber link between a keyboard and a computer. While the objective was to transmit keystroke information, a slight modification to the design would enable detection of disconnection. With such detection, the link would enable security monitoring of any attached device.

19. OTDR Structural Sensor - In approximately 1985, I received an assignment perform a 'proof of principle' study on the use of optical fiber as a structural sensor for use on oil pipelines. I believe the name of the firm was G2 Consulting. This sensor would be attached to an oil-carrying pipe and used with an OTDR to detect bending of a pipeline due to subsidence of the ground. With such a sensor, the amount and location of bending could be monitored. Such monitoring would be automatic and enable dispatch of personnel to address the subsidence prior to pipeline failure. While the fiber was a structural sensor, such a sensor could be used in the same manner as Fiber Fence for the protection of merchandise.

20. Access Control Security System - I previously worked on the evaluation of the installation of a passive optical network (PON). This PON

served multiple functions, including access control and monitoring of doors within a sports facility. My activities resulted in familiarity of use of fiber in a security system with access control and monitoring. The system monitored door sensor status and enabled access through keypads connected to the fiber system. The system enabled security of materials, some of which were merchandise for sale, and equipment within the rooms.

21. In addition, from 1995 to 2007, I was a Director of the Fiber Optic Association. From the FOA, I have five certifications: Certified Fiber Optic Technician (CFOT), Certified Fiber Optic Specialist in Connector Installation (CFOS/C), Certified Fiber Optic Specialist in Splicing (CFOS/S), Certified Fiber Optic Specialist in Testing (CFOS/T), and Certified Fiber Optic Specialist in Instruction (CFOS/I).

22. My certifications and involvement with the Fiber Optic Association resulted in presenting training programs that have resulted in certification of more than 1000 installation personnel. These programs have resulted in the certifications of: CFOT, CFOS/C, CFOS/T, and CFOS/S.

23. In addition, I have provided extensive training services to those seeking to become competent in fiber optic design, installation, and operation. To date, I have trained more than 11,100 individuals in fiber optics, providing me with

strong insight into the level of ordinary skill in this field. As a result of these activities, the Fiber Optic Association has recognized me as a “Master Instructor.”

24. I have also been designated as a Master Instructor by the Building Industry Consulting Services International (BICSI). For BICSI, I developed and presented the fiber-optic network design program, F0110. From 1999 until 2014, I presented this program. Because of my experience in network design, I can opine on issues concerning fiber link transmission, optical power loss in link components, and component reliability.

25. I have authored more than 100 articles for trade journals and books. I present a partial list in my curriculum vitae provided as Appendix A.

26. I am listed in: Who’s Who Worldwide, Who’s Who of Business Leaders, Who’s Who in Technology and Who’s Who in California. I have been quoted in fiber optic and related trade journals. From 1986-2002, I was a Member, Editorial Advisory Board, Fiberoptic Product News.

### **III. LEGAL PRINCIPLES**

27. I am not an attorney, nor have I independently researched the law on the issue of patent validity. Attorneys for the Patent Owner explained certain legal principles to me that I have relied upon in forming my opinions set forth in this declaration.

28. I have been asked to provide my opinions regarding the validity of certain claims of the '358 patent in light of the arguments and evidence offered by Petitioner and John "Jack" Figh, Jr., identified by Petitioner as its expert, as it relates to 1) the purported motivation or reasons to combine U.S. Patent Pub. 2015/0235533 (Ex. VPG-1004, "Grant") and U.S. Patent No. 5,912,619 to Vogt (Ex. VPG-1008, "Vogt"), Petition at 39-49; Ex. 1012 ¶¶ 47-50; 96-98, and 2) the purported motivation or reasons to combine U.S. Patent Pub. 2014/0335730 (Ex. VPG-1010, "the '730 Publication") and WO 2011/045058 to Brenner (Ex. VPG-1007, "Brenner"), Petition at 69-78; Ex. 1012 ¶¶ 63-65, 120-24.

29. I have been informed by counsel that in *Inter Partes* Review, the petitioner bears the burden of proving unpatentability by a preponderance of the evidence.

30. I have been further informed that patents and other publications that are publicly available even one day before the "effective filing date" of the '358 patent are considered "prior art" to the patent. I have been informed that, in certain circumstances, the effective filing date for a patent may be earlier than the patent's filing date. Although I do not have any reason to believe that this distinction has any relevance in the circumstances of this proceeding, I have been told to assume for the purposes of this declaration that the effective filing date for the '358 patent is the earliest possible priority date for this patent, or February 19, 2016. I

understand that, in assuming this date as the effective filing date, I am also establishing the time at which the state of the art is measured. By selecting the earliest possible date, I understand that I am also making the most conservative estimate of the state of the art.

31. I understand that Petitioner has alleged in its Petition claims 1-3, 16-20, 23, 28, and 29 of the '358 patent are invalid as obvious in view of various combinations of references. I have been informed that an obviousness inquiry assesses whether the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person of ordinary skill in the art.

