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UNITED STATES AND BRITISH PATENTS OF SCENIC AND
ILLUSIONISTIC DEVICES AND EFFECTS
FOR THE THEATRE: 1916-1970

Daryl Melvin Wedwick

A Dissertation

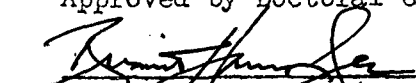
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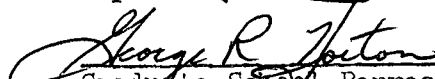
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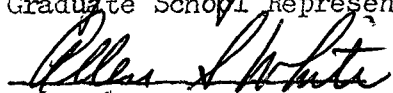
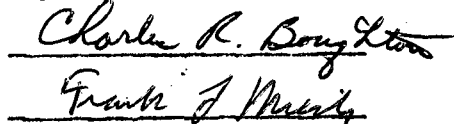
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ABSTRACT

This study traces the development of scenic and illusionistic devices for theatre as documented in United States and British patents within the period 1916-1970.

The research plan was (1) to investigate patent classifications for devices which could be classified as theatrical patents, (2) to search thoroughly the appropriate classifications to discover specific patents which fell within the scope of the study, and (3) to research sources such as theatrical periodicals, technical journals, reviews, and theatre histories to obtain information which would relate the patent information to actual use of the devices. As a result, technical and historical trends and developments both in the theatre and in other areas of performance have been defined.

Two major trends became apparent in the course of this study. The first was the increase in sophistication of the mechanical and electrical components of patented inventions. The second defined the number and chronological distribution of the patents. Though patenting of theatrical devices declined rapidly after 1930, this trend appeared to have reversed itself in the last five years of the study. Several significant developments in theatre technology were also documented.

The study concluded that the development of theatre technology within the period covered was influenced by factors such as the literary merit and technical requirements of the plays produced, the development of sound motion pictures, economic conditions, the rate of construction of new theatres, and availability of the results of new technological breakthroughs in science and engineering.

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CHAPTER ONE

INTRODUCTION

The purpose of this study is to trace the development of the scenic and illusionistic facets of physical and technical theatre from an historic viewpoint as documented in United States and British patents for the period 1916-1970. It will not only provide an historical view of the evolution of modern theatre equipment, but also of physical and technical theatre as reflected through patents. This study includes only the development of patented equipment. It cannot be considered a reflection of the entire field of theatre development. It will make available to both theatre scholars and practitioners information which might prove helpful to them: (1) in determining a style of production for plays of the period; (2) in mounting authentic reproductions of such plays; and (3) in construction and use of a wide variety of scenic and illusionistic effects. In addition, significant developments in theatre technology are pointed out as they occur in the course of the study. Similarly, trends within the field are defined as they become apparent. Wherever possible, data concerning the actual use of patented devices is cited. Finally, the state of theatre technology will be related to the dramatic literature of the period of the study.

Certain terms are defined as used in this study. Scenery refers to those elements which provide a visual environment for the action of the play. Synonyms for illusion, as used herein, would be trickery,

optical illusion, deception, and magic. A device is a piece of equipment designed to perform a special function. The result of an action of or the use of a device is an effect. Finally, a patent is an official document, issued by the respective government, which grants certain rights of monopoly to an inventor. The term of a United States patent is 17 years; that of a British patent is 16 years.

The major sources for the study were the patent abstracts as published in The United States Patent Office Gazette and The British Patent Office - Abridgements of Specifications. The abstracts were used since the patented devices are the basis for this study.

The abstracts of United States patents are published weekly in the Gazette in magazine format. The British Abridgements are only issued in sets of twenty-five bound volumes. Each set contains the abstracts of the 50,000 patents granted since the previous volumes were issued. Since the British system depends on quantity rather than specific dates, the Abridgements appear far less frequently and less regularly than the Gazette.

In both instances, however, the form of the individual abstracts are virtually identical. Usually a small drawing of the invention is accompanied by the patent number, title of the invention, the date of issue, the date of application, the name and address of the patentee, and the class and subclass numbers. Below this on the two-column page employed by both patent offices appear one or more of the specifications of the patent document.¹ The particular specifications which appear in

¹A selection of patent texts and drawings are contained in Appendix C.

the abstracts are chosen to give a concise, yet accurate summary of the device. By using these abstracts, one may obtain a working knowledge of the general properties of each device. The abstracts are also more readily available than the complete patent documents. These abstract documents are available at the Bowling Green State University Library, the Toledo Public Library, or the Detroit Public Library. The BGSU Library became a depository for the Gazette in 1933. United States patent documents prior to that date can be found in the Toledo Public Library. The Detroit Public Library is the nearest depository for the British documents.

For purposes of this study, patent information sought in The United States Patent Office Gazette included classifications with the following titles: Wooden Buildings; Static Structures, e.g., Buildings; Amusement Devices, Toys; Curtains; Derrick Hoists; and Amusement and Exercise Devices. The classifications listed are the only ones which contain documents pertinent to this study, according to the U. S. Patent Office Index to Classification.² The more broadly defined British classifications searched were # 20(1) which includes various types of buildings and # 132 (1 & 3) which includes games, toys, and amusements. Headings found in these classifications included Scenic Exhibitions, which encompasses all types of stage scenery; Amusement Apparatus, which includes curtain tracks and rigging; and Conjuring, under which all manner of illusionistic effects and devices are found.

This study is limited to those patents which are specifically defined as being related to scenic or illusionistic devices and effects

²For a detailed description of these classes and subclasses, see Appendix A.

for the theatre. No equipment, regardless of its actual or potential use in the theatre, was considered for inclusion unless such a specific definition was stated in the title of the patent, the title of the classification in which it was found, or in the description of its application. An exception to this rule was made in only one isolated instance.

Many devices in the category of Color Music included in Chapter One were classified as theatrical patents according to the above criteria. However, a number of virtually identical devices were classified as musical devices. Essential differences between the patents in the two classifications could be detected neither by the author of this study nor by such an authority as Adrian Bernard Klein.³ Therefore, appropriate patents in both classifications were included in the discussion of Color Music devices. From study of original sources of contemporary theatre technology, it became apparent that little had been written concerning original sources of equipment design and development. Only two previous studies have been done which deal extensively with patents; this study fills an information gap left by the previous studies. This study also does not duplicate material found in the previous studies.

Excluded from this dissertation were patents which have to do with general stage illumination and dimming equipment. Dr. Joel Rubin's dissertation entitled The Technical Development of Stage Lighting Apparatus in the United States 1900-1950 is an exhaustive technical

³Adrian Bernard Klein, Coloured Light: An Art Medium, The Technical Press, Ltd., London, England, 1937.

examination of the areas of stage lighting and dimming control.⁴ It was felt that the inclusion of lighting and dimming control equipment would duplicate Dr. Rubin's work needlessly. Selection of patents for sound devices and effects was limited to those which deal with the original production of sound. Excluded were those patents involving the reproduction of sound effects using means such as tape recorders or phonographs. Devices and effects prior to 1916 were excluded also. Such patents have been studied in Dr. Raoul Johnson's dissertation, United States and British Patents of Scenic and Lighting Devices for the Theatre from 1861 to 1915.⁵

The research pattern employed was (1) to investigate patent classifications containing those patents which could be classified as theatrical patents, (2) to search thoroughly the appropriate classifications to discover specific patents which fall within the scope of this study, and (3) to research sources such as theatrical periodicals, technical journals, reviews, histories, reference works, etc., to obtain information which would allow relating of the patents to performances or technical or historical trends or developments both in the theatre and in other areas of performance endeavor as well.

The organization of the study is as follows: the material gathered through the research has been arranged under chapter headings as determined by broad categories. Within each chapter, sub-categories

⁴Joel Edward Rubin, "Technical Development of Stage Lighting Apparatus in the United States 1900-1950," unpublished Ph.D. dissertation, Stanford, 1959.

⁵Raoul Fenton Johnson, "United States and British Patents for Scenic and Lighting Devices for the Theatre from 1861 to 1915," unpublished Ph.D. dissertation, University of Illinois, 1966.

of patents are correlated with information from other sources. The discussion in each chapter traces trends and developments in physical and technical theatre as reflected through the patents.

After the introductory chapter, Chapter Two deals with scenic devices and effects. Devices for shifting scenery are found in Chapter Three. Chapter Four contains illusionistic devices and effects including sound effects. Following the concluding chapter, the Appendices contain definitions of patent classifications, a list of the patents included in this study, and a selection of complete patent texts and drawings.

CHAPTER TWO

SCENIC DEVICES AND EFFECTS

Until comparatively recently, stage scenery was not really regarded as part of the theatrical art. Prior to the twentieth century, designing stage settings was a sideline for a painter or an architect. The setting itself "was not integrated with the other elements of the production; it was a thing apart, a handsome or startling background for action, something to be admired for its own sake."¹ Under the influence of such visionaries as Adolphe Appia and Edward Gordon Craig, all aspects of the theatrical art were developed as individual elements of an organic whole. Stage scenery came to be regarded as "not a background; it is an environment . . . an environment in which all noble emotions are possible."² It is the purpose of this chapter to examine scenic devices and effects which have been patented between 1916 and 1970.

