

CRAIG A. NEWBY (NSBN 8591)  
McDONALD CARANO WILSON LLP  
2300 West Sahara Avenue, Suite 1200  
Las Vegas, NV 89102  
Telephone: 702.873.4100  
Facsimile: 702.873.9966  
cnewby@mcdonaldcarano.com

Ryan Baker (admitted *pro hac vice*)  
rbaker@bakermarquart.com  
Scott Malzahn (admitted *pro hac vice*)  
smalzahn@bakermarquart.com  
Baker Marquart LLP  
10990 Wilshire Blvd. 4<sup>th</sup> Floor  
Los Angeles, CA 90024  
Telephone: (424) 652-7800  
Facsimile: (424) 652-7850

*Attorneys for Plaintiffs Hologram USA, Inc.,  
MDH Hologram Limited, and Uwe Maass*

**UNITED STATES DISTRICT COURT**

**DISTRICT OF NEVADA**

HOLOGRAM USA, INC., a Delaware  
corporation; MDH HOLOGRAM LIMITED, a  
corporation organized under the laws of the  
United Kingdom; and UWE MAASS, an  
individual,

Plaintiffs,

v.

CIRQUE DU SOLEIL MY CALL, LLC, a  
Delaware limited liability company; JOHN  
BRANCA and JOHN MCCLAIN, Executors of  
the Estate of Michael J. Jackson; MJJ  
PRODUCTIONS, INC., a California  
corporation; ARENA3D INDUSTRIAL  
ILLUSION, LLC, a Louisiana limited liability  
company; and DOES 1 through 10,

Defendants.

Case No. 2:14-cv-00916-RFB-NJK  
Related Case No.: 2:14-cv-00772-GMN-NJK

**THIRD AMENDED COMPLAINT**

**DEMAND FOR JURY TRIAL**

## **INTRODUCTION**

1  
2       1.       In 1862, John Pepper and Henry Dircks invented “Pepper’s Ghost,” an illusion  
3 technique, which, over the last 150 years, has appeared in movies, concerts, magic shows and  
4 amusement park rides. Many of us have sat alongside Pepper’s Ghost in Disneyland’s Haunted  
5 Mansion. Today, thanks to the Plaintiffs’ patented technology, a new incarnation of Pepper’s  
6 Ghost has appeared. The patented technology renders three-dimensional images virtually  
7 indistinguishable from real-life bodies.

8       2.       Plaintiff Hologram USA acquired exclusive rights to the patented technology  
9 directly from plaintiffs MDH Hologram Limited, formerly known as Musion das Hologram  
10 (“MDH”) and Uwe Maass, holders of the relevant patents. Hologram USA was created to  
11 specifically promote and publicize the type of three-dimensional entertainment only made  
12 possible by the Plaintiffs’ patented technology.

13       3.       Although it has been widely acknowledged that Defendants employ Plaintiffs’  
14 patented technology to create hologram-like images<sup>1</sup> of Michael Jackson in Cirque de Soleil’s  
15 “Michael Jackson: One” (the “Show”), Defendants do not possess a valid license to use that  
16 technology. Such a license may only be provided by Plaintiffs. In spite of their knowledge of  
17 Plaintiffs’ rights, none of the Defendants have ever obtained a license to use the patented  
18 technology from Plaintiffs.

19       4.       Plaintiffs have never authorized any of the Defendants to use their patented  
20 technology. Yet Defendants have used, and continue to use, the patented technology in the  
21 Show. Defendants’ willful infringement has damaged, and continues to greatly damage,  
22 Plaintiffs. Plaintiffs seek the assistance of this Court to recover damages and enjoin Defendants’  
23

---

24  
25       <sup>1</sup> Technically, the image of Michael Jackson that performs at the Cirque du Soleil show is not  
26 a hologram. The patented technology at issue in this case does not create three-dimensional  
27 images. Instead, it creates the illusion of moving, three-dimensional images through use of a  
28 patented system that projects a two-dimensional image onto glass or plastic arranged at an angle  
(e.g., a 45-degree angle) on stage.

wrongful conduct.

### **THE PARTIES**

5. Plaintiff Uwe Maass (“Maass”) is a citizen of Germany and an individual residing in the United Arab Emirates. The United States Patent & Trademark Office (“PTO”) issued U.S. Patent No. 5,865,519 (the “’519 patent”) to Mr. Maass on February 2, 1999. Mr. Maass is also the sole named inventor on the ‘519 patent. Mr. Maass has owned all rights, title and interest to the ‘519 patent since the patent’s issuance.

6. Plaintiff MDH is a corporation organized and existing under the laws of the United Kingdom, having a principal place of business at 90 High Holborn, London, United Kingdom WC1V 6XX.

7. The PTO issued U.S. Patent No. 7,883,212 (the “’212 patent”) on February 8, 2011, to Ian O’Connell and James Rock as named inventors. The ‘212 patent issued from U.S. Patent Application No. 10/599,553 (the “’553 application”). In September 2006, O’Connell and Rock, “for good and valuable consideration,” assigned their entire right, title and interest to the ‘553 application, including any and all patents granted on any division, continuation, continuation-in-part and reissue of the ‘212 patent (the “September 2006 Assignment”), to Musion Systems Limited (“MSL”). On September 26, 2013, MSL assigned “all such right, title, and interest” in the ‘212 patent, including any and all patents granted on any division, continuation, continuation-in-part and reissue of the ‘212 patent (the “September 2013 Assignment”) to Plaintiff MDH.

8. The PTO issued U.S. Patent No. 8,328,361 (the “’361 patent”) on December 11, 2012. The ‘361 patent issued from U.S. Patent Application No. 13/011,452 (the “’452 application”), which was filed on January 21, 2011. The ‘452 application is a continuation of the ‘553 application. As a result, the September 2006 Assignment to MSL included O’Connell and Rock’s entire right, title and interest to the ‘452 application and the ‘361 patent. The September 2013 Assignment to Plaintiff MDH similarly included the ‘452 application and the ‘361 patent.

1           9.       By virtue of the September 2013 Assignment, Plaintiff MDH owns all rights, title  
2 and interest to the '212 patent and the '361 patent since September 26, 2013.

3           10.      Plaintiff Hologram USA, Inc. ("Hologram USA") is a corporation organized and  
4 existing under the laws of the State of Delaware, having a principal place of business at 301 N.  
5 Canon Drive, Beverly Hills, California 90210. Since February 2014, Hologram USA is and has  
6 been the exclusive licensee of the '212 patent, the '361 patent and the '519 patent (collectively,  
7 the "Patents in Suit") for all uses except adult entertainment.

8           11.      On information and belief, defendant Cirque du Soleil My Call, LLC ("CDS My  
9 Call") is a limited liability company organized and existing under the laws of Delaware, having a  
10 principal place of business in Las Vegas, Nevada. CDS My Call is the entity that was in charge  
11 of the production, rehearsal and preparation of the Show for its presentation in Las Vegas,  
12 Nevada. CDS My Call is part of the Cirque du Soleil corporate family ("Cirque").

13           12.      On information and belief, defendants John G. Branca and John McClain are  
14 individuals residing in Los Angeles, California. Branca and McClain have been appointed as the  
15 Executors of the Estate of Michael J. Jackson (the "Jackson Estate"). They are sued in that  
16 capacity.

17           13.      On information and belief, defendant MJJ Productions, Inc. is a corporation  
18 organized and existing under the laws of California, having a principal place of business in  
19 Hollywood, California.

20           14.      On information and belief, defendant Arena3D Industrial Illusion, LLC  
21 ("Arena3D") is a limited liability company organized and existing under the laws of Louisiana,  
22 with its principal place of business in New Orleans, Louisiana.

23           15.      The true names and capacities, whether individual, corporate, associate, or  
24 otherwise, of the defendants sued in this complaint as DOES 1-10 (the "Doe Defendants") are  
25 presently unknown to Plaintiffs, who therefore sue them by fictitious names. Plaintiffs will  
26 amend the complaint to allege their true names and capacities when ascertained. Plaintiffs are  
27 informed and believe and therefore allege that all Defendants were or are, in some way or  
28

1 manner, responsible for and liable to Plaintiffs for the events, happenings, and damages alleged  
2 in this complaint.

3 16. Plaintiffs are informed and believe and thereon allege that at all times mentioned,  
4 each Defendant was the agent, servant, employee, co-venturer, representative, or co-conspirator  
5 of each of the other defendants, and acted with the knowledge, consent, ratification,  
6 authorization and/or at the direction of each Defendant, or is otherwise responsible in some  
7 manner for the occurrences alleged in this complaint.

8 **JURISDICTION AND VENUE**

9 17. This is a civil action for patent infringement arising under the Patent Laws of the  
10 United States of America, 35 U.S.C. § 101, *et seq.*

11 18. This Court has jurisdiction over the subject matter of this Complaint pursuant to  
12 28 U.S.C. §§ 1331 and 1338.

13 19. This Court has personal jurisdiction over Defendants for at least the following  
14 reasons: (i) Defendants regularly do business or solicit business, engage in other persistent  
15 courses of conduct, and/or derive substantial revenue from products and/or services provided to  
16 individuals in this District and in this State; (ii) Defendants have purposefully established  
17 substantial, systematic, and continuous contacts with this District and expect or should  
18 reasonably expect to be in court here; and (iii) the Defendants purposefully availed themselves of  
19 the privilege of conducting activities within the forum state and the causes of action alleged  
20 herein arise out of Defendants' contacts with the forum. Thus, this Court's exercise of  
21 jurisdiction over Defendants will not offend traditional notions of fair play and substantial  
22 justice.

23 20. Venue is proper in this judicial district pursuant to 28 U.S.C. §§ 1391(b)-(c) and  
24 1400(b) because Defendants have committed acts of infringement in this District, Defendants  
25 have a regular and established place of business in this District, and Defendants reside in and are  
26 subject to personal jurisdiction in this District.

**FACTUAL ALLEGATIONS****A. The Patented Technology**

21. The Patents in Suit cover various amazing techniques for creating the illusion of life-size, full color, 3D moving images. The images in these systems appear three-dimensional, but are projected as two-dimensional images into a three-dimensional stage set. This technology is capable of creating the appearance of life-size, three-dimensional moving images on stage that are nearly indistinguishable from real people.

22. For example, Maass developed the inventions claimed in the '519 patent after researching an old stage trick called "Pepper's Ghost," originally developed in the 1800s. Pepper's Ghost was capable of creating the illusion of a ghost on stage. The trick relied, in part, on a heavy pane of glass positioned on stage to reflect the image of an actor positioned off-stage. This trick is still used today, such as at Disney's Haunted Mansion. While Pepper's Ghost is a relatively simple technique for creating an illusion, it is not capable of producing large effects that could move around on a large stage. Before Maass's invention, people had to use technology that relied on 3D glasses to create the illusion of a large three-dimensional moving image on stage or on screen.

23. After studying Pepper's Ghost, Maass invented a proprietary system using a transparent smooth foil, capable of creating the illusion of life-size and three-dimensional images that may move around on a large stage. Importantly, the use of transparent smooth foil is practical to transport and setup on an existing stage and safe in comparison to the glass traditionally used in Pepper's Ghost. The invention also eliminated the need for using 3D glasses.

24. The technology described in the Patents in Suit is known for producing high quality holographic-like projections. In 2006, certain embodiments of the technology were used to create a "live" performance by the animated band Gorillaz at the Grammy Awards. Subsequently, in 2012, pursuant to a license it had obtained from the patent holders at the time, Digital Domain used certain embodiments of the Plaintiffs' patented technology at the Coachella

1 Music Festival to produce a life-size, three-dimensional moving image of deceased rapper Tupac  
2 Shakur performing on stage with Dr. Dre and Snoop Dogg.

3 25. In February 2014, Hologram USA acquired exclusive rights to the Patents in Suit.  
4 Hologram USA entered into an agreement with Maass and MDH to acquire these exclusive  
5 rights. As a result of the parties' agreement, Hologram USA became the exclusive licensee to  
6 the Patents in Suit in all markets in the United States and Canada, with the exception of adult  
7 entertainment.

8 **B. "Michael Jackson: One"**

9 26. "Michael Jackson: One" (the "Show") is the second Michael Jackson-themed  
10 show produced by Cirque, after "Michael Jackson: The Immortal World Tour." Cirque  
11 partnered with the Jackson Estate and/or MJJ Productions to produce this spectacular show at  
12 Mandalay Bay on the Las Vegas strip. It has been enormously successful. According to press  
13 reports, the show has helped the Jackson Estate reap almost a billion dollars in revenue.

14 27. On information and belief, the Show was approved by the Jackson Estate.  
15 According to press reports, the Jackson Estate and Cirque agreed to "split the costs and profits of  
16 their collaborative ventures 50/50, while intellectual property royalties will go to the estate." See  
17 Randy Lewis, *Michael Jackson estate, Cirque du Soleil team for 2011 arena tour, 2012 Las*  
18 *Vegas show*, Los Angeles Times, April 20, 2010, available at  
19 [http://latimesblogs.latimes.com/music\\_blog/2010/04/michael-jackson-cirque-du-soleil-team-for-](http://latimesblogs.latimes.com/music_blog/2010/04/michael-jackson-cirque-du-soleil-team-for-arena-tour-permanent-las-vegas-show-.html)  
20 [arena-tour-permanent-las-vegas-show-.html](http://latimesblogs.latimes.com/music_blog/2010/04/michael-jackson-cirque-du-soleil-team-for-arena-tour-permanent-las-vegas-show-.html).

21 28. According to advertisements, the Show's plot is centered around four "misfits"  
22 who set out on a journey into Michael Jackson's world and music. By journey's end, they  
23 personify Jackson's agility, courage, playfulness and love. These values are represented with his  
24 white gloves, white socks and black shoes, hat and sunglasses.

25 The show strategically uses video and audio footage of the deceased singer throughout  
26 the plot's peaks and valleys. Welby Altidor, the show's director of creation, explained the  
27 creative vision for the show: "What we wanted to do in this show is build Michael's presence  
28

1 through his voice and feeling his shadow, to feeling him progressively becoming more and more  
2 present throughout the show, until we can create the longing. And then the apex, the moment  
3 where we'll really feel that he's there and he's still with us." Ashley Lee, *Cirque du Soleil's*  
4 *Tribute Show 'Michael Jackson One' Moves Into Las Vegas (Exclusive Photo)*, The Hollywood  
5 Reporter, May 6, 2013, available at [http://www.hollywoodreporter.com/news/cirque-du-soleil-s-](http://www.hollywoodreporter.com/news/cirque-du-soleil-s-tribute-452213)  
6 [tribute-452213](http://www.hollywoodreporter.com/news/cirque-du-soleil-s-tribute-452213).

7 29. At the climax of the 26-scene show, a hologram-like projection of the late King of  
8 Pop magically materializes on stage and delivers a rousing rendition of "Man In The Mirror."  
9 *Forbes* magazine describes the mesmerizing performance:

10 Throughout the song, Jackson's hologram stomps around the stage as a coterie of  
11 backup dancers swirl around him, moving in unison like a school of fish with one  
12 illusory leader. The phantom Jackson even executes a move that involves  
13 dropping to one knee and getting back up; he's briefly transformed into a Jackson  
14 5 era version of himself before evaporating at the song's end.

15 When Jackson first appeared onstage, you could feel a swell of energy ripple  
16 through the sellout crowd at Mandalay Bay. It wasn't accompanied by the  
17 volume level of some of the show's other big moments, almost as if the audience  
18 was holding its collective breath to keep from shattering the fleeting sliver of  
19 hope that this was not an illusion, but the King of Pop himself.

20 Zack O'Malley Greenburg, *Michael Jackson Returns To The Stage In Vegas--As A Hologram*,  
21 Forbes, Mar. 24, 2013, available at [http://www.forbes.com/sites/](http://www.forbes.com/sites/zackomalleygreenburg/2013/05/24/michael-jacksons-hologram-rocks-las-vegas-arena/)  
22 [zackomalleygreenburg/2013/05/24/michael-jacksons-hologram-rocks-las-vegas-arena/](http://www.forbes.com/sites/zackomalleygreenburg/2013/05/24/michael-jacksons-hologram-rocks-las-vegas-arena/).

23 30. Several years ago during the planning stages of the Show, Cirque engaged in  
24 discussions with Plaintiffs' predecessor, Musion Systems Limited, about obtaining a license to  
25 practice the patented technology. Pursuant to a non-disclosure agreement, Musion Systems  
26 Limited provided Cirque with information detailing how to create a holographic-like projection  
27 of Michael Jackson for the Show using the patented technology. However, Cirque turned down  
28 the opportunity to license the right to practice the patented technology.

31. Even though CDS My Call and the other Defendants did not obtain any license or  
other authorization from Plaintiffs or any of their predecessors, based on information and belief,



Defendants used the patented technology to create the projection of Jackson in the Show.

32. Hologram USA has placed Cirque (including CDS My Call) on notice of its infringing activities, but CDS My Call has not stopped using the patented technology.

33. Based on information and belief, Defendants are infringing on one or more of the claims of the Patents in Suit.

Defendants' infringement of the '519, '212, and '361 patents has caused and will continue to cause monetary and other damages to Plaintiffs.

### C. Arena3D's Infringing Activities

34. Based on information only recently obtained, Plaintiffs have confirmed that Arena3D supplied certain parts to CDS My Call for the apparatus that was used to create the Jackson hologram for the Show. Specifically, Plaintiffs believe that Arena3D supplied Mylar foil and possibly other equipment and know-how to CDS My Call.

35. Arena3D advertises itself as a provider of a low cost and "license-free" alternative to the patented technology offered by Plaintiffs. On its website, Arena3D claims that its system "is package priced for your budget. Once you have purchased it, you own it. We offer turnkey systems as well as 'ala carte' device selection so to speak." See <http://www.arena3d.com/facts.html>.

36. Additionally, Arena3D's website purports to "compare" its product to the patented technology owned by Maass and MDH. Arena3D attempts to differentiate itself through a series of bullet points, writing:

#### HOW WE STACK UP AGAINST THE COMPETITION

##### ARENA3D®

- we're nice to deal with
- excellent effect
- crystal clear effect foils
- reflectivity / transmission selection

##### MUSION® UK ... MEL/MSL/

March 2014 -- UPDATE -- Musion® UK has split

- excellent effect
- restricted install method

- |   |  |   |
|---|--|---|
| 1 | choices  | ● alarming NDA agreement                      |
| 2 | ● flexible installation routine                                | ● you never own the equipment                 |
| 3 | ● world's largest super-span foils up to 12m x infinite length | ● flame resistant                             |
| 4 | ● certified NFPA 701 & 702 flame resistant                     | ● pay every time you use it                   |
| 5 | ● LICENSE FREE   | ● must buy foils from Musion® UK ... MEL/MSL? |
| 6 | ● UNRESTRICTED Pepper's Ghost methodology                      | ● <u>pay in British Pounds or Euro</u>        |
| 7 | ● you retain ownership   | ● considerably more costly                    |
| 8 | ● save at least 25%+ overall costs                             |   |

9 See <http://www.arena3d.com/compare.html>.

10 37. Arena3D acknowledges on its website that it is frequently asked if its system  
 11 infringes on the patented technology developed by Maass. In response to this question, Arena3D  
 12 claims that “there are other equally good ways to produce the effect not under any patent  
 13 restriction whatsoever, hence we simply employ one of these. We are happy to educate clients  
 14 about this.” See <http://www.arena3d.com/facts.html>.

15 38. Despite the self-serving assertions on its website, Arena3D’s system does infringe  
 16 on Plaintiffs’ patented technology. On information and belief, Arena3D uses the same tension  
 17 system and other elements that infringe on one or more claims in the Patents in Suit.

18 39. Additionally, Arena3D improperly acquired confidential proprietary business  
 19 information about Plaintiffs’ technology from an ex-employee who used to work for Maass’  
 20 company. Arena3D has improperly exploited this proprietary information for its own  
 21 enrichment in violation of Plaintiffs’ rights.

22 40. Arena3D has been placed on notice of its infringing activities, but has continued  
 23 to use and sell the patented technology.

24 41. Defendants’ infringement of the ‘519, ‘212, and ‘361 patents has caused and will  
 25 continue to cause monetary and other damages to Plaintiffs. Based on information and belief,  
 26 Arena3D’s infringement of the Patents in Suit is not limited to the Show, but extends to other  
 27 acts of direct and indirect infringement in connection with other projects.  
 28



1           48.     Plaintiffs have been and continue to be damaged by Defendants' infringement of  
2 the '519 patent in an amount to be determined at trial.

3                     **SECOND CLAIM FOR RELIEF – Against All Defendants**

4                             **(Infringement of Patent No. 7,883,212)**

5           49.     Plaintiffs incorporate by reference the preceding averments set forth in the  
6 preceding paragraphs.

7           50.     The '212 patent was duly and lawfully issued on February 8, 2011 and is titled  
8 "Projection Apparatus And Method For Pepper's Ghost Illusion." Ian O'Connell and James  
9 Rock are the named inventors. The claims of the '212 patent are directed at a projection  
10 apparatus arranged to project an image of an object upon an inclined, partially reflective, screen  
11 so as to give a false perception of depth and a method for constructing such an apparatus. *See*  
12 Exhibit B.

13           51.     In or about September 2006, Ian O'Connell and James Rock assigned all their  
14 interests in the anticipated application for the '212 patent to MSL. A true and correct copy of the  
15 Patent Assignment Abstract of Title is attached as Exhibit C.

16           52.     In or about September 2013, MSL assigned all its interests in the '212 patent to  
17 MDH. In fact, on May 21, 2014, the Court of Appeal for the Royal Courts of Justice in the  
18 United Kingdom issued a decision in which a three-judge panel unanimously affirmed a lower  
19 court order permitting an administration sale of Musion Systems Limited's assets to MDH. A  
20 true and correct copy of this decision by the Court of Appeal is attached as Exhibit D.

21           53.     MDH is the owner of the '212 patent, and Hologram USA has licensed the  
22 exclusive right to exploit this patent in all markets in the U.S. and Canada with the exception of  
23 adult entertainment. MDH and Hologram USA have the right to bring this suit for injunctive  
24 relief and damages.

25           54.     On information and belief, Defendants have been, are currently, and unless  
26 enjoined, will continue to directly infringe one or more claims of the '212 patent by making,  
27 using, offering to sell, and selling within the United States the patented invention, including but  
28

1 not limited to the improper and unauthorized use of the patented technology to create a  
2 holographic-like projection of Michael Jackson on stage. Defendants' products and services  
3 embody and/or practice one or more claims of the '212 patent.

4 55. Defendants' infringing activities have caused and will continue to cause Plaintiffs  
5 irreparable harm, for which they have no adequate remedy at law, unless Defendants' infringing  
6 activities are enjoined by this Court in accordance with 35 U.S.C. § 283.

7 56. Plaintiffs have been and continue to be damaged by Defendants' infringement of  
8 the '212 patent in an amount to be determined at trial.

9 **THIRD CLAIM FOR RELIEF – Against All Defendants**

10 **(Infringement of Patent No. 8,328,361)**

11 57. Plaintiffs incorporate by reference the preceding averments set forth in the  
12 preceding paragraphs.

13 58. The '361 patent was duly and lawfully issued on December 11, 2012 and is titled  
14 "Projection Apparatus and Method for Pepper's Ghost Illusion." Ian O'Connell and James Rock  
15 are the named inventors. A true and correct copy of the '361 patent is attached as Exhibit E.

16 59. The '361 patent is a continuation of the '212 patent. In or about September 2006,  
17 Ian O'Connell and James Rock assigned all their interests in the anticipated application for the  
18 '212 patent, including any continuations such as the '361 patent, to MSL.

19 60. In or about September 2013, MSL assigned all its interests in the '361 patent to  
20 MDH pursuant to an administration sale.

21 61. MDH is the owner of the '361 patent, and Hologram USA is the exclusive  
22 licensee to the '361 patent in all markets in the U.S. and Canada with the exception of adult  
23 entertainment. MDH and Hologram USA have the right to bring this suit for injunctive relief  
24 and damages.

25 62. On information and belief, Defendants have been, are currently and, unless  
26 enjoined, will continue to directly infringe one or more claims of the '361 patent by making,  
27 using, offering to sell, and selling within the United States the patented invention. Defendants'  
28

1 products and services embody and/or practice one or more claims of the '361 patent literally  
2 and/or under the doctrine of equivalents.

3 63. Defendants' infringing activities have caused and will continue to cause Plaintiffs  
4 irreparable harm, for which they have no adequate remedy at law, unless Defendants' infringing  
5 activities are enjoined by this Court in accordance with 35 U.S.C. § 283.

6 64. Plaintiffs have been and continue to be damaged by Defendants' infringement of  
7 the '361 patent in an amount to be determined at trial.

8 **FOURTH CLAIM FOR RELIEF – Against All Defendants**

9 **(Willful Infringement)**

10 65. Plaintiffs incorporate by reference the preceding averments set forth in the  
11 preceding paragraphs.

12  
13 66. As alleged above, the Defendants are and have been aware of the Patents in Suit.  
14 The Defendants have been practicing and continue to practice the technology claimed in the  
15 Patents in Suit without a valid license to do so. Defendants' infringement of the Patents in Suit  
16 has been willful.

17 67. Defendants willfully and deliberately infringe the Patents in Suit in disregard of  
18 Plaintiffs' rights. On information and belief, each of the Defendants was aware of the Patents in  
19 Suit. In light of their experience in the entertainment industry, Defendants certainly had reason  
20 to know that the technology used to create the famous Tupac Shakur holographic-like projection  
21 is patented. Despite their knowledge of the existence of the Patents in Suit, each of the  
22 Defendants willfully, intentionally and consciously infringed the patent by making, using, selling  
23 and offering to sell the patented Eyeliner system to create a holographic projection of Michael  
24 Jackson for the Show. Plaintiffs will continue to be irreparably harmed by the infringement  
25 because the Defendants have contributed to confusion in the marketplace as to the rightful  
26 owners and licensors of the Patents in Suit.

27 68. As alleged above, the Defendants did not possess a valid license from the  
28

1 Plaintiffs to make, use, offer to sell or sell the patented technology to create a holographic  
2 performance of Michael Jackson for the Show. Despite not having the proper license,  
3 Defendants willfully infringed the Patents in Suit. Additionally, Arena3D has continued its  
4 infringing activities and its infringement is not limited to the Show.

5 69. On information and belief, the Defendants knew about the Patents in Suit before  
6 the complaint in this action was filed, and acted despite an objectively high likelihood that their  
7 actions constituted infringement of a valid patent. All of the Defendants are sophisticated and  
8 experienced players in the entertainment industry with reason to know about the existence of the  
9 Patents in Suit. Indeed, especially after the YouTube video of the Tupac Shakur performance at  
10 the 2012 Coachella Music Festival went viral, the patented technology grew in popularity within  
11 the entertainment industry.