32. I have been further informed that a determination of obviousness involves consideration of: (1) the scope and content of the prior art; (2) differences between the prior art and the claims at issue; (3) the level of ordinary skill in the relevant art; and (4) objective indicia of non-obviousness. In reviewing the combination of different elements found in the prior art, I understand from counsel that it is important to examine the motivation or reasons that one of ordinary skill would or would not combine those elements and whether there would be a reasonable expectation of success in making the combination. I understand that the reason to select and combine features may be found in the prior art, in the nature of any need or problem in the field addressed by the patent, in the knowledge of a

person of ordinary skill in the art, or in the common sense or the ordinary level of creativity exhibited by a person of ordinary skill in the art as of the effective filing date. I further understand that the reason need not be express or explicitly disclosed in a given prior art reference.

33. In contrast, I have been informed that there if there is no motivation or reason to combine disclosures from different prior art references, if there is no reasonable expectation of success in the combination, or if the prior art provides information that would have taught away from the combination or otherwise expressed doubt regarding the likelihood of success of the combination, then the patent claim is not obvious.

34. I also understand that it is impermissible to employ hindsight by merely reconstructing the subject matter of the patent from prior art references without a reasonable rationale justifying the combination of elements from the prior art. In other words, I understand that the claimed invention may not be used as a template to guide the obviousness analysis, but that the inquiry must focus on what a person of ordinary skill in the art would have understood prior to the effective filing date of the patent at issue.

#### **IV. MATERIALS CONSIDERED**

35. In preparing this declaration, I considered the '358 patent, the Petition for *Inter Partes* Review in this proceeding and its exhibits, the file histories of the

'358 patent and its parent application (resulting in U.S. Patent No. 10,043,358), the publications set forth in Appendix B to this declaration, any other references cited herein, and my extensive experience in the field of fiber optics. I reserve the right to consider additional materials that may be brought to my attention during the course of this proceeding.

**V. CLAIM CONSTRUCTION UNDER 37 C.F.R. § 42.104(B)(3)**

**A. Level of Ordinary Skill in the Art**

36. A person of ordinary skill in the art ("POSA") would have at least a Bachelor of Science degree in degree in electrical engineering, mechanical engineering, materials science, or some equivalent level of education and at least some knowledge or experience with security devices, including alarms and sensors, the powering of electronic devices, and at least some knowledge or experience with applications using optical communication technology including the design and application of fiber optic cabling, optical communication components, and data transmission.

37. I disagree with Petitioner's identification of the level of ordinary skill, on the basis of what it includes and the what it omits. *See* Petition at 6.

38. In particular, I believe an acceptable education level would not just be a Bachelor of Science degree in electrical engineering but could also include a Bachelor of Science degree in mechanical engineering, materials science, or some

equivalent level of education with security devices, including alarms and sensors, the powering of electronic devices, and at least some knowledge or experience with applications using optical communication technology including the design and application of fiber optic cabling, optical communication components, and data transmission.

39. Petitioner's proposed level of skill lacks any requirement that a POSA have at least some experience with applications using optical communication technology, yet dependent claims 19, 20, 23, and 28 relate to this technology and such is part of Petitioner's arguments in challenging these claims. Dependent claim 19 of the '358 patent requires that, with reference to a cable and a sensor described in independent claim 1, "the cable and the sensor communicate optical signals with one another for detecting a security event associated with the sensor, the cable, or the item of merchandise." Ex. VPG-1001. Dependent claim 20 of the '358 patent requires, with reference to the limitations of claim 19, that "an end of the cable comprises an optical transceiver for communicating optical signals with the sensor." Ex. VPG-1001. Dependent claim 23 requires, with reference to the limitations of claim 20, that the "sensor comprises an optical transceiver for communicating optical signals with the optical transceiver of the cable." Ex. VPG-1001. And dependent claim 28 requires, with reference to the limitations of claim 23, that "the optical transceiver of the cable is configured to communicate with the



optical transceiver of the sensor for detecting disconnection of the cable from the sensor.” Ex. VPG-1001.

40. While I recognize that the preamble to the challenged claims of the ’358 patent is written in the context of “[a] merchandise security system for displaying and protecting an article of merchandise and an auxiliary device of the article of merchandise from theft,” I note that this specific application is not uniquely relevant to the interaction of optical sensors, transceivers, and cabling otherwise addressed, for example, in claims 19, 20, 23, and 28 of the ’358 patent.

41. Indeed, at least one of the references on which the Petition relies has no exclusive relationship to “merchandise security systems.” For example, Vogt (Ex. VPG-1008) “relates to a system for monitoring relative displacement between one object and another object normally located adjacent to, or in close proximity of, the sensor employing energy in the frequency of light....” VPG-1008 at 1:14-18. Simply put, a skilled artisan need not have experience in “merchandise security systems” in order to understand the teachings of these references, which have numerous uses beyond this one limited application.

42. Instead, challenged claims 19, 20, 23, and 28 of the ’358 patent fundamentally involve optical communication using optical components and cabling as applied in a particular application. Mere experience with merchandise security systems or general engineering education alone would not suffice to give a

POSA knowledge sufficient to understand the many intricacies of a broad field such as optical communication. Therefore, in my opinion, specific experience with optical fiber, sensors, and other optical communication components is absolutely essential to qualify an individual as having even an ordinary level or skill in the art. This requisite knowledge is absent from Petitioner's formulation of the level of ordinary skill, an omission having great significance, as I will show in my analysis below.

**B. Claim Construction**

43. I have not been asked to consider claim construction. Rather, I have been told that, for the purposes of this declaration, I should adopt the claim constructions proposed by Petitioner where relevant to my opinions and otherwise consider all remaining claim terms to carry their plain and ordinary meaning to one of ordinary skill in the art.