Within the period of this study, a total of 135 patents were granted for scenic devices and effects. Of this total, sixty-seven are United States patents and the remaining sixty-eight were granted in England.

The largest single group of patents included in this chapter are those for projected scenery. The effects produced by such devices

¹Scene Design for Stage and Screen, ed. Orville K. Larson, (East Lansing, Michigan, 1961), p. ix.

²Robert Edmond Jones, The Dramatic Imagination (New York, 1941), pp. 23-27.

vary widely. The simplest is perhaps Burrows' device for lighting a decorative panel from the rear. At the other extreme are Ralph Alswang's systems for combining motion pictures with live action on-stage and Schwabe & Company's moving cloud projector.

Another large and important category of patents concerns the Color Music inventions. This interesting effort to combine the two art media into one art form attracted inventors from around the world. Particularly in these patents, it is evident that, while early electrical equipment did not possess the degree of sophistication that was found later, inventors such as Adrian Bernard Klein, Alexander Burnett Hector, Schwabe & Company, Mary Hallock Greenewalt, Thomas Wilfred, and Richard Lovstrom made up for such a lack with sophisticated and ambitious imaginations.

Other significant groupings of patents discussed include the construction and support of scenery, the variety of water effects, which range from projected images of falling rain to functional waterfalls and a wide range of devices for producing reflected and projected images.

Within these categories, significant developments will be found. Although a wide variety of projection effects were patented, the most interesting result is the development of the combination of motion pictures and live actors. Such inventions heralded the attempt to combine two art forms; film, developed in the Twentieth Century, and drama, in the Fifth Century, B.C.

Another interesting invention is Benjamin M. Giroux's volcanic scenic drop. Painted drops have been with us for centuries, but Mr. Giroux added a few features to his as it contains provisions for violent trembling, the spewing of vapor, and even falling 'boulders.'

Transportable scenery was developed to be easily assembled and disassembled. Patents by John L. Carroll and Fox D. Holden provide for collapsible unit frames and elasticized covering material to fasten to clamps on the frames. T. Nordland patented a series of adjointedly hinged cubes or prisms which may be used to form a variety of configurations for stage use, then easily fold for transportation. J. Blascheck invented a scenic house which is unique in that the walls, roof, and floor are hinged to that it may be readily collapsed and reassembled.

Another significant grouping is the inventions of stage vehicles. Designed to provide illusions of modes of transportation, they may provide effective touches of realism. Several references to devices similar to those patented may be found in reviews and similar articles.

The mechanics of such inventions vary widely but the basic purpose is the same in each; to create a dramatic environment or a portion thereof. Included are various devices: projected scenery, simulated natural phenomena, stages and curtains, construction and support of scenery, stage vehicles, color music apparatuses, color changing appliances, and light show devices.

PROJECTED SCENERY

The simplest form of projected scenery was patented in 1934. According to the specifications, "designs, etc. are produced on a rearwardly electrically illuminated translucent screen . . . by arranging or draping loose pieces of fabric between the source of light . . . and the screen."³

³W. and R. L. Burrows, British Patent # 411,112, 1932.

Slightly more complex with an added dimension is a device which produced a shadow on the illuminated screen.⁴ The patented apparatus includes elements for adjusting the angles of the screen, an illuminating device behind the screen, and various supports for the shadow-producing elements.

Within the period of this study, the earliest patent for a specific projected background was granted in 1916.⁵ The specifications call for placing the design in the focus of a projecting apparatus thereby projecting the design onto a screen.

A projected scenery device which makes use of both front and rear projection was patented in 1921 in England⁶ and in 1927 in the United States⁷ by Max Hasait. A light source is placed behind a translucent screen on the stage. Between the light and the screen, a number of differently shaped layers of translucent material are arranged in such a manner as to produce the desired combination of projected images on the screen. An additional light source is adjustable in color and brilliance and is placed in front of the screen to further modify the image, if so desired.

Another 1927 patent indicates the position and arrangement of lights for illumination of the actors.⁸ The specifications state the

⁴George G. Lone, United States Patent # 1,272,820, 1918.

⁵Charles F. deSoria, United States Patent # 1,186,292, 1916.

⁶Max Hasait, British Patent # 178,413, 1921.

⁷Hasait, United States Patent # 1,649,689, 1927.

⁸R. Lisatz and R. Geyling, British Patent # 278,272, 1927.

importance of avoiding any light spill onto the translucent panel, thereby reducing the clarity of the scenic images.

A modification of the translucent material through which the light is projected provides for altering the direction of the light rays by the use of the refractive properties of the background.⁹ Examples in the specifications include a series of glass facets affixed to a glass plate and liquid in a glass casing being subjected to mechanical, physical, or chemical changes. Also suggested is a series of rotating elements designed to produce a kaleidoscopic effect.

Perhaps the most complicated of the projected scenery apparatuses patented in 1927 is a

stage scenery and lighting apparatus for producing changing scenic effects which comprises one or more screens for dividing the stage into two or more bays, means for illuminating the front of the screen or screens and means for creating optical scenic effects on the rear of the screen or screens.¹⁰

The scrim-like screens are positioned so that a performer can pass between them and also between their individual panels, thus gaining a large measure of flexibility. Further specifications include means for producing various projected scenic effects.

Examples of devices designed specifically for the creation of a single projected scenic image are two British patents for planetarium-like projectors. The earliest (1937) indicates that the star images are included on a sky background in such a manner that they are invisible

⁹R. Geyling and P. Planer, British Patent # 283,536, 1927.

¹⁰C. S. M. Raikes, British Patent # 291,901, 1927.

while the sky is lighted in a normal manner.¹¹ However, when the sky is darkened and ultraviolet light is shown upon it, the stars will glow, having been coated with paint sensitive to such light.

The more recent device was patented by the British Minister of Supply.¹² The Minister's device includes a light source mounted within a glass sphere. The sphere has opaque and transparent portions so arranged as to produce the desired effects such as stars projected on a dark background.

An early patent combines projections with painted scenic elements. An effect developed in 1919 consists of painting a portion of a fixed screen with detailed representations of objects.¹³ The remainder of the screen has the colored ground tones of the general background projected onto it. The projections are aligned in such a manner that the painted details and the projected ground tones combine to form the complete scenic background.

Similarly, a patent granted to William Maxwell specifies two elements combining to create a scenic effect.¹⁴ However, in this instance, the effect consists of projecting two or more colors from different illuminating elements. One of the colors is interrupted by an opaque body of such shape as to produce the desired configuration on the screen.

¹¹C. H. A. Gamain, British Patent # 513,310, 1937.

¹²Minister of Supply, British Patent # 707,877, 1950.

¹³Fredrick C. Rockwell, United States Patent # 1,295,374, 1919.

¹⁴William Maxwell, United States Patent # 1,451,046, 1923.

The second group of patents for projected scenery is comprised of devices which are specifically designed to provide either moving or stationary scenery to be used in conjunction with living actors. To accommodate the actors, two such devices include a sloping stage which blends with the lower edge of the projection screen. The earliest such patent, granted in 1919, "relates to kinematographic effects in connexion with stage scenery. According to the invention, the stage slopes up and merges in to the lower edge of a kinematographic screen."¹⁵ A refinement modifies the lower portion of the screen to accommodate scenery such as doors.¹⁶ Additional provisions are made in the specifications for the latter patent to illuminate the actors but not the screen.

Two 1922 devices place the projection screen downstage of the actors. The British patents granted to C. Parolini developed means whereby the screen can be rendered invisible to allow the actors to be seen through it. The first patent simply specifies that the screen is to be lighted in the manner of a scrim to render it transparent or opaque.¹⁷ Parolini's second patent varies the opacity by varying the density of the weave of the screen fabric.¹⁸ The screen has a length of at least twice the height of the proscenium opening. The upper portion of the screen is of relatively open weave which diminishes to

¹⁵E.J.R. Atkinson, British Patent # 141,614, 1919.

¹⁶J.G. Walker, British Patent # 285,161, 1926.

¹⁷C. Parolini, British Patent # 193,812, 1922.

¹⁸Parolini, British Patent #199,688, 1922.

a close weave near the bottom. By rolling the screen onto a roller placed below stage level, the upper, more open portion of the screen is brought into the proscenium opening, thus allowing the actors to appear through the screen without interrupting the projection. The opposite effect can be obtained by reversing the direction of the screen's motion.

Ralph Alswang patented a device in both the United States and England which combines a rear projection system and a scrim downstage of the acting area.¹⁹ The projection screen has a reflective front surface and a set design is painted on the rear surface with translucent materials. The design is invisible when viewed from the front, but visible when backlighted. A dissolve to a motion picture is accomplished by moving the rear screen close to the downstage scrim and projecting the motion picture onto the combination of the scrim and rear reflective screen. The reverse can be effected by moving the rear screen into its upstage position, crossfading from the motion picture to the regular stage lighting, backlighting the rear screen, and placing the actors between the rear screen and the scrim.