12 70. CDS My Call clearly knew about the Patents in Suit because Cirque engaged in  
13 contract discussions with Plaintiffs' predecessor, MSL, about obtaining the rights to use the  
14 patented technology. Despite its failure to obtain a license, based on information and belief,  
15 CDS My Call, working in partnership with the Jackson Estate and the other Defendants, used the  
16 technology to create a holographic-like projection of Michael Jackson for the Show. Further,  
17 Arena3D, which actively promotes itself as a provider of a "license-free" alternative to the  
18 services offered by Plaintiffs and their predecessors, knew about the Patents in Suit. Under these  
19 circumstances, the Defendants surely understood that the cutting-edge technology used to create  
20 the holographic-like projection was patented.

21 71. Additionally, before filing this lawsuit, on March 17, 2014, Plaintiffs sent a letter  
22 to Cirque in which it placed them on written notice of their alleged infringement. Rather than  
23 cease and desist from any further patent infringement, CDS My Call continued to use the  
24 patented technology without Plaintiffs' authorization.

25 72. Despite their knowledge of the existence of the Patents in Suit, based on  
26 information and belief, Defendants willfully, intentionally and consciously infringed the Patents  
27 in Suit in disregard of Plaintiffs' rights.

73. As a direct and proximate result of Defendants' willful infringement of the Patents in Suit, Plaintiffs have been and will continue to suffer monetary damages and irreparable injury. Defendants have contributed to on-going confusion in the marketplace as to the rightful owners and licensors of the Patents in Suit, which renders this case appropriate for treble damages.

**FIFTH CLAIM FOR RELIEF – Against CDS My Call and Arena3D**

**(Active Inducement)**

74. Plaintiffs incorporate by reference the preceding averments set forth in the preceding paragraphs.

75. In addition to or as an alternative to directly infringing the Patents in Suit, CDS My Call and Arena3D are liable for indirect infringement. CDS My Call and Arena3D actively induced the direct infringement of the Patents in Suit in violation of 35 U.S.C. section 271(b), which provides that whoever "actively induces infringement of a patent shall be liable as an infringer."

76. As alleged in greater detail above, CDS My Call and Arena3D knew about the Patents in Suit before the complaint in this action was filed, and acted with knowledge that their induced acts constitute patent infringement. Arena3D has had prior experiences with the Plaintiffs' patented technology – which is widely known within the entertainment industry. Additionally, before filing this lawsuit, on March 17, 2014, Plaintiffs sent a letter to Cirque in which it placed them on written notice of their alleged infringement. On information and belief, CDS My Call and Arena3D intended to induce infringement of the Patents in Suit. These defendants are sophisticated in the entertainment industry and knew or had reason to know that the technology at issue, which was famously used to create a holographic-like projection of Tupac Shakur in 2012, is patented. Despite this knowledge, these defendants worked together to create a holographic performance of Michael Jackson, which was used and still is used in the Show. CDS My Call and Arena3D intended to induce each other and the Jackson Estate and MJJ Productions to infringe the Patents in Suit. Indeed, CDS My Call and Arena3D caused,



1 urged, encouraged and/or aided in the infringing conduct. Additionally, it is suspected that  
2 Arena3D supplied Mylar foil to the other defendants knowing and specifically intending that the  
3 foil would be used to infringe the Patents in Suit.

4 77. As a direct and proximate result of CDS My Call and Arena3D's induced  
5 infringement of the Patents in Suit, Plaintiffs have been and will continue to suffer monetary  
6 damages and irreparable injury.

7 **SIXTH CLAIM FOR RELIEF – Against CDS My Call and Arena3D**

8 **(Contributory Infringement)**

9 78. Plaintiffs incorporate by reference the preceding averments set forth in the  
10 preceding paragraphs.

11 79. In addition to or as an alternative to directly infringing the Patents in Suit, CDS  
12 My Call and Arena3D are liable for indirect infringement. These defendants engaged in  
13 contributory infringement of the Patents in Suit in violation of 35 U.S.C. section 271(c), which  
14 provides that “[c]ontributory infringement occurs if a party sells or offers to sell, a material or  
15 apparatus for use in practicing a patented process, and that ‘material or apparatus’ is material to  
16 practicing the invention, has no substantial non-infringing uses, and is known by the party ‘to be  
17 especially made or especially adapted for use in an infringement of such patent.’”

18 80. As alleged in greater detail above, CDS My Call and Arena3D knew about the  
19 Patents in Suit before the complaint in this action was filed, and acted with knowledge that their  
20 induced acts constitute patent infringement.

21 81. Based on information and belief, CDS My Call and Arena3D contributed to the  
22 infringement of the Patents in Suit by having customers sell, offer to sell, use and import into the  
23 United States and this Judicial District, and placing into the stream of commerce, the patented  
24 technology including but not limited to its related components (including Mylar foil) with  
25 knowledge that such products infringe the Patents in Suit.

26 82. Based on information and belief, CDS My Call and Arena3D's products,  
27 including but not limited to the Mylar foil, are especially made or adapted for infringing the  
28

1 Patents in Suit and have no substantially non-infringing uses. Indeed, this foil was specially  
2 designed for the purpose of practicing the Patents in Suit.

3 83.

4 As a direct and proximate result of CDS My Call and Arena3D's contributory infringement of  
5 the Patents in Suit, Plaintiffs have been and will continue to suffer monetary damages and  
6 irreparable injury.

7 **SEVENTH CLAIM FOR RELIEF – Against All Defendants**

8 **(Preliminary and Permanent Injunction)**

9 84. Plaintiffs incorporate by reference the preceding averments set forth in the  
10 preceding paragraphs.

11 85. Immediate and irreparable injury will result to Plaintiffs unless this Court enters a  
12 Preliminary Injunction, pursuant to FRCP 65, enjoining all Defendants and their agents, servants,  
13 employees, attorneys, subsidiaries and any other individual or entity in active concert or  
14 participation with them who receives actual notice of the order, from infringing, inducing others  
15 to infringe, or contributing to the infringement of the Patents in Suit, including the manufacture,  
16 use, sale, importation, and offer to sell any holographic-like equipment or services related to the  
17 use of such holographic-like equipment covered by the Patents in Suit.

18 86. Plaintiffs have a likelihood of success on the merits given that there is no dispute  
19 that Defendants have infringed and continue to infringe the Patents in Suit, by using and selling  
20 this patented technology to create a holographic-like image of Michael Jackson for the Show.

21 87. As a result of Defendants' unlawful activities, Plaintiffs have suffered and will  
22 suffer irreparable harm. Hologram USA has spent several million dollars building the Hologram  
23 USA name and brand, including a Beverly Hills showroom to display and market the patented  
24 technology to potential customers.

25 88. The acts of the Defendants have already caused Plaintiffs significant harm. By  
26 advertising, promoting and displaying a Michael Jackson holographic image at the Show,  
27 Defendants have contributed to significant confusion in the marketplace. That confusion has  
28

1 diluted the value of the Hologram USA brand by causing confusion among potential  
2 customers. The actions of the Defendants have interfered with numerous potential business deals  
3 between Hologram USA and potential customers.

4 89. If Defendants are permitted to continue their infringing conduct, including but not  
5 limited to the continued use of the Michael Jackson holographic image at the Show, the  
6 irreparable harm suffered by Hologram USA will be immeasurable. The publicity associated  
7 with such a display cannot be reduced to monetary terms.

8 90. Additionally, Arena3D's infringement is not limited to its involvement in  
9 supplying certain parts to CDS My Call for the Show. It has engaged in and continues to engage  
10 in acts of direct and/or indirect infringement that undermine Plaintiffs' patent rights.

11 91. Defendants' actions will continue to irreparably harm Plaintiffs' business  
12 reputation and brand by creating consumer confusion as to the true owner of the patented  
13 technology. No adequate remedy at law will alleviate this harm.

14 **REQUEST FOR RELIEF**

15 WHEREFORE, Plaintiffs respectfully request that:

16 a. Judgment be entered finding that Defendants have infringed one or more claims  
17 of the '212, '361 and '519 patents;

18 b. Judgment be entered permanently enjoining Defendants, their directors, officers,  
19 agents, servants, and employees, and those acting in privity or in concert with them, and their  
20 subsidiaries, divisions, successors and assigns, from further acts of infringement of the '212,  
21 '361 and '519 patents;

22 c. Judgment be entered finding that Defendants' infringement has been willful;

23 d. Judgment be entered awarding Plaintiffs all damages adequate to compensate  
24 them for Defendants' infringement of the '212, '361 and '519 patents, including all pre-judgment  
25 and post-judgment interest at the maximum rate permitted by law, and including a trebling of  
26 such damages due to Defendants' willful infringement.

27 e. For reasonable attorneys' fees incurred in bringing and litigating this action;

- f. For costs of suit herein; and  
g. Judgment be entered awarding all other relief as the Court deems proper.

**DEMAND FOR JURY TRIAL**

Please take notice that Plaintiffs demand trial by jury in this action.

DATED this 4th day of March, 2015.

McDONALD CARANO WILSON LLP

By: /s/ Ryan G. Baker

CRAIG A. NEWBY (#8591)  
2300 W. Sahara Avenue, #1200  
Las Vegas, Nevada 89102  
Telephone: 702.873.4100  
Facsimile: 702.873.9966  
cnewby@mcdonaldcarano.com

RYAN G. BAKER (admitted *pro hac vice*)  
BAKER MARQUART LLP  
10990 Wilshire Boulevard  
Fourth Floor  
Los Angeles, CA 90024  
Telephone: 424.652.7800  
Facsimile: 424.652.7850  
rbaker@bakermarquart.com

*Attorneys for Plaintiffs Hologram USA, Inc.,  
MDH Hologram Limited and Uwe Maass*

# **EXHIBIT A**



US005865519A

**United States Patent** [19][11] **Patent Number:** **5,865,519****Maass**[45] **Date of Patent:** **Feb. 2, 1999**[54] **DEVICE FOR DISPLAYING MOVING IMAGES IN THE BACKGROUND OF A STAGE**

5,573,325	11/1996	Lekowski	353/28
5,669,685	9/1997	Kotau et al.	353/28
5,685,625	11/1997	Beaver	353/28

[76] **Inventor:** **Uwe Maass**, Lindlarer Strasse 107, D-51491, Overath, Germany**FOREIGN PATENT DOCUMENTS**[21] **Appl. No.:** **836,911**

389185	9/1908	France
408191	3/1910	France
2714741	7/1995	France
2039680	8/1980	United Kingdom
WO 89/05682	6/1989	WIPO

[22] **PCT Filed:** **Aug. 31, 1996**[86] **PCT No.:** **PCT/EP96/03832****OTHER PUBLICATIONS**§ 371 Date: **Jul. 7, 1997**

Rasche et al., Buhntechnische Rundschau (1990) BTR 3:24-5.

§ 102(e) Date: **Jul. 7, 1997**[87] **PCT Pub. No.:** **WO97/11405***Primary Examiner*—William Dowling  
*Attorney, Agent, or Firm*—Klauber & Jackson**PCT Pub. Date:** **Mar. 27, 1997**[30] **Foreign Application Priority Data**[57] **ABSTRACT**

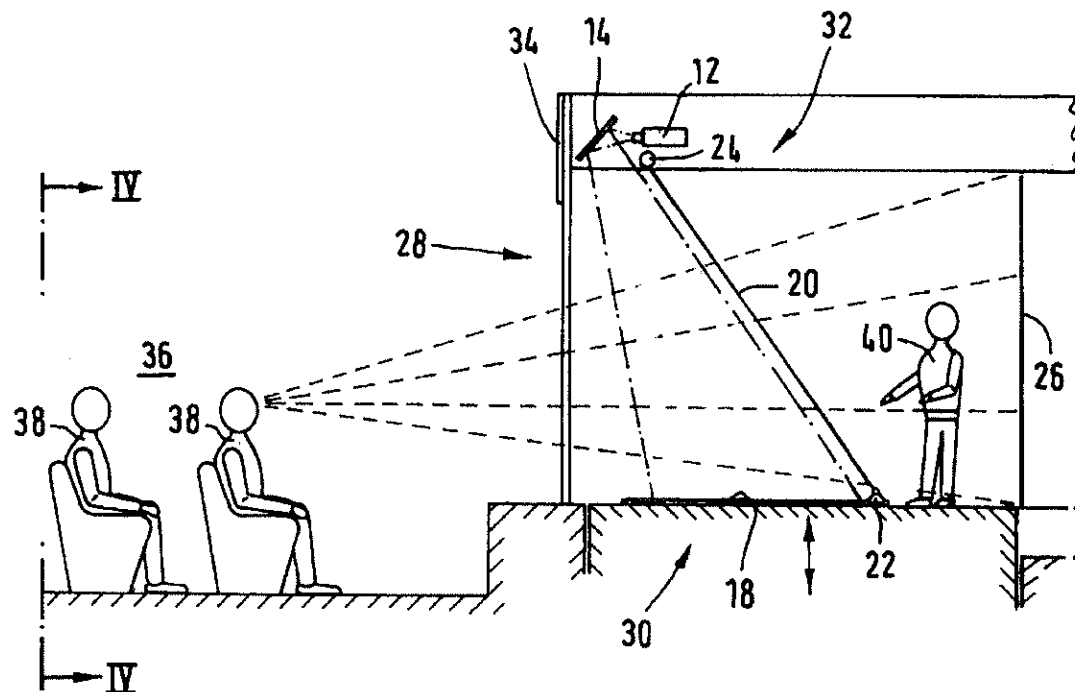
Sep. 20, 1995 [DE] Germany ..... 295 15 073 U

[51] **Int. Cl.<sup>6</sup>** ..... **G03B 21/28**[52] **U.S. Cl.** ..... **353/28; 359/630; 472/58**[58] **Field of Search** ..... 353/28, 98, 30, 353/29, 10; 359/478, 630; 472/58, 61, 63

An article such as for example a motor vehicle at a publicity function is to be represented in front of different viewers (38) in the background of a stage (28) in the form of a virtual image (26). A presenter (40) is to stand in the image and give explanations. Disposed above the stage (28) is an image source (12, 14). It projects an image, a film, on to a reflecting surface (18) on the floor (30) of the stage (28). Behind that reflecting surface (18) a transparent smooth foil (20) extends at 45° from the ceiling (32) to the floor (30). The image produced by the image source (12, 14) appears to the viewers (38) as a virtual image (26) behind the foil (20). The presenter (40) stands behind the foil (20) and in the middle of the image.

[56] **References Cited****U.S. PATENT DOCUMENTS**

1,053,887	2/1913	Sontag	
1,358,110	11/1920	Presicce	
2,198,815	4/1940	Haskin	
3,035,836	5/1962	McCulley	353/28
4,805,895	2/1989	Rogers	

**15 Claims, 5 Drawing Sheets**

U.S. Patent

Feb. 2, 1999

Sheet 1 of 5

5,865,519

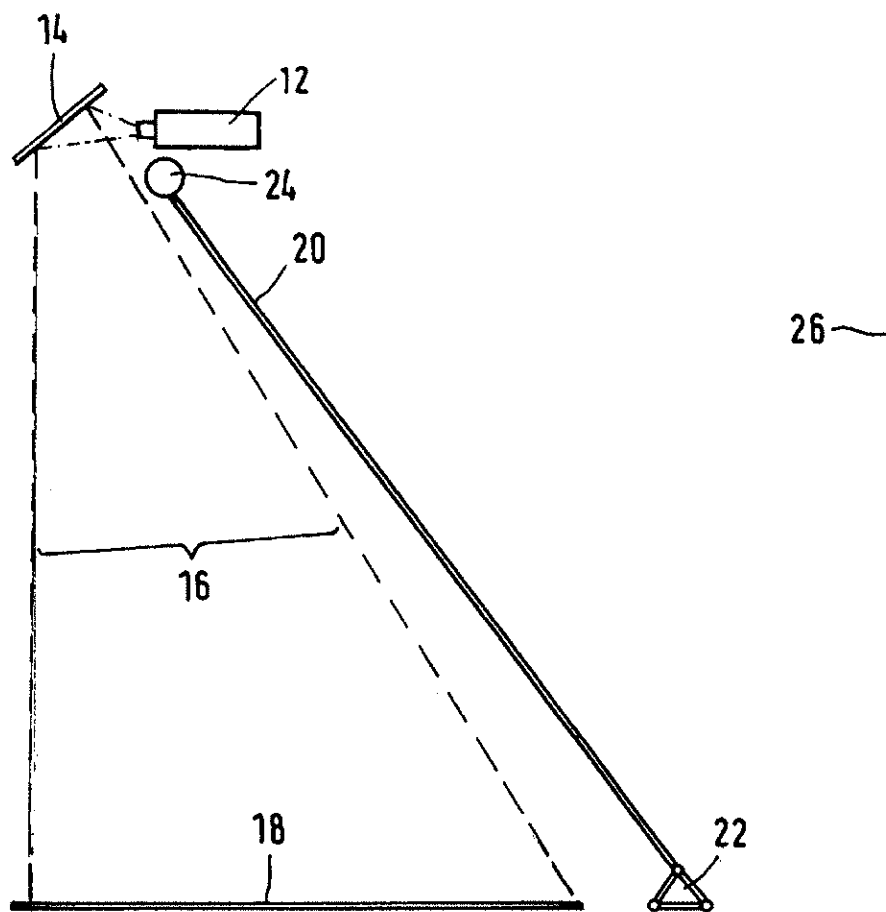


FIG.1

U.S. Patent

Feb. 2, 1999

Sheet 2 of 5

5,865,519

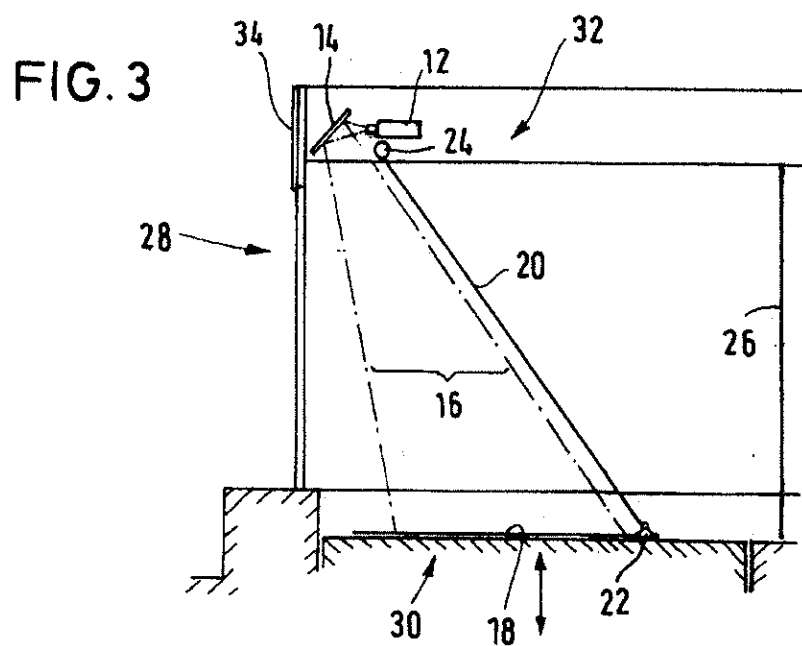
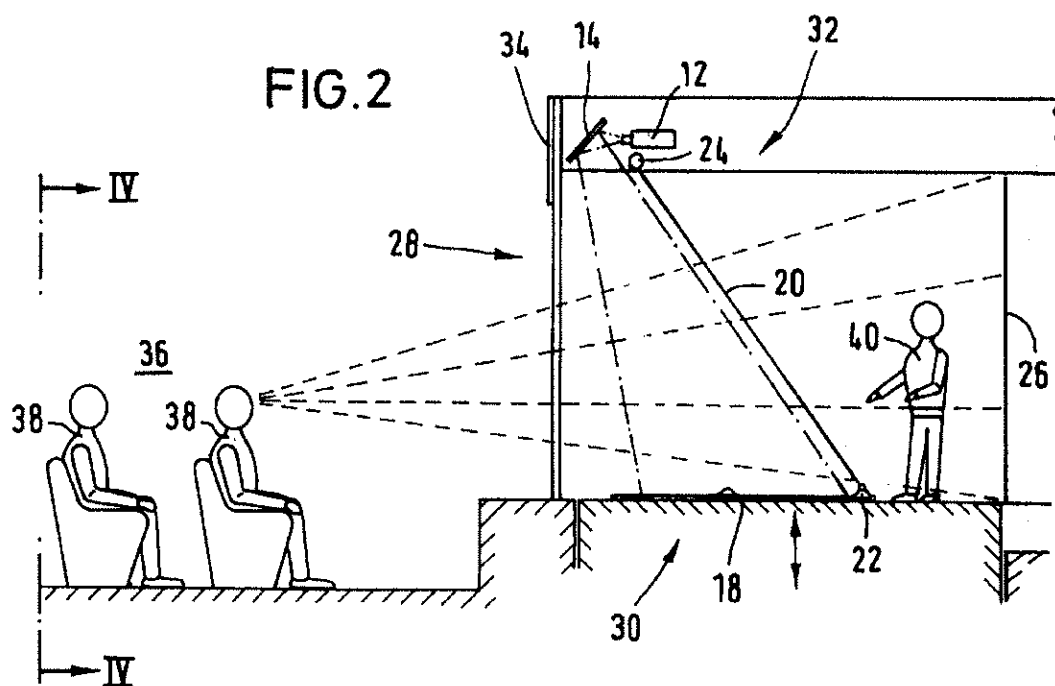
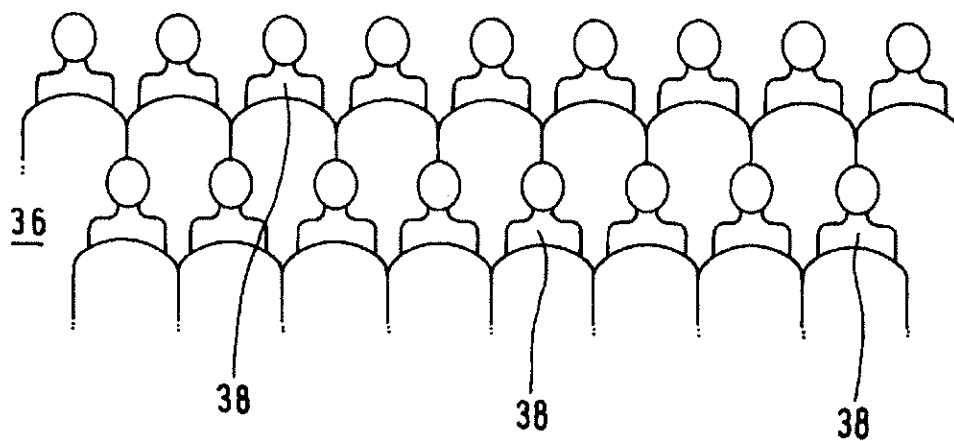
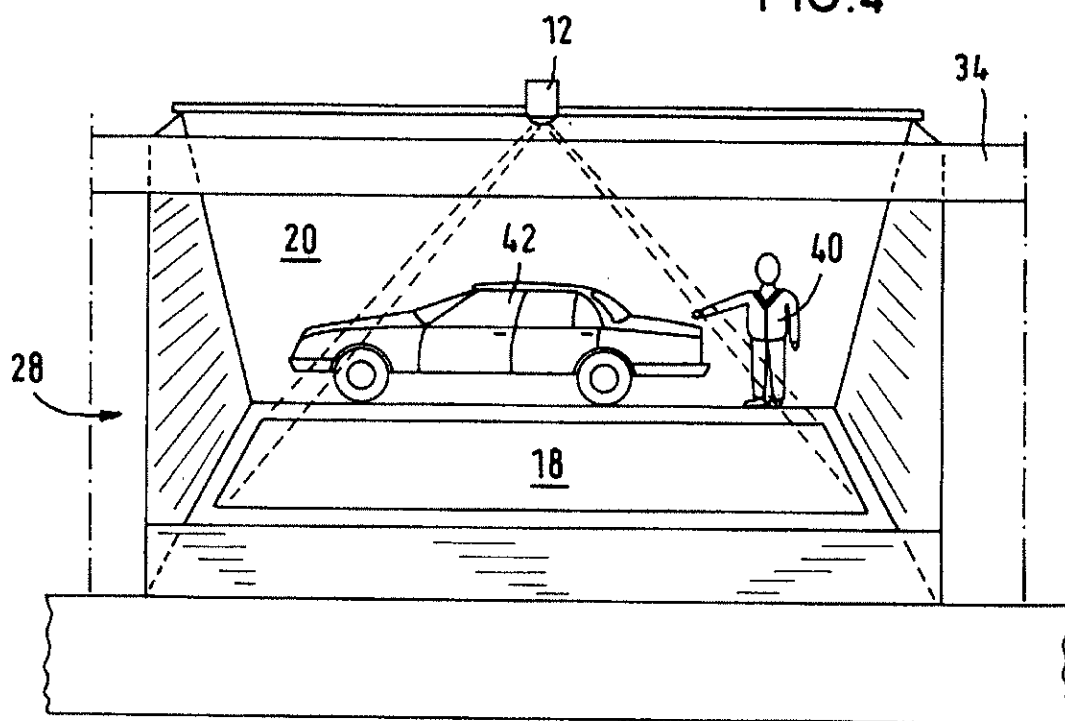