**VI. THE PETITION FAILS TO ESTABLISH THE OBVIOUSNESS OF CHALLENGED CLAIMS 19, 20, 23, AND 28.**

**A. Lack of a Motivation to Combine Vogt and Grant**

44. In my opinion, Petitioner has failed to provide evidence sufficient to show that a POSA would be motivated to integrate Vogt's optical transceivers into Grant and, therefore, does not show that claims 19, 20, 23, and 28 of the '358 patent are obvious.

45. Before turning to Vogt, I must first state that I disagree with the Petitioner's starting point – asserting that because Grant provides multiple sensing examples, a POSA would somehow conclude that Grant “could be improved by employing a different sensing technique.” Petition at 42 (citing Ex. VPG-1012 (Figh Decl.)) at ¶ 48. While Grant discloses at ¶ 32 that “various sensing techniques may be employed for determining whether the cable 20 has been cut or removed from the sensor in an unauthorized manner,” Grant also provides examples of such techniques without ever suggesting to a POSA that such examples are deficient or that Grant “could be improved by employing different sensing techniques.” Petitioner fails to point to any evidence of such a suggestion or how a POSA would reach this conclusion. The mere listing of multiple examples does not suggest to a POSA that Grant is in need of improvement here. So, I disagree with Petitioner's starting place – i.e. that something about Grant motivates a POSA to look elsewhere, such as to Vogt.

46. Moreover, examination of Vogt added to Grant demonstrates lack of improvement, as I now show. If Vogt was added to Grant and the cable was disconnected or broken, power from the conductors that is delivered to the Vogt transceiver through the cable would be lost. Vanguard's Petition states this clearly: “If both units remain operational” – i.e., power conductors providing power to the optical transceivers – “and connected to one another, the signal exchange is

successful. However, if one of the units fails to receive an expected optical signal from the other unit, an alarm is triggered, indicating that the units have been separated, or the security system has been compromised otherwise.” Petition at 40 (citation omitted). The Vogt transceiver would lose connection and an alarm would be generated.

47. If Vogt was not added to Grant and the cable was disconnected or broken, a security event/alarm would be generated. Grant states this explicitly: “As such, the sense loop may be used to detect various security events associated with the cable 20, such as the cable being cut, shorted, and/or disconnected.” Ex. VPG-1004 at ¶ 17. In other words, whether or not the Vogt optical transceivers are present, a cut, shorted, or disconnected cable will result in an alarm.

48. As a break or disconnection with and without Vogt results in the same alarm, there would be no improvement by “employing a different sensing technique” as urged by Petitioner. Petition at 43. Thus, I conclude that POSA would recognize no improvement by use of Vogt as a different sensing technique. In addition, the POSA would choose the simpler system, the Grant system, instead of more complex one based on both Grant and Vogt.

49. Without providing a rationale for why a POSA would look outside the merchandise security system of Grant, Petitioner nevertheless references Vogt, which relates generally to a security system that utilizes a pair of optical sensors.

Petitioner then points to certain statements in Vogt (“security system having enhanced monitoring capability”; “highest level of assurance”; “security of the system of the invention is virtually assured”) as motivating a POSA to “use the sensing technique disclosed in Vogt to monitor the connection between the tether cable and the sensor in Grant’s security system.” Petition at 42-43; VPG-1012 at ¶ 48.

50. Again, I must disagree. A POSA would not be motivated by Vogt’s generalized, self-accolades for the simple reason that Vogt does not describe or otherwise explain how its security system would provide such “assurance” or enhancements. To be motivated to consider the combination of Grant and Vogt, the POSA would seek specific benefits, not vague and unsupported such “assurance” or enhancements. Notably, the Petition and the declaration of Petitioner’s expert (Figh) also fail to point to benefits. This is particularly true when, as stated above, Grant does not identify any deficiencies with its security system – much less invite a POSA to make improvements as asserted by Petitioner.

51. I note that Vogt repeatedly criticizes the use of security systems that utilized magnets and reed switches to monitor the relative displacement between two objects to create an alarm event. Ex. VPG-1008 at 1:24-66. Vogt indicates these types of systems can be compromised, *id.* at 1:59-66, and that Vogt’s optical sensors should be employed instead, *id.* at 2:9-20; 5:60-67. A POSA could readily

conclude that Vogt is referring to improvements over this conventional reed switch system in its self-accolades. Regardless, this would not motivate a POSA to modify Grant with Vogt because Grant does not rely upon a magnet and reed switch to monitor the connection between the tether cable and the sensor or base.

52. Despite the Petition's failure to cite any actual evidence of a motivation for the reason a POSA would modify Grant with Vogt, the Petition then asserts a POSA could successfully replace Grant's inductive coils with Vogt's optical sensors. Petition at 43; Ex. VPG-1012 at ¶ 49. This lack of evidence is clearly shown with a comparison of Grant as modified by Vogt to Grant without the modification.

53. In Grant, cutting of the cable or removal of the cable from the base initiates an alarm. Grant states: "As such, the sense loop may be used to detect various security events associated with the cable 20, such as the cable being cut, shorted, and/or disconnected." Ex. VPG-1004 at ¶ 17.