A similar device was patented in 1962 by Dale McCulley.²⁰ However, McCulley's device lacked the means for moving the screens close to each other.

A series of patents were granted for devices which combine projection screens with a variety of scenic apparatus which are placed downstage of the screens. The earliest such patent was granted in 1916.²¹

¹⁹Ralph Alswang, United State Patent # 3,085,799, 1963, and British Patent # 889,681, 1960.

²⁰Dale McCulley, United States Patent # 3,035,836, 1962.

²¹Frank D. Thomas, United States Patent # 1,186,451, 1916.

The specifications include provisions for a vertical screen which has a permanent painted scene covering a portion of its area and means for projecting a correlated scene on the remaining portion of its area. Also included is a spotlight which is positioned either so that it may wash out a portion of the projected scene or that it may illuminate moving actors.

Two similar devices employed a series of objects arranged so that they provided shadowed outlines when placed in conjunction with a projection screen.²² Such objects are lit from the rear until such time as they can be also illuminated from the front in order to reveal their true nature.

A third such patent, issued in 1925, contains provisions for a stage vehicle such as a railway car to be placed in front of the screen.²³ Projectors produce an image of moving scenery on the screen, portions of which can be seen through the vehicle and the passengers can either be presented in silhouette or lighted from the front.

In 1938, a patent was granted for a system of scenic units which include a rear projection screen, a number of scenic wings and borders, and a rotatable ground row.²⁴ The ground rows are placed on a flat-sided drum which has its long axis running parallel to the footlights. The rear projection screen is placed upstage of the other scenic elements and the actors move in the space downstage of the scenic

²²Langdon McCormick, United States Patent # 1,372,969, 1921, and Walter L. Ackerman, United States Patent # 1,482,831, 1924.

²³H. F. Maynes, British Patent # 246,399, 1925.

²⁴Giuseppe Guidorossi, United States Patent # 2,116,114, 1938.

elements. The scenery is changed by bringing new wings and borders into the view of the audience, rotating the ground row unit, and changing the rear projection slide.

A number of patents have been granted to inventors whose inventions are based on a motion or still picture of scenery which allows actors to interact with the scene projected by the film. The first such patent was granted in 1921 for a screen which contains a black-draped section in its lower center portion.²⁵ The performer is placed in front of the black area and the slide or film contains an opaque portion in a corresponding area in each frame so that the scenery design does not fall on the performer. In the patent drawing, the details of the proscenium arch are also projected by the slide.

Another patent specifies that the stage be divided into two areas placed laterally with respect to each other.²⁶ One area contains a normal stage setting. The other half of the stage is occupied by a projection screen. The object of such a juxtapositioning is to allow live dramatic action to take place in the setting while a motion picture is projected next to it. The motion picture is to depict events exterior to, but closely related to the action of the live scene.

A theatrical apparatus which consists of a motion picture screen with an opening which can be concealed by a moveable portion was patented in 1946.²⁷ Located behind the screen is an apparatus for operating such

²⁵G. Robson, British Patent # 196,326, 1921.

²⁶A. Juillet, British Patent # 252,396, 1925.

²⁷Walter S. Spohn, United States Patent # 2,405,766, 1946.

means of concealment. The patent drawing shows an image of a building projected onto the screen. A window in the wall is opened through which the actors are conversing.

Another patent for a device similar in principle was granted to Ralph Alswang in 1963.²⁸ Alswang's patent is, however, dependent on swiftly shifting the moveable portion of the screen without such motion being noticed by the audience.

The latest patent for an apparatus which permits actors to interact with filmed scenes was granted in 1969 for a

theatrical device which includes a stage, and a screen for receiving motion pictures from a projector. [The] screen is formed of flat parallel stretchable strips held in taut condition. During motion picture display, strips are expanded by pressing against them to create temporary openings in screen through which live action moves from one side to the other.²⁹

The remaining two patents for devices which project general scenic backgrounds have to do with moveable screens. In 1937, a patent was granted to Norman R. Greathouse for a motion picture screen which is mounted on vertical rollers.³⁰ Greathouse's patent also includes means for projecting a variable-sized picture and means for synchronizing the motion of the screen with the variation in size of the picture area.

The latest such patent was granted in 1966 for a system which rapidly moves a screen out of the view of the audience.³¹ The patent

²⁸Alswang, United States Patent # 3,084,933, 1963.

²⁹Tibor Rudas, United States Patent # 3,442,508, 1969.

³⁰Norman R. Greathouse, United States Patent # 2,147,648, 1939.

³¹John S. Rush, United States Patent # 3,259,386, 1966.

also includes means for coordinating the motion of the screen, which is powered by high-speed winches, and control of the lights. Another specification indicates means for setting the stage behind the screen to correspond to the setting being displayed on the screen.

SIMULATED NATURAL PHENOMENA

A number of devices have been developed to project specific images of natural phenomena. Patents have been granted for projections of sunlight/moonlight, searchlights, clouds, rain, snow, and water. The sunlight/moonlight patent specifies a housing which contains a light source.³² One face of the housing is of a transparent or translucent nature and is positioned to face a screen. To give the impression of rays emanating from the sun or moon, a series of opaque bars are arranged behind the translucent face, giving a rayed effect to the projection.

One British and two United States patents were granted to Conrad Joseph Tritschler for devices which produce the projected images of searchlights. The British patent and the earliest United States patent simply indicate a light source enclosed within a box which has a slit in it.³³ The slit is cut in such a fashion as to give an inverted cone shape to the light passing through it. The remaining U. S. patent includes means for what is apparently a ground row which conceals the projecting apparatus.³⁴ Such an object is fitted with

³²T. J. Digby and A. O. Gibbons, British Patent # 302,807, 1927.

³³Conrad Joseph Tritschler, British Patent # 134,443, 1919, and United States Patent # 1,332,084, 1920.

³⁴Tritschler, United States Patent # 1,332,085, 1920.

interiorly illuminating means which are designed to first show the object in its natural light and then as being on fire. The patent drawing shows a searchlight projected upward from a silhouetted city and aimed at an image of an aircraft. Presumably, the aircraft is on a bombing mission which will start fires within the city, according to the script.

Another natural phenomena which can be projected by means of patented equipment is cloud formations. The earliest patent granted for a cloud image projector was issued to Schwabe & Company in 1920.³⁵ A series of projectors are arranged about a vertical axis and can be moved vertically as well as horizontally, thus permitting a variety of movement of the cloud images.

Another patented device which may be used for clouds, among other effects, consists of two transparent cylinders.³⁶ A light source is placed within the innermost cylinder and the larger cylinder is placed around the smaller. On one of the cylinders a landscape scene is painted and the other carries pictures of clouds and sky. Thus, the resultant image is a projection of both clouds and landscape, either or both of which can be independently changed.

Rain, lightning, and snow are associated with clouds. Patents were granted for equipment which produce the projected images of each. The rain device is quite simple in principle.³⁷ Light is reflected

³⁵Schwabe & Company, British Patent # 162,663, 1920.

³⁶General Electric Company, Ltd., and B. Dean, British Patent #212,498, 1923.

³⁷O. Heller, British Patent # 678,082, 1948.

onto the setting by a mirror and a stream of liquid is run downward over the surface of the mirror. The patent specifies a mirror which is movably mounted in a stirrup-like frame. Along the upper edge of the structure is a perforated pipe from which the water is discharged. When the mirror is placed at the proper angle to reflect light onto the setting and the water is caused to flow over the mirror's surface, the desired effect is produced.

Frequently, rain is accompanied by lightning. Such an effect was also patented by Schwabe & Company.³⁸ An opaque screen with assorted zig-zag openings in front of a flash lamp is automatically moved after each flash. Thus the shape of the lightning bolts can be varied in a very natural manner.

A result of a rainstorm is, perhaps, the presence of puddles of water which produce shifting light and shadow patterns of light reflected from their surfaces. Such an effect is produced by a device patented in 1941.³⁹ The apparatus is comprised of a frame containing a series of moveable screens. Each screen contains a random pattern of dark and light areas and can be provided with a reciprocal motion to produce the desired image of light reflecting from the surface of a disturbed body of water.

Another product of clouds is snow. A Snowfall Simulating Display Lighting Assembly was patented in 1970.⁴⁰ A cylinder with an

³⁸Schwabe & Company, British Patent # 176,310, 1921.

³⁹Anton F. Grot, United States Patent # 2,254,650, 1941.

⁴⁰Hugh N. Taylor, United States Patent # 3,494,614, 1970.

irregularly reflective surface is placed so that its axis is in a horizontal position. The cylinder is illuminated and rotated in such a manner that the reflected light causes a random pattern to move downward on a backdrop. Means are also provided for concealing the cylinder and its associated apparatus from the sight of the audience.

Various types of fog may also be associated with clouds. Three different devices were granted a total of four patents for producing fog effects. The earliest is a device patented both in England and in the United States by Richard Walton Tully in 1918.⁴¹ Essentially, it is a scrim through which the setting is visible. A control system enables either the footlights or a similar device to light the scrim from the front with sidewardly moving portions of light to produce the effect of moving fog.