FIG.4



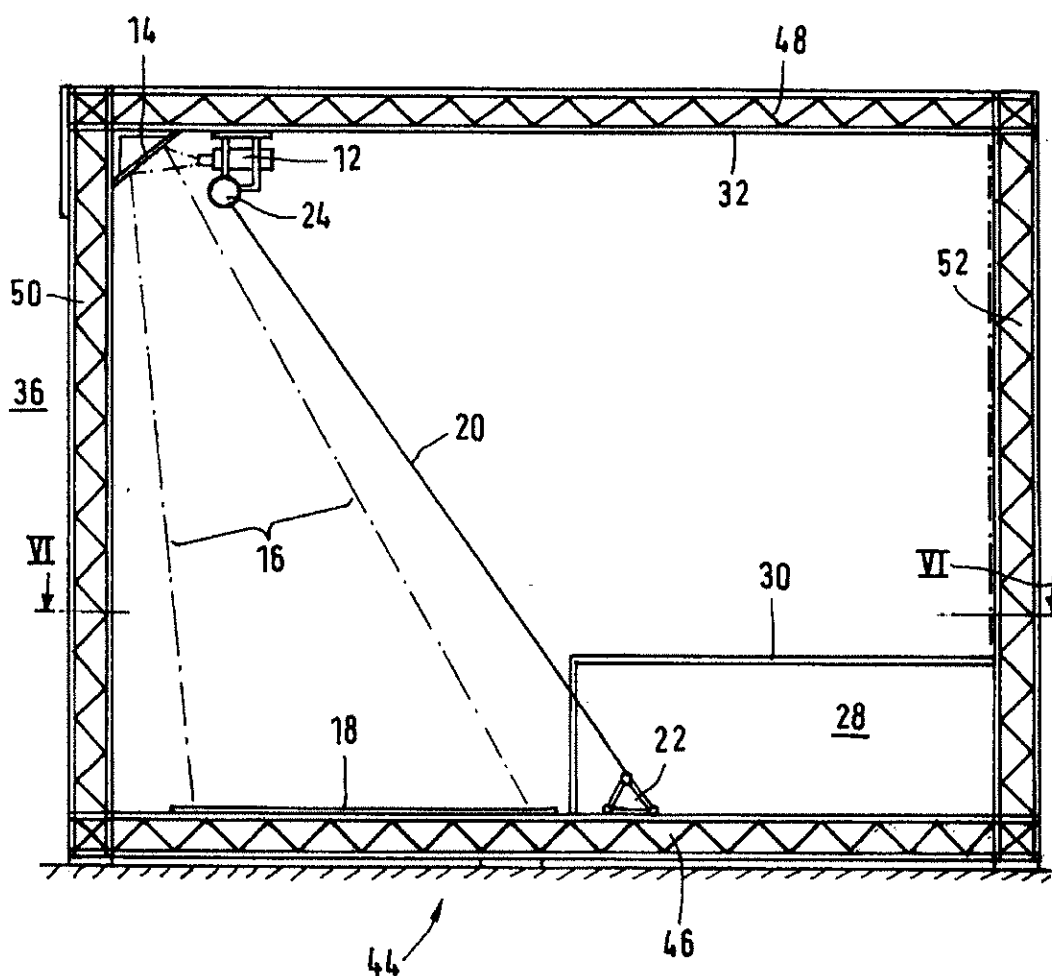
U.S. Patent

Feb. 2, 1999

Sheet 4 of 5

5,865,519

FIG. 5



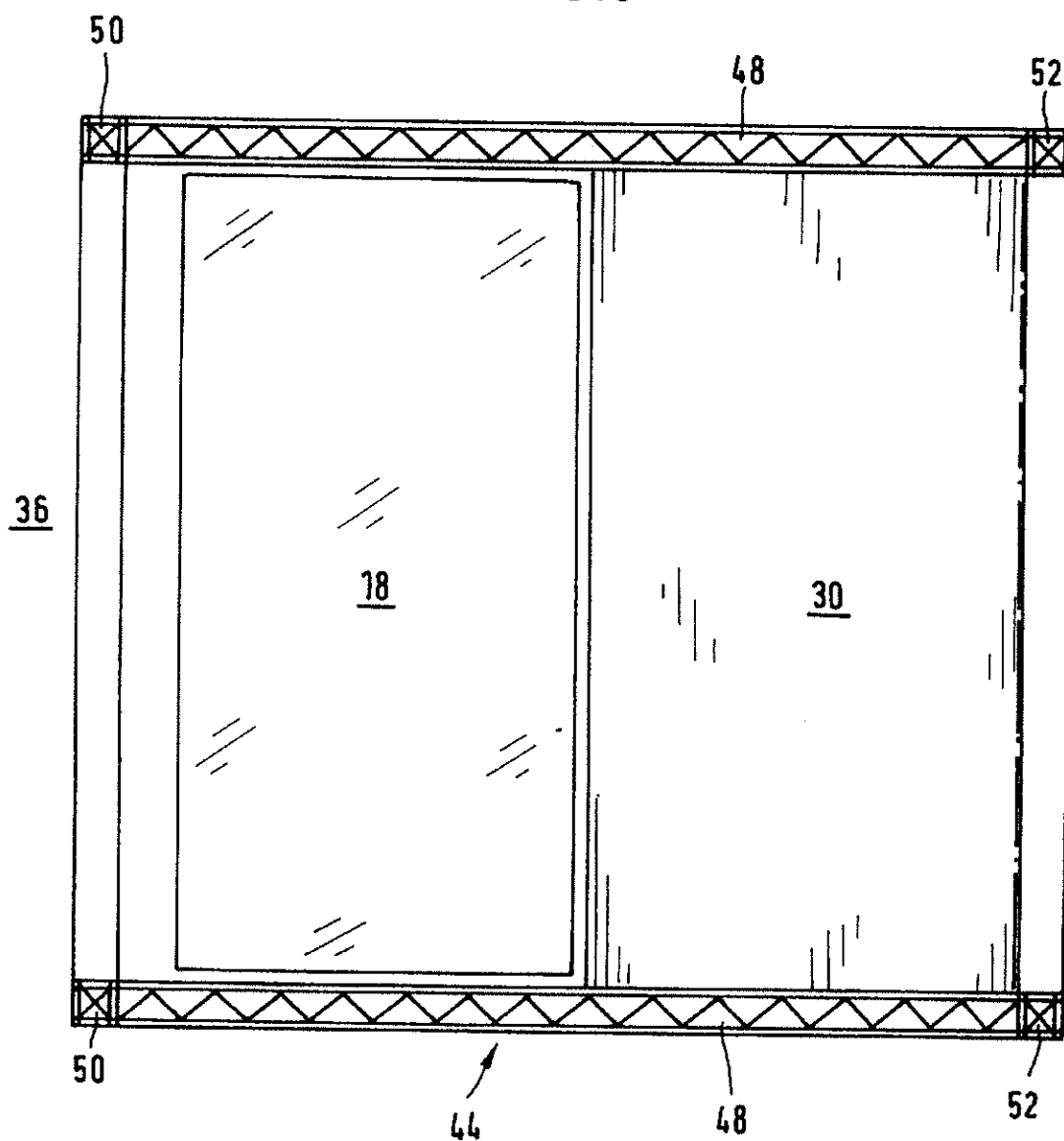
U.S. Patent

Feb. 2, 1999

Sheet 5 of 5

5,865,519

FIG. 6



5,865,519

1

# **DEVICE FOR DISPLAYING MOVING IMAGES IN THE BACKGROUND OF A STAGE**

The invention concerns an apparatus for representing moving images in the background of a stage or the like using an image source.

Transparency lectures or presentations are known, and that expression is a well-established piece of terminology. In a transparency presentation the presenter projects still images or pictures on to a projection screen. The presenter himself stands outside the light cone between the projector and the projection screen and comments on the images. Instead of the transparency projector the presenter can also use a film apparatus. In that case moving images appear on the projection screen and the presenter comments thereon. In both cases the presenter stands outside the light cone. He does not appear on or in the image himself. If he were to move into the light cone he would mask off a part of the light beam. Instead of the image, the shadow of the presenter would then appear on the projection screen. If the presenter wants to direct the attention of his viewers to a given point in the image he uses for that purpose a pointer or a light with a sharply focussed light beam.

The foregoing kind of presentation is sufficient for image and film presentations for photographic and film amateurs. Travellers who show films or transparencies of their travels to a wide circle of viewers can also use that kind of presentation without detriment. The viewers are only interested in the film or the transparencies and the words of the presenter. They attribute only slight significance to the manner of presentation and the technical equipment involved.

The position is different if the viewers do not have any particular interest in the articles to be shown and an interest first has to be aroused. The position is also different when the film presentation is to take place at a high technical level, for overriding reasons. The situation is also different if the film presentation is to be made more relaxed and less monotonous and linked to so-called display effects.

A theatre production is described as a ghost trick in the literature (for example Bühnentechnische Rundschau, BTR 3/1990, pages 24 and 25), involving disposing a pane of glass inclinedly in the front region of the stage. An actor is positioned beneath the pane of glass and in a lowered part of the stage. He is bedecked with wide white garments and represents the ghost. He is lit by a spotlight which is also disposed under the stage. The image of that actor representing the ghost is projected on to the pane of glass and appears to the viewers behind the pane of glass a virtual image. In that theatre presentation a second actor is on the stage. He represents a hero or sorcerer who conjures up the ghost.

On the basis thereof, the object of the present invention is an apparatus with which film and image presentations can be made relaxed and the presenter himself can move into the image without thereby interfering with reproduction of the image on a projection screen or generally on a surface. In accordance with the invention, that object is attained in an apparatus of the kind set forth in the opening part of this specification, in that a reflecting surface is arranged on the floor of the stage in the central region thereof, a transparent smooth foil extends between the floor and the top or ceiling of the stage over the entire width thereof in such a way that its lower end is held to a position between the reflecting surface and the background and its upper end is held to the ceiling at a position which is disposed further forwardly, and the image source is arranged at the ceiling in front of the

2

upper end of the foil which is held there, and is directed on to the reflecting surface.

The apparatus according to the invention makes use of the physical principle that any motor car driver experiences on the windshield of his vehicle. An article lying on the storage surface in front of the windshield is reflected therein in such a way that it seems to the motor car driver to be disposed in front of the windshield, as viewed in the direction of travel. In the case of the apparatus according to the invention the article to be represented is projected by the image source on to the reflecting surface which corresponds to the above-mentioned support surface, and it is then reflected in the transparent smooth foil in such a way that it appears to the viewer on the background of the stage. The foil which extends over the entire width of the stage and which is held to the floor and ceiling thereof acts like the windshield in a motor vehicle. A viewer at any point in the auditorium believes that he is seeing any article reflected by the reflecting surface on to the foil, behind same. The presenter stands on the stage outside the light cone of the image source. As viewed from the auditorium, he stands behind the reflecting surface. That means that his image is not formed on the background, nor does he disturb the image representation thereon. He can draw the attention of the viewers to given details in the image representation, without making use of a pointer or a light. He can likewise move with the images and interpret the reproduction thereof by virtue of his body language.

Desirably the foil extends at an angle of about 45° relative to the floor of the stage. The image source can be a display screen tube with a very high degree of resolution. It can be controlled by a computer. That means that the image can also be electronically influenced. Desirably a computer-controlled intelligent light amplifier (also known as an ILA) is used as the image source. It is oriented horizontally and emits light in the direction of the auditorium. Accordingly its longest extent lies in the horizontal and it can be easily concealed from the viewers. So that the light which it radiates reaches the reflecting surface, a further embodiment provides that a mirror is arranged in front of the computer-controlled light amplifier and the latter is directed on to the mirror and the mirror receives the light emitted by the light amplifier, is directed on to the reflecting surface and projects the light on to same.

If possible the viewer should not notice how the image in the background of the stage is produced. Therefore the light amplifier and the mirror are desirably covered over forwardly by a curtain or a board which extends over the entire width of the stage. The foil itself is under a very high tensile stress of up to 8t. In that way it is held tautly smooth and the image is not distorted. The foil is preferably without any inclusions. It is also to be very smooth on its front side and its rear side. It is also to be very thin. Finally the foil is to reflect between 30 and 50%, preferably 30%, of the light impinging on it. Such a foil is particularly well suited for the purposes according to the invention. The absence of inclusions and the smooth front and rear sides thereof result in very slight and imperceptible distortion effects. The fact that the foil is very thin serves the same purpose. Reflection phenomena at the front and rear sides thereof thus coincide. The foil used for the purposes according to the invention is generally subjected to further processing as transparency or 35 mm films. When used as a transparency film, it is cut up into the format of the transparency or 35 mm films. When it is used for the invention the foil has a surface area of at least 3 m times 4 m.

In a desirable embodiment the foil is rolled on to a winding tube. It is suspended therewith at the ceiling of the

5,865,519

3

stage. Desirably it is fixed to the ceiling, together with the intelligent light amplifier. The free end of the foil can be pulled off the winding tube and is fixed to the floor of the stage. A support mounting arranged on the floor of the stage is used for that purpose.

The reflecting surface may be a white projection screen which is to be laid on to the floor of the stage. The reflecting surface however may also be a simple white coat of paint. As the presenter moves outside it and more specifically behind it, it retains its reflecting properties for a very long period of time.

The apparatus according to the invention is advantageously used in connection with a stage with a floor which can be raised and lowered. The reflecting surface, the projection screen, the coat of paint or the like, is disposed on that part of the floor, which can be raised and lowered. When the floor is lowered the spacing between the image source and the reflecting surface is increased. As a result the virtual image which appears in the background of the stage is displaced rearwardly.

The apparatus according to the invention is to be easy to transport from one location to another and to set up at different locations. For that purpose, in a desirable embodiment, the invention provides that its components are enclosed by a lattice frame and can be secured thereto. Desirably, the lattice frame has units which can be set up on the two sides of the apparatus or the stage thereof and which each have a lower girder portion, an upper girder portion, a front girder portion and a back girder portion. The lattice frame units which can be set up on the two sides of the apparatus or stage can be connected together by transversely extending struts.

Desirably the winding tube is secured to the upper girder portions by way of brackets while the mounting support which holds the free end of the foil is fixed to the lower girder portions.

The invention will now be further described by way of the example of the embodiments illustrated in the drawing in which:

FIG. 1 is a simplified diagrammatic side view of the apparatus according to the invention,

FIG. 2 is a more detailed diagrammatic side view of the apparatus according to the invention, simultaneously showing the auditorium,

FIG. 3 is a side view of the stage similarly to the illustration in FIG. 2 with the floor lowered,

FIG. 4 is a view of the auditorium and the stage looking in the direction of the line IV—IV in FIG. 2,

FIG. 5 is a side view of the apparatus according to the invention when using the lattice frames surrounding it, and

FIG. 6 is a view in the direction of the line VI—VI.

FIG. 1 shows the physical principle of the apparatus according to the invention with the computer-controlled intelligent light amplifier 12 which acts as an image source, the mirror 14 which in the view in FIG. 1 is arranged to the left in front of it and which projects the light radiated on to it from the light amplifier 12 on to the reflecting surface 18 in the form of a light cone 16 as indicated by two broken lines, the foil 20 with its lower holding means in the form of a mounting bracket 22 and its upper holding means in the form of a winding tube 24 and the virtual image 26 which is represented in the background of the stage. The computer-controlled intelligent light amplifier 12 projects a moving image on to the mirror 14. This projects it on to the reflecting surface 18 which projects it on to the foil 20. From the point of view of a viewer who is at the left in FIG. 1—see FIG. 2—a moving image appears in the background as a virtual image 26.

4

FIGS. 2 and 3 show a practical application of the apparatus according to the invention at a presentation or lecture function. More specifically FIG. 2 again shows the stage 28, the floor 30 thereof and the ceiling 32 thereof. Extending under the ceiling 32 of the stage 28 over the entire width thereof is a curtain or a cover rail or board 34. It covers over in a forward direction the computer-controlled intelligent light amplifier 12 and the mirror 14. The viewers 38 sit in the auditorium 36. The presenter or lecturer 40 stands on the stage 28 behind the reflecting surface 18. The reflecting surface 18 is for example a projection screen or a coat of white paint. The double-headed arrow shown under the floor 30 is intended to indicate that it can be raised and lowered. FIG. 2 shows the floor 30 at its normal height. The virtual image 26 appears in the background of the stage 28 at a given location. FIG. 3 shows the same stage 28 with the floor 30 lowered. When the floor 30 is lowered the virtual image 26 moves rearwardly, towards the right when looking at FIGS. 2 and 3.

FIG. 4 shows a practical application of the apparatus according to the invention in a presentation function relating to motor vehicles. FIG. 4 shows a presentation article 42, in this example being a motor vehicle. The viewers 38 see it in the background as a virtual image. They do not recognise that this involves a reflection at the reflecting surface 18 and the foil 20. They only see how the presenter 40 moves freely in front of the motor vehicle, points with his arms and hands to the motor vehicle and parts thereof, explains details in words, and in so doing neither interferes with nor in any way influences the reproduction of the motor vehicle in the background in the form of the virtual image 26.

FIGS. 5 and 6 show the transportable embodiment of the apparatus according to the invention, which can be set up at any desired location. Lattice frames 44 which can be set up at both sides of the apparatus serve for that purpose. Each lattice frame comprises a lower girder portion 46, an upper girder portion 48, a front girder portion 50 and a back girder portion 52. Lattice frames of that kind are known. Each girder portion comprises a plurality of parts which can be releasably connected together. For the purposes of erecting the apparatus, the parts of the girder portions are fitted together and joined together. For transportation purposes they are separated from each other and can be transported in the form of comparatively small units on a truck or the like. As shown in FIG. 5 the computer-controlled intelligent light amplifier 12 and the winding tube 24 are fixed to a bracket. The bracket is in turn fixed to a transverse strut which connects the two upper girder portions 48. The same applies in regard to the mirror 14. When the apparatus is erected the foil 20 is pulled off the winding tube 24, fixed to the mounting bracket 22 and then tensioned. The reflecting surface 18 is laid on the floor in the form of a plate or the like which is coated or painted white, or in the form of a projection screen. The stage 28 on which the presenter 40 stands when making his presentation is composed of parts which are known per se on their own and it is erected in the rearward region of the apparatus.

I claim:

1. Apparatus for representing moving images in the background of a stage using an image source, said stage including a floor, a ceiling disposed vertically above said floor and a background disposed therebetween, said apparatus characterised in that a reflecting surface (18) is arranged on said floor (30) of said stage (28) in the central region thereof, a transparent smooth foil (20) extends between said floor (30) and said ceiling (32) at a position which is disposed further forwardly, and the image source is arranged at the ceiling

5,865,519

5

(32) in front of the upper end of the foil (20) which is held there, and is directed on to the reflecting surface (18).

2. Apparatus as set forth in claim 1 characterised in that the foil (18) extends at an angle of about 45° relative to the floor (30) of the stage (28).

3. Apparatus as set forth in claim 1 or claim 2 characterised in that the image source is a computer-controlled intelligent light amplifier (12).

4. Apparatus as set forth in claim 3 characterised in that a mirror (14) is arranged in front of the computer-controlled light amplifier (12) and said light amplifier is directed on to the mirror (14) and the mirror (14) receives the light radiated from the light amplifier (12), is directed on to the reflecting surface (18) and projects the light on to said reflecting surface.

5. Apparatus as set forth in claim 4 characterised in that the light amplifier (12) and the mirror (14) are covered over forwardly by a curtain extending over the entire width of the stage (28).

6. Apparatus as set forth in claim 1 characterised in that the foil is subject to a tensile stress.

7. Apparatus as set forth in claim 6 characterised in that the foil (20) has a surface area of at least 3 m times 4 m.

8. Apparatus as set forth in claim 7 characterised in that the foil (20) is rolled on a winding tube (24) and can be pulled off same and can be fixed with its free end in a support mounting (22).

6

9. Apparatus as set forth in claim 1 characterised in that the reflecting surface (18) is a coat of white paint.

10. Apparatus as set forth in claim 1 characterised in that the reflecting surface (18) is a white projection screen.

11. Apparatus as set forth in claim 1 characterised in that the floor (30) of the stage (28) can be raised and lowered.

12. Apparatus as set forth in claim 4 characterised in that light amplifier (12), mirror (14), reflecting surface (18), foil (20) and stage (28) are enclosed by a lattice frame (44) and can be fixed thereto.

13. Apparatus as set forth in claim 12 characterised in that the lattice frame (44) includes two units which can be set up on both sides of the stage (28) and each unit has a lower girder portion (46), an upper girder portion (48), a front girder portion (50) and a back girder portion (52).

14. Apparatus as set forth in claim 13 characterised in that the two lattice frame units which can be set up on both sides of the stage (28) can be connected by transversely extending struts.

15. Apparatus as set forth in claim 4 characterised in that the light amplifier (12) and the mirror (14) are covered over forwardly by a cover bar (34) extending over the entire width of the stage (28).

\* \* \* \* \*

## **EXHIBIT B**





US007883212B2

(12) **United States Patent**  
**O'Connell et al.**

(10) **Patent No.:** **US 7,883,212 B2**  
(45) **Date of Patent:** **Feb. 8, 2011**

(54) **PROJECTION APPARATUS AND METHOD  
FOR PEPPER'S GHOST ILLUSION**

(56) **References Cited**  
**U.S. PATENT DOCUMENTS**

(76) Inventors: **Ian O'Connell**, c/o Musion Systems Limited, Covden House, 7a Langley Street, London (GB) WC2H 9JA; **James Rock**, c/o Musion Systems Limited, Covden House, 7a Langley Street, London (GB) WC2H 9JA

221,605 A	11/1879	Pepper et al.	
2,991,841 A	7/1961	Sampson et al.	
4,019,656 A *	4/1977	Spears	222/103
4,805,895 A	2/1989	Rogers	
4,927,238 A *	5/1990	Green et al.	359/466
5,255,028 A	10/1993	Biles	
5,573,325 A	11/1996	Lekowski	
5,685,625 A	11/1997	Beaver	

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1129 days.

(Continued)

(21) Appl. No.: **10/599,553**

**FOREIGN PATENT DOCUMENTS**

(22) PCT Filed: **Apr. 1, 2004**

EP 0 919 258 6/1999

(86) PCT No.: **PCT/GB2004/001414**

§ 371 (c)(1),  
(2), (4) Date: **Sep. 30, 2006**

(Continued)

(87) PCT Pub. No.: **WO2005/096095**

*Primary Examiner*—Georgia Y Epps  
*Assistant Examiner*—Ryan Howard  
(74) *Attorney, Agent, or Firm*—Thomas, Kayden, Horstemeyer & Risley, LLP; Larry W. Brantley

PCT Pub. Date: **Oct. 13, 2005**

(65) **Prior Publication Data**

(57) **ABSTRACT**

US 2007/0201004 A1 Aug. 30, 2007

(51) **Int. Cl.**  
**G03B 21/00** (2006.01)  
**G03B 21/56** (2006.01)  
**G02B 27/22** (2006.01)  
**A63G 31/00** (2006.01)  
**A63J 5/00** (2006.01)

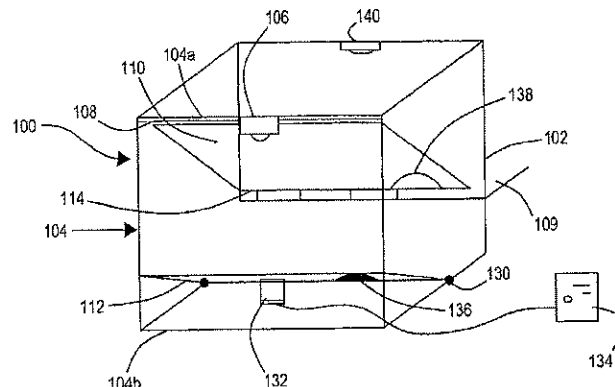
(52) **U.S. Cl.** ..... **353/10; 359/449; 359/478; 472/63**

(58) **Field of Classification Search** ..... **353/10, 353/74, 79, 119, 122, 28; 359/443, 449, 359/447, 478, 479, 630; 472/58, 61, 63**

See application file for complete search history.

An image projection apparatus (100) comprises a projector (106), a frame (108), and a partially transparent screen (110). The frame (108) retains the screen (110) under tension, such that the screen (110) is inclined at an angle with respect to a plane of emission of light from the projector (106). The screen (110) has a front surface arranged such that light emitted from the projector (106) is reflected therefrom. The projector (106) projects an image such that light forming the image impinges upon the screen (11) such that a virtual image is created from light reflected from the screen (110), the virtual image appearing to be located behind the screen (110).

**18 Claims, 4 Drawing Sheets**





**US 7,883,212 B2**

Page 2

---

U.S. PATENT DOCUMENTS

5,809,624	A	9/1998	Nakamae et al.
5,865,519	A	2/1999	Maass
5,944,403	A	8/1999	Krause
5,964,064	A	10/1999	Goddard et al.
6,129,649	A	10/2000	Yang
6,341,868	B1	1/2002	Shriver
6,364,490	B1	4/2002	Krause
6,481,851	B1	11/2002	McNelley et al.
6,817,716	B1	11/2004	Hines

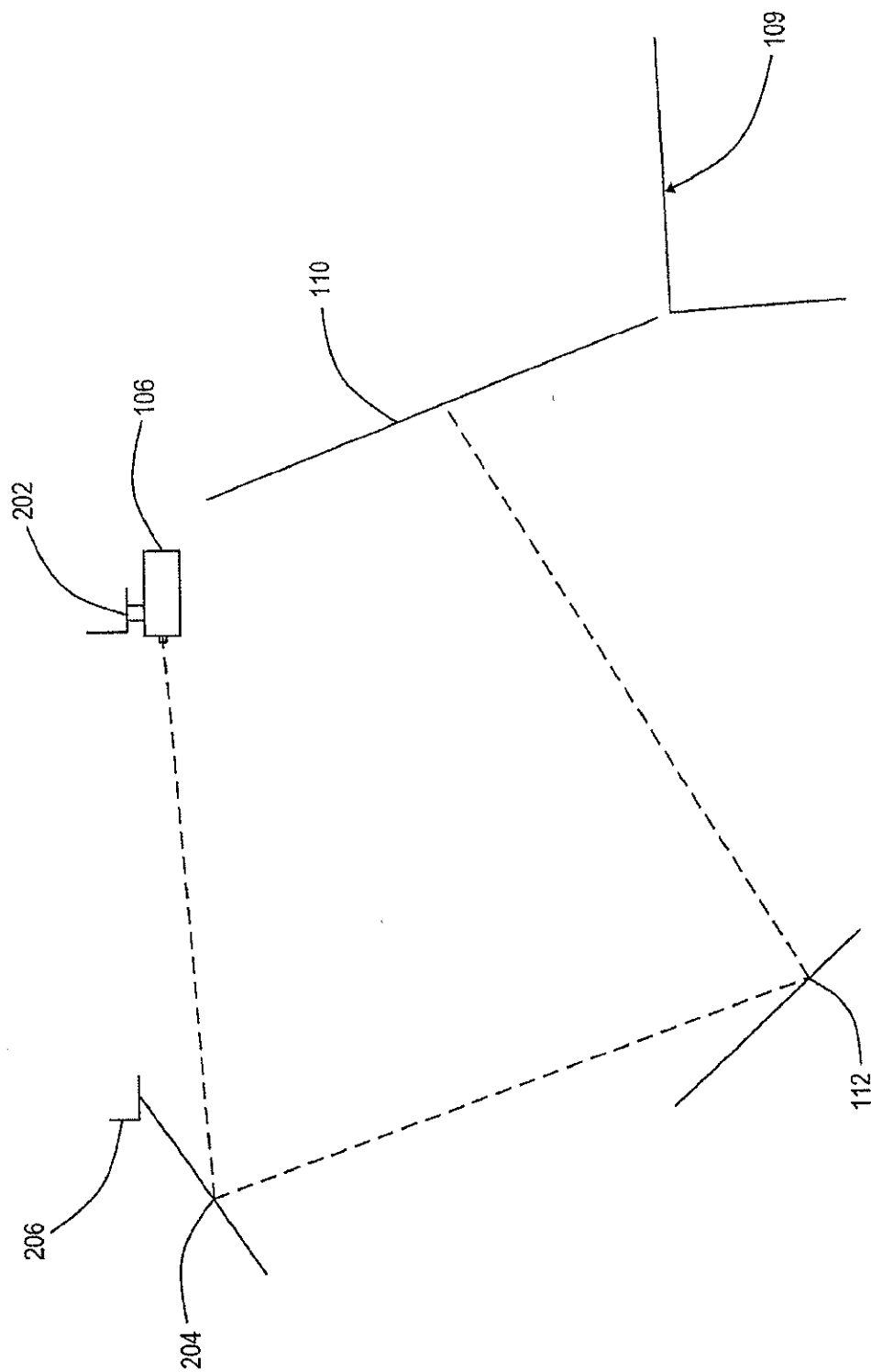
2003/0117583	A1	6/2003	Werhahn-Wunderlich
2003/0174292	A1	9/2003	White
2004/0036844	A1	2/2004	Wood et al.