54. According to Figh, when Grant is modified by Vogt, "if the unit disposed within the cable is powered via conductors within the cable, cutting of the cable or removal of the cable from the base would depower the unit; as such, the optical signal exchange between the two units would fail, thereby indicating that a security event has occurred." Ex. VPG-1012 at ¶ 49. In other words, whether or not the Vogt optical transceivers are present, a cut shorted or disconnected cable

will result in an alarm. This comparison demonstrates an absence of improvement by the addition of Vogt. Once again, the Petition fails to point to any evidence of a reason that would motivate a POSA to believe this modification would improve Grant, provide the “highest level of assurance,” or otherwise meet Vogt’s ambiguous self-accolades. Once again, the simple implementation of Grant provides the same functionality as Grant modified by Vogt, an implementation of increased complexity. A POSA would choose a simple implementation in preference to a complex one.

55. I would like to return again to the Petition’s reliance on Vogt’s ambiguous self-accolades. As I already stated, Vogt does not describe to a POSA how Vogt’s security system provides any such “enhancements.” Nevertheless, Petitioner might attempt to assert that a POSA would understand these statements (e.g., “highest level of assurance”) refer to Vogt’s description of utilizing coded signals between respective optical transducers in the first and second units. Specifically, Vogt indicates that a code generator 51 in a first unit 20 can generate a coded signal that is converted by optical transducer 23 into an optical signal that is transmitted to a second unit 21. Ex. VPG-1008 at Abstract, 5:67-6:64. There, another optical transducer 34 converts the optical signal back into an electrical signal supplied to another code generator 56 in the second unit 21. *Id.* The failure of the two units to either exchange the properly coded signals or to receive a

return signal results in producing an alarm. *Id.* Vogt asserts that whereas with magnets and reed sensors “it may have been possible to fool the security system using other magnets,” the use of coded optical signals in units 20 and 21 “cannot be readily decoyed.” Ex. VPG-1008 at 5:60-67.

56. Even if a POSA would somehow understand that such coding is this basis for Vogt’s undefined references to “highest level of assurance” or “enhanced monitoring,” in my opinion there are multiple reasons a POSA would not combine Vogt with Grant based on Vogt’s use of coded signals.

57. First, as already stated, Grant does not use magnets and reed switches to monitor the cable. As such, a POSA would understand that Grant lacks the deficiency that Vogt references as overcoming with its coded signals.

58. Second, a POSA would also recognize, as previously stated, that substituting Vogt’s optical sensors for Grant’s inductive coils and using coded optical signals adds an unnecessary complexity to Grant with no resulting improvement or benefit. As described in Vogt, such coding requires coding an electrical signal, converting it to an optical signal, transmitting the optical signal, receiving the optical signal, converting such back into an electrical signal with a code that must be checked for correspondence. Ex. VPG-1008 at Abstract, 5:67-6:64. Such coding requires the addition of at least two optical transducers as well as two code generators/microprocessors. *Id.*



59. A POSA would understand such modifications from Vogt would create significant additional complexity to Grant with no corresponding benefit for monitoring Grant's cable 20 – particularly when Grant does not rely on magnets and reed sensors for such anyway. Instead, Grant uses a cable 20 that could include “one or more electrical conductors for transmitting electrical, security, and/or communication signals” that can be used in determining whether the cable has been cut or disconnected. Ex. VPG-1004 at ¶¶ 24, 31. The Petition points to no evidence that would provide a reason that a POSA would be motivated to employ in Grant the more complicated solution of Vogt requiring the conversion, back and forth, between coded, electrical signals and optical signals.

60. Furthermore, even if there were some reason (which the Petition does not identify) to employ a coded signal, a POSA would readily understand that “electrical, security, and/or communication signals” described by Grant are either already coded or readily could be coded – all without the complications of Vogt. As such, a POSA would understand that conversion of the coded electrical signals to optical signals and the reverse conversion is unnecessary. Accordingly, even if coding is the benefit that Vogt is ambiguously referencing, a POSA would need to see some other, additional benefit, to the optical conversion because such is already understood from Grant. The Petition, however, presents no such additional benefit or advantage.

61. Third, even if a POSA would somehow recognize a benefit (unidentified by Petitioner) in using a coded signal between Grant's sensor and base in monitoring Grant's cable 20, a POSA would also understand Grant explicitly provides for such a feature so that there would be no motivation for modifying with Vogt. Specifically, Grant describes the use of wireless signals between the base and the sensor. Ex. VPG-1004 at ¶¶ 5, 7, 8, 21, 28, 29, 34. A POSA would understand that wireless signals (e.g., Bluetooth, BLE, WiFi, and others) are coded signals. Indeed, Grant even describes the transmission of a unique identifier – i.e., a code – wirelessly transmitted between the base and the sensor. Ex. VPG-1004 at ¶ 29. Grant further describes that the sensor can transmit a wireless signal between the base and sensor in event the cable is disconnected. Ex. VPG-1004 at ¶¶ 33-36.

62. For at least these reasons, in my opinion, a POSA would not be motivated to substitute Vogt's optical transceivers for the inductive coils in Grant, and the Petition provides no evidence otherwise.

63. I understand that Petitioner's Ground 2 asserting the invalidity of claims 19, 20, 23, and 28 depends on the faulty reasoning set forth in the Petition and addressed above. Petition at 6. Because the Petition fails to provide any plausible rationale or motivation to modify the Grant system as proposed by Petitioner, the Petition fails to set forth any valid obviousness allegation.