A year later, Schwabe & Company patented a series of troughs.⁴² Within the troughs is contained a mixture of chemicals which produce a smoke or fog which drifts across the stage. Alternatively, a substance such as an ammonium compound can be heated in the troughs to produce the same effect.

A similar appliance was patented in 1953 in the United States.⁴³ This latest fog device patent has a series of jet openings in a surface and connections between such openings and concealed tanks. The tanks contain pressurized vapors which are released through the jet openings onto the stage.

⁴¹Richard Walton Tully, United States Patent # 1,281,720, 1918, and British Patent # 141,366, 1918.

⁴²Schwabe & Company, British Patent # 156,506, 1919.

⁴³William J. Lancaster, United States Patent # 2,624,578, 1953.

Another substance found in nature and simulated on the stage is grass. Two British patents have been granted for artificial grass for stage use. The first, in 1921, specifies a procedure for drawing strips of raffia into a canvas backing, forming loops which are then cut, leaving the raffia ends standing upright, and the product is then dyed.⁴⁴ The second patent, granted in 1924, specifies that the raffia loops are to be sewn onto the backing prior to cutting.⁴⁵ Both patents mention general provisions for waterproofing, fireproofing, and an additional layer of backing.

An appliance which employs the same rotating reflective cylinder principle as the above mentioned snowfall device was patented for the purpose of providing the simulation of a fireplace flame.⁴⁶ The rotating cylinder is substantially concealed within an assembly of simulated logs. An appropriately colored light shines upon the reflective surface which is visible between the logs.

A device which provides a similar effect of glowing coals was patented in England in 1928.⁴⁷ This device also breaks up the rays of light from a steady source but it employs a body of mercury to do so. The surface of the mercury is agitated by electromagnetic means. The specifications of the patent provide details of the construction of such a device.

⁴⁴S. G. Nash, British Patent # 183,223, 1921.

⁴⁵W. J. Nash, British Patent # 236,272, 1924.

⁴⁶Lorimer P. Brooks, United States Patent # 2,684,244, 1954, and reissued # 24,399, 1957.

⁴⁷British Thomson-Houston Company, Ltd., S. F. Davies, L. J. Davies, and H. W. H. Warren, British Patent # 319,389, 1928.

Simulated open flames were produced in 1917 by one of two patented British devices. A series of individual flames such as are produced by a campfire are simulated by a series of streamers which were placed over an open grate.⁴⁸ The streamers are illuminated by colored lights while a current of air from beneath the grate agitates them. A modification includes means for opening or closing individual portions of the grate to increase or decrease the size of the conflagration and also for altering the inclination of the flames.

A single flame, such as that produced by a large candle, was produced by the second device.⁴⁹ The same principle of streamers being supported and agitated by a current of air is employed. However, in this case, the arrangement of the streamers produces the simulation of a single flame.

Another fiery appliance is the subject of another patent granted to Mr. Tritschler.⁵⁰ In this case, an airship is caused to appear in a night sky, catch fire, and burst into flames. An open-fronted box-like structure contains a series of electric lamps. Small white lamps outline the form of the airship to cause it to appear in the sky and a series of red lamps, lighted in sequence, cause the appearance of a spreading fire. The device is suspended by wires and can be lowered in a manner which gives the effect of falling. Such a fate can presumably have overtaken the aircraft which bombed the city

⁴⁸P. H. Boggis, British Patent # 110,071, 1916.

⁴⁹B. F. Kelsey, British Patent # 116,621, 1917.

⁵⁰Tritschler, British Patent # 134,687, 1918.

in Mr. Tritschler's patents discussed earlier.

A final device employing the war-like use of fire was also invented in Great Britian. In 1947, two years after the end of World War II, a patent was granted for a stage sub-machine gun which produced a realistic muzzle flash when fired.⁵¹ The body of the gun is connected to a device which contains a distributor for producing a series of electric sparks and containers of acetylene and oxygen. Conduits carry the gases to a mixing chamber in the muzzle of the weapon where the flash is caused by ignition of the gaseous mixture by a series of sparks. The sparks and the flow of the gases are controlled by the trigger mechanism of the weapon.

STAGES AND CURTAINS

In addition to projection equipment of various types, scenery patents include units which are designed to permit modification of the stage itself. Two such units are in the form of artificial proscenium panels which can change the size and/or shape of the proscenium arch. The earliest of the United States patents granted to such units (1924) is for a series of parallel panels.⁵² The downstage panel on each side of the stage is equipped with a hinged portion which can be adapted to swing back out of sight or swing forward at such an angle as to form the thickness of an inner proscenium arch.

A patent granted in 1925 for a similar device specifies a similar adjustable scenery frame.⁵³ The unique features of this later

⁵¹D. & P. Studios, Ltd., and A. Ackland-Snow, British Patent # 625,230, 1947.

⁵²Harry Robert Law, United States Patent # 1,490,471, 1924.

⁵³William E. Price, United States Patent # 1,564,272, 1925.

patent consist of a series of specifications related to the construction of such a unit. It is to be constructed of a frame of members substantially cylindrical in cross section. Means are also provided for the joining and tightening of the members and their supports.

Placed immediately upstage from the proscenium is the show curtain. Two such curtains were granted patents, one in England, one in the United States. The British patent specifies an opaque curtain which contains translucent portions of various colors and designs (Japanese lanterns in the patent drawing).⁵⁴ The translucent portions bear the advertising matter and can be lighted from either side.

The United States patent is similar in principle.⁵⁵ However, it contains specifications for the translucent portions to be arranged to form windows and silhouettes as in a night scene. It is to be illuminated only from the rear.

A number of curtains and similar devices have been developed for scenic purposes. In 1916, Benjamin M. Giroux was granted both United States and British patents for a painted curtain and associated means for depicting an erupting volcano.⁵⁶ It is a rather complicated device which produces the shaking earthquake effect by agitating the fullness of the curtain. The erupting gases are simulated by the discharge of a vapor from a vent cut through the curtain at the point where the crater is painted. For a further effect, sponges painted to

⁵⁴C. J. Smith & Company, Ltd., and J. G. S. Browett, British Patent # 180,203, 1921.

⁵⁵Charles F. Thompson, United States Patent # 1,429,802, 1922.

⁵⁶Benjamin M. Giroux, United States Patent # 1,196,104, 1916, and British Patent # 102,938, 1916.

resemble stones are affixed to the curtain on the painted slopes and are detached on cue to simulate an avalanche. Additional effects are produced by lights.

A 1919 British patent is interesting in its simplicity.⁵⁷ A net curtain has fabric strips woven through the netting to form rough-textured scenery. The patent drawing shows a tree with rough, gnarled bark and branches constructed by such means.

A 1923 United States patent provides a unique manner of changing scenic elements on a backdrop.⁵⁸ The backdrop includes a number of billboards in its scenic vista. The billboards are equipped with flexible flaps which can be quickly rolled up or dropped to substantially change the appearance of the backdrop.

A German invention patented in England in 1924 employs a similar principle.⁵⁹ However, it differs from the preceding device in that the flaps are designed to blend invisibly with the scenery until released.

CONSTRUCTION AND SUPPORT

The construction and support of scenery is a category which includes a number of inventions, among them collapsible units. In 1920, a scenic unit was patented which can be easily collapsed to form a readily moveable unit.⁶⁰ A house so constructed has a floor which is hinged to the front wall, and the roof is hinged to the rear wall and can also be hinged in the center.

⁵⁷Jutta Bell-Ranske, United States Patent # 1,304,649, 1919.

⁵⁸William A. Fowler, United States Patent # 1,449,170, 1923.

⁵⁹Blau-Vogel Russisch-Deutsche Theatre Ges., British Patent # 227,737, 1924.

⁶⁰J. Blascheck, British Patent # 163,084, 1920.

The construction of collapsible scenery was further facilitated by the invention of a corner clasp which permits the frame of such a unit to be rapidly disassembled and reassembled.⁶¹ An arrangement of bevelled tongues on the top and bottom members slide into bevelled ways on the side members to permit rapid assembly of the frame of the unit. Elastic-edged canvas panels which fasten to clamps on the frame complete the assembly. A built-in system of cords enables the structure to be rapidly erected.

A similar invention includes a series of frames for windows, doors, and the like in addition to the collapsible flat frames.⁶² The coverings specified in this 1936 patent are designed to be fastened to a series of pins on the lower structural members and are adapted to be folded over the tops of such frames. The coverings are anchored in place by means of clamp bars and tension springs.

In 1939, a British patent was granted for the simplest scenic unit construction discovered in the course of this study. "A unit of scenery in the form of a hollow structure comprises a rigid framework . . . provided with a suitable covering . . . and mounted on wheels . . ."⁶³

A similar unit, a "mutilated cylinder," was patented five years later.⁶⁴ Basically cylindrical in form, an annular shell which

⁶¹John L. Carroll, United States Patent # 1,485,594, 1924.