FOREIGN PATENT DOCUMENTS

EP	0 919 258	A2	6/1999
FR	2 793 062		11/2000
FR	2 793 062	A1	11/2002

\* cited by examiner





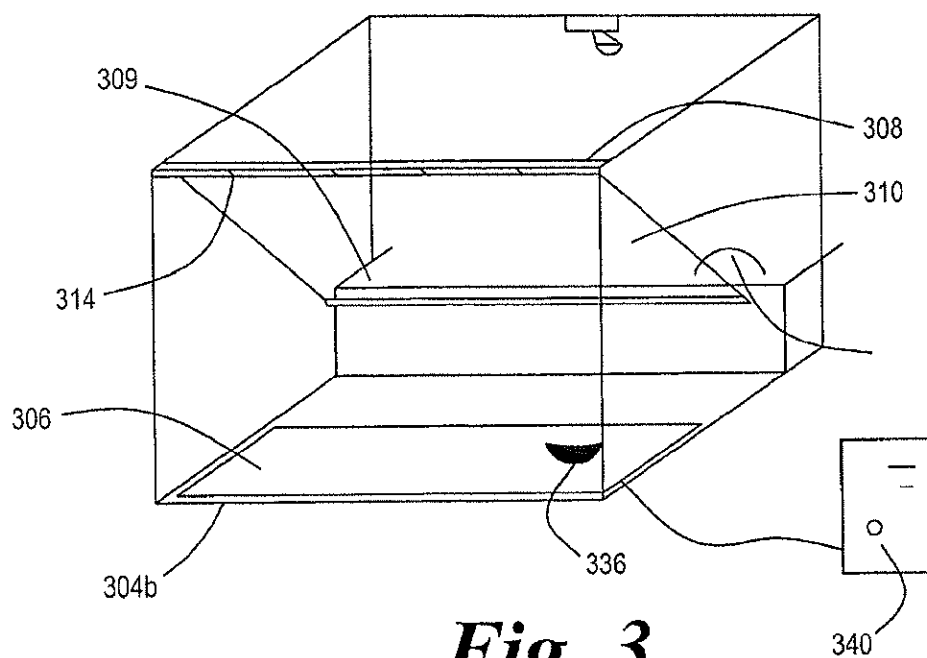
*Fig. 2a*

U.S. Patent

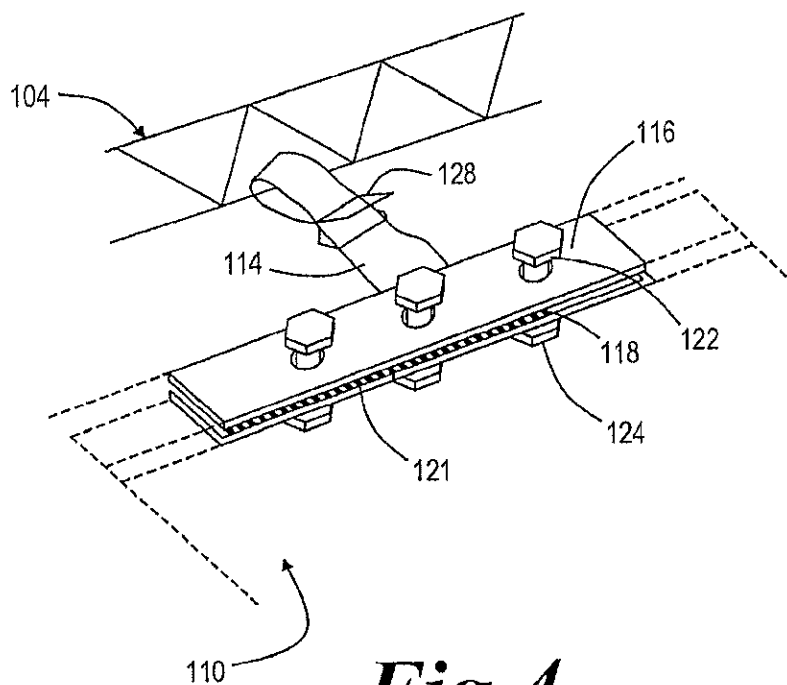
Feb. 8, 2011

Sheet 3 of 4

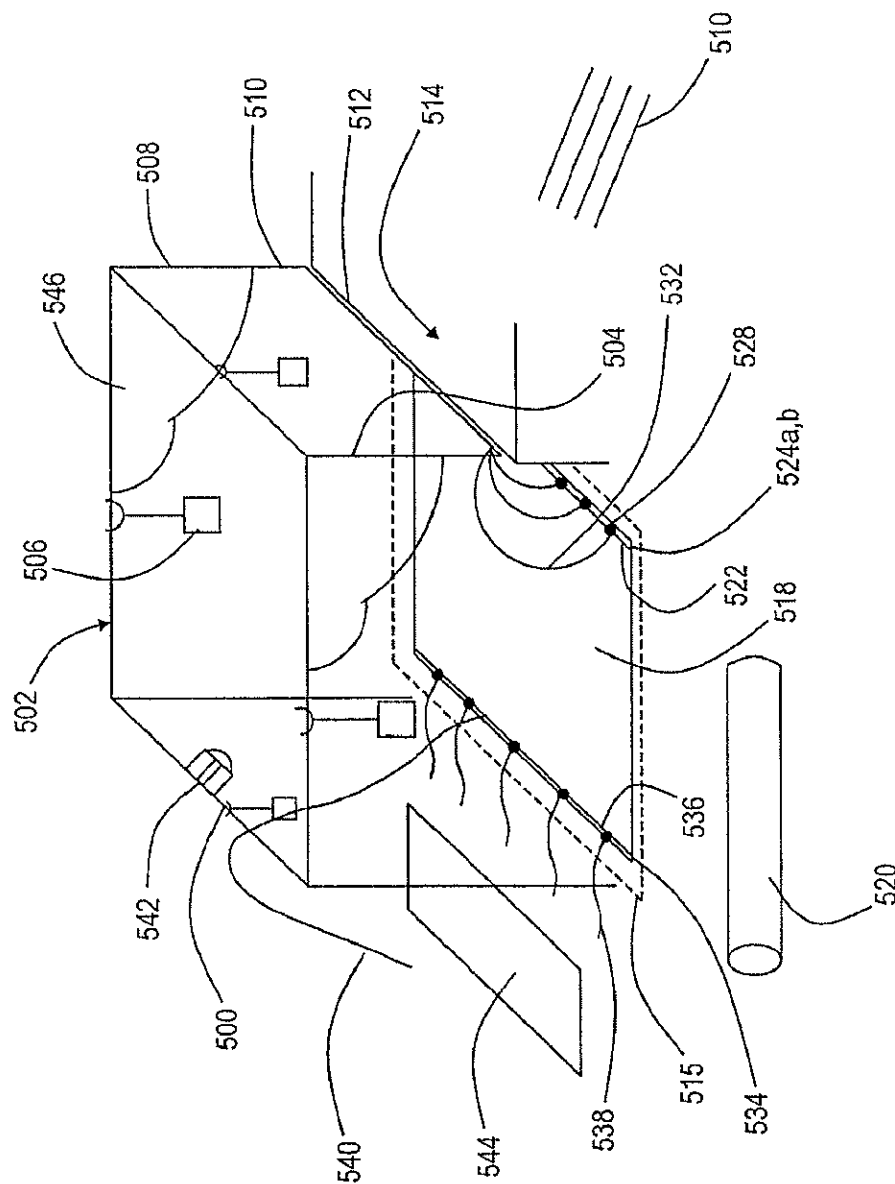
US 7,883,212 B2



*Fig. 3*



*Fig. 4*



**Fig. 5**

US 7,883,212 B2

1

## PROJECTION APPARATUS AND METHOD FOR PEPPER'S GHOST ILLUSION

This invention relates to a projection apparatus and method. More particularly, but not exclusively, it relates to a projection apparatus arranged to project an image of an object upon an inclined, partially reflective, screen so as to give a false perception of depth and a method for constructing such an apparatus.

### BACKGROUND OF THE INVENTION

The projection of an image upon a partially reflective screen such that is observable by a viewer positioned in front of the screen is known, the so-called "Peppers ghost" arrangement that is known from fairground shows.

This has been applied to publicity and promotional displays where a presenter resides behind an inclined, partially reflective screen, typically a tensioned foil, onto which an image of, for example, a motor vehicle is projected, via at least one reflective surface, see for example EP 0799436. The location of the presenter behind the projected image has a number of inherent advantages over systems where the presenter stands in front of a screen, not least of which is that the presenter does not obscure the projected image when walking across the projected image. Additionally, the use of an inclined screen results in a viewer of the image perceiving the image as having depth rather than merely being a two dimensional image, for example where a motor vehicle is seen to rotate upon a turntable.

However, current image projection apparatus' do have a number of problems associated with them, for example, mounting of the foil can prove difficult which in turn leads to uneven tensioning of the foil and wrinkles upon the foil, that impair the viewed quality of the image projected onto the foil. Also, in mounting the foil the foil must be laid out upon a clean dust free piece of cloth or plastic sheet, which is larger than the foil, in order to prevent particles adhering to the foil, such particles can scratch the surface of the foil and impair the viewed quality of the projected image or act as scattering centres from which projected light is incoherently scattered, thereby detracting from the viewed quality of the image as this scattered light does not contribute to the viewed image.

Also, as the illusion of peppers ghost relies on the reflected image formed by light contrasting with its immediate surroundings and background. The stronger the reflected image, the more solid that reflected image looks, the more vibrant the colours will be, and the more visible the reflected image is to an audience. In circumstances where the presenter may be unable to control high levels of ambient light forward of the foil, e.g. from an auditorium at a trade show, the high level of ambient light results in significant levels of reflection of the ambient light from the screen detracting from the strength of the reflected image over the background. In these circumstances a bright projector (8000 lumens+) is desirable. However, the use of a bright projector results in unwanted light hitting the projection surface and reflecting through the foil to create a milky hue upon the stage and around the area where the reflected image appears.

Another problem with current image projection apparatus is that projectors used with such apparatus are very powerful, typically 8,000 to 27,000 lumens and consequently project a significant amount of light into areas of an image where there is no object within the image. This is an inherent feature of projectors and results in low contrast ratios which leads to a milky hue spread over the part of the film where the projector is creating an image when the projector is switched on. The

2

milky hue is clearly undesirable as it detracts from the viewer's perception that there is no screen present.

The level of the milky hue relative to the brightness of the image is, at least partially, determined by the level of contrast ratio offered in the projector. The higher the contrast ratio, then the brighter the image can be relative to the brightness level of the milky hue. Even projectors with contrast ratios as high as 3000:1 still emit a milky light hue when used in a "Pepper's Ghost" arrangement.

A further problem associated with some projectors is the "keystone" effect, in which distorted, typically elongated, images (up and down) occur due to angled projection. This is of particular relevance where depth perception is of importance. The solution employed in modern, expensive projectors is to employ digital correction of keystone distortions. However, older, less-expensive or even some specialist High Definition projectors do not employ such digital keystone correction and are therefore difficult to configure for use with current image projection apparatus. High definition (HD) projectors do not offer keystone adjustment because when keystone correction is attempted in conjunction with the increased number of pixels about an image's edge causes the pixels about the edge of the image to appear 'crunched'. Additionally, when processing moving images HD projectors compromise projector processing speed. When the processing power is used to carry out both keystone correction and motion processing the image is seen to jerk during movements, an effect known as "chokking". In general, it can be said that the use of electronic keystone correction to alter a video image will result in the degradation of picture quality compared to an image which is not subject to such a process.

Additionally, current systems do not allow for the projected image to apparently disappear and re-appear from behind a solid 3D object placed upon the stage, as the screen lies in front of the presenter and closest to the viewing audience.

### BRIEF SUMMARY OF THE INVENTION

According to a first aspect of the present invention there is provided a image projection apparatus comprising a projector, a frame, and an at least partially transparent screen:

the frame being arranged to retain the screen under tension, such that the screen is inclined at an angle with respect to a plane of emission of light from the projector;

the screen having a front surface arranged such that light emitted from the projector is reflected therefrom; and

the projector being arranged to project an image such that light forming the image impinges upon the screen such that a virtual image is created from light reflected from the screen, the virtual image appearing to be located behind the screen.

Such an apparatus is advantageous over present systems in that the screen need not be coated with an expensive, partially reflective coating, an angular dependence of reflectivity of transparent dielectric materials can be used to bring about partial reflectance of the projected image. Thus, this apparatus simplifies the manufacture of such systems and also reduces their production costs. Additionally, the use of a frame frees the screen from having to be fixed directly to a ceiling, or a floor, and therefore increases the utility of apparatus over the prior art systems.

The screen may be a foil. The foil may be rolled about a cylinder when not in use. The screen may be inclined at approximately 45° to the plane of emission of light from the projector. The screen may comprise a partially reflective layer upon the front surface.

US 7,883,212 B2

3

The use of a foil screen reduces the weight of the apparatus, this allows ready transportation of the apparatus between sites. Rolling the foil onto a cylinder when not in use serves to protect the foil from damage during transportation and also allows ready transportation of the apparatus between sites. The use of a partially reflective screen can increase the degree of light reflected from the screen and can increase the audience perceived strength of the virtual image.

The screen may be attached to the frame at the screen's upper and/or lower edges. The frame may comprise first and second retention members arranged to sandwich an edge region of the screen therebetween. At least one of the first and second retention members may comprise an abrasive coating, typically sandpaper, arranged to contact the screen. The first and second retention members may comprise respective openings therethrough that may be arranged to collocate with openings in respective jaws of clamping members attached to tensioning straps, the openings may be arranged to receive a fixing means so as to clamp the screen between the first and second retention members. The tensioning straps may be attached to a truss arrangement and may be adjustable such that the tension of the screen within the truss arrangement can be varied about the periphery of the screen. Preferably, the retention members are substantially parallel to truss members comprising the truss arrangement.

The use of a variable tensioning arrangement allows wrinkles upon the screen to be minimised, and ideally eradicated to present a smooth surface for upon which the image can be projected. An abrasive surface upon at least one of the retention members increases the grip between the retention member and the screen thereby reducing the likelihood of the screen slipping when held by the retention member.

The apparatus may comprise a pigmented reflective member in an optical pathway between the projector and the screen. The pigmented member may reflect only part of the visible spectrum of light, typically the pigmented member will appear grey or white to a viewer.

It has been found that the use of a grey reflective member in the optical pathway between the projector and the screen reduces the outline of the reflective member upon the screen compared to when a white reflective member is used, and also reduces the level of the milky white hue associated with the projector emitting light where there is no image of an object to be projected.

The pigmented reflective member may be inclined at an angle with respect to the plane of emission of light from the projector. The angle of inclination of the member with respect to the plane of emission of light from the projector may be variable. The member may comprise a plurality of sections each of which may have an independently variable angle of inclination with respect to the plane of emission of light from the projector.

The inclination of the reflective member can compensate, at least partially and in some instances completely, for keystone effect. The variation of the angle of inclination or distance of the reflective member allows for a variation of the apparent depth and/or position of an object when projected upon the screen. This is because the virtual image appears as far behind the screen as the real image is in front of the screen.

There may be a reflective device, typically a mirror, arranged to direct light projected from the projector on to the reflective member. Typically, the reflective device is mounted upon an upper part of the framework. The reflective member may be parallel, or substantially parallel, to the reflective device. In some embodiments the projector may be mounted upon an upper truss of the framework and may be aligned with

4

the horizontal, typically light projected from the projector is directed on to the reflective device.

Such an arrangement compliments the keystone correction achievable by the inclination of the screen and the reflective member and is particularly useful where an HD projector is used in order to compensate for the keystone effect without the use of the projector's processing power.

The reflective member may comprise a mask corresponding to the apparent location of a prop in the screen to an audience. Typically, the mask will absorb light over at least a fraction of the visible spectrum and preferably the mask will be black. The mask may be arranged to produce an area upon the screen upon which the image is not projected. The mask may vary in extent and shape, for example by the use of a sliding element that is moved in and out of position upon the reflective member.

The mask can be used to make the illusion of an article disappearing and reappearing behind a prop that is placed upon a stage, either behind or in front of the screen.

The apparatus may comprise a light source arranged to selectively illuminate an area of stage comprising the prop. The light source may be a white light source. Lighting the prop causes the prop to become more visible and better defined against the dark, typically black, background. This enhances the three dimensional effect of the projected image interacting with the prop.

Also directing bright light upon the prop serves to reduce the contrast ratio of the projected image upon the prop, which typically remains slightly visible even when a mask is used in the prop's shadow upon the reflective member, thus enhancing the illusion of the projected image disappearing behind the prop.

The apparatus may comprise a light source arranged to illuminate at least part of a stage. The light source may be located to the rear of the screen, typically along a top edge of the frame and/or along either side of the stage. The apparatus may comprise a plurality of light sources. The apparatus may comprise a lighting desk equipped with faders arranged to control the level of each light source, or selection means arranged to selectively control the supply of power to each light source.

Such a light source is used in order that the colour and light levels of the area immediately surrounding the peppers ghost image, the stage background, can most closely match the colour of the projection surface background, excluding the area on both which is carrying the image. This, reduces the milky hue perceived by the audience. The use of a plurality of light sources increases the uniformity of lighting of the stage, in order to produce a similar effect to the way light emitted from a projector hits the projection screen. By controlling each light source separately the lighting levels upon the stage can be controlled to closely match the levels of light as dictated by the show performance, or the levels of unwanted light hitting the projection surface of the screen.

The projector may comprise a standard projector, for example a JVC ML4000, or a Barco G5. Alternatively, the projector may comprise an LCD, or a television display. The display may comprise at least one element arranged to be non-emitting in response to control from a processor. The at least one element may form a mask arranged to produce an area upon the screen upon which the image is not projected. The mask may correspond to the shape and location of a prop upon stage. The prop may be three dimensional.



US 7,883,212 B2

5

According to a second aspect of the present invention there is provided a method of providing a projection apparatus comprising the steps of:

- (i) resting a frame upon a number of elevation means;
- (ii) attaching leg sections to the frame;
- (iii) increasing the height of the elevation means;
- (iv) adding further leg sections;
- (v) attaching a lower edge of a screen to a lower rear piece of the frame;
- (vi) raising an upper edge of the screen to adjacent an upper front section of the frame; and
- (vii) attaching the upper edge of the screen to the upper front section of the frame.

The method may comprise providing the elevation means in the form of a jack.

The method may comprise providing the screen in the form of a film. The method may comprise removing a roll of screen film from a protective cylindrical casing. The method may comprise laying the screen upon a dust-free protective sheet.

The method may comprise placing the lower edge of the screen between jaws of a first retention member and may further comprise securing the screen in position using a fixing means passing through the retention member and the screen and a locking means arranged to lock the fixing means being arranged to secure the locking means in position. The method may comprise providing the fixing means in the form of a bolt and the locking means in the form of a nut.

The method may comprise attaching tensioning means to the retention member adjacent at least some of the fixing means.

The method may comprise attaching the tensioning means to the lower rear piece of the frame.

The method may comprise attaching a second retention member to an upper edge of the film screen, typically in the same manner as the first retention member is attached to the lower edge. The method may comprise attaching tensioning means to the second retention member. The method may comprise providing the tensioning members in the form of ratchet straps.

The method may comprise attaching a rope to the second retention member and passing the rope over the upper frame and using the rope in step (vii) to raise the screen.

The method may include tensioning each of the tensioning means such that the screen is flat and substantially wrinkle free.

The method may include depending a projector from the upper frame.

The method may include placing a pigmented reflective board between the screen and a front edge of the frame. The method may comprise reflecting light emitted by the projector from the board onto the screen.

The method may comprise forming the frame from a truss work.

According to a third aspect of the present invention there is provided a projection apparatus constructed according to the second aspect of the present invention.

#### BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

The invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

6

FIG. 1 is a schematic representation of a first embodiment of a projection apparatus according to at least an aspect of the present invention;

FIG. 2 is a side view of a the projection apparatus of FIG. 1 showing a pigmented reflective member in first and second positions;

FIG. 2a is a schematic representation of an alternative projection arrangement, suitable for use with the apparatus of FIGS. 1 and 2;

FIG. 3 is a schematic representation of a second embodiment of a projection apparatus according to at least an aspect of the present invention;

FIG. 4 is a perspective view of a screen clamping arrangement of FIGS. 1, 2 and 3; and

FIG. 5 is a schematic view of a projection apparatus being constructed according to the second aspect of the present invention.

#### DETAILED DESCRIPTION OF THE INVENTION

Referring now to FIGS. 1, 2 and 4, a projection apparatus 100 comprises a box frame 102 formed of trusses 104, a projector 106, a support frame 108, a screen 110 held within the support frame 108 and a grey pigmented reflective board 112.

The projector 106 depends from a front upper cross-piece truss 104a of the box frame 102. The board 112 lies below the projector 106 at the base of the box frame 102. The screen 110, is inclined at approximately 45° to the horizontal and the front edge of the screen 110 is proximate the front upper cross-piece truss 104a of the box frame 102 and the rear edge of the screen is proximate a stage 109 that lies to the rear of the box frame 102.

The screen 110 is typically a polymeric foil, which can have a partially reflective coating upon a front face of the foil. The screen 110 is retained within the box frame 102 by means of tensioning straps 114 attached to the box frame 102, at the top and bottom edges of the screen 110. At a free end of each of the tensioning straps 114 there is pair of clamp jaws 116 which have respective openings 118, 120 passing there-through. The faces of the jaws 116 are optionally coated with an abrasive 121, such as sandpaper, in order to enhance the grip of the jaws 116 upon the screen 110.

Edges of the screen 110 are placed between the jaws 116 and a bolt 122 is placed through the openings 118, 120 and passes through the screen 110. A nut 124 is threaded onto the bolt 122 and tightened to hold the screen 110 between the jaws 116. The tensioning straps 114 pass through the trusses 104 and are tightened using a friction locking buckle arrangement 128.

Each of the tensioning straps 114 can be tightened or loosened individually so as to allow an even tension to be applied over the whole surface of the screen 110 thereby reducing, and ideally eliminating, the formation of wrinkles upon the screen 110 which reduce the quality of an image projected upon the screen 110.

The reflective board 112 lies below the projector 106 adjacent to a lower front cross-piece truss 104b of the box frame 102. The projector 106 is directed such that light emitted by the projector 106 strikes the reflective board 112. The board 112 is inclined so that the light emitted by the projector 106 is reflected upwards from the board 112 onto the screen 110. The use of a grey, or otherwise coloured board 112 reduces the milky hue associated with light from the projector where there is no image to be projected.

A fraction of the projected light striking the screen 110 is reflected from the front surface of the screen 110 where is can



US 7,883,212 B2

7

be viewed by an audience. A presenter upon the stage 109 behind the screen 110 can also be viewed by the audience but does not interfere with the viewing of the image by the audience.

The board 112 is connected to a hinge arrangement 130 along a rear edge thereof. The hinge arrangement 130 allows the board 112 to be raised and lowered, typically be a hydraulic ramp 132 controlled by a computer 134, in order to compensate for the 'keystone' effect. Alternatively, the board 112 can be raised and lowered by the person pulling upon a string, or an electric motor to drive the board up and down.

The raising and lowering of the board 112 also allows for the audience's perception of the positional depth upon the stage of an element of a projected image to be altered by varying the height of the element of the image upon the screen 110. It is envisaged that the board 112 may comprise a number of individual sections each of which may be raised and lowered individually in order to allow the perceived depth of an individual element of an image to be varied independently of other elements of the image.

A non-reflective mask 136 in the shape of a prop 138, in this example a rock, is placed upon the board 112. The prop 138 is placed upon the stage 109, typically behind the screen 110. The mask 136 is placed such that the board 112 is obscured in a region corresponding to where the prop 138 is located with respect to the screen 110. This arrangement of mask 136 and prop 138 results in an image, or part of the image, projected upon the screen 110 apparently disappearing as the image, or part of the image, passes over prop 138 and reappearing once the image, or part of the image has passed over the prop 138 as the mask 136 prevents light being reflected onto the region of the screen 110 corresponding to the location of the prop 138. The mask 136 can be variable in size and shape, for example by means of a sliding panel that is moved into location and varied in size according to the size of the prop 138. This also allows for the depth perception of props to be varied as their apparent effect upon variable depth image elements, as discussed hereinbefore, can be varied appropriately, for example a given size of rock will obscure proportionately more of a distant image than the same rock will of a near image.

A light source 140 is mounted upon the box frame 102 and illuminates the prop 138 in order to reduce the effect of any residual light reflected from the board 112 onto the prop.

Referring now to FIG. 2a, an alternative projection arrangement 200, suitable for use with the apparatus of FIGS. 1 and 2 with an additional truss, comprises the projector 106 depending from a truss 202 forward of the screen 110, an inclined mirror 204 of variable inclination depending from a second truss 206 forward of projector 110. The projector 106 projects an image on to the mirror 204 such that the image is projected on to the reflective board 112 and on to the screen 110. The mirror 204 is typically arranged to be perpendicular to the board 112, and in embodiments where the board 112 has a variable angle of inclination the mirror 204 will usually be arranged to track, synchronously, with any variation in the angle of inclination of the board 112.

It will be appreciated that the term mirror is used herein to describe any reflective surface that reflects substantially all, typically in excess of 50% preferably in excess of 80%, light impinging upon it.

Referring now to FIG. 3, a projection apparatus 300 is substantially similar to that of FIGS. 1 and 2 accordingly identical parts to those of FIGS. 1 and 2 are accorded similar reference numerals in the three hundred series.

A projection screen 306 resides in front of the screen 310 adjacent the lower front cross-piece truss 304b. The projec-

8

tion screen 306 is typically a liquid crystal display (LCD) screen or a television screen. The projection screen 306 projects an image upwards onto the front surface of the screen 310. The use of a projection screen 306 removes the 'keystone' effect associated with conventional projectors.

A mask 336 can be formed upon the screen by use of a computer 340 to control the projection screen 306 to black out the appropriate part of the projection screen 306 electronically. This removes the need for a physical mask to be produced. The computer 340 can be used to switch off areas of the projection screen 306 which do not contain part of an image to be projected, this reduces the milky white hue associated with such areas when using conventional projectors. Also, the use of a computer 340 to control the projection screen 306, together with image sizing in relation to image movement allows an image to be readily scaled and positioned upon the projection screen 306 to enhance an audience's perception of depth and movement of a projected image using known image processing techniques. Alternatively, the projection screen 306, or sections of the projection screen 306, can be raised and lowered under the control of the computer 340 in order to enhance the audience's perception of depth of the projected image.

Referring now to FIG. 5, a box truss framework 500 comprises a square upper truss work 502 and leg trusses 504. In constructing the framework 500 the upper truss work 502 rests upon a number of jacks 506. First sections 508 of the leg trusses 504 that extend at right angles to the upper truss work 502 are added at the corners of the upper truss work 502. The height of the jacks 506 is increased to allow additional sections 510 of the leg trusses 504 to be added until the desired height of the box truss framework 500 is achieved.

A cross-piece truss 512 is fixed to two of the leg trusses 504 such that it horizontally spans the gap therebetween at a height close to, and typically slightly below, the level of a stage floor 514. The leg trusses 504 spanned by the cross-piece truss 512 constitute the rear legs of the framework 500 and are located adjacent the front of the stage floor 514.