Accordingly, I conclude that Petitioner has failed to establish the obviousness of the challenged claims 19, 20, 23, and 28 of the '358 patent.

**B. Lack of Motivation to Combine Brenner and the '730 Publication**

64. In my opinion, Petitioner has failed to establish the obviousness of any of the challenged claims 19, 20, 23, and 28 for at least the reason that Petitioner has failed to provide a reasonable rationale explaining why one of ordinary skill in the art would replace the optical waveguide disclosed in Brenner with the standard electrical conductors purportedly disclosed in the '730 Publication. *See* Petition at 71-74; Ex. VPG-1012 at ¶¶ 62-65, 120-22.

65. As explained more fully below, the rationale provided by Petitioner for combining these aspects of Brenner and the '730 Publication is: (1) contrary to the state of the art of fiber optics as of February 19, 2016, the earliest possible priority date for the '358 patent, and (2) based on assumptions that are neither supported in the Petition nor inherently true. To the contrary, Petitioner's assumptions are false and thus fail to support its proposed rationale.

66. In particular, Petitioner explicitly states that a component of the system disclosed in Brenner – an optical waveguide – is unfit for the purpose for which Brenner discloses it and thus a skilled artisan would be motivated to discard it out of hand. Petition at 71-73; Ex. VPG-1012 at ¶¶ 63-65. I disagree.

67. In order to understand the numerous flaws in this rationale, it is useful to briefly address the security system disclosed in Brenner. Brenner teaches an apparatus for securing objects, more particularly exhibited goods, against theft. Ex. VPG-1007 at 1. The security system of Brenner includes a sensor unit, a base unit, and a securing tether connecting the sensor and base units. *Id.* The securing tether includes an optical waveguide (i.e., a fiber optic cable) within the tether that is used to communicate optical signals between the sensor and base units. *Id.* at 2.

68. The sensor unit of Brenner is attached to an item sought to be protected. *Id.* at 1. In doing so, a push-button on the surface of the sensor unit is depressed. *Id.* Thus, in the event that the protected item is removed, the push-button is released, causing the sensor unit to send an optical signal through the optical waveguide to the base unit. *Id.* at 2. As an alternative safety mechanism, Brenner explains that the sensor unit may be connected to the optical waveguide in such a way that the end of the waveguide terminating at the sensor unit is exposed when a protected item is unexpectedly removed, permitting light to travel down the optical waveguide to the base unit and triggering an alarm. *Id.* at 4.

69. Brenner further teaches various embodiments of the securing tether that might be useful in enabling handlers of the protected items to lift the item from its resting position and thus inspect the item. In one instance, Brenner suggests that the securing tether may constitute a spiral cable. *Id.* at 5. One can understand

a spiral cable to be shaped like the cord of a corded telephone. In another embodiment, Brenner teaches that the securing tether may be wound in a winding device under tensile stress. *Id.* In other words, the winding device might be a reel that retracts the securing tether automatically following extension of the tether by a customer.

70. According to the Petition, a POSA would have been motivated to modify the system of Brenner by replacing the optical waveguide. *See* Petition at 71-74. The Petition seeks to support this conclusion by asserting, “when an optical waveguide is subjected to bending or winding, it is prone to at least two types of signal loss: ‘curvature loss’ and ‘microbend loss.’” Petition at 71; *see* Ex. VPG-1012 ¶ 63. As a result of these losses, the Petition argues that “[a] POSA would have recognized that Brenner may suffer from reliability issues because the securing tether can be ‘a spiral cable’ or ‘can be wound under tensile stress’ in a winding device.” *Id.* (emphasis omitted). Thus, according to Petitioner, the skilled artisan would purportedly have been motivated to replace the optical waveguide of Brenner with electrical conductors. Petition at 73.

71. I disagree. Aside from directly contradicting Brenner’s express indication that the optical waveguide would be reliable when used in this exact scenario, these statements contain numerous errors, omissions, and improper assumptions that are inconsistent with the state of the art as of February 19, 2016

and which negate the ultimate conclusion drawn in the Petition. I will address each of these omissions and improper assumptions in turn.

72. First, the Petition errs in making the false assumption that “curvature loss” and “microbend loss” necessarily result in “signal loss.” To explain this error, it is first necessary to understand what these terms mean.

73. I begin with the term “signal loss.” Light traveling through an optical fiber has a specific intensity. As the light travels along its path, it is scattered by the atoms in the core (center region) of the fiber towards the side of the fiber. This main mechanism for such power loss is known as Rayleigh scattering. This mechanism is analogous to observing light from a flashlight from the side of the beam in a dark, dusty room. The light in the beam is scattered to the side by the dust particles. This scattering results in a reduction of intensity, a power loss, of the forward traveling beam.

74. In an optical fiber, there is a similar reduction in power. In an optical fiber, reduction in intensity (power loss) from Rayleigh scattering occurs when this scattered power arrives at the core/cladding boundary of the fiber at an angle greater than the critical angle of the fiber. *See Fiber Optic Test and Measurement* 448 (Dennis Derickson ed., 1998) (Ex. 2011); *see also* Ex. VPG-1014 at 545-46 (defining “macrobend,” “macrobend attenuation,” and “macrobending”). Such power escapes from the core and is lost from the forward traveling power. *See* Ex.