⁶²Fox D. Holden, United States Patent # 2,052,178, 1936.

⁶³J. A. P. Bax, British Patent # 523,134, 1939.

⁶⁴A. P. Smith, British Patent # 580,425, 1944.

surrounds an open center area is constructed of solid vertical pillars. Between the pillars, two irregular openings are placed 180 degrees apart to facilitate movement of the actors into and out of the interior of the cylinder. Such openings are covered by transparent, semitransparent, or opaque curtains, according to the patent specifications.

A stage setting unit (which is also described as "hinged modules; toys") was patented in 1967.⁶⁵ The patent described a variety of configurations into which the patented series of hingedly joined cubes can be moved. The text of the patent abstract also extolled the virtues of the units as being easily transformable.

Regarding equipment for supporting scenery, one device is designed to eliminate the all-too-familiar problem of disappearing stage screws.⁶⁶ A 1919 patent was granted for a stage screw designed to be normally inseparable from the floor plate of a stage brace. A flange attached to the shank of the stage screw prevents it from being removed from the hole in the floor plate through which it passes. Loosening the nut which holds the shank to the handle of the screw permits it to be disassembled.

In 1922, a patent was granted to the inventor of a device which supports both the wings and borders of a stage setting from the floor.⁶⁷ A vertical column member is anchored to the floor behind the wing portion

⁶⁵T. Norland, British Patent # 1,197,895, 1967.

⁶⁶E. d'Arcy and J. F. P. Hill, British Patent # 136,514, 1919.

⁶⁷George Hanlon, United States Patent # 1,419,848, 1922.

of the scenery, and provides support for the scenic wing. At a distance above the floor, provisions are made for horizontal members to be anchored to the vertical member. The horizontal member then supports the scenic border as it extends across the stage.

In the same year, a type of stage brace was patented.⁶⁸ However, this brace does not attach to a conventional brace cleat. Instead, the upper end of the stage brace is designed to extend through a hole in the stile of a scenic flat. The brace is then attached to the flat by means of a clamp and the other end is fastened to the floor.

A further development in stage braces was patented in 1945.⁶⁹ The floor plate of a stage brace is pivoted so that it can be moved with respect to the shaft of the brace. This floor plate is constructed to permit its being anchored by a specially designed weight. An alternative specification includes a hole in the floor plate so that it may be affixed to the stage floor by means of a stage screw.

Two patents were granted for rigging systems for tightwire acts. The first, issued in 1922, describes a set of two pylon-type towers anchored firmly to the stage floor.⁷⁰ Between the two towers is stretched a wire for use by the performers. An additional specification provides a series of spaced electrical conductors arranged

⁶⁸R. G. Hall, British Patent # 601,464, 1945.

⁶⁹George Kelly, United States Patent # 1,432,601, 1922.

⁷⁰Edna H. Acker, United States Patent # 1,419,191, 1922.

along the wire, apparently for energizing electrical apparatus worn or carried by the performers.

The second patent, issued in 1953, describes a set of two masts joined by a horizontal member at their centers.⁷¹ A cable is fastened to the tops of the masts and tension is applied to the cable by means of drawing the lower ends of the masts closer together. The masts pivot on the center horizontal member, and as the lower ends are drawn closer together by means of an adjustable cable, the upper cable is drawn taut.

Another group of patented scenic constructions have little in common with each other. Therefore, they will be considered chronologically, beginning with a rotating spiral staircase which bears one of the first patents issued within the scope of this study.⁷² In 1917, a rotating staircase was developed to be constructed around a vertical column. The upper end of the column is secured to a horizontal beam above the stage. The lower end of the column rests on a series of casters which allows the unit to rotate. The rotary motion is imparted by a series of gears or belts which are attached to a power source. A system of flags is also specified to be drawn into the edges of the individual steps in the unit.

A 1924 United States patent was granted to a theatrical device comprised of an upright frame on the back of which a slidable frame was concealed.⁷³ The rear frame contains a substantially circular

⁷¹Frank P. Evers, United States Patent # 2,646,280, 1953.

⁷²A. Collins, British Patent # 110,856, 1917.

⁷³Leon Levy, United States Patent # 1,500,507, 1924.

frame which surrounds a star trap, the flaps of which can conceal the trap opening.

A base for floral displays was patented in 1925 as a theatrical device.⁷⁴ It is constructed as a frame to which a screen is affixed. Over the screen is placed a fabric cover which is designed to represent the earth of the flower bed. A number of tubular members designed to accommodate the stems of flowers or plants are inserted through the fabric and screen at various points in a random pattern. Scenic elements representing plants are then inserted in the tubular members to complete the representation of a flower bed.

A three-dimensional treatment of scenery may be effected according to the means provided in a patented arrangement of transparent walls.⁷⁵ The 1925 patent specifies that scenic elements are to be painted on the appropriate glass sheets which are placed behind each other on the stage. The scenery which is to be farthest from the audience is painted on the upstage panel and that scenery closest to the audience is painted on the downstage panel. Real pieces of scenery may also be used for an additional dimension such as staircases and lights mounted on the wall.

A British patent was issued in 1927 for

An exhibition tower which is constructed with superposed tiers . . . each tier having an outer platform . . . some or all of which platforms are arranged to rotate. Parts . . . of the platforms may be stationary to serve as gangways, and glass rooms may be provided for the platforms. A luminous fountain . . . may surmount the tower and colored lamps and artificial foliage may ornament the walls, while scenery may be arranged within the building. Further fountains may be placed on each tier.⁷⁶

⁷⁴Paul Petching, United States Patent # 1,554,650, 1925.

⁷⁵R. Neppach and W. Voss, British Patent # 254,925, 1925.

⁷⁶A. Heinz, British Patent # 284,902, 1927.

Explicit instructions for creating scenery are contained in a 1947 patent:

Imitation scenery, scenic models, and the like are formed by heating woven asbestos cloth impregnated with sodium silicate, pressing or otherwise forming to the desired shape, and then reheating. The heating may be carried out for about 20 minutes at a temperature of 112-200° C. according to the nature of the desired product. The product may be colored by treating the asbestos cloth before or after impregnation or before or after heating. Preferably, a coloring-material which changes color on heating is employed. Articles may be made in several sections secured together by adhesive such as sodium silicate.⁷⁷

In 1954, Albert Ganz was granted a patent for a scenic device, the patent drawing of which suggests a bird flying over a rainbow.⁷⁸ The rainbow is painted on a semicircular arch of a wall. Another wall is placed upstage of the rainbow and has a slot cut through it. The slot circumscribes an arc somewhat larger in radius than that of the rainbow arc. Through the slot project members which are connected to an endless belt. On the projecting members are affixed images of flying birds which move around the arc of the rainbow and are returned to their starting point by movement along the bottom of the upstage wall. Their return movement is masked by the lower portion of the rainbow wall.

A common characteristic shared by a number of patented scenic devices is that of producing water effects by means other than light projection. An early patent, granted to Frank A. Beard in 1923, uses a film of water to conceal the motion of a moveable panel.⁷⁹ A scenic panel is inclined rearwardly and a sheet of water is discharged downward over its surface, thus obscuring it. A second panel is then shifted

⁷⁷P. Morrey and W. W. MacArthur, British Patent # 134,514, 1919.

⁷⁸Albert Ganz, United States Patent # 2,670,956, 1954.

⁷⁹Frank A. Beard, United States Patent # 1,474,567, 1923.

laterally across the first, concealed by the film of water.

Two scenic appliances which produced the image of reflecting water were patented in the United States.⁸⁰ Both employ a scenic background panel and a reflective surface. The reflective surface provides a mirror image of the background such as is provided by a still body of water.

The remaining water effects patents deal with waterfalls and fountains. In a 1930 patent, the effect of a flowing waterfall is produced by an endless belt.⁸¹ Scenic elements are arranged around the belt mechanism in such a manner as to present the appearance of a cliff. The belt is placed in such a manner that when it moves, it presents the appearance of a stream flowing over the edge of a cliff and forming a waterfall. The patent suggests the use of a silver cloth for the image of falling water.

A 1934 patent for a water effects device has as its base a receptacle for holding liquid.⁸² A portion of the device extends upward from the rear portion of the bowl and forward to form an overhanging element above at least a portion of the bowl. From the overhanging portion, a helical shaft extends downward into the bowl and is rotated. The rotation of the helical member produces an agitation of the liquid in the receptacle and the visual impression that the liquid is flowing in a stream from the overhanging portion of the structure into the receptacle.

⁸⁰Frank O. King, United States Patent # 1,525,782, 1925, and George Solkover, United States Patent # 2,211,353, 1940.

⁸¹Conrad B. Maurer and Howard P. Maurer, United States Patent # 1,756,565, 1930.

⁸²John J. Anderlick, United States Patent # 1,971,150, 1934.

The most recent such patents have been granted to J. Currie in 1945⁸³ and in 1963.⁸⁴ Both of Currie's patents consist of rather detailed specifications which differ in only minor ways. Water is pumped from a main tank into a weir tank at the top of the waterfall construction. From the weir tank, it flows down over a series of simulated pools, rocks, rapids, cascades and the like, finally emptying into the main tank. The cycle is then repeated. The patent drawings show the structure to be mounted on casters in both patents.