A dust-free protective plastic sheet 515 is laid across the width of the stage floor 514 in front of the rear legs of the framework 500. A roll of screen film 518 is removed from a protective cylindrical casing 520 and is unwound across the width of the stage floor 514. The film 518 is placed upon the sheet 515 in order to prevent damage to the surface from dust particles or other sharp protrusions.

A lower edge 522 of the film 518 is placed between jaws 524a,b of a retention member 526, each jaw 524a,b having opposed openings therethrough spaced at approximately 0.5 m intervals. Bolts 528 are placed through the openings, and through the film 518, and secured in position using respective nuts. Ratchet straps 532 are attached to the retention member 526 adjacent alternate bolts 528, having a spacing of approximately 1 m, and are then attached to the cross-piece truss 512.

A second retention member 534 is attached to an upper edge 536 of the film 518 in a similar manner to how the retention member 526 is attached to the lower edge 522. Ratchet straps 538 are attached to the second retention member 534.

A rope 540 is tied to the second retention member 534 and is passed over the upper truss work 502 opposite the cross-piece truss 512. The film raised into position using the rope 540 and the ratchet straps 538 are attached to the upper truss work 502. Both sets of ratchet straps 532, 538 are tightened individually until the screen film is tensioned such that the film 518 is flat and, ideally, free from wrinkles.

A projector 542 is depended from the upper truss work 502 and a pigmented reflective board 544 is placed between the

US 7,883,212 B2

9

screen 518 and the front edge of the box truss framework 500 such that light emitted by the projector 542 is reflected from the board 544 onto the screen 518. The screen 518 reflects at least part of the light from a front surface thereof away from the stage and into an auditorium to be viewed by and audi-

In order to prevent the audience observing the projection apparatus both side and front drapes 546 are used to screen the apparatus from the audience.

The invention claimed is:

1. An image projection apparatus, comprising:

a projector, a frame, a light source and an at least partially transparent screen;

the frame being arranged to retain the screen under tension, such that the tension of the screen can be varied at a plurality of positions along at least one edge of said screen such that the screen is substantially wrinkle free; the light source arranged to illuminate at least part of the apparatus;

the screen inclined at an angle with respect to a plane of emission of light from the projector and the screen having a front surface arranged such that light emitted from the projector is reflected therefrom; and

the projector being arranged to project an image such that light forming the image impinges upon the screen such that a virtual image is created from light reflected from the screen, the virtual image appearing to be located behind the screen, wherein the screen is foil and the frame comprises first and second retention members each arranged to sandwich an edge region of the screen therebetween, the first and second retention members comprising respective openings therethrough arranged to collocate with respective openings in the screen, wherein the openings are arranged to receive a fixing means so as to clamp the screen between the first and second retention members, and wherein at least one of the first and second retention members is attached to tensioning straps.

2. The apparatus of claim 1, wherein the screen is attached to the frame at the screen's upper edge, lower edge, or both.

3. The apparatus of claim 1, wherein the tensioning straps are attached to a truss arrangement or a fixed mounting point located in a permanent structure such as a wall, floor or ceiling and are adjustable such that the tension of the screen within the truss arrangement can be varied about the periphery of the screen.

4. The apparatus of claim 3, wherein the retention members are substantially parallel to truss members comprising the truss arrangements.

5. The apparatus of claim 1, wherein the screen is inclined at approximately 45° to the plane of emission of light from the projector.

6. The apparatus of claim 1, wherein the light source is located to the rear of the screen, along a top edge of the frame, along either side of a stage, or some combination thereof.

7. An image projection apparatus, comprising:

a projector, a frame or fixed mounting points, and an at least partially transparent screen;

the frame or fixed mounting points being arranged to retain the screen under tension, such that the screen is inclined at an angle with respect to a plane of emission of light from the projector;

the screen having a front surface arranged such that light emitted from the projector is reflected therefrom; and the projector being arranged to project an image such that light forming the image impinges upon the screen such that a virtual image is created from light reflected from

10

the screen, the virtual image appearing to be located behind the screen, and wherein the frame comprises first and second retention members arranged to sandwich an edge region of the screen therebetween, and wherein a plurality of fixing means pass through the first retention member and through the screen and clamp the screen between the first and second retention members, and optionally locking means is provided adapted to lock the fixing means;

wherein the screen is a polymeric transparent foil that is held taught and substantially wrinkle-free by the retention members, the retention members having generally parallel faces which clamp an edge region of the foil between them, and wherein individually variable foil tensioning mechanisms are provided at spaced apart locations around the periphery of the foil to enable the foil to have tensioning force independently varied at the said spaced apart locations around the periphery of the foil, and wherein the first and second retention members are connected to one or more flexible tensioning means, which extend from the frame or fixed mounting points to the foil-gripping members, the foil, flexible tensioning means and the frame or fixed mounting points lying in a common inclined plane, with the tension on the foil being applied in the plane of the flexible tensioning means, and the foil, the tensioning mechanisms comprising straps and ratchet strap tensioners, or straps and a friction-locking buckle arrangement.

8. The apparatus according to claim 7, wherein respective locking means are provided for the fixing means.

9. The apparatus according to claim 8, wherein the locking means is provided in the form of nuts, to lock the fixing means in position, the fixing means extending through the retention members and the screen.

10. The apparatus according to claim 7, wherein the first and second retention members comprise a plurality of respective openings, with the fixing means extending through the openings.

11. The apparatus according to claim 7, wherein an abrasive surface is provided on at least one of the retention members to increase the grip between the retention member and the screen, thereby reducing the likelihood of the screen slipping when held by the retention member.

12. The apparatus according to claim 11, wherein the abrasive surface comprises sandpaper.

13. The apparatus according to claim 7, wherein the screen is a foil.

14. An image projection apparatus, comprising:

a projector, a frame or fixed mounting points, and an at least partially transparent screen;

the frame or fixed mounting points being arranged to retain the screen under tension, such that the screen is inclined at an angle with respect to a plane of emission of light from the projector;

the screen having a front surface arranged such that light emitted from the projector is reflected therefrom; and

the projector being arranged to project an image such that light forming the image impinges upon the screen such that a virtual image is created from light reflected from the screen, the virtual image appearing to be located behind the screen, and wherein the frame comprises first and second retention members arranged to sandwich an edge region of the screen therebetween, the first and second retention members being connected to one or more flexible tensioning means, which extend from the frame or fixed mounting points, the foil, flexible tensioning means and the frame or fixed mounting points lying

US 7,883,212 B2

11

in a common inclined plane, with the tension on the foil being applied in the plane of the flexible tensioning means and the foil, and wherein a plurality of fixing means pass through the first retention member and through the screen and clamp the screen between the first and second retention members, optionally locking means is provided adapted to lock the fixing means, and the first and second retention members comprise respective openings therethrough arranged to collocate with openings in respective jaws of clamping members attached to tensioning straps.

15. The apparatus according to claim 14, wherein the screen comprises a partially reflective layer upon the front surface and is inclined at approximately 45° to the plane of emission of light from the projector.

12

16. The apparatus according to claim 14, wherein the screen is attached to the frame at the screen's upper edge, lower edge, or both.

17. The apparatus according to claim 14, wherein the tensioning straps are attached to a truss arrangement or a fixed mounting point located in a permanent structure such as a wall, floor or ceiling and are adjustable such that the tension of the screen within the truss arrangement can be varied about the periphery of the screen.

18. The apparatus according to claim 17, wherein the retention members are substantially parallel to truss members comprising the truss arrangement.

\* \* \* \* \*

## **EXHIBIT C**



United States Patent and Trademark Office

[Home](#) | [Site Index](#) | [Search](#) | [Guides](#) | [Contacts](#) | [eBusiness](#) | [eBiz alerts](#) | [News](#) | [Help](#)



Assignments on the Web > [Patent Query](#)

## Patent Assignment Abstract of Title

**NOTE: Results display only for issued patents and published applications.  
For pending or abandoned applications please consult USPTO staff.**

### Total Assignments: 2

Patent #: [7883212](#)

Issue Dt: 02/08/2011

Application #: 10599553

Filing Dt: 09/30/2006

Publication #: [20070201004](#)

Pub Dt: 08/30/2007

Inventors: Ian O'Connell, James Rock

Title: PROJECTION APPARATUS AND METHOD FOR PEPPER'S GHOST ILLUSION

### Assignment: 1

Reel/Frame: [018419/0258](#)

Recorded: 10/21/2006

Pages: 5

Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).

Assignors: [O'CONNELL, IAN](#)

Exec Dt: 09/08/2006

[ROCK, JAMES](#)

Exec Dt: 09/11/2006

Assignee: [MUSION SYSTEMS LIMITED](#)

7A LANGLEY STREET

COVDEN HOUSE

LONDON, UNITED KINGDOM WC2H 9JA

Correspondent: DR. MATTHIAS SCHOLL, ESQ.

14781 MEMORIAL DRIVE

SUITE 1319

HOUSTON, TX 77079

### Assignment: 2

Reel/Frame: [031615/0800](#)

Recorded: 11/11/2013

Pages: 12

Conveyance: ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).

Assignor: [MUSION SYSTEMS LIMITED](#)

Exec Dt: 09/26/2013

Assignee: [MUSION DAS HOLOGRAM LIMITED](#)

90 HIGH HOLBORN

LONDON, UNITED KINGDOM WC1V 6XX

Correspondent: MICHAEL S. TUSCAN

1299 PENNSYLVANIA AVE., NW

SUITE 700

WASHINGTON, DC 20004-2400

Search Results as of: 03/13/2014 09:35 PM  
If you have any comments or questions concerning the data displayed, contact PRD / Assignments at 571-272-3350. v.2.3.4  
Web interface last modified: Jul 8, 2013 v.2.3.4

[HOME](#) | [INDEX](#) | [SEARCH](#) | [eBUSINESS](#) | [CONTACT US](#) | [PRIVACY STATEMENT](#)

# EXHIBIT D



Neutral Citation Number: [2014] EWCA Civ 639

Case No: A2/2013/2959/2959(A) & 2959(B)

**IN THE COURT OF APPEAL (CIVIL DIVISION)**  
**ON APPEAL FROM THE HIGH COURT OF JUSTICE**  
**CHANCERY DIVISION, COMPANIES COURT**  
**The Hon Mr Justice Warren**  
**No 5598 of 2013**

Royal Courts of Justice  
Strand, London, WC2A 2LL

Date: Wednesday 21<sup>st</sup> May 2014

**Before:**

**LORD JUSTICE KITCHIN**  
**LORD JUSTICE FLOYD**  
and  
**LORD JUSTICE FULFORD**  
-----

**Between:**

<b>Ian O'Connell</b>	<b><u>Appellant</u></b>
<b>- and -</b>	
<b>(1) Michael David Rollings</b>	<b><u>Respond-</u></b>
<b>(2) Vivienne Elizabeth Oliver</b>	<b><u>ents</u></b>
<b>(3) Chris Laughton</b>	
<b>(4) Peter Godfrey-Evans</b>	
<b>(as Joint Administrators of Musion Systems Limited)</b>	

(Transcript of the Handed Down Judgment of  
WordWave International Limited  
A Merrill Communications Company  
165 Fleet Street, London EC4A 2DY  
Tel No: 020 7404 1400, Fax No: 020 7831 8838  
Official Shorthand Writers to the Court)

Thomas Graham (instructed by Keystone Law) for the Appellant  
Lexa Hilliard QC and Adam Al-Attar (instructed by Speechly Bircham LLP)  
for the Respondents

Hearing date: 4 April 2014  
Judgment  
As Approved by the Court

Crown copyright©



**Lord Justice Kitchen:**

**Introduction**

1. This is an appeal against the judgment of Warren J given on 25 September 2013 and his consequential order upon an application made by the respondents, as administrators of Musion Systems Limited (“MSL”), pursuant to paragraph 71 of Schedule B1 to the Insolvency Act 1986 (“the Act”) for an order that they be permitted to sell the assets of MSL which were subject to a fixed charge security held by the appellant, Mr Ian O’Connell, as if they were not subject to that security.
2. The application was made by the respondents (collectively “the Administrators”) on an urgent basis and it was opposed by Mr O’Connell who asked that it be adjourned to enable him properly to prepare a response and to be represented. He also asked that the application should not be heard until after the first creditors’ meeting scheduled for 30 September 2013, and preferably until after the hearing of a pending arbitration which he contended would determine whether MSL held the benefit of certain valuable intellectual property licences.
3. The judge neither granted nor refused the adjournment Mr O’Connell sought, indicating that he could not make a ruling on the point without hearing more about the issues. Accordingly, he proceeded to hear the application. At the end of the first day, he adjourned it over until the following day to allow counsel instructed by Mr O’Connell to appear on his behalf. The hearing duly resumed the following morning with Mr O’Connell now represented by counsel, Mr Michael Smith, who was familiar with the background and who supplemented the submissions Mr O’Connell had made on the first day. At the end of his submissions, Mr Smith again asked the judge to adjourn the application. The judge then rose and, on his return a short while later, announced that he had decided to allow the application and to grant to the Administrators the relief they sought subject to the condition that there be applied towards discharging the sums secured by the charge the net proceeds of the disposal of the assets, and any additional money required to be added to the net proceeds so as to produce the amount determined by the court as the net amount which would be realised on a sale of the assets at market value. The judge indicated that he would give a reasoned judgment the following day, and that is what he did.
4. Upon this appeal, brought with the permission of the judge, Mr O’Connell contends that the judge should have adjourned the application or should have refused it. He also seeks permission to adduce further evidence which he maintains would probably have had an important influence on the result but which he was not able to put before the judge having regard to the great speed with which the hearing was convened and the enormous difficulties with which he was faced in preparing his response to it.

**The legislative scheme**

5. Paragraph 71 of the Schedule B1 of the Act provides, so far as relevant:

“(1) The court may by order enable the administrator of a company to dispose of property which is subject to a security (other than a floating charge) as if it were not subject to the security.



- (2) An order under sub-paragraph (1) may be made only –
    - (a) on the application of the administrator, and
    - (b) where the court thinks that disposal of the property would be likely to be promote the purpose of administration in respect of the company.
  - (3) An order under this paragraph is subject to the condition that there be applied towards discharging the sums secured by that security –
    - (a) the net proceeds of disposal of the property, and
    - (b) any additional money required to be added to the net proceeds so as to produce the amount determined by the court as the net amount which would be realised on a sale of the property at market value.
  - (4) If an order under this paragraph relates to more than one security, application of money under sub-paragraph (3) shall be in the order of the priorities of the securities.”
6. Market value is defined by paragraph 111(1) of Schedule B1 as “the amount which would be realised on a sale of property in the open market by a willing vendor”.

#### **The background**

- 7. MSL was incorporated on 2 October 2002 and carried on business providing holographic illusion services at events organised by its customers.
- 8. From October 2002 until April 2013, MSL had two directors, Mr O’Connell and Mr James Rock. On 29 April 2013 they were joined by a third director, Mr Uwe Maass. Mr O’Connell was removed as a director by a members’ resolution on 30 May 2013 and Mr Rock ceased to be a director on 5 September 2013.
- 9. MSL is one of a number of companies with which Mr O’Connell, Mr Rock and Mr Maass are associated. It is a wholly owned subsidiary of Musion Intellectual Property Limited, the shares in which are held equally by Mr O’Connell, Mr Rock and Mr Maass, and it conducted business in parallel, albeit in different territories, with Musion Events Limited (“MEL”), the shares in which are held equally by Mr O’Connell and Mr Rock. There are two other important matters concerning MSL which I must mention at the outset. First, Mr Rock and Mr O’Connell were charge-holders in respect of several debts allegedly owed to them by MSL under a debenture dated 14 July 2009 (“the Debenture”). Second, MSL and MEL exploited various intellectual property rights owned by Mr Maass or entities in which he had an interest and which he licensed to MSL and MEL under the terms of an agreement referred to as the “Eyeliner Agreement”.

10. The relationship between Mr Maass, Mr Rock and Mr O'Connell was initially harmonious. However, in the course of 2012 the relationship began to break down as a result, so Mr O'Connell says, of the misconduct of Mr Maass. Attempts at mediation failed and, in April 2013, Mr Maass purported to terminate the Eyeliner Agreement. Shortly afterwards, Mr O'Connell was removed as a director of MSL.
11. The breakdown of the relationship and the purported termination of the Eyeliner Agreement caused MSL and MEL enormous difficulties. Mr Maass contends that the termination was entirely proper and that all the intellectual property rights licensed to MSL and MEL have now reverted to him. Mr O'Connell maintains that the termination was not justified and that MSL is entitled to compensation from Mr Maass arising from his various breaches of agreement, breaches of confidence and breaches of fiduciary duty which far exceed any claims which Mr Maass has against MSL or MEL. Most importantly, however, Mr O'Connell disputes that MSL and MEL no longer enjoy a licence of the intellectual property rights owned or controlled by Mr Maass. This, amongst other issues, will, says Mr O'Connell, be determined by an arbitration proceeding before the London Court of International Arbitration (the "LCIA") which began in mid August 2013.
12. Meanwhile, on 3 July 2013, Mr O'Connell presented a petition for the winding up of MSL. Then, on 23 July 2013, the first and second respondents, Mr Michael Rollings and Ms Vivienne Oliver, were appointed as joint administrators by Mr Rock pursuant to the Debenture. They took the view that an administration would achieve a better result for MSL's creditors as a whole than would be likely if the company were wound up. However, Mr O'Connell objected to their appointment on the grounds that Mr Rock had not sought or obtained his consent, as he claimed Mr Rock was bound to do under the terms of the Debenture. At a directions hearing before Mann J on 9 August 2013, this particular aspect of the dispute was resolved by the discharge by consent of the appointment of Mr Rollings and Ms Oliver under the Debenture and their re-appointment as joint administrators by the court with effect from 23 July 2013. At the same time, and at the request of Mr O'Connell, the third and fourth respondents, Mr Christopher Laughton and Mr Peter Godfrey-Evans, were also appointed as joint administrators with effect from 9 August 2013. Mr O'Connell and Mr Rock agreed that the appointment of the Administrators would provide a practical way forward. For their part, the Administrators made mention of two matters which they anticipated would require the co-operation of Mr Rock and Mr O'Connell, namely Mr O'Connell's claim to certain foil stock in the possession of MSL, and Mr Rock's and Mr O'Connell's consent to a sale of the business and assets of MSL, assuming that was the course the Administrators decided to take. In the event, Mr O'Connell's claim to the foil stock was resolved by agreement. However, no agreement was reached regarding the sale of the business and assets of MSL free of the Debenture, as I shall explain.
13. Following their appointment, the Administrators continued to conduct the business of MSL as best they could. It had about £80,000 available in cash but was incurring salary costs of some £40,000 per month and, on 27 September 2013, a quarter's rent in respect of one of the properties it occupied would fall due. The Administrators formed the view that, in the light of the lack of available funds and the numerous disputes between the various parties to which I have referred, it was unlikely they could rescue the company as a going concern and therefore decided to continue to

trade the company for a short period in order to achieve a sale of its business and assets. They also initiated a sales process by advertising the business and assets for sale through their agents, Edward Symmons, and on the ip-bid.com website.

14. In light of the submissions advanced on behalf of Mr O'Connell on this appeal, I must now explain how the marketing process progressed. By 16 August 2013, some 29 potential purchasers had expressed interest and, of these, 14 returned signed confidentiality agreements and were supplied with details of the business.
15. The first offers were received from or on behalf of Mr Rock and Mr O'Connell. On 16 August 2013, Musion Global Limited ("MGL"), a company controlled by Mr Rock and Mr Maass, offered £250,000. Shortly afterwards, on 19 August 2013, Mr O'Connell made an offer of £300,000, of which one half would be payable on completion and the other half in three later instalments conditional upon a ratification of MSL's rights under the Eyeliner Agreement.
16. On 21 August 2013 the Administrators entered into an agreement with MEL (a company now effectively controlled by Mr O'Connell) in relation to the foil stock to which Mr O'Connell had asserted title. In light of this settlement, on 28 August 2013, MGL revised its offer to £214,000. It was, however, supported by Mr Maass who indicated that he would release debts of £800,000 which he claimed were owed to him by MSL.
17. On 29 August 2013 the Administrators wrote to Mr Rock and Mr O'Connell requesting the release of their security under the Debenture on the basis that they would require such a release to complete any sale. Agreement was not forthcoming and the following day MGL withdrew its revised offer. The Administrators were therefore left with no choice but to re-start the sales process, which they did on 31 August 2013 by inviting new offers and requesting potential bidders to state their best offer and give proof of funding by midday on 3 September 2013. Four bids were received, including one from MEL and one from MGL.
18. On 5 September 2013 the Administrators decided to accept in principle, and subject to contract, a third offer of £214,000 made by Ms Julie Benson, a former employee of MSL. That same day, however, they received an offer of £250,000 from Mr Giovanni Palma, together with a deposit of £20,000. This was supported by Mr Maass who again indicated that he would release the debt of £800,000 which he claimed was owing to him. This offer was significantly better than that of Ms Benson and so the Administrators decided to accept it, again in principle. Ms Benson then indicated that she wished to make a further and better offer and arranged for the payment of a deposit of £20,000. The payment was in fact made by Mr O'Connell, indicating that she had his backing. Anticipating an imminent sale, the Administrators' solicitors again wrote to Mr Rock and Mr O'Connell asking them to release their security under the Debenture.
19. On 6 September 2013 the Administrators invited Ms Benson and Mr Palma to submit their best and final offers by 3.00pm that day. Ms Benson offered £330,000 but was unable to provide adequate proof of funding. Mr Palma, acting through his company, Musion Das Hologram ("MDH"), offered £300,000, accompanied by the waiver by Mr Maass of his claim to £800,000. This being the better offer, the Administrators accepted it in principle with a view to completing the sale the following week.

20. Later that same day, a new bidder emerged. Mr John Textor, an American, acting through his company Musion Entertainment LLC, offered US \$1m, with US \$100,000 payable upon completion and the balance payable in quarterly instalments of US \$100,000 over a period of two years commencing 90 days after completion. The Administrators considered this offer was not viable because of the substantial deferred consideration payable over such a long period of time.
21. On 9 September 2013 Mr Textor submitted a revised offer of US \$1m, with the substantially greater sum of US \$400,000 payable on completion and the remainder in quarterly instalments, as before. The following day, Mr Textor wired a non-refundable deposit of US \$40,000 which was received by the Administrators on 11 September 2013. This offer appeared to the Administrators to be marginally better than that of Mr Palma and so they decided to proceed with it. They had a meeting with Mr Textor on the evening of 11 September 2013. I should add, that by this time, both Mr Rock and O'Connell had indicated they were not prepared to release their security.
22. On the following day, 12 September 2013, Mr Textor withdrew his revised offer and instead made a further offer of US \$300,000 payable on completion and then variable deferred payments depending upon the outcome of the dispute in relation to the Eyeliner Agreement. Faced with this revised offer the Administrators decided to proceed with Mr Palma, considering that this would provide them with the greatest degree of certainty.
23. On 13 September 2013, a number of events happened. First, notice of a creditors' meeting to be held on 30 September 2013 was circulated to all known creditors. Second, Mr Laughton met with a representative of Mr O'Connell to discuss the release of Mr O'Connell's security. These discussions continued on 18 September 2013. Third, Mr Textor reinstated his earlier and more generous offer of US \$1m, with US \$400,000 payable on completion and US \$600,000 deferred. This led the Administrators to inform Mr Palma that they were again considering Mr Textor's offer.
24. On 16 September 2013 Mr Textor revised his offer yet again and proposed an arrangement whereby if any of the deferred consideration of the US \$600,000 was paid within 14 days of completion, then twice this sum would be deducted from the total deferred consideration payable. The Administrators thereupon sent the sale and purchase documents to Mr Textor in what they believed to be substantially agreed form and asked for the initial consideration to be paid into their client account, to be held to Mr Textor's order. However, it was not clear to the Administrators whether Mr Textor had any settled intention to enter into an agreement at all. They were also concerned at the time the bidding process was taking.
25. Accordingly, on 17 September 2013, the Administrators informed Mr Palma and Mr Textor that there would be a contract race and that the Administrators would enter into an agreement with whichever party provided the essential elements for the sale first. They made this decision in light of what they considered to be the very similar offers they had received, the uncertainty over Mr Textor's intentions, the limited period of time for which they could continue to trade, the approaching September quarter date and their perception that they needed to provide certainty to the company's employees.

26. On being notified of the contract race, Mr Palma acted very promptly. He put his solicitors in funds in the sum of nearly £280,000 that same afternoon and immediately travelled to London from Italy. Meetings were held with the Administrators and contracts for the sale of the business and assets of MSL to MDH were exchanged early in the morning of the following day, 18 September 2013. Importantly, Mr Palma requested and the Administrators agreed a side letter under the terms of which Mr Palma could withdraw in the event no unconditional order was made to release the security held by Mr Rock and Mr O'Connell by 5.00pm on 25 September 2013.
27. As for Mr Textor, he did not move so swiftly. He did not provide to the Administrators all of the documents they needed and, although it is true to say that he did initiate a transfer of funds late in the evening of 17 September 2013, those funds were not received by the Administrators' solicitors until mid-morning on 18 September 2013, by which time they had exchanged contracts with Mr Palma.

#### **The application to the judge and his decision**

28. Faced as they were with a refusal by Mr O'Connell and Mr Rock to release their security, on 19 September 2013, the Administrators served upon them in draft an application for an order under paragraph 71 of Schedule B1 together with supporting evidence. The following day, 20 September 2013, Mr Rock's solicitors indicated that he would consent to a release of his security. However, Mr O'Connell, by his solicitors, requested until 5.00pm on 24 September 2013 to provide a release. The Administrators responded that this was not possible because of Mr Palma's right to withdraw.
29. On 23 September 2013, the following Monday, Mr O'Connell's solicitors again requested an extension of time. The Administrators responded granting a short extension but still the release was not forthcoming. Accordingly they issued the application returnable the following day, and notified Mr O'Connell accordingly.
30. The application came before Warren J in the applications court on 24 September 2013 supported by the first witness statement of Mr Rollings dated 23 September 2013. The Administrators were represented by solicitors and counsel. Mr O'Connell appeared in person because his solicitor was on an aeroplane and his counsel, Mr Smith, was engaged in court elsewhere. At the outset of the hearing, Mr O'Connell requested an adjournment to give him an opportunity properly to prepare his response and be represented. The Administrators opposed that application because they were concerned that unless they were authorised to complete the sale to Mr Palma as a matter of urgency, there was a real risk it would fall through. They considered this would have been highly detrimental to MSL's creditors because the agreement with Mr Palma was the best that could be achieved in all the circumstances and, if Mr Palma were to withdraw, it was likely they would have to put MSL into liquidation.
31. The judge was clearly placed in a very difficult position but, as I have indicated, he decided to proceed to hear the application and submissions from both sides because he felt he could not decide whether to adjourn it without so doing. However, he said that he would adjourn the application over until the following day if, at the end of the first day, he felt the need to hear from counsel on behalf of Mr O'Connell. As the judge explained, Mr O'Connell presented his case fully and effectively and, although not a lawyer, addressed him in a highly articulate and comprehensive way.