2011 at 448 (“The mechanism [Rayleigh scattering] does not cause elimination or conversion of optical energy but simply forces a part of the optical wave [that is, energy or power] to escape from the waveguide.”); *see also Optical Fiber Loss and Attenuation*, FOSCO, available at <https://www.fiberoptics4sale.com/blogs/archive-posts/95048006-optical-fiber-loss-and-attenuation> (Ex. 2012 at 5-7).

75. Signal loss, in contrast, addresses the ability of an optical receiver to detect the light intensity (aka, power level) and convert that optical power into an electrical signal nearly identical to the electrical signal presented to the optical transmitter for transmission. Only when the power of the light at the receiver drops below the operational threshold (that is, the receiver sensitivity) of a given receiver does signal loss occur. *See* Martin H. Weik, *Fiber Optics Standard Dictionary* 263 (2d ed. 1989) (Ex. 2005) (defining “receiver optical sensitivity” as “[t]he worst-case value of input optical power (dBm) coupled into a receiver, as measured on the line side of the receiver connector under specified standard or extended operating conditions, that is necessary to achieve the manufacturer-specified bit error ratio (BER) as measured under standard procedures”).

76. As a result, a POSA would understand that the transmission of light in an optical fiber is likely to result in a power loss, but such a loss does not necessarily result in a signal loss. Moreover, different optical receivers have different signal loss thresholds, that is, sensitivities (*see supra* ¶ 75), depending on

the design and materials employed in the manufacture of the receiver. As such, a POSA would understand that a power loss in the transmission of light through an optical fiber may result in signal loss in one optical receiver but that same power loss may not result in signal loss in an optical receiver that functions at reduced signal strength (power) level.

77. “Curvature loss” refers to power loss associated with macrobending of optical fiber. Exhibit VPG-1014 at 196. In optical fibers, a macrobend is a bend large enough to be seen by the human eye. *See What Are Bend Insensitive Fiber Optic Cables*, available at <https://patchbox.com/blog/the-patchblogs-1/post/what-are-bend-insensitive-fiber-optic-cables-11> (Ex. 2013 at 2). To avoid significant power losses, the radius of a macrobend in optical fiber should be greater than the minimum “bend radius.” At a radius less than this minimum, light arrives at the core/cladding boundary at an angle greater than the “critical angle” of the optical fiber. Such light escapes from the core and results in power loss. This power loss may, or may not, result in signal loss, depending of the amount of power loss and sensitivity of the receiver. *See supra* ¶¶ 75-76; Ex. VPG-1014 at 545; *see also Why Not Use Bend Insensitive Fiber Optic Cable to Reduce Bend Radius?*, FS.Com (June 29, 2016), available at <https://community.fs.com/blog/why-not-use-bend-insensitive-fiber-optic-cable-to-reduce-bend-radius.html> (Ex. 2014). The “bend radius” of optical fiber represents how sharply a cable can safely bend at any given



point without experiencing physical damage and degradation of receiver performance. *See* Ex. 2014 at 1.

78. “Microbend loss” is attributed to “optical power loss caused by a microbend, i.e., a small bend, kink or abrupt discontinuity” in the optical fiber. Exhibit VPG-1014 at 575-76. In certain circumstances, these disruptions in the interface between the optical fiber core (its central region), and its cladding (its outer region) can cause light waves to scatter, decreasing the power level of the light within the fiber core.

79. In light of these definitions, it is evident that the Petition errs in assuming that “curvature loss” and “microbend loss” in an optical waveguide (i.e., an optical fiber) result in signal loss. Both curvature loss and microbend loss refer to power losses, not signal loss. Further, neither the Petition nor Mr. Figh’s declaration provide any analysis of the factors necessary to calculate whether and how much power loss would occur in the Brenner system and whether that power loss would be sufficient to result in signal loss by the optical receiver/transceiver in the base unit of the system described in Brenner. Such an analysis would require at least a knowledge of the power delivered by the optical transmitter in the sensor unit, the materials and composition of the optical fiber (from which an appropriate bend radius could be determined), whether the optical fiber employed a sheath to support the fiber and, if so, the material and composition of that sheath, the type of

receiver employed and the minimum power it requires to generate an accurate electrical signal. Without this analysis of the specific application taught by Brenner, it is purely speculative for the Petition to conclude that the Brenner system is prone to signal loss. This point is only further accentuated by the Petition's failure to address that Brenner specifically indicates the waveguide can be successfully used. Ex. VPG-1007 at 2 (indicating that transmission using a waveguide is possible and preferred: "According to the invention, said problem is solved in that the securing tether has an optical waveguide..."); *id.* at 3 (indicating that "the optoelectronic signal transfer device operates practically without wear").

80. The second error in Petitioner's analysis arises in its assertion that a POSA would have recognized that because Brenner's optical waveguide can be a spiral cable or can under tensile stress it would be prone to signal loss. Petition at 72-74, Ex. VPG-1012 at ¶ 63. Petitioner contends that the spiraling or winding of the cable would generate curvature loss and microbending loss leading to signal loss. *Id.* at 73. Petitioner argues that a POSA would have recognized that the Brenner system "may suffer reliability issues" for these reasons. *Id.*

81. Once again, I disagree. This assertion finds absolutely no support in materials presented by Petitioner. For the reasons discussed above, an analysis of the source power, transmission power loss, and power requirements of the receiver would be necessary to conclude that signal loss was likely to occur. None of that

information is provided by Petitioner. Indeed, the reference relied upon by Mr.