Still another category of patents consists of equipment which produces snowfalls onstage. An unusual feature about such devices is that they all were patented in the final decade of the study. The earliest patent was granted in 1960 for cylindrical containers which allow the artificial snow to fall from slits in the cylinders.⁸⁵ The containers also have internal paddles to tumble the snow product. Such cylinders are mounted on a shaft which is turned by electric motors and provisions are made for mounting several containers on one shaft and using several such shafts to provide several rows of containers, thereby covering the entire stage area if necessary.

According to a 1966 patent, flexible but relatively stiff paper disks are tumbled in a cylindrical apparatus.⁸⁶ Circular openings in the sides of the cylinder allow the disks to fall through in a random pattern as the cylinder is rotated by a shaft connected to an electric motor.

⁸³J. Currie, British Patent # 605,499, 1945.

⁸⁴Currie, British Patent # 964,250, 1963.

⁸⁵Packman Machinery Ltd., British Patent # 907,704, 1960.

⁸⁶Candirus De Scrange, United States Patent # 3,243,183, 1966.

The final two snowfall patents were granted to devices invented by Jack Burnbaum in 1968.⁸⁷ The patents are for two devices which differ slightly in technical details but employ the principle of operation used in Currie's waterfall patents, discussed previously. An artificial Christmas tree has a hose running beside its trunk. The tree is mounted within a base which resembles an inverted cone. Within such a base is contained a quantity of artificial snowflakes. A blower mechanism forces the snowflakes upward through the hose into a rotating deflector mounted on the top of the tree in the position of a Christmas ornament. The deflector distributes the snowflakes on the tree in a random pattern after which they fall into the base and are again recirculated. The difference between Burnbaum's two patents is the placement of the blower mechanism and the design of the rotating deflector.

STAGE VEHICLES

Several patents were granted for pieces of equipment which, although diverse in nature, can be categorized as Stage Vehicles. Such devices share the characteristic of producing some mannerism of some type of mechanical equipment which was designed for transportation. A warship is the subject of the first patent, granted in 1917.⁸⁸ A series of scenic wings simulate portions of the vessel and a background vista. The turretted great guns are the center of attention, however, as they may be pivoted relative to the wings and even

⁸⁷ Jack Burnbaum, United States Patent # 3,415,512, 1968 and # 3,415,513, 1968.

⁸⁸ John H. M. Dudley, United States Patent # 1,230,877, 1917.

extended out over the heads of the audience. This is similar to Lee Simonsen's design of the battleship superstructure for Roar China.⁸⁹

A startling effect was produced by the use of a device which moved a vehicle downstage toward the audience.⁹⁰ Patented in 1919, the device makes use of a curtained rear wall for a previous scene. A moveable platform containing at least one lamp is moved toward the audience after the curtain has been raised during a blackout. The lamp increases in brilliancy, and other effects are added.

A review describes the use of such a device in 1945.

Roaring out of a darkened stage, right into the laps of the people in the front rows, a huge 'runaway locomotive' scares theatregoers out of their wits in the Olsen and Johnson hysteria festival 'Laffing Room Only' at the Winter Garden Theatre in New York.

Ingenious effects help create the terrifying illusion. The dummy locomotive front, mounted on a dolly, moves about 55 feet outward and downward from the back of the stage while the headlight grows from a pinpoint of light to a blinding glare. Recorded train noises blare from loudspeakers. Steam (really sprays of mineral oil) glows in the red light of a make-believe firebox. Smoke from burning coal dust billows out over the spectators, mixed with bits of luminous painted cork that shine like sparks in ultraviolet light.⁹¹

Two British patents were granted in 1921 for means for imitating the motion of an airplane. The first suspends the aircraft structure from a mast.⁹² Motion is provided by means of a series of cables

⁸⁹Lee Simonsen, Part of a Lifetime, Duell, Sloan and Pearce, New York, 1943, pp. 45-47.

⁹⁰Howard Thurston, United States Patent # 1,324,630, 1919.

⁹¹Andrew Boone, "It Scares Them to Death," Popular Science Monthly, CXLVI (May, 1945), pp. 88-89.

⁹²S. P. Thompson, British Patent # 181,598, 1921.

attached to various portions of the aircraft structure and pulled in appropriate directions. Provisions are also made for a reservoir which discharges air intermittently through a rotary valve, thereby causing an engine sound. Scenic drops placed upstage are caused to rise or fall, thereby giving the visual impression of the aircraft diving or climbing.

The second patent specifies that the aircraft body is to be mounted in a cradle attached to the floor or other platform.⁹³ A system of axles within the cradle permit longitudinal and lateral movements. A trap door is provided below the tail portion so that the rear portion of the fuselage may dip below stage level if necessary.

A number of spectacular effects may be obtained by operation of a motorcycle invented for stage use and patented in 1924.⁹⁴ An imitation engine is mounted between the seat and the pedals and provided with a rattle which is driven from a sprocket on the rear wheel. The bar between the seat support and the front fork is fitted with a tank which contains firecrackers and sparklers. An alarm device may be operated when engaged with the front wheel. Finally, a pistol mounted on the handlebar.

The most recent stage vehicle patent was granted in 1961 for a flaming car illusion apparatus.⁹⁵ A number of perforated pipes are attached in close proximity to the body of a motor vehicle. Means are

⁹³C. W. Holcroft, British Patent # 183,640, 1921.

⁹⁴A. Klein, British Patent # 220,254, 1924.

⁹⁵James D. Avery, United States Patent # 3,011,781, 1961.

provided for introducing a mixture of fuel and air into the pipes and controlling such a supply electrically. The ignition of the fuel mixture in the burner pipes produces the illusion of a burning vehicle, and the extent of the flames can be varied by the electrical fuel controls.

COLOR MUSIC DEVICES AND EFFECTS

An important group of devices have been developed for the purpose of combining visual elements and auditory stimuli into a single art form which has been given the title of Color Music. Such systems can be used in combination with actors and scenery to contribute to Adolphe Appia's theories of all elements of a production working together to produce a unified entity and/or Edward Gordon Craig's suggestion that all aspects of a production should be controlled by a single individual. The systems may also stand alone as a combination of art forms.

Briefly, the light projection elements of the Color Music systems are controlled by the same keyboard that controls the music from a piano or organ. The musical notes and chords are those expected from such an instrument. However, the lighting effects to be displayed are determined by mathematical systems which were developed by each inventor according to his own theories. A detailed description of the various systems and theories is the subject of Coloured Light: An Art Medium by Adrian Bernard Klein.⁹⁶

⁹⁶Adrian Bernard Klein, Coloured Light: An Art Medium; Being The Third Edition Enlarged of "Colour Music," The Technical Press, Ltd., London, England, 1937.

Mr. Klein was well-qualified to write about Color Music for he also held patents, one within the scope of this study, for such devices. After 1915, Mr. Klein was granted a patent in 1920 for a method of controlling the color of the light.⁹⁷ A single source of light is broken into various bands of colors by a prism. The band of colors is caused to fall upon a panel which has a plurality of slits which can be opened or closed by means of shutters. Each slit corresponds to a key on a piano keyboard. When a key is depressed, a note is sounded, and a mechanism allows the appropriate shutter to open. The light is then projected onto a surface. Other specifications provide means for adjusting the prism mechanism and for keeping the shutter open without having the key constantly depressed.

Of the other patents granted in the Color Music category, seven were granted to one inventor, an Australian. Alexander Burnett Hector's earliest patent, within the scope of this study, was granted for a series of piano or organ keys which can also control lights.⁹⁸ One electrical contact can be operated by the striker of the key mechanism. Two more may be activated by the degree of pressure of the operator's finger on the instrument's key. Intensity can also be controlled by the wind pressure in a pipe organ by means of a sensory switch attached to the bellows of such an instrument.

Mr. Hector's second patent continues the list of key operated switches.⁹⁹ Mercury and contact switches are operated by the keys and

⁹⁷Klein, British Patent # 174,747, 1920.

⁹⁸Alexander Burnett Hector, British Patent # 107,380, 1916.

⁹⁹Hector, British Patent # 109,263, 1916.

striker mechanisms. In addition, an arrangement of levers and arms can be activated by a pedal so as to couple several lamps to the action of a single key.

An additional patent further extends the variety of switches.¹⁰⁰ This third patent of Mr. Hector's specifies the use of time-delayed electromagnetic relays. Such relays are designed to produce a sustained effect with regard to the color producing means.

A mathematical progression of light colors and intensities is the subject of Mr. Hector's fourth patent.¹⁰¹ The keys of each octave of the piano or organ are to display colors of different hues. The lights controlled by the same key in each octave control the intensity of the light in geometrically progressive steps relative to the frequency of the note.