Nevertheless, at the end of the first day, the judge did indeed feel that he would be assisted by further submissions and so stood the application over. The next morning, Mr Smith appeared on behalf of Mr O'Connell and, as the judge put it, was able to supplement Mr O'Connell's submissions because he was not new to the case. At the end of the hearing on the second day, Mr Smith again asked for an adjournment, which the judge refused. At about 3.30pm, and under pressure from the Administrators to make a decision, with the deadline expiring at 5.00pm, the judge said that he had decided to grant the application and would give his reasons the following morning.

32. Two other matters emerged during the course of the hearing which I should mention before explaining how the judge arrived at the conclusion he did. The first concerned Mr Textor. On the morning of the first day of the hearing, Mr O'Connell explained that he had been contacted by Mr Textor and that he had made a further offer of £300,000 for the business and assets of MSL, excluding its intellectual property rights. Mr O'Connell said that if this offer were accepted, he would forgive part of the debt which he claimed MSL owed to him. Then, after the lunch time adjournment, Mr O'Connell informed the judge that Mr Textor was now prepared to offer US \$1m for the business and assets of MSL and that, if accepted, he, that is to say Mr O'Connell, would release £400,000 of the moneys MSL owed to him. After the judge had risen at the end of the day, Mr Rollings telephoned Mr Textor only to be told that he had accepted the outcome of the contract race and that, since MDH had entered into a contract to purchase the business and assets of MSL, he had been liaising with Mr Palma to find a way that they could work together. He also indicated that should the application be refused and Mr Palma withdraw then he would reconsider his position.
33. The second matter concerns another potential purchaser called Solutions Diverse. On the morning of the first day, Mr O'Connell stated that this company had made an offer. The judge commented in his judgment on the lack of evidence as to the nature of the offer but the position has now become rather more clear. On 17 September 2013 Mr Laughton spoke to Ms Gemma Birch, an accountant. She indicated that she represented a client who had an interest in the business, but she did not identify the client and made no offer on its behalf. Mr Laughton told her that, with only a few hours to go, there was little point in encouraging the client to make an offer. Ms Birch appeared to accept this position. On the following day, after contracts had been exchanged, Ms Birch e-mailed Mr Laughton saying that she represented a Ms Horsley and asked for her client's details to be kept on file and her interest noted in case the transaction did not complete. Again, Ms Birch did not give details of the nature of her client's interest or the name of any corporate entity involved.
34. On the previous day, but again after the contracts had been exchanged, Ms Oliver received a call from Mr Kevin McCook, who introduced himself as being from a company called Solutions Diverse. He stated that Solutions Diverse was willing to pay £350,000 "up front" with a deferred payment of £100,000. However, no further details were provided and the Administrators never had any reason to suppose that Solutions Diverse was represented by Ms Birch. However the evidence before us now shows that was in fact the case.
35. That brings me to the judgment given on 26 September 2013. The judge began by setting out the background, including details of the debt owed to Mr O'Connell. He



explained that Mr O'Connell claimed to be a secured creditor for in excess of £800,000, and that this was disputed by the Administrators although they accepted that, for the purposes of their application, this was not a matter that he needed to decide and that he should proceed on the basis that Mr O'Connell was indeed a secured creditor for the sum he claimed.

36. The judge also gave careful consideration to the submissions advanced by and on behalf of Mr O'Connell. He noted first of all the position in relation to the Eyeliner Agreement. He fully understood that Mr Maass had purported to terminate this agreement and that Mr Maass maintained that such termination meant that the intellectual property rights previously enjoyed by MEL and MSL had reverted to him. However, Mr O'Connell disputed the validity of that termination and this issue was the subject of the LCIA arbitration. Mr O'Connell informed the judge that the result of that arbitration would be known by the beginning of December 2013 at the latest and possibly as early as October. As for the Administrators, they had not formed a view about the merits of this dispute, however they estimated MSL's rights to be worth around £100,000 if its arguments prevailed but nothing if they failed. Mr O'Connell, by contrast, asserted that MSL's rights were worth around £3m. The judge observed that he not been given any explanation as to how Mr O'Connell had arrived at this figure or what evidence there might be to support it. This is something addressed by the further evidence upon which Mr O'Connell seeks to rely before this court.
37. The judge also had regard to a contention advanced by Mr O'Connell that Mr Maass and Mr Rock had improperly diverted business away from MEL and that they were using for their own purposes MEL's confidential information. The judge was conscious too that Mr O'Connell believed Mr Maass and Mr Rock were closely associated with Mr Palma.
38. The final matter to which the judge gave careful consideration was the submission by Mr O'Connell that both Mr Textor and Solutions Diverse were ready and willing to make better offers than that of Mr Palma. So far as Mr Textor was concerned, the judge was provided by Mr O'Connell with details of the telephone conversations he had had with Mr Textor on the first day of the hearing. However, on the second day he was also provided by Mr Rollings with a further witness statement setting out the substance of the conversations that he had had with Mr Textor after court on the first day. In the result, the judge felt that he could not say with any great confidence that a better offer from Mr Textor would become available. As for Solutions Diverse, the judge observed he had no evidence whatsoever of the nature of any offer made by this company. The judge recorded that the Administrators had not heard from this bidder at all. In this particular and limited respect, the judge was not provided with the full picture and this is a matter to which I must return.
39. The judge said he had found the decision a very difficult one to make and, as he put it, "the balance could not be finer". However, notwithstanding the submissions advanced by Mr O'Connell, he had come to the conclusion that he should make the order sought by the Administrators for the following reasons. First, the bid process was open and fair. Second, the Administrators needed an order under paragraph 71 of Schedule B1 in order to allow them to complete the sale of the business and assets. Third, there was no better offer on the table than that of Mr Palma. Fourth, there was a risk of losing the sale if he did not make the order sought. That risk might be small but it

was nevertheless real. Fifth, the sale would not deprive MSL of any claim against any third party because such claims were not included within the assets the subject of the sale agreement. The purpose of the administration would be promoted by the completion of the sale and Mr O'Connell was not entitled to control the timing of the realisation of his security, at least in the context of a situation in which the result of the LCIA arbitration might not be known until December 2013. Finally, the Administrators were entitled to have regard to the problems they would face in trying to continue to trade the business until that time, particularly having regard to the need to pay rent and the salaries of MSL's staff.

### **The appeal**

40. Mr O'Connell has been represented on this appeal by Mr Thomas Graham. His submissions to us were directed to first, Mr O'Connell's application to adduce further evidence; and second, the substantive appeal. In addressing the substantive appeal, Mr Graham focused upon Mr O'Connell's contention that the judge ought to have refused the application. However, he made clear that Mr O'Connell also maintained his contention that, in the alternative, the judge should not have abridged time and should have adjourned the application.
41. The Administrators have been represented on this appeal by Ms Lexa Hilliard QC and Mr Adam Al-Attar. Ms Hilliard invited us to refuse the application to adduce further evidence or, if we were minded to admit it, to allow the Administrators to rely upon evidence in response. As for the substantive appeal, she submitted that the judge was entitled to exercise his discretion as he did and that no proper basis has been shown for this court to interfere with his decision. She also explained that, so far as necessary, the Administrators relied upon the matters raised in their respondents' notice as providing a further reason for upholding the judge's decision, namely that Mr O'Connell was never in fact a secured creditor in respect of debts of £800,000, or anything approaching that figure.

### *The further evidence*

42. The further evidence which Mr O'Connell wishes to introduce is contained in his second witness statement dated 16 October 2013 and falls into four parts. The first concerns the LCIA arbitration. Here Mr O'Connell refers to correspondence with the LCIA which confirms the receipt on 21 August 2013 of a request for arbitration dated 14 August 2013, and of the registration fee. Mr Graham emphasised that, although MSL is not a party to the arbitration, it will determine whether the intellectual property licences granted to MSL survived the purported termination of the Eyeliner Agreement by Mr Maass and consequently its outcome will have a significant effect upon the value of MSL's intellectual property rights. However, he also explained that, contrary to expectations, the substantive hearing of the arbitration has not yet taken place and will not do so for at least another two months.
43. The second part concerns the value of MSL's intellectual property rights. As I have explained, the Administrators valued those rights at about £100,000. Mr O'Connell says that this is significantly less than they were worth and relies in support upon various contracts between MSL and its customers, the income those contracts generated, the revenues MSL generated by licensing its intellectual property rights in the years to 2012, and details of a contract which MSL was negotiating in early 2013.



44. The third part concerns the sums secured by the Debenture. Here Mr O'Connell refers to certain correspondence with the Administrators' solicitors after the hearing before the judge in which he set out his claim that further debts totalling in excess of £111,000 were secured. In further correspondence since the date of the witness statement this figure has grown to about £240,000.
45. The final part concerns the position of Solutions Diverse. Mr O'Connell explains that Solutions Diverse did not become aware of the administration until 12 September 2013 and expressed its interest in purchasing the business and assets of MSL on 17 and 18 September 2013. This evidence therefore supports the submissions made by Mr O'Connell to the judge at the hearing and which he dealt with in the manner I have described.
46. The Administrators vigorously opposed the admission of this evidence on the grounds that it is, in part, not admissible; that it is disputed; and that, in any event, it cannot be said that it would probably have had an important influence on the result of the hearing. Despite these points which were all advanced powerfully by Ms Hilliard on the Administrators' behalf, I would admit this evidence in the unusual circumstances of this case. The hearing took place at short notice and this rendered it very difficult for Mr O'Connell to assemble all of the evidence upon which he wished to rely; it does bear upon and is relevant to the issues the judge had to decide; and it is apparently credible, though I recognise that it is disputed. In all these circumstances I believe it would be just to allow Mr O'Connell to rely upon it. However, I also believe that, this being so, the Administrators should have the opportunity to rely upon the responsive evidence contained in the third witness statement of Mr Rollings dated 2 November 2013. Mr Graham made clear that, if we were to admit Mr O'Connell's further evidence, he would have no objection to the admission of Mr Rollings' further evidence. Accordingly, I would admit that too.

*Should the judge have refused the application?*

47. Mr Graham contended that the judge should have refused the application and that he fell into error in seven different respects, each of which forms a separate ground of appeal. As I will explain, Mr Graham focused particularly on the fourth of these in his oral submissions to us. Nevertheless all of the grounds are maintained so I will address them in turn. Before doing so I would, however, emphasise one important and over-arching point. It is not and has never been suggested that the judge did not have jurisdiction to exercise his discretion under paragraph 71 of Schedule B1. The jurisdiction to exercise the discretion conferred by that paragraph arises if the sale in issue is "likely to promote the purpose of the administration in respect of the company". The judge held that it was and there is no appeal against that finding. Mr Graham's criticisms were all directed at the exercise by the judge of his discretion to make the order sought. That necessarily involves inviting this court to find that the judge erred in principle in approaching the matter as he did, or that he left out of account, or took into account, some features that he should, or should not, have considered, or that his decision was wholly wrong. Mr Graham accepted that that was so but contended that the judge did indeed fall into error in such a way in each of the respects identified in Mr O'Connell's grounds of appeal.
48. The first of those grounds is that the Administrators failed to produce any or any adequate evidence as to the value of the sums secured by the Debenture; or that there

would be sufficient funds available to pay Mr O'Connell the sums so secured. Mr Graham submitted that, as a result of the lack of such evidence, the judge was unable to carry out a fair and proper assessment of the extent of the prejudice that would be caused to Mr O'Connell by granting the Administrators the relief they sought, and accordingly he erred in principle.

49. In assessing this contention, I think that the following points are material. First, Mr Rock having released his security on the basis of the proposed sale to Mr Palma, the only secured creditor was Mr O'Connell. As I have explained, Mr O'Connell claimed to be a secured creditor in respect of debts in excess of £800,000 and, although this was and is disputed by the Administrators, they accepted that, for the purposes of the application, and in the light of the limited time available for the hearing, the judge should assume that it was. The judge therefore proceeded on the basis that Mr O'Connell was secured to the extent he claimed. Second, Mr Rollings exhibited to his second witness statement dated 25 September 2013 a comparison of outcomes which showed that the Administrators expected to achieve £355,860 if the application was granted but only £111,119 if it was refused and the Administrators had to place MSL into liquidation and sell the assets on a break up basis. Third, it was therefore perfectly clear that the net proceeds of sale would not exceed the sums which Mr O'Connell claimed were secured by the Debenture. I do not, however, accept that the judge was, in these circumstances, bound to refuse the application. Rather, he was required to satisfy himself that the Administrators were proposing to sell the business and assets of MSL for a proper price and to consider the balance of relative prejudice, that is to say the prejudice to Mr O'Connell if he made the order sought against the prejudice to all those interested in the promotion of the purposes of the administration if he refused it. As Knox J explained in *Re AVR v Aviation Ltd* [1989] BCLC 664 at 669:

“The court has to make a balancing exercise between the prejudice that will be felt if the order is made by the secured creditor, against the prejudice that would be felt by those interested in the promotion of the purposes specified in the administration order if it is not.”

50. This, it seems to me, is precisely what the judge did. As I will elaborate in addressing the other grounds of appeal, he satisfied himself that the Administrators were proposing to sell the business and assets at a proper price and then he undertook the required balancing exercise, and in so doing had proper regard to the prejudice that would be suffered by Mr O'Connell if he made the order, and also to the prejudice that would be suffered by all those interested in the promotion of the purposes of the administration if he did not.
51. The first ground of appeal is supplemented by the second which relies upon the further evidence contained in Mr O'Connell's second witness statement which I would permit him to rely upon for the reasons I have given. Mr O'Connell explains in that witness statement how a further sum in excess of £111,400 is due and owing to him and secured by the Debenture in addition to the £800,000 upon which he relied before the judge. As I have said, that figure has now risen to about £240,000. Once again, this is disputed but, for the purpose of this appeal, I am prepared to assume that Mr O'Connell's claim is justified. I do not, however, believe that this would have had any effect upon the way the judge exercised his discretion because the £800,000 of

secured debt already materially exceeded the sum of £300,000 which Mr Palma was prepared to pay.

52. The third ground concerns the impact of the LCIA arbitration. Mr Graham submitted that it will be decided in the arbitration whether the intellectual property licences granted to MSL survived the purported termination by Mr Maass of the Eyeliner Agreement. The result of the arbitration will, Mr Graham continued, have an overwhelming impact on the value of MSL's assets and yet the Administrators failed to carry out any investigation into the merits or value of the claim. Moreover, as a debenture holder, Mr O'Connell had the right to decide when to exercise his rights, yet they were overridden by the judge's order.
53. The fundamental difficulty with this submission is that the Administrators were far from sure that the arbitration could and would be concluded within a relatively short timescale. Mr O'Connell was confident that the substantive hearing would take place before 5 December 2013 and probably a good deal earlier but the Administrators were rather more cautious in their approach, and rightly so as it has turned out for, as I have explained, the hearing has still not taken place; nor has a date for that hearing been fixed. Moreover, in mid September 2013, the Administrators knew that MSL could only continue to trade for a relatively short period of time. It had limited funds, was occupying two premises with quarter-day rental payments about to fall due on both premises, and had 17 employees. In these circumstances the Administrators formed the entirely reasonable view that, unless they could sell the business and assets on a going concern basis, they would have to place the company into liquidation, and that would mean selling its assets on a forced sale basis. They therefore had no choice but to try and sell the assets and business, such as they were, with an inevitable associated uncertainty about their value. As Ms Hilliard put it, Mr O'Connell may win or lose the arbitration but, if he loses, MSL's intellectual property rights will be shown to have had little or no value at all. I of course accept that the order made by the judge amounted to a significant interference with Mr O'Connell's rights as a fixed charge holder to realise his security at a time and in a manner of his own choosing, but this is the inevitable consequence of an order under paragraph 71 of Schedule B1 in a case where the fixed charge holder objects to the sale. In such a case the prejudice to the charge holder caused by the making of an order must be balanced against the interests of those interested in the promotion of the purposes of the administration, just as the judge did.
54. That brings me to the fourth ground of appeal, and the one upon which Mr Graham placed particular reliance at the hearing. He contended that the judge should have refused the application on the basis that the proposed sale of the business and assets would not achieve a proper price having regard, in particular, to the value of its intellectual property rights. To the contrary, continued Mr Graham, the Administrators chose to conduct an unfair and unjustified contract race; they accepted Mr Palma's offer which was lower than that of Mr Textor; Mr Textor's bid was still available at the date of the hearing; and Mr Maass deliberately and wrongfully depressed the market by intimidating Mr Textor, as the judge was or should have been aware. Moreover, there were other offers in the wings and consequently the Administrators had every reason to suppose they would secure another and better offer than that of Mr Palma were they to go back to the market. In short, there was, submitted Mr Graham, no proper investigation of the value of the assets of the

business and, in particular, its intellectual property rights. Further, the Administrators carried out no adequate investigation of the diversion of the assets of the business by Mr Maass and Mr Rock by way of asset stripping.

55. Attractively and forcefully though Mr Graham advanced these submissions, I have found myself unable to accept them. Starting with the contention that the Administrators conducted an unfair contract race, I accept that this was announced on 17 September 2013 without prior warning. I also recognise that Mr Palma was able to board an aeroplane in Italy and arrive in London that same day, whereas Mr Textor had no such opportunity, resident as he was in the United States. However, it must be remembered that Mr Textor had been aware of the marketing process for some time, having made his first offer on 6 September 2013. Further, he had made a total of five different offers by 16 September 2013. He had had his second offer accepted in principle on 11 September 2013 only to withdraw it the following day. Then, on 13 September 2013, he had reinstated his previous offer, revised it again on 16 September 2013 and been sent sales documentation for him to execute. He was, therefore, intimately familiar with the issues by 17 September 2013 and had instructed lawyers to act for him. Accordingly and while it is entirely true to say that he could not travel from the US to England on 17 September, there was no reason at all why he could not have exchanged contracts, had he so wished. Further, it is notable that he has never himself complained that the procedure initiated by the Administrators was unfair.
56. As for the contention the contract race was unjustified, it seems to me the following points are material. The marketing process was initiated on 9 August 2013 and yet by 17 September 2013 the Administrators still had no firm offer. Further, the Administrators knew that they might well have to make an application to the court under paragraph 71 of Schedule B1; they had limited cash available to them; they were continuing to incur liabilities to the 17 employees in the business; and they knew that on 27 September 2013 another quarter-day rental payment would become due and payable. Faced as they were with diminishing assets and no firm commitment, the Administrators sought to crystallise the situation and bring some finality to the marketing process, and they did so by announcing a contract race. In the circumstances I do not think they can be criticised for so doing.
57. Mr Graham's next submission was closely related to those I have addressed. He argued that Mr Textor's bid was plainly higher than that of Mr Palma and that the Administrators should therefore have favoured him and given him more time to enter into a binding agreement. I do not accept this was so. Mr Textor's offer would involve an initial payment of, so we were told, around £240,000 at the exchange rate of the time, with the balance deferred. It seems to me the Administrators had every reason to be cautious about this deferred consideration bearing in mind the potential difficulties associated with enforcement, particularly against a US corporation. Further and importantly, by 17 September 2013 it was unclear to the Administrators whether Mr Textor had any settled intention to enter into a binding agreement at all. They knew too that if either Mr Palma or Mr Textor withdrew then it was likely the other would take the opportunity to revise his offer. I consider that the Administrators were therefore entitled to take the view they did on the morning of 18 September 2013 that they should accept Mr Palma's offer.

58. Mr Graham then submitted that Mr Textor's offer was never withdrawn and he was plainly willing and available to negotiate with the Administrators at any time and certainly throughout the two days of the hearing before the judge. I am prepared to accept that this was indeed the case. Certainly, on the first day of the hearing Mr O'Connell related to the judge that Mr Textor had made a further and higher offer for the business and assets. However, it must also be borne in mind that, at the end of that day, the Administrators themselves telephoned Mr Textor and in the course of their conversation Mr Textor did not confirm the offer Mr O'Connell had earlier related but said he was content to abide by the outcome of the contract race and looked forward to finding a way to work with Mr Palma. Accordingly, and while Mr Textor did indeed express his continuing interest should the sale to Mr Palma fall through, it seems to me far less certain what the terms of any offer Mr Textor might then have been prepared to make would have been. Certainly I do not believe the Administrators had any solid reason to believe it would be higher than that of Mr Palma.
59. That brings me to the fourth aspect of Mr Graham's submissions, namely that Mr Maass intimidated Mr Textor and thereby depressed the market. Further, continued Mr Graham, this was something the judge failed to take into account. I recognise that the considerable uncertainty about the intellectual property rights previously enjoyed by MSL was the consequence of the action taken by Mr Maass to terminate the Eyeliner Agreement. I also accept that this did have a significant effect upon the value of the business and assets of MSL in September 2013 and reduced the price which any bidder was prepared to pay for them. Whether Mr Maass was entitled to terminate the Eyeliner Agreement is an issue which will be decided in the arbitration. However, I am not persuaded that any other action taken by Mr Maass affected the price which Mr Textor was prepared to offer and certainly nothing said by Mr Maass seems to have deterred Mr Textor or caused him any particular concern because, as he said to the Administrators at the end of the first day of the hearing, he was content to abide by the outcome of the contract race and was looking forward to finding a way to work with Mr Palma.
60. I must now address the submission that there were other offers available and that this demonstrates that this was, in truth, a vibrant market and that the Administrators therefore had no justification in seeking to push forward with the offer made by Mr Palma and to make the application on short notice in the manner they did. Here Mr Graham relied in particular upon the offer from Solutions Diverse on 18 September 2013 to pay a total of £450,000 of which £100,000 would be deferred. This matter, referred to by Mr Rollings in his third witness statement of 5 November 2013, was not drawn to the attention of the judge. To the contrary, he was told by Mr Al-Attar on the first day of the hearing that the Administrators had not heard from this company. It is now tolerably clear that Mr Al-Attar's instructions on this point were not correct. He and those present in court were aware of the discussions with Ms Birch but, at that stage, had no reason to suppose that her client was Solutions Diverse. Ms Oliver, who had the conversation with Mr McCook of Solutions Diverse was, regrettably, not present in court and she had not conveyed the substance of her telephone conversation with Mr McCook to those who were. In this respect there was an unfortunate breakdown in communication.

61. Ms Hilliard accepted that the information conveyed to the judge was wrong and apologised. However, she explained that this lapse was not deliberate and emphasised that the Administrators had no idea whether or not Solutions Diverse was an entity with any real interest or, indeed, ability to pursue a bid. This is, I think, a fair point and, bearing in mind that Mr McCook's offer and the communications from Ms Birch had come so late in the day and were so ill defined, it seems to me the Administrators were justified in attaching little weight to them and, most importantly, I do not believe that, had the judge been provided with full information, it would have affected the exercise of his discretion in any way.
62. I come then to the investigation of the value of the assets. The parties are agreed that it was incumbent upon the Administrators to obtain on the sale the proper and fair value of the business and assets they were selling. However, there was a sharp disagreement between them as whether or not this is something the Administrators achieved. Mr Graham relied for this purpose upon the third witness statement of Mr O'Connell in which he explained that MSL entered into two new licence agreements in 2012, one with an Indian company called Kasu Mani Enterprises Private Limited and another with a Slovenian company called Elekronecek dd. These agreements generated licence fees and a revenue stream based upon the number of holographic displays each company installed. Mr O'Connell also gave evidence that, over the previous five years, its gross revenue from licensing its IP rights amounted to in excess of £7,800,000. Finally, he explained that, in early 2013, MSL was negotiating for a new licence which had a potential value to MSL of around £6m. In light of all these matters Mr O'Connell valued the company's intellectual property rights at around £3m, and certainly very substantially more than the Administrators achieved.
63. This is powerful evidence. However, it suffers from the fundamental problem that the purported termination of the Eyeliner Agreement by Mr Maass had a devastating impact upon MSL's business. It therefore seems to me that evidence of the value of the business before the relationship between the various protagonists deteriorated is of little assistance in determining its value once it had. Instead, the Administrators ascertained the value by undertaking a wide and extensive marketing exercise. They placed adverts on appropriate websites, received 29 expressions of interest and 14 prospective purchasers were provided with information regarding MSL's business. But ultimately all of this interest translated into just a few offers. MGL withdrew in the manner I have described leaving Mr Textor and Mr Palma, both of whom made offers which were, in the Administrators' eyes, very similar. I am therefore satisfied that the Administrators did ascertain the value of the business and assets of the company, including its intellectual property rights, such as they were, by testing the market, and doing so in a perfectly sensible and adequate way. Faced with rising costs and diminishing assets, they were naturally concerned to secure a sale as soon as reasonably possible. That is precisely what they did and I am satisfied that, in doing so, they obtained a proper price.
64. The final matter relied upon by Mr Graham under this ground of appeal is that the Administrators failed to investigate potential claims by MSL against Mr Maass and Mr Rock and, in particular, took no adequate steps to recover assets and opportunities improperly diverted from the business.
65. Ms Hilliard's response to this submission, which I accept, is that the benefit of any actual or potential claim against third parties falls within the assets excluded from the



sale and the right to pursue such claims remains vested in MSL. However the Administrators face the difficulty that they do not have and have never had the funds to pursue any such claims. They only ever had two options, one being to try and sell the assets and business of MSL on a going concern basis for the best price they could achieve and the other being to place the company into liquidation. They took the former because this was, as all parties accepted, likely to produce a better result for the creditors than the latter.

66. Drawing the threads together, I reject the fourth ground of appeal. I am satisfied that the Administrators did achieve a proper price for the business and assets of MSL; that the offers of Mr Palma and Mr Textor were comparable and that the Administrators were entitled to conduct a contract race and to accept Mr Palma's offer in the way they did.
67. The fifth and sixth grounds of appeal relied upon by Mr O'Connell are directed to rather wider issues, some of which I have addressed earlier in this judgment. But there are two particular matters to which I have not yet referred. First, Mr O'Connell contends that the judge ought to have had regard to the fact that the assets proposed to be sold included electronic equipment containing, or at least giving access to, data which was the confidential proprietary information of MEL and that for this information to fall into the hands of a third party purchaser would be extremely damaging to MEL. Second, he contends that the assets proposed to be sold included physical property owned by MEL.
68. I can deal with these matters quite shortly. The Administrators have not in fact sold any assets or property belonging to MEL. They only sold such assets used by MSL as that company actually owned. The Administrators were, however, conscious of the need to protect any confidential information belonging to MEL and not to permit it to fall into the hands of Mr Palma. Indeed, this was something to which the judge specifically referred in paragraph 12 of his judgment. However, as he explained, this did not go so much to the merits of the application as to the mechanics of the completion of the sale.
69. Mr O'Connell's seventh ground of appeal is that the judge ought to have refused the application because it was overwhelmingly likely that the unsecured creditors of MSL would receive no dividend. Mr O'Connell contends that, in practice, the Administrators had no constituency to serve other than the secured creditors, of which he was the only one, and that in these circumstances the matters he relied upon and the prejudice he would suffer from the proposed sale should have been given particular weight.
70. I accept that, on the basis of the proposed sale to Mr Palma and the release by Mr Rock of his security, Mr O'Connell was the only secured creditor and accordingly his interests were a matter to which the Administrators had to have particular regard, but I do not accept this meant the Administrators were precluded from agreeing the sale to Mr Palma without Mr O'Connell's consent. It is accepted that the judge had jurisdiction under paragraph 71 of Schedule B1 to make the order sought because he was satisfied that the sale was likely to promote the purposes of the administration, namely to achieve a better result for the creditors as a whole than an immediate winding up. The question then was how the discretion that provision conferred upon him should be exercised. The judge balanced, as he was bound to, the prejudice that

would be suffered by Mr O'Connell if he made the order against the prejudice that would be felt by all those interested in the promotion of the purposes specified in the administration if he did not. In considering the latter, the judge properly took into account that the Administrators had engaged in a process which would leave Mr O'Connell no worse off than if he had sold the assets secured by the Debenture himself, and also the interests of all other creditors and potential creditors, including the employees of the company and its landlords. Everybody agreed that an administration would achieve a better result for the creditors as a whole than would be likely if the company were wound up and that an administration would necessarily involve, in due course, a sale of the assets and business of the company on a going concern basis for the best price that could be achieved. That is precisely what the Administrators sought to do.