Figh acknowledges that “curvature loss” occurs only “if the radius of the bend [of the optical fiber] is less than the critical radius.” Ex. VPG-1014 at 196. While the reference thereby acknowledges that bend radii exist for optical fiber where minimal or no energy loss occurs, Mr. Figh has not identified any circumstances under which the bend radius (i.e., the critical radius) of optical fiber that was known and commercially available on or before February 19, 2016 would have been violated such that the optical fiber could not have been used in the form of a “spiral cable ... [or] wound in a winding device” as disclosed in Brenner. Ex. VPG-1007 at 5-6. In fact, Mr. Figh has not analyzed the bend radius at all with respect to Brenner nor identified what bend radius would be typical in the relevant field. In the absence of such analysis, Petitioner’s and Mr. Figh’s unequivocal claim that optical fibers are prone to signal loss due to curvature loss and microbend loss is entirely speculative.

82. Nor would such information be within the knowledge of a POSA without the additional information about the materials, dimensions, other design considerations of the optical fibers and transceivers employed in the Brenner system. Brenner itself does not provide this information. In fact, Brenner provides only a conceptual blueprint and leaves it up to the skilled artisan to work out the design details. As such, a POSA would design the elements of Brenner system so

as to avoid the power loss and signal loss constraints of which Petitioner warns.

For example, a POSA would avoid curvature loss concerns by designing a coiled cord or winding device for use in the Brenner system that exceeds the minimum bend radius for the optical fiber material and size selected for the application.

83. Not only does Brenner itself directly contradict the Petition's assertion that coiled cords employing optical fiber would result in signal loss, *see* Ex. VPG-1007 at 5 (teaching that transmission is nearly without loss), but other art available well before February 19, 2016 expressly demonstrates that optical fiber was known and was commercially available that could readily be utilized with the security system of Brenner and was not "prone to reliability issues due to signal loss" when incorporated into a security tether. At least as early as 2005, "[o]ptical fiber coiled cords" (i.e., the spiral cable disclosed in Brenner at 5) were known. *See* U.S. Patent 7,349,610 to Ohsono (Ex. 2004) (hereinafter "Ohsono") at 1:19.

84. Indeed, in 2005 optical fiber that was suitable for use in "coiled cord[s] in which no damage is caused to optical connectors *and the optical fiber cord* when the optical fiber cord is tensioned" was known and disclosed in Ohsono. *Id.* at 2:37-40 (emphasis added). Ohsono disclosed optical fiber which could be wound to a diameter of between 12mm to 16mm (approximately 1/2 inch), resulting in insignificant loss. *Id.* at 4:37-49.

85. In addition to engineering the physical dimensions of the system so as to avoid significant power losses, a POSA could further limit power loss by the selection of fiber material. For example, most commonly, optical fiber has a circular cross-section and is often made from silica glass or another type of glass. *See* Bob Chomycz, *Fiber Optic Installations: A Practical Guide* 19 (1996) (Ex. 2015) (“The core and cladding are commonly made from pure silica glass.”). However, plastic optical fiber can be used in short-distance applications (such as in Brenner). One reference indicates commercialization of plastic optical fiber by Mitsubishi Rayon and others in 1986. *See Plastic Optical Fiber: An Overview*, Science Direct § 10.7.1, *available at* <https://www.sciencedirect.com/topics/materials-science/plastic-optical-fiber> (Ex. 2016 at 2). I am aware of plastic fiber manufacturing as early as 1965.

86. A POSA would understand that, unlike glass fiber, plastic fiber is less sensitive to bending power losses than is glass fiber. Plastic fiber has a critical angle, or numerical aperture, that is larger than that of glass fiber. As the critical angle increases, the minimum radius to which a fiber can be bent without power loss decreases. *See* Rüdiger Paschotta, *Numerical Aperture*, RP Photonics Encyclopedia, *available at* [https://www.rp-photonics.com/numerical\\_aperture.html](https://www.rp-photonics.com/numerical_aperture.html) (Ex. 2017 at 5-6) (stating that “a higher NA [numerical aperture] has the following consequences: ... [b]end losses are reduced; the fiber can be more strongly bent

before bend losses become significant.”). Notably, Brenner does not disclose the material of the optical fiber to be employed in its system. Thus, even if one were to accept Petitioner’s unsupported contention that the power losses in the Brenner system attributable to curvature loss and microbending loss were so excessive as to result in signal loss, a POSA would recognize that merely employing plastic optical fiber would provide a much simpler solution than fundamentally changing the entire system to replace the optical fiber with electrical conductors, as Petitioner proposes.