The remaining three patents granted to Mr. Hector go into further detail regarding the relationships of sound frequency to the hue and intensity of the lights displayed.¹⁰² The primary features of the specifications in the remaining patents are based on a concept of the light hues being arranged in a double rainbow pattern with the reds in the center and the violets at the end of the scale as well as the arrangement of the lights in a logarithmic spiral pattern. Further details of such mathematical formulae are available in Mr. Klein's book noted above.

¹⁰⁰Hector, United States Patent # 1,338,706, 1921.

¹⁰¹Hector, United States Patent # 1,432,552, 1922.

¹⁰²Hector, United States Patent # 1,432,553, 1922, British Patent # 274,468, 1926, and United States Patent # 1,728,860, 1929.

Another inventor of a number of Color Music devices is Mary Hallock Greenewalt. Her United States patent which is extremely broad in its claims was originally granted in 1924 and reissued in 1927.¹⁰³ The brief patent abstract merely states that it is for a device which produces rhythmic sounds of emotional value coupled with lighting effects. In his book, Mr. Klein states that Ms. Greenewalt was granted at least twenty other patents for individual elements of her Color Organ.¹⁰⁴ Of those, only two are pertinent to this study. The earliest is for a device which carries a number of translucent color panels.¹⁰⁵ Means are also provided for moving the proper panel in relation to the light source. The second device is composed of a series of independent translucent panels, each of a single color.¹⁰⁶ Means are included to introduce each of the panels into a beam of light and then remove it.

Another inventor who was very influential in the development of the Color Music systems is Thomas Wilfred, the inventor of the "Clavilux, [which] is a keyed instrument by means of which the colour, form, and movement of light thrown upon a white screen can be controlled by its operator."¹⁰⁷ The Clavilux is perhaps the most famous of all of

¹⁰³Mary Hallock Greenewalt, United States Patent # 1,481,132, 1924, reissued 16,825, 1927.

¹⁰⁴Klein, Coloured Light, p. via.

¹⁰⁵Greenewalt, United States Patent # 1,345,168, 1920.

¹⁰⁶Greenewalt, United States Patent # 1,654,873, 1928.

¹⁰⁷"The Clavilux," London Times, May 18, 1925, p. 9. Additional reviews of Thomas Wilfred's Clavilux Concert at the Queen's Hall in London on May 19, 1925, may be found in Appendix IV of Klein's Coloured Light.

the Color Music systems which have been developed. Mr. Wilfred's patents within the scope of this study are for refinements of his equipment which he had developed prior to 1916.

His 1931 patent, for instance, concerns the screen on which the lighting effects are to be projected.¹⁰⁸ It specifies that a multisided screen of concave configuration be used in conjunction with the lighting means. The lighting devices are to be controlled so that the combined effects from each side cooperate to produce the desired effects.

Two years later, he was granted a patent for a lighting device which produces a band of light which is brightest in the center and faded toward the edges.¹⁰⁹ The effect is produced by placing a series of specially designed lenses in front of a single light source.

Mr. Wilfred later patented a light projection apparatus which employed a moving strip of film.¹¹⁰ Two or more lanes of color on the film each run through an individual projecting apparatus. The resulting projections of colors are then blended or separated as desired by controlling the projection apparatus.

A fourth Color Music inventor was Richard Lovstrom. His two patents are for light projection devices which may be used in conjunction with a musical composition. The first, granted in 1922, makes great use of a variety of gears, levers, and tracks.¹¹¹ By such means, the

¹⁰⁸Thomas Wilfred, United States Patent # 1,825,497, 1931.

¹⁰⁹Wilfred, United States Patent # 1,908,203, 1933.

¹¹⁰Wilfred, United States Patent # 1,973,454, 1934.

¹¹¹Richard Lovstrom, United States Patent # 1,406,663, 1922.

light source of the instrument may be moved sideways, vertically, and toward or away from the lens. Such movements produce a variety of movement of the resultant images on the screen. Means for coloring the light beam are also provided.

Mr. Lovstrom's second patent differed from the first primarily in the method specified for positioning the light source relative to the lens.¹¹² A carriage of several sections is employed. Each section includes its own light source placed differently relative to the lens. The movement of the image is thus effected by switching light sources rather than moving a single source.

Six other patents were discovered within the period of this study for similar color/light devices. They will be treated in chronological order.

Two British patents deal with controlling mechanisms.¹¹³ In their specifications, the nearly identical patents include solenoids and/or electromagnetic relays. Such electronic devices are employed to provide the connection between instrument keyboard and projection apparatus.

A 1923 patent is for a device which is similar to Mr. Wilfred's latest patent. It provides for a film to be passed through a conventional sound gate mechanism which consists of an exciter lamp and a photoelectric cell.¹¹⁴ The resultant sound current is fed through a tube of rarified gas and produces color effects within the tube. Such

¹¹²Lovestrom, United States Patent # 1,549,778, 1925.

¹¹³J. A. Tayler, British Patent # 198,384, 1922, and A. Molloy and F. Molloy, British Patent # 247,619, 1924.

¹¹⁴J. R. Robertson, British Patent # 214,274, 1923.

color effects vary with the sound produced and can be arranged to project onto stage scenery.

An apparatus similar to Mr. Klein's band of colors was also patented in 1923. One specification calls for a series of individual lamps to be contained within separate housings. The housings have provisions for apertures to be covered by slides of colored glass "comprising a series of colours the wave length of which bear the same relation to each other as the wave lengths of a series of musical notes comprising an octave . . ." ¹¹⁵

In 1953, another British patent was granted for a device which employs films of colored water as the color medium. ¹¹⁶ A light beam is projected through a hollow cell. The liquid is stored in tubes which can be moved into position to discharge their contents into and through the cell. Solenoids are specified to open or close the individual valves in the tubes and are controlled by circuits attached to a keyboard.

The latest Color Music patent was granted in 1967. ¹¹⁷ An interesting feature of the patent is the specification that the operator wear magnetically patterned gloves. Such gloves are so sensitized that a only a particular finger can actuate the lamps connected with a specific key.

Related to the Color Music devices are a number of groups of patents which were granted to inventors of devices which modified light

¹¹⁵M. M. Miles, British Patent # 219,776, 1923.

¹¹⁶A. M. Low and T. C. Arnold, British Patent # 719,560, 1953.

¹¹⁷H. E. Cameron, British Patent # 1,184,697, 1967.

in a number of ways. Two easily defined groups are the color-changing appliances and those which produce moving light effects by means of distorting reflective surfaces. A third group of inventions have little in common with each other and are considered, for the purposes of this study, to occupy a miscellaneous category.

The earliest color-changing devices was patented in England, as were the others, in 1916.¹¹⁸ A semicircular drum is formed of a series of colored panels. The drum-like frame is placed below a light source and may be rotated so that the correct color panel is in position to cast the proper color of light onto the stage. Provisions are also made for the operator to be informed as to which panel is in position by means of a series of electrical pilot lamps.

In 1923, a patent was granted for a series of colored screens.¹¹⁹ The screens are placed in front of a light source and cause various colors of light to be projected. The screens are guided in a series of grooves and, in one specification, are controlled by a series of keys. The patent drawing suggests an apparatus very similar to a 'boomerang' attached to the front of a follow spot.

An apparatus which changes color by means of a rotatable transparent disc was patented in 1924.¹²⁰ Light color is affected by the various hues of the panes in the disc and a fan-like shutter is employed to interrupt the light beam when so desired. The disc and shutter are both driven by a shaft attached to an electric motor.

¹¹⁸W. E. Grant, British Patent # 100,918, 1916.

¹¹⁹B. Irwin, British Patent # 227,534, 1923.

¹²⁰H. C. Terrett and P. H. Scott, British Patent # 304,854, 1927.

LIGHT SHOW DEVICES

The British Patent Office has defined apparatuses which distort reflective surfaces for the purpose of producing moving light effects as Optical Toys. The earliest optical toy patent was granted in 1953.¹²¹ It contains specifications for a variety of effects. In general, this device projects a beam of light onto the reflective figure. The light may be colored by the usual means and is reflected onto a screen. Motion is imparted to the reflective surface by twisting, bending, shaking, or otherwise deforming it. The resultant effect is a pattern of light which moves across the screen in either a haphazard fashion or in a series of controlled movements. The inventor, John P. Hoppe, patented a similar device in the United States in 1966.¹²²

In 1958, Mr. Hoppe was granted another British patent for a modification of the above device.¹²³ The later patent is based on the same principle and has merely included specifications for an additional variety of reflective forms. In addition, means for controlling the distortion of the reflective surface from the rear were more clearly detailed.

A 1955 United States patent includes an association of lighting elements in specific relation to a flexible reflective surface.¹²⁴ The flexible surface is supported by two columns which contain a series of lamps. The lamps are positioned so as to project their beams in front

¹²¹John P. Hoppe, British Patent # 749,434, 1953.

¹²²Hoppe, United States Patent # 237,937, 1966.

¹²³Hoppe, British Patent # 881,328, 1958.

¹²⁴Oskar Fischinger, United States Patent # 2,707,103, 1955.

of and substantially parallel to the front surface of the device. By means of pushing and/or pulling movements from the rear, the surface can be moved into or out of the light beam. The greater the pushing force, the greater the distortion of the reflective surface and therefore the greater the movement of the light pattern.