71. The eighth and final ground of appeal relied upon by Mr O'Connell is that both he and the judge were led to believe that Mr Maass, as a purported creditor of MSL in a sum exceeding £800,000, had agreed to waive all his claims against the company if the sale to Mr Palma proceeded to completion. In fact, however, and while Mr Maass did indeed waive his claims against MSL, he nevertheless retained all his voting rights as a purported creditor and this was a matter of which Mr O'Connell was unaware until after the hearing. In due course Mr Maass exercised those voting rights at the creditors' meeting which was ultimately held on 14 October 2013 with the result that Mr O'Connell and his supporters were outvoted.
72. It is true the judge was not aware of the retention by Mr Maass of his voting rights and that he did in due course exercise them at the creditors' meeting. I also recognise that, in consequence of the retention by Mr Maass of his voting rights, Mr O'Connell was unable to carry a majority at the meeting. Nevertheless, I do not believe this provides a basis for overturning the judge's decision. First, Mr Maass was under no obligation to waive his voting rights and there was no basis for compelling him to do so. He retained those voting rights, as was his right, and then, in due course, chose to exercise them in the way that he did. Second, I accept that the retention by Mr Maass of his voting rights was not a matter to which the judge's attention was specifically drawn. But that, it seems to me, is neither nor there. Had the judge's attention been drawn to this matter, it could not have led him to exercise his discretion in any different way. Indeed, if anything, it would have reinforced the decision to which he came for it would have rendered it that much less likely Mr O'Connell would be able to carry a majority.
73. As I have said, the judge found the decision with which he was faced an extremely difficult one to make. That I can well understand. However, I am satisfied that he approached the matter correctly, properly took into account those matters to which he was bound to have regard and came to a conclusion which fell well within the bounds of a reasonable exercise of his discretion. I do not believe there is any proper basis for this court to interfere with it.

*Should the judge have adjourned the application?*

74. Mr O'Connell contends that the judge was wrong to abridge time and that he should have adjourned the application to enable him to be represented and to have a fair and proper opportunity to respond to it, or until after the imminent creditors' meeting, or



until after the conclusion of the LCIA arbitration. I will deal with these three contentions in turn.

75. Mr Graham developed the first of these grounds in the following way. He emphasised that the application was issued on Monday 23 September and made returnable the following day. Neither Mr O'Connell's counsel nor his solicitor was available and the judge had no skeleton argument from Mr O'Connell because there was no time to prepare one. Mr O'Connell's witness statement was prepared at short notice and lacked focus. It was 55 pages long and much of it had been cut and pasted from statements prepared for earlier applications. It was not served until the morning of the hearing and the judge had no time to read it. Accordingly Mr O'Connell attended on that first day but sought an adjournment to give him an opportunity to prepare his response properly and be represented. The judge did not accede to that request and instead proceeded to hear the application although, as I have said, it was, later in the day, adjourned until the following day to allow counsel, Mr Smith, to appear on Mr O'Connell's behalf. Further, Mr Graham continued, there was no real urgency and certainly no sufficient urgency to justify depriving Mr O'Connell of his right to a fair hearing.
76. I entirely accept that the hearing took place before the judge in circumstances which were far from ideal. I also accept that Mr O'Connell was placed in an extremely difficult position which he dealt with as best he could. I may say that, despite the formidable challenge with which he was presented, a review of the transcript reveals that he acquitted himself with distinction and clearly articulated the objections to the order which have been developed more fully on his behalf on this appeal. Further, looking at the matter more broadly, as Ms Hilliard has invited us to, it must be borne in mind that Mr O'Connell had been aware for some time that an application would have to be made if he declined to release his security. This was raised at the hearing before Mann J and pursued by the Administrators with Mr O'Connell as the marketing process unfolded. Further, the application and evidence were served upon Mr O'Connell in draft on 19 September 2013, four clear days before the hearing, albeit that period included a weekend. The judge was also conscious of the difficulties facing Mr O'Connell on the first day and, recognising that he would be assisted by hearing submissions from Mr O'Connell's counsel, adjourned the application over until the second day.
77. Further, for all the reasons I have explained, the application was indeed urgent. Mr Palma required the side letter because he was not prepared to purchase the business and assets of MSL subject to the Debenture. That side letter required the Administrators to secure an order of the court under paragraph 71 of Schedule B1 by close of business on 25 September 2013. Had the order not been granted, there was, as the judge recognised, a real risk that Mr Palma would withdraw. That would have meant a further marketing exercise of uncertain outcome and the likely accrual of a further rental liability of around £30,875 which was, as the judge noted, no small sum in the context of this particular administration. To that would have had to be added the payroll for September which was, in the event, paid by Mr Palma. In all these circumstances I do not believe it can be said that the judge fell into error in exercising his discretion to case manage the application in the way that he did.
78. Mr Graham then turned to the alternative contention that the judge ought to have adjourned the hearing of the application until after the creditors' meeting which was

due to held on 30 September 2013. This was a matter to which the judge was not prepared to attach great weight because, as he put it at paragraph 14 of his judgment, there was no firm, or even something approaching a firm, alternative offer. Nevertheless Mr Graham submitted that the views of the creditors about the proposed sale were highly material and the judge ought to have adjourned the application so as to allow them to be expressed. In support of this submission he referred us to *Re Consumer & Industrial Press Ltd (No 2)* [1988] 4 BCC 72, a decision under the former administration regime. In that case Peter Gibson J refused an application by administrators for an order under s.15 of the Act authorising them to dispose of property subject to fixed charges, and he did so because the administrators' proposals had not been put to a meeting of creditors. He said (at page 73):

"I am very unhappy indeed at the suggestion that the court should make an order such as will mean that there can be no useful meeting of creditors. It seems to me that the power the court undoubtedly has under sec. 15 should only be exercised in circumstances in which it can readily be seen that the disposals are really the only sensible course to be adopted and when unsecured creditors have had a chance to say what they think about the proposals in the administration. It seems to me that quite exceptional circumstances would be needed for the court to frustrate a meeting of creditors to consider proposals by the administrators."

79. Recent decisions, however, have seen the adoption of a more pragmatic approach to the commercial pressures facing administrators. Thus in *In re T & D Industries Plc* [2000] 1 WLR 646, Neuberger J considered whether administrators might dispose of the assets and undertaking of a company prior to the meeting of creditors and, if so, whether the court should give directions to sanction such a sale. After referring to the decision of Vinelott J in *In re Charnley Davies Ltd* (unreported), 21 January 1987, the decision of Millett J in *In re Charnley Davies (No. 2)* [1990] BCLC 760, his own decision in *In re Montin Ltd* [1999] 1 BCLC 663 and the decision of Rimer J in *In re Osmosis Group Ltd* (unreported), 25 May 1999, Neuberger J explained (at page 657):

"Faced with a course which the administrator was advised, and believed, was highly beneficial to the company, where the course had to be taken very quickly because the proposed purchaser would otherwise withdraw, Rimer J., like me in *In re Montin Ltd*. [1999] 1 B.C.L.C. 663, appears to have felt that he had little real alternative in effect but to sanction the proposal. This tends to emphasise the point mentioned earlier, namely that in the great majority of cases it seems a little difficult for the court to do anything other than sanction a commercial decision which the administrator reasonably, and, on the face of it, justifiably wishes to make."

A little later Neuberger J emphasised the desirability, indeed need, for administrators to put their proposals to creditors, and to call a meeting as soon as reasonably possible before continuing (at page 657):

“[M]y decision tends to emphasise the fact that a person appointed to act as an administrator may be called upon to make important and urgent decisions. He has a responsible and potentially demanding role. Commercial and administrative decisions are for him, and the court is not there to act as a sort of bomb shelter for him.

[A]dministrators should not be able to take unfair advantage of the fact that the creditors’ rights are, as it were, limited by sections 23 to 25. There will be many cases where an administrator will be called upon to make urgent and important decisions and where the urgency means that there is no possibility of a section 24 creditors’ meeting being called to consider the decision prior to it having to be made. However, the importance of the decision and the time involved may well be such that the administrator should have what consultation he can with the creditors. An obvious case might be where there were three days to make a decision and there were only four creditors of the company, or there were four creditors who make up 80 per cent. in value of the total creditors of the company. In those circumstances, it seems to me that the administrators should at least consider consulting those four creditors. Whether he should effect any consultation, with whom he should effect it, how he should effect it and what decision he should make following any consultation must be matters for him to decide by reference to the facts of the individual case.”

80. While not in any way seeking to diminish the importance of the creditors’ meeting in the context of an administration, I too recognise that the urgency of the situation and commercial pressures will sometimes require administrators to make a decision before a meeting can be convened. But in any such case it may still be possible for the administrators to consult with the creditors and, so far as circumstances permit and it is reasonable to do so, that is what they should do. It seems to me that much the same considerations apply to paragraph 71 of Schedule B1, for the underlying issue is the same, namely whether a sale should be authorised before it has been considered at the creditors’ meeting. In the present case the Administrators did not require a direction from the court to exercise the general power of sale but they did require an order under paragraph 71 of Schedule B1 unless Mr O’Connell agreed to release his security. They believed and the judge accepted there was a real risk that, absent an order, the sale to Mr Palma would be lost and, despite his plain expression of interest, Mr Textor had not committed himself to buy the business and assets on the terms he had discussed. Further, the judge was well aware that Mr O’Connell and Mr Maass represented 80% by value of the creditors of the company and that Mr O’Connell opposed the sale to Mr Palma and Mr Maass supported it. In all these circumstances I believe the judge was entitled to proceed as he did.
81. Finally, Mr Graham submitted that the hearing should have been adjourned until after the conclusion of the LCIA arbitration. Mr Graham did not place this ground at the forefront of his submissions, and rightly so. As I have explained, it was far from clear

when the substantive hearing would take place and, in the event, there is still no scheduled date for it. There was no realistic possibility that the Administrators could continue to trade MSL's business in the meantime. Inevitably, therefore, they had to carry out their duties on the basis that there was a real uncertainty over the intellectual property rights to which Mr O'Connell claimed the company was entitled.

**Conclusion**

82. For all of the reasons I have given, I believe the judge was entitled to exercise his discretion in the way that he did. The Administrators could not continue to trade until after the conclusion of the LCIA arbitration and even now it is far from clear that Mr O'Connell will prevail at the end of the day. There was, therefore, a considerable degree of uncertainty attaching to the value of MSL's intellectual property rights. The Administrators therefore decided to conduct a marketing exercise and then a competitive sale process with a view to selling the business and assets of the company, such as they were, for a fair and proper price. The sale realised a substantial sum, enabled a transfer of the company's 17 employees and avoided the accrual of further liabilities. Had the sale fallen through, there was a real risk the Administrators would have been forced to put the company into liquidation. In all these circumstances no basis has been shown for this court to interfere with the exercise by the judge of his discretion in the way that he did. It is therefore not necessary to address the issues raised by the Administrators in their respondents' notice and, these being points which were not argued out before us at the oral hearing, I prefer not to do so. Nor is it necessary to address a further point which was briefly touched upon in the course of oral submissions, namely from what date any re-exercise of discretion would have taken effect. I would dismiss this appeal.

**Lord Justice Floyd:**

83. I agree.

**Lord Justice Fulford:**

84. I also agree.

- 85.

**EXHIBIT E**

(12) **United States Patent**  
**O'Connell et al.**

(10) **Patent No.:** **US 8,328,361 B2**  
(45) **Date of Patent:** **Dec. 11, 2012**

(54) **PROJECTION APPARATUS AND METHOD  
FOR PEPPER'S GHOST ILLUSION**

(75) Inventors: **Ian O'Connell**, London (GB); **James Rock**, London (GB)

(73) Assignee: **Musion IP Limited** (GB)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/011,452**

(22) Filed: **Jan. 21, 2011**

(65) **Prior Publication Data**

US 2011/0157556 A1 Jun. 30, 2011

**Related U.S. Application Data**

(63) Continuation of application No. 10/599,553, filed on Sep. 30, 2006, now Pat. No. 7,883,212.

(30) **Foreign Application Priority Data**

Apr. 1, 2004 (WO) ..... PCT/GB2004/001414

(51) **Int. Cl.**

**G03B 21/00** (2006.01)

**G03B 21/56** (2006.01)

**G02B 27/22** (2006.01)

**A63G 31/00** (2006.01)

**A63J 5/00** (2006.01)

(52) **U.S. Cl.** ..... 353/10; 359/449; 359/478; 472/63

(58) **Field of Classification Search** ..... 353/10, 353/74, 79, 119, 122, 28; 359/443, 447, 359/449, 478, 479, 630; 472/58, 61, 63

See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

4,019,656	A *	4/1977	Spears	222/103
4,927,238	A *	5/1990	Green et al.	359/466
5,573,325	A *	11/1996	Lekowski	353/79
5,685,625	A *	11/1997	Beaver	353/28
5,865,519	A *	2/1999	Maass	353/28

**OTHER PUBLICATIONS**

Office Action in related U.S. Appl. No. 13/008,111 dated Jul. 11, 2011.

Amendment and Response filed with the United States Patent and Trademark Office on Sep. 2, 2011 in related U.S. Appl. No. 13/008,111.

\* cited by examiner

*Primary Examiner* — William C Dowling

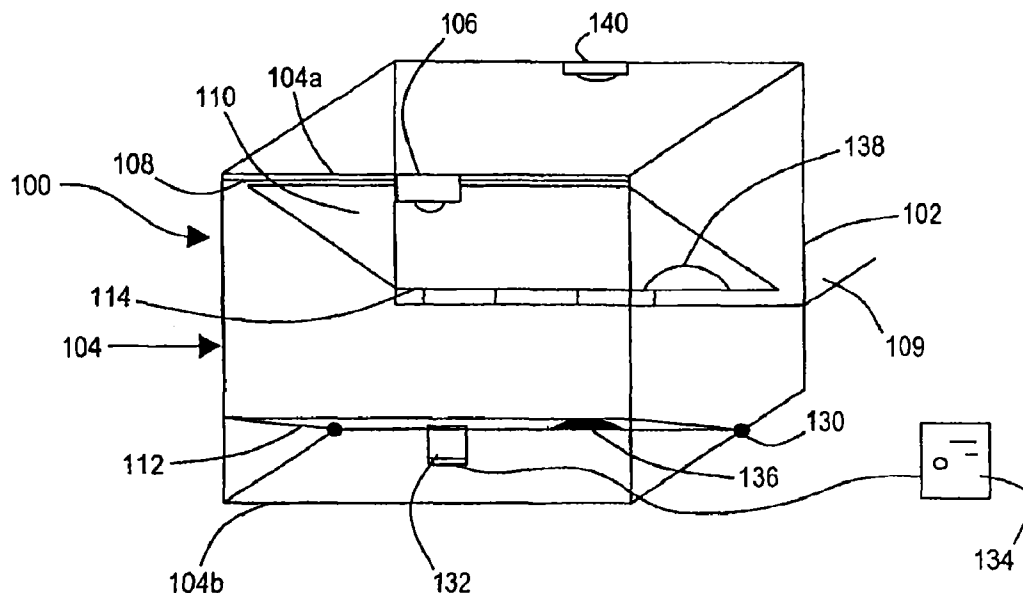
*Assistant Examiner* — Ryan Howard

(74) *Attorney, Agent, or Firm* — Thomas, Kayden, Horsttemeyer & Risley LLP.

(57) **ABSTRACT**

An image projection apparatus includes a projector, a frame, and a partially transparent screen. The frame retains the screen under tension, such that the screen is inclined at an angle with respect to a plane of emission of light from the projector. The screen has a front surface arranged such that light emitted from the projector is reflected therefrom. The projector projects an image such that light forming the image impinges upon the screen such that a virtual image is created from light reflected from the screen, the virtual image appearing to be located behind the screen.

**20 Claims, 4 Drawing Sheets**

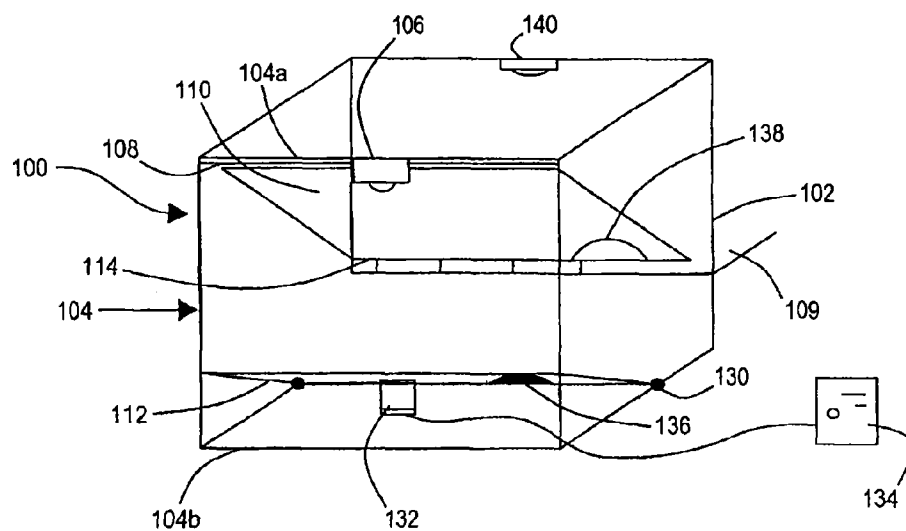


**U.S. Patent**

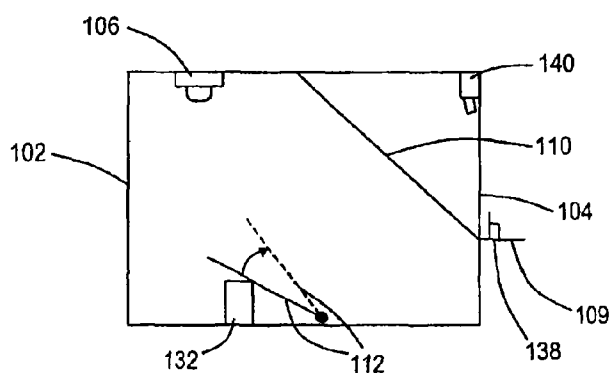
**Dec. 11, 2012**

**Sheet 1 of 4**

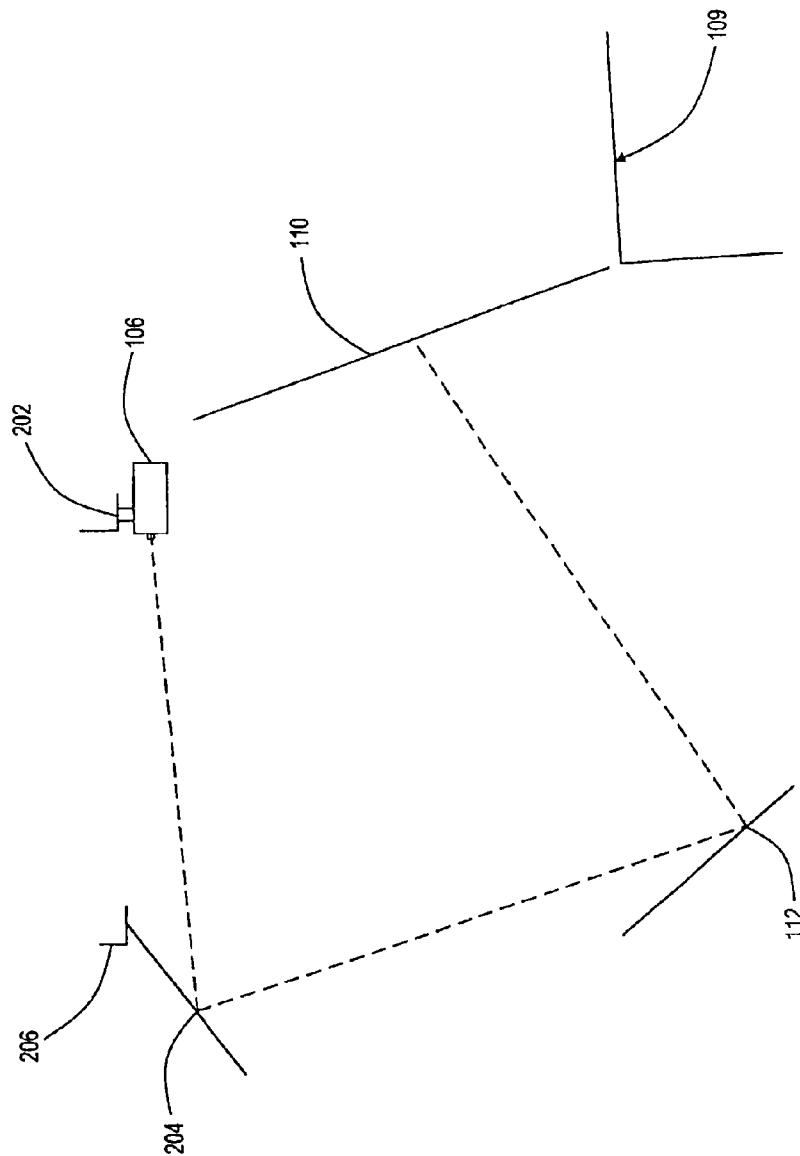
**US 8,328,361 B2**



***Fig. 1***

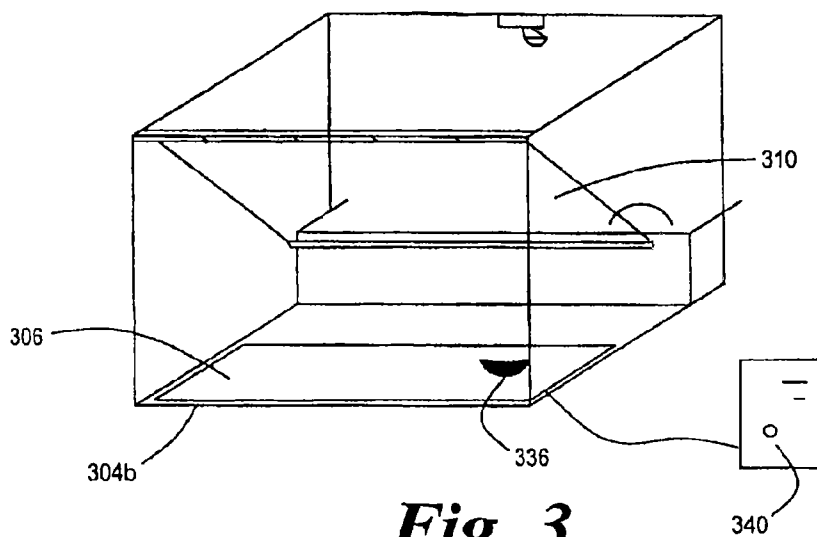


***Fig. 2***

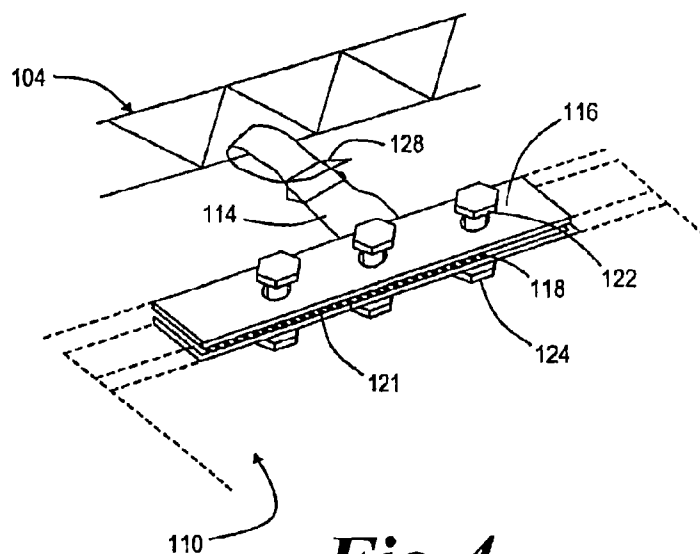


*Fig. 2a*

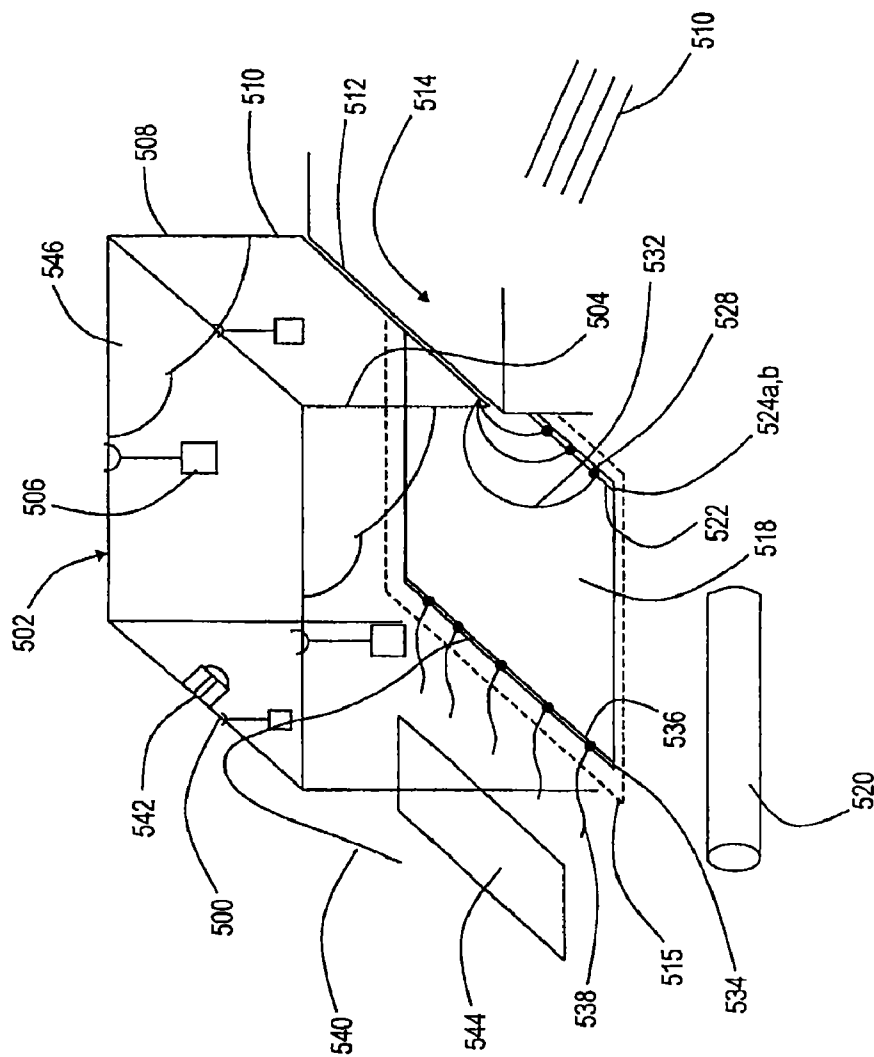




*Fig. 3*



*Fig. 4*



*Fig. 5*

US 8,328,361 B2

1

## PROJECTION APPARATUS AND METHOD FOR PEPPER'S GHOST ILLUSION

This invention relates to a projection apparatus and method. More particularly, but not exclusively, it relates to a projection apparatus arranged to project an image of an object upon an inclined, partially reflective, screen so as to give a false perception of depth and a method for constructing such an apparatus.