87. My disagreement with Petitioner’s position is further supported by the availability of ‘bend insensitive’ fibers. At least as early as 2007, bend insensitive optical fibers were introduced and available in the marketplace. *See Bend Insensitive Fiber*, Fiber Optic Association, *available at* <https://www.thefoa.org/tech/ref/fiber/BIfiber.html> (Ex. 2018 at 2). These optical fibers could be bent to small radii without significant loss. *Id.*; *see also* U.S. Patent No. 7,272,289 to Bickham at 1:50-62 (Ex. 2007) (disclosing in 2007 an operable optical waveguide fiber having a bend radius of 10 mm (i.e., a bend diameter of 20 mm)); U.S. Patent No. 7,680,381 to Bookbinder (Ex. 2008) (disclosing same in 2010); U.S. Patent Publication No. US2009/0060437 (Ex. 2019) at ¶¶ 7-9, 95 (disclosing in 2009 bend insensitive fiber operable with a bend radius between 4-15 mm). These known and commercially available bend insensitive optical fibers

would function reliably as part of the security system disclosed in Brenner. A POSA would have recognized that bend insensitive optical fiber was commercially available in or before February 19, 2016, and that such fibers would function reliably as part of the security system disclosed in Brenner. For this reason, a POSA would not have been motivated to modify Brenner by replacing the waveguide.

88. Nor would a POSA have considered the issue of microbending loss to be a concern. One with experience or knowledge of optical fibers and communications would understand that the issues associated with microbending are significant only in applications that involve long distance optical communication, not over the very short distances involved in theft-security devices like, e.g., Brenner. *See* U.S. Publication No. US2006/0045449 (Ex. 2003) at ¶ 20 (noting that “[m]icrobend losses are usually negligible for short lengths of fiber”); *id.* at ¶ 36 (defining “short lengths” as including local communications systems, such as for premises wiring and patch cabling); *see also* U.S. Patent Publication No. US2010/0124396 (Ex. 2020) at ¶ 57 (defining “short sections of fiber (1-20 meters)” as appropriate for “fiber-to-the-home, access fiber, fiber-in-the-home applications, and fiber jumpers”). Over the very short distance represented by the securing tether of Brenner, any power loss attributable to microbends would be

inconsequential and would not result in any signal loss with appropriately chosen transceivers.

89. Accordingly, contrary to the argument advanced in the Petition, a POSA would not have concluded that a spiral or wound cable would be prone to signal loss, physical damage, or would otherwise present reliability concerns. For the reasons explained above, this statement is simply incorrect and inconsistent with the state of the art as of February 19, 2016.

90. Third, and finally, the Petition errs in concluding that a POSA would have been motivated to modify the system of Brenner by replacing the optical waveguide with electrical conductors. Petition at 73-74; Ex. VPG-1012 at ¶ 64. As demonstrated above, a POSA would have recognized that he had many options in designing the dimensions and materials employed in the Brenner system and would therefore have been able to avoid any power loss concerns. As such, a POSA would have found it much simpler to implement Brenner as described, rather than scrapping the optical waveguide in favor an undisclosed system employing electrical conductors, which itself would require engineering to design.

91. Moreover, adopting Petitioner's suggestion would have required a POSA to ignore that, as of February 19, 2016, the use of standard electrical conductors presents its own set of problems, including fatigue failure, from the same cable-bending concerns raised in Mr. Figh's declaration. For example, U.S.



Patent 8,698,618 (Ex. 2009) to Henson (hereinafter “Henson”), which issued in April 2014, teaches away from the use of security cables including standard electrical conductors and identifies a “need to completely eliminate multi-conductor retractors in the retail display industry.” *Id.* at 2:47-3:3; 3:11-12.

92. A POSA, knowing the teachings of Henson, would have been discouraged from employing standard electrical conductors in security cables. Because the optical waveguide of Brenner provided the skilled artisan with an effective and reliable alternative, a POSA would not have been motivated to modify Brenner by replacing the waveguide with a security tether including standard electrical conductor.

93. I understand that Petitioner’s Ground 4, asserting the invalidity of claims 19, 20, 23, and 28, depends on the faulty reasoning set forth in the Petition and addressed above. Petition at 6. Because the Petition fails to provide any plausible rationale or motivation to modify the Brenner system as proposed by Petitioner, the Petition fails to set forth any valid obviousness allegation. Accordingly, I conclude that Petitioner has failed to establish the obviousness of the challenged claims 19, 20, 23, and 28 of the ’358 patent.

## **VII. CONCLUSION**

94. For the reasons set forth above, I conclude that a person of ordinary skill in the art as of February 19, 2016 would have implemented Grant exactly as

disclosed and would not have modified its system with Vogt. I also conclude that a person ordinary skill in the art as of February 19, 2016 would have implemented Brenner exactly as disclosed, selecting optical fibers and components known in the art to eliminate any concerns that would result in signal loss. The skilled artisan would have had no reason—and Petitioner does not identify any valid reason—to discard the optical waveguide disclosed in Brenner in favor of designing a new system from scratch using electrical conductors. In the absence of such a rationale justifying the combination of Grant or Brenner with other references, as proposed by Petitioner, I conclude that Petitioner’s proposed combinations do not render claim 19, 20, 23, or 28 of the ’358 patent invalid as obvious.

I hereby declare, under penalty of perjury, that all statements made herein based on my own personal knowledge are true and that all statements made based on information and belief are believed by me to be true. I have been warned, and I understand, that willful false statements and the like are punishable by fine, imprisonment, or both under 18 U.S.C. § 1001, and may jeopardize the validity of the '358 patent involved in this proceeding.

Dated: 6/25/2020

Eric R. Pearson

Eric R. Pearson