### BACKGROUND OF THE INVENTION

The projection of an image upon a partially reflective screen such that is observable by a viewer positioned in front of the screen is known, the so-called "Peppers ghost" arrangement that is known from fairground shows.

This has been applied to publicity and promotional displays where a presenter resides behind an inclined, partially reflective screen, typically a tensioned foil, onto which an image of, for example, a motor vehicle is projected, via at least one reflective surface, see for example EP 0799436. The location of the presenter behind the projected image has a number of inherent advantages over systems where the presenter stands in front of a screen, not least of which is that the presenter does not obscure the projected image when walking across the projected image. Additionally, the use of an inclined screen results in a viewer of the image perceiving the image as having depth rather than merely being a two dimensional image, for example where a motor vehicle is seen to rotate upon a turntable.

However, current image projection apparatus' do have a number of problems associated with them, for example, mounting of the foil can prove difficult which in turn leads to uneven tensioning of the foil and wrinkles upon the foil, that impair the viewed quality of the image projected onto the foil. Also, in mounting the foil the foil must be laid out upon a clean dust free piece of cloth or plastic sheet, which is larger than the foil, in order to prevent particles adhering to the foil, such particles can scratch the surface of the foil and impair the viewed quality of the projected image or act as scattering centres from which projected light is incoherently scattered, thereby detracting from the viewed quality of the image as this scattered light does not contribute to the viewed image.

Also, as the illusion of peppers ghost relies on the reflected image formed by light contrasting with its immediate surroundings and background. The stronger the reflected image, the more solid that reflected image looks, the more vibrant the colours will be, and the more visible the reflected image is to an audience. In circumstances where the presenter may be unable to control high levels of ambient light forward of the foil, e.g. from an auditorium at a trade show, the high level of ambient light results in significant levels of reflection of the ambient light from the screen detracting from the strength of the reflected image over the background. In these circumstances a bright projector (8000 lumens+) is desirable. However, the use of a bright projector results in unwanted light hitting the projection surface and reflecting through the foil to create a milky hue upon the stage and around the area where the reflected image appears.

Another problem with current image projection apparatus is that projectors used with such apparatus are very powerful, typically 8,000 to 27,000 lumens and consequently project a significant amount of light into areas of an image where there is no object within the image. This is an inherent feature of projectors and results in low contrast ratios which leads to a milky hue spread over the part of the film where the projector is creating an image when the projector is switched on. The

2

milky hue is clearly undesirable as it detracts from the viewer's perception that there is no screen present.

The level of the milky hue relative to the brightness of the image is, at least partially, determined by the level of contrast ratio offered in the projector. The higher the contrast ratio, then the brighter the image can be relative to the brightness level of the milky hue. Even projectors with contrast ratios as high as 3000:1 still emit a milky light hue when used in a "Pepper's Ghost" arrangement.

A further problem associated with some projectors is the "keystone" effect, in which distorted, typically elongated, images (up and down) occur due to angled projection. This is of particular relevance where depth perception is of importance. The solution employed in modern, expensive projectors is to employ digital correction of keystone distortions. However, older, less-expensive or even some specialist High Definition projectors do not employ such digital keystone correction and are therefore difficult to configure for use with current image projection apparatus. High definition (HD) projectors do not offer keystone adjustment because when keystone correction is attempted in conjunction with the increased number of pixels about an image's edge causes the pixels about the edge of the image to appear 'crunched'. Additionally, when processing moving images HD projectors compromise projector processing speed. When the processing power is used to carry out both keystone correction and motion processing the image is seen to jerk during movements, an effect known as "chokking". In general, it can be said that the use of electronic keystone correction to alter a video image will result in the degradation of picture quality compared to an image which is not subject to such a process.

Additionally, current systems do not allow for the projected image to apparently disappear and re-appear from behind a solid 3D object placed upon the stage, as the screen lies in front of the presenter and closest to the viewing audience.

### SUMMARY OF THE INVENTION

According to a first aspect of the present invention there is provided a image projection apparatus comprising a projector, a frame, and an at least partially transparent screen:

the frame being arranged to retain the screen under tension, such that the screen is inclined at an angle with respect to a plane of emission of light from the projector;

the screen having a front surface arranged such that light emitted from the projector is reflected therefrom; and

the projector being arranged to project an image such that light forming the image impinges upon the screen such that a virtual image is created from light reflected from the screen, the virtual image appearing to be located behind the screen.

Such an apparatus is advantageous over present systems in that the screen need not be coated with an expensive, partially reflective coating, an angular dependence of reflectivity of transparent dielectric materials can be used to bring about partial reflectance of the projected image. Thus, this apparatus simplifies the manufacture of such systems and also reduces their production costs. Additionally, the use of a frame frees the screen from having to be fixed directly to a ceiling, or a floor, and therefore increases the utility of apparatus over the prior art systems.

The screen may be a foil. The foil may be rolled about a cylinder when not in use. The screen may be inclined at approximately 45° to the plane of emission of light from the projector. The screen may comprise a partially reflective layer upon the front surface.

US 8,328,361 B2

3

The use of a foil screen reduces the weight of the apparatus, this allows ready transportation of the apparatus between sites. Rolling the foil onto a cylinder when not in use serves to protect the foil from damage during transportation and also allows ready transportation of the apparatus between sites. The use of a partially reflective screen can increase the degree of light reflected from the screen and can increase the audience perceived strength of the virtual image.

The screen may be attached to the frame at the screen's upper and/or lower edges. The frame may comprise first and second retention members arranged to sandwich an edge region of the screen therebetween. At least one of the first and second retention members may comprise an abrasive coating, typically sandpaper, arranged to contact the screen. The first and second retention members may comprise respective openings therethrough that may be arranged to collocate with openings in respective jaws of clamping members attached to tensioning straps, the openings may be arranged to receive a fixing means so as to clamp the screen between the first and second retention members. The tensioning straps may be attached to a truss arrangement and may be adjustable such that the tension of the screen within the truss arrangement can be varied about the periphery of the screen. Preferably, the retention members are substantially parallel to truss members comprising the truss arrangement.

The use of a variable tensioning arrangement allows wrinkles upon the screen to be minimised, and ideally eradicated to present a smooth surface for upon which the image can be projected. An abrasive surface upon at least one of the retention members increases the grip between the retention member and the screen thereby reducing the likelihood of the screen slipping when held by the retention member.

The apparatus may comprise a pigmented reflective member in an optical pathway between the projector and the screen. The pigmented member may reflect only part of the visible spectrum of light, typically the pigmented member will appear grey or white to a viewer.

It has been found that the use of a grey reflective member in the optical pathway between the projector and the screen reduces the outline of the reflective member upon the screen compared to when a white reflective member is used, and also reduces the level of the milky white hue associated with the projector emitting light where there is no image of an object to be projected.

The pigmented reflective member may be inclined at an angle with respect to the plane of emission of light from the projector. The angle of inclination of the member with respect to the plane of emission of light from the projector may be variable. The member may comprise a plurality of sections each of which may have an independently variable angle of inclination with respect to the plane of emission of light from the projector.

The inclination of the reflective member can compensate, at least partially and in some instances completely, for keystone effect. The variation of the angle of inclination or distance of the reflective member allows for a variation of the apparent depth and/or position of an object when projected upon the screen. This is because the virtual image appears as far behind the screen as the real image is in front of the screen.

There may be a reflective device, typically a mirror, arranged to direct light projected from the projector on to the reflective member. Typically, the reflective device is mounted upon an upper part of the framework. The reflective member may be parallel, or substantially parallel, to the reflective device. In some embodiments the projector may be mounted upon an upper truss of the framework and may be aligned with

4

the horizontal, typically light projected from the projector is directed on to the reflective device.

Such an arrangement compliments the keystone correction achievable by the inclination of the screen and the reflective member and is particularly useful where an HD projector is used in order to compensate for the keystone effect without the use of the projector's processing power.

The reflective member may comprise a mask corresponding to the apparent location of a prop in the screen to an audience. Typically, the mask will absorb light over at least a fraction of the visible spectrum and preferably the mask will be black. The mask may be arranged to produce an area upon the screen upon which the image is not projected. The mask may vary in extent and shape, for example by the use of a sliding element that is moved in and out of position upon the reflective member.

The mask can be used to make the illusion of an article disappearing and reappearing behind a prop that is placed upon a stage, either behind or in front of the screen.

The apparatus may comprise a light source arranged to selectively illuminate an area of stage comprising the prop. The light source may be a white light source

Lighting the prop causes the prop to become more visible and better defined against the dark, typically black, background. This enhances the three dimensional effect of the projected image interacting with the prop. Also directing bright light upon the prop serves to reduce the contrast ratio of the projected image upon the prop, which typically remains slightly visible even when a mask is used in the prop's shadow upon the reflective member, thus enhancing the illusion of the projected image disappearing behind the prop.

The apparatus may comprise a light source arranged to illuminate at least part of a stage. The light source may be located to the rear of the screen, typically along a top edge of the frame and/or along either side of the stage. The apparatus may comprise a plurality of light sources. The apparatus may comprise a lighting desk equipped with faders arranged to control the level of each light source, or selection means arranged to selectively control the supply of power to each light source.

Such a light source is used in order that the colour and light levels of the area immediately surrounding the peppers ghost image, the stage background, can most closely match the colour of the projection surface background, excluding the area on both which is carrying the image. This, reduces the milky hue perceived by the audience. The use of a plurality of light sources increases the uniformity of lighting of the stage, in order to produce a similar effect to the way light emitted from a projector hits the projection screen. By controlling each light source separately the lighting levels upon the stage can be controlled to closely match the levels of light as dictated by the show performance, or the levels of unwanted light hitting the projection surface of the screen.

The projector may comprise a standard projector, for example a JVC ML4000, or a Barco G5. Alternatively, the projector may comprise an LCD, or a television display. The display may comprise at least one element arranged to be non-emitting in response to control from a processor. The at least one element may form a mask arranged to produce an area upon the screen upon which the image is not projected. The mask may correspond to the shape and location of a prop upon stage. The prop may be three dimensional.

According to a second aspect of the present invention there is provided a method of providing a projection apparatus comprising the steps of:

- (i) resting a frame upon a number of elevation means;
- (ii) attaching leg sections to the frame;

US 8,328,361 B2

5

- (iii) increasing the height of the elevation means;
- (iv) adding further leg sections;
- (v) attaching a lower edge of a screen to a lower rear piece of the frame;
- (vi) raising an upper edge of the screen to adjacent an upper front section of the frame; and
- (vii) attaching the upper edge of the screen to the upper front section of the frame.

The method may comprise providing the elevation means in the form of a jack.

The method may comprise providing the screen in the form of a film. The method may comprise removing a roll of screen film from a protective cylindrical casing. The method may comprise laying the screen upon a dust-free protective sheet.

The method may comprise placing the lower edge of the screen between jaws of a first retention member and may further comprise securing the screen in position using a fixing means passing through the retention member and the screen and a locking means arranged to lock the fixing means being arranged to secure the locking means in position. The method may comprise providing the fixing means in the form of a bolt and the locking means in the form of a nut.

The method may comprise attaching tensioning means to the retention member adjacent at least some of the fixing means.

The method may comprise attaching the tensioning means to the lower rear piece of the frame. The method may comprise attaching a second retention member to an upper edge of the film screen, typically in the same manner as the first retention member is attached to the lower edge. The method may comprise attaching tensioning means to the second retention member. The method may comprise providing the tensioning members in the form of ratchet straps.

The method may comprise attaching a rope to the second retention member and passing the rope over the upper frame and using the rope in step (vii) to raise the screen.

The method may include tensioning each of the tensioning means such that the screen is flat and substantially wrinkle free.

The method may include depending a projector from the upper frame.

The method may include placing a pigmented reflective board between the screen and a front edge of the frame. The method may comprise reflecting light emitted by the projector from the board onto the screen.

The method may comprise forming the frame from a truss work.

According to a third aspect of the present invention there is provided a projection apparatus constructed according to the second aspect of the present invention.

#### BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

The invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

FIG. 1 is a schematic representation of a first embodiment of a projection apparatus according to at least an aspect of the present invention;

FIG. 2 is a side view of a the projection apparatus of FIG. 1 showing a pigmented reflective member in first and second positions;

FIG. 2a is a schematic representation of an alternative projection arrangement, suitable for use with the apparatus of FIGS. 1 and 2;

6

FIG. 3 is a schematic representation of a second embodiment of a projection apparatus according to at least an aspect of the present invention;

FIG. 4 is a perspective view of a screen clamping arrangement of FIGS. 1, 2 and 3; and

FIG. 5 is a schematic view of a projection apparatus being constructed according to the second aspect of the present invention.

#### DETAILED DESCRIPTION OF THE INVENTION

Referring now to FIGS. 1, 2 and 4, a projection apparatus 100 comprises a box frame 102 formed of trusses 104, a projector 106, a support frame 108, a screen 110 held within the support frame 108 and a grey pigmented reflective board 112.

The projector 106 depends from a front upper cross-piece truss 104a of the box frame 102. The board 112 lies below the projector 106 at the base of the box frame 102. The screen 110, is inclined at approximately 45° to the horizontal and the front edge of the screen 110 is proximate the front upper cross-piece truss 104a of the box frame 102 and the rear edge of the screen is proximate a stage 109 that lies to the rear of the box frame 102.

The screen 110 is typically a polymeric foil, which can have a partially reflective coating upon a front face of the foil. The screen 110 is retained within the box frame 102 by means of tensioning straps 114 attached to the box frame 102, at the top and bottom edges of the screen 110. At a free end of each of the tensioning straps 114 there is pair of clamp jaws 116 which have respective openings 118, 120 passing there-through. The faces of the jaws 116 are optionally coated with an abrasive 121, such as sandpaper, in order to enhance the grip of the jaws 116 upon the screen 110.

Edges of the screen 110 are placed between the jaws 116 and a bolt 122 is placed through the openings 118, 120 and passes through the screen 110. A nut 124 is threaded onto the bolt 122 and tightened to hold the screen 110 between the jaws 116. The tensioning straps 114 pass through the trusses 104 and are tightened using a friction locking buckle arrangement 128.

Each of the tensioning straps 114 can be tightened or loosened individually so as to allow an even tension to be applied over the whole surface of the screen 110 thereby reducing, and ideally eliminating, the formation of wrinkles upon the screen 110 which reduce the quality of an image projected upon the screen 110.

The reflective board 112 lies below the projector 106 adjacent to a lower front cross-piece truss 104b of the box frame 102. The projector 106 is directed such that light emitted by the projector 106 strikes the reflective board 112. The board 112 is inclined so that the light emitted by the projector 106 is reflected upwards from the board 112 onto the screen 110. The use of a grey, or otherwise coloured board 112 reduces the milky hue associated with light from the projector where there is no image to be projected.

A fraction of the projected light striking the screen 110 is reflected from the front surface of the screen 110 where it can be viewed by an audience. A presenter upon the stage 109 behind the screen 110 can also be viewed by the audience but does not interfere with the viewing of the image by the audience.

The board 112 is connected to a hinge arrangement 130 along a rear edge thereof. The hinge arrangement 130 allows the board 112 to be raised and lowered, typically by a hydraulic ramp 132 controlled by a computer 134, in order to compensate for the 'keystone' effect. Alternatively, the board 112



US 8,328,361 B2

7

can be raised and lowered by the person pulling upon a string, or an electric motor to drive the board up and down.

The raising and lowering of the board **112** also allows for the audience's perception of the positional depth upon the stage of an element of a projected image to be altered by varying the height of the element of the image upon the screen **110**. It is envisaged that the board **112** may comprise a number of individual sections each of which may be raised and lowered individually in order to allow the perceived depth of an individual element of an image to be varied independently of other elements of the image.

A non-reflective mask **136** in the shape of a prop **138**, in this example a rock, is placed upon the board **112**. The prop **138** is placed upon the stage **109**, typically behind the screen **110**. The mask **136** is placed such that the board **112** is obscured in a region corresponding to where the prop **138** is located with respect to the screen **110**. This arrangement of mask **136** and prop **138** results in an image, or part of the image, projected upon the screen **110** apparently disappearing as the image, or part of the image, passes over prop **138** and reappearing once the image, or part, of the image has passed over the prop **138** as the mask **136** prevents light being reflected onto the region of the screen **110** corresponding to the location of the prop **138**. The mask **136** can be variable in size and shape, for example by means of a sliding panel that is moved into location and varied in size according to the size of the prop **138**. This also allows for the depth perception of props to be varied as their apparent effect upon variable depth image elements, as discussed hereinbefore, can be varied appropriately, for example a given size of rock will obscure proportionately more of a distant image than the same rock will of a near image.

A light source **140** is mounted upon the box frame **102** and illuminates the prop **138** in order to reduce the effect of any residual light reflected from the board **112** onto the prop.

Referring now to FIG. **2a**, an alternative projection arrangement **200**, suitable for use with the apparatus of FIGS. **1** and **2** with an additional truss, comprises the projector **106** depending from a truss **202** forward of the screen **110**, an inclined mirror **204** of variable inclination depending from a second truss **206** forward of projector **110**. The projector **106** projects an image on to the mirror **204** such that the image is projected on to the reflective board **112** and on to the screen **110**. The mirror **204** is typically arranged to be perpendicular to the board **112**, and in embodiments where the board **112** has a variable angle of inclination the mirror **204** will usually be arranged to track, synchronously, with any variation in the angle of inclination of the board **112**.

It will be appreciated that the term mirror is used herein to describe any reflective surface that reflects substantially all, typically in excess of 50% preferably in excess of 80%, light impinging upon it.

Referring now to FIG. **3**, a projection apparatus **300** is substantially similar to that of FIGS. **1** and **2** accordingly identical parts to those of FIGS. **1** and **2** are accorded similar reference numerals in the three hundred series.

A projection screen **306** resides in front of the screen **310** adjacent the lower front cross-piece truss **304b**. The projection screen **306** is typically a liquid crystal display (LCD) screen or a television screen. The projection screen **306** projects an image upwards onto the front surface of the screen **310**. The use of a projection screen **306** removes the 'key-stone' effect associated with conventional projectors.

A mask **336** can be formed upon the screen by use of a computer **340** to control the projection screen **306** to black out the appropriate part of the projection screen **306** electronically. This removes the need for a physical mask to be pro-

8

duced. The computer **340** can be used to switch of areas of the projection screen **306** which do not contain part of an image to be projected, this reduces the milky white hue associated with such areas when using conventional projectors. Also, the use of a computer **340** to control the projection screen **306**, together with image sizing in relation to image movement allows an image to be readily scaled and positioned upon the projection screen **306** to enhance an audience's perception of depth and movement of a projected image using known image processing techniques. Alternatively, the projection screen **306**, or sections of the projection screen **306**, can be raised and lowered under the control of the computer **340** in order to enhance the audience's perception of depth of the projected image.

Referring now to FIG. **5**, a box truss framework **500** comprises a square upper truss work **502** and leg trusses **504**. In constructing the framework **500** the upper truss work **502** rests upon a number of jacks **506**. First sections **508** of the leg trusses **504** that extend at right angles to the upper truss work **502** are added at the corners of the upper truss work **502**. The height of the jacks **506** is increased to allow additional sections **510** of the leg trusses **504** to be added until the desired height of the box truss framework **500** is achieved.

A cross-piece truss **512** is fixed to two of the leg trusses **504** such that it horizontally spans the gap therebetween at a height close to, and typically slightly below, the level of a stage floor **514**. The leg trusses **504** spanned by the cross-piece truss **512** constitute the rear legs of the framework **500** and are located adjacent the front of the stage floor **514**.

A dust-free protective plastic sheet **515** is laid across the width of the stage floor **514** in front of the rear legs of the framework **500**. A roll of screen film **518** is removed from a protective cylindrical casing **520** and is unwound across the width of the stage floor **514**. The film **518** is placed upon the sheet **515** in order to prevent damage to the surface from dust particles or other sharp protrusions.

A lower edge **522** of the film **518** is placed between jaws **524a,b** of a retention member **526**, each jaw **524a,b** having opposed openings therethrough spaced at approximately 0.5 m intervals. Bolts **528** are placed through the openings, and through the film **518**, and secured in position using respective nuts. Ratchet straps **532** are attached to the retention member **526** adjacent alternate bolts **528**, having a spacing of approximately 1m, and are then attached to the cross-piece truss **512**.

A second retention member **534** is attached to an upper edge **536** of the film **518** in a similar manner to how the retention member **526** is attached to the lower edge **522**. Ratchet straps **538** are attached to the second retention member **534**.

A rope **540** is tied to the second retention member **534** and is passed over the upper truss work **502** opposite the cross-piece truss **512**. The film raised into position using the rope **540** and the ratchet straps **538** are attached to the upper truss work **502**. Both sets of ratchet straps **532**, **538** are tightened individually until the screen film is tensioned such that the film **518** is flat and, ideally, free from wrinkles.

A projector **542** is depended from the upper truss work **502** and a pigmented reflective board **544** is placed between the screen **518** and the front edge of the box truss framework **500** such that light emitted by the projector **542** is reflected from the board **544** onto the screen **518**. The screen **518** reflects at least part of the light from a front surface thereof away from the stage and into an auditorium to be viewed by and audience.

In order to prevent the audience observing the projection apparatus both side and front drapes **546** are used to screen the apparatus from the audience.

US 8,328,361 B2

9

The invention claimed is:

1. An image display apparatus, comprising:

an image source, a frame, a light source and an at least partially transparent screen;

the frame being arranged to retain the screen under tension, such that the tension of the screen can be independently varied at a plurality of positions along at least one edge of said screen;

the light source arranged to illuminate at least part of the apparatus;

the screen inclined at an angle with respect to a plane of emission of light from the image source and the screen having a front surface arranged such that light emitted from the image source is reflected therefrom; and

the image source being arranged such that light forming the image impinges upon the screen such that a virtual image is created from light reflected from the screen, the virtual image appearing to be located behind the screen,

wherein the screen is polymeric foil and the frame comprises first and second retention members having opposing faces arranged in parallel to sandwich an edge region of the screen therebetween, and at least one of the faces of the first and second retention members comprises an abrasive coating arranged to contact the screen, and

wherein the first and second retention members are connected to one or more flexible tensioning means, which extend from the frame, the flexible tensioning means comprising tensioning straps and corresponding friction locking buckle arrangements for tightening the tensioning straps;

the foil, flexible tensioning means and the frame lying in a common inclined plane, with the faces of the first and second retention members being oriented parallel to the common inclined plane and the tension on the foil being applied in the common inclined plane.

2. The apparatus according to claim 1 wherein the abrasive coating is sandpaper.

3. The apparatus according to claim 1 wherein the first and second retention members comprise respective openings therethrough arranged to collocate with respective openings in the screen wherein the openings are arranged to receive a fixing means so as to clamp the screen between the first and second retention members.

4. The apparatus according to claim 1 wherein the frame is arranged to retain the screen under tension such that the tension of the screen can be varied at a plurality of positions along at least one edge of the screen such that the screen is substantially wrinkle free.

5. The apparatus according to claim 1 further comprising a pigmented reflective member provided in an optical pathway between the image source and the screen and being operative to reflect only light from part of the visible spectrum.

6. The apparatus according to claim 5 wherein the pigmented reflective member appears grey to a viewer.

7. The apparatus according to claim 1 further comprising a second light source arranged to illuminate at least part of a stage lying behind the screen.

8. The apparatus of claim 1, wherein both of the faces of the first and second retention members comprise an abrasive coating.

9. The apparatus according to claim 1 wherein the image source comprises one of a projector, an LCD, or a television display.

10. An image display apparatus, comprising:

an image source, a frame, tensioning straps and corresponding friction locking buckle arrangements for tightening the tensioning straps, a light source and an at least partially transparent screen;

the frame being arranged to retain the screen under tension, such that the tension of the screen can be independently varied at a plurality of positions along at least one edge of said screen;

the light source arranged to illuminate at least part of the apparatus;

the screen inclined at an angle with respect to a plane of emission of light from the image source and the screen having a front surface arranged such that light emitted from the image source is reflected therefrom; and

the image source being arranged such that light forming the image impinges upon the screen such that a virtual image is created from light reflected from the screen, the virtual image appearing to be located behind the screen,

wherein the screen is polymeric foil and the frame comprises first and second retention members having opposing faces arranged in parallel to sandwich an edge region of the screen therebetween, and at least one of the faces of the first and second retention members comprises an abrasive coating arranged to contact the screen, and

wherein the foil and the frame reside in a common inclined plane, with the faces of the first and second retention members being oriented parallel to the common inclined plane, the retention members being under tension, with the tension on the retention members and the foil being applied by the tensioning straps in the common inclined plane.

11. The apparatus of claim 10, wherein the first and second retention members are connected to one or more tensioning means, which extend from the frame.

12. The apparatus of claim 11, wherein the tensioning means are flexible tensioning means.

13. The apparatus according to claim 10, wherein the abrasive coating is sandpaper.

14. The apparatus according to claim 10, wherein the first and second retention members comprise respective openings therethrough arranged to collocate with respective openings in the screen wherein the openings are arranged to receive a fixing means so as to clamp the screen between the first and second retention members.

15. The apparatus according to claim 10, wherein the frame is arranged to retain the screen under tension such that the tension of the screen can be varied at a plurality of positions along at least one edge of the screen such that the screen is substantially wrinkle free.

16. The apparatus according to claim 10, further comprising a pigmented reflective member provided in an optical pathway between the image source and the screen and being operative to reflect only light from part of the visible spectrum.

17. The apparatus according to claim 16, wherein the pigmented reflective member appears grey to a viewer.

18. The apparatus according to claim 10, wherein the image source comprises one of a projector, an LCD, or a television display.

19. The apparatus according to claim 10, further comprising a second light source arranged to illuminate at least part of a stage lying behind the screen.

20. The apparatus of claim 10, wherein both of the faces of the first and second retention members comprise an abrasive coating.

\* \* \* \* \*