The final Optical Toy patent was granted in 1960 for a device which is extremely broad in concept.¹²⁵ A rigid framework supports a flexible background panel. Moveably mounted on the framework and on the background panel are several reflective shapes. The specifications include a number of suggestions for modifying the shapes or their surfaces: crumpling the metal foil before mounting it; paper, leather, or plastic backings may carry a coating of beads, glitter, mirror fragments, etc. Similarly, a number of methods of imparting motion to the structure are suggested: pushing/pulling means may employ pneumatic, hydraulic, or electromagnetic devices; an endless belt system can move portions of the device; oscillating movements may be imparted to the entire structure; etc. Further, a projector equipped with a rotating color filter can alter the hues of the reflections. The final specification suggests that a multi-track tape recorder can control the lights and movements of the reflectors through devices which transform sound into light or other electrical current as discussed previously.

MISCELLANEOUS DEVICES AND EFFECTS

Several devices which have been patented fall into none of the previously mentioned categories. However, they are classified as

¹²⁵A. I. Cohen, British Patent # 952,059, 1960.

theatrical devices by the respective patent offices. Therefore, they shall be herein discussed in a chronological order.

A 1921 patent includes a moving object which has a number of independently moving parts and a light projector.¹²⁶ The moving object is a large number of white streamers joined together at one end and agitated by a current of air from a fan. The light from the projector is shown upon the streamers through a rotating disc which has alternating opaque and colored panels. The resulting lighting effect is similar to a strobe light which varies in hue.

One year later, a patent was issued for a system of colored slides.¹²⁷ The unique feature of this patent consists of joining the slides end to end in a colored column. A frame holds the slides in position above and in front of a projector. A system of gears and/or counterweights allows the assembly to move downwardly in front of the light source. The motion may be adjusted from a single movement to a series of intermittent movements which will position each slide in the beam of light in turn.

In 1923, a decorative lantern with a mirrored surface was granted a patent.¹²⁸ The lantern is suspended from some overhead support and means are provided to rotate it. Provisions are also specified to permit the lantern to hold and release a variety of objects such as carnival novelties, balloons, and streamers.

¹²⁶A. S. Cushman, British Patent # 181,347, 1921.

¹²⁷British Thompson-Houston Company, Ltd., and H. C. Wheat, British Patent # 210,537, 1922.

¹²⁸H. R. V. Addenbrooke, British Patent # 218,039, 1923.

An apparatus for projecting changing colors of light onto a screen by means of a film running through a motion picture projector was patented in 1927,¹²⁹ The film furnishes part of the color changes but is modified by a number of color filters placed in the beam of light. The patent text describes a number of variations of the applications of the same principle.

A 1956 United States patent describes a device whereby a beam of light is reflected through a number of elements.¹³⁰ A number of light sources spaced apart from each other produce light rays which arrive at the same destination, but which take different routes. A number of elements such as reflectors and color media modify the individual beams of light and produce the desired blending of effects.

The final patented device to be considered herein was invented by Charles R. Dockum. It is described as a "projector system for composing in color and form."¹³¹ A film projector produces a beam of light in the conventional manner. Arranged in the light beam are color media. Further modifying the light beam are strips of film arranged in the aperture of the projector. At least one of the film strips move in the usual manner, but at least one other strip is controlled so that moves angularly in relation to the others. The resultant pattern of images is projected onto a screen. When any of the film strips is moved, a new pattern is formed.

¹²⁹J. T. Doyle, British Patent # 287,379, 1927.

¹³⁰Phillip Weintraub, United States Patent # 2,725,230, 1955.

¹³¹Charles R. Dockum, United States Patent # 2,731,264, 1956.

CONCLUSION

From a study of the patents contained in this chapter, two significant trends become apparent. The first is the increasing sophistication of mechanical and electrical equipment not only from 1916 to 1970, but within the development of individual categories of patents, specifically the group of projected and reflected lighting effects.

Such reflected effects, together with a number of projections devices, provide the basis for an art form which came into being during the last ten years of this study. With the development of a number of variations on the rock music theme, it has become fashionable for such rock groups performing in concert to have behind them a background which changes with the beat of the music. A number of projected slides which change every measure or two usually are interspersed with reflected images which are also deformed according to the music's rhythm. It is interesting to note the difference in electrical apparatus specified in the patents between John P. Hoppe's 1953 patent, the earliest discovered, and A. I. Cohen's 1960 patent. The extent of Hoppe's electrical specifications is the mention of a light source operated by a foot switch. Cohen, however, specifies not only a light source, but adds to his reflective devices a series of electric motors and electromagnetic devices for distorting the reflective surfaces. In addition, Cohen suggests that a tape recorder may be attached to an apparatus which can control the lights and the motion of the reflectors by means of sound. This category is an example of the noticeable trend of the increasing sophistication of electrical and mechanical equipment

throughout the development of scenic devices and effects from 1916 through 1970.

The second trend is a rather severe decrease in the number of patents granted for scenic devices and effects in the late 1920s. This decrease in numbers is quite abrupt. In 1927, nine patents were granted, but only two were issued in 1928. Eighty-four of the 135 patents discussed in this chapter were issued during the initial twelve years of this study. The remaining fifty-one patents are distributed fairly evenly throughout the last forty-three years. Subsequent investigation as reported in other areas of the study offers additional evidence of these trends.

CHAPTER THREE

DEVICES FOR SHIFTING SCENERY

A great variety of equipment has been developed for moving scenery during the past 2000 years. Whether designed for proscenium, thrust, or arena stages, such equipment moves scenery vertically, laterally, or forward and backward with respect to the location of the audience. This variety of devices for shifting scenery has taken many forms and, in some instances, has required considerable ingenuity on the part of the inventor.

However intriguing the workings of such mechanical contrivances may be, it must be remembered that they are but a means to an end; the presentation of a unified work of dramatic art.

Ever since the theatre left the primitive path of the religious procession or the war dance within the tribal circle and conceived moveable scenic settings as backgrounds for the drama's unfolding action, one of its chief problems has been the time consumed in changing stage settings. If anything irks an audience . . . it is the awkwardly long pauses between acts and scenes. And nothing destroys, so surely as these delays, the illusion of a closely knit, swiftly moving play of many scenes. . . .

Curio [50 B. C.] solved the problem by building two theatres side by side, so arranged that they could be revolved on a pivot and first bring one audience and then the other to two separate stages. Other plans have had to do with the construction of revolving stages, elevating stages, or stages that move on wheels.¹

Still other plans have been developed for flying systems, jackknife stages, and a variety of tracks and riggings. Of particular

¹Oliver M. Saylor, "Theatre Delays Shortened," Scientific American, CXXXVIII (March, 1928), pp. 248-249.

interest are a number of hybrid devices which combine two or more of the above types into one unit.

From 1916 to 1970, a total of eighty-six patents were issued for devices for shifting scenery. Forty-six of this total are U. S. Patents and the remaining forty are British.

The largest single group of such patents consists of inventions for rotary stage devices. Of particular interest within this group are the inventions of the Blackburns and Glagolin; two stages which revolve in a vertical plane instead of horizontally.

Other important groups are comprised of patents for elevator stages in many forms, a variety of flying systems, tracks and riggings for curtains and drops, and a series of inventions for controlling the movement of curtains and lights simultaneously. This last category was also one of the most interesting developments within the period. Although they spanned only a period of three years (1918-1920), the inventions of C. E. Falcongridge and J. W. Lewsley, A. H. Oliver, J. O. Dunabin, and G. K. Jensen provided four innovative and interesting patents.

Another outstanding development was the number of patents issued for devices which caused stages to move in several manners at the same time. Graeme E. Young's inventions for a jackknife stage which carries two turntables and his patent for a series hexagonal platforms which carry turntables and move onstage and offstage, and William C. Barnard's invention of a turntable within a circular platform which moves upstage and downstage are but three such inventions. The most ambitious of such schemes was Max Hasait's patented system for moving rotary stages up and down, forward and backward, and right and left.

Perhaps the patent with the greatest implications for scenery movers of the future is George C. Izenour's development and refinement of his synchronized control of winch systems. Because of the delicate control it gives one operator who can make minute trimming adjustments or rapidly fly out entire sets, it seems destined to be an invaluable feature of many theatres of the future.

Of all the devices used to shift scenery, perhaps the most complicated is a moveable stage floor since it is an integral part of the theatre building. Extra lines may be hung to fly extra scenery without significantly altering the architectural structure. Scenery may be rolled, carried, or pushed onstage or offstage in any structure that passes for a theatre (and in some that do not) with no regard for the building itself. However, any moveable floor of either a permanent or temporary nature does affect the theatre structure. The effect may be that the stage floor is raised only a few inches, in the case of a temporary turntable, or it may be that the entire stage floor can be raised or lowered twenty or thirty feet as in the case of a mammoth elevator stage.

ROTARY STAGES

A number of temporary single rotary stages have been patented within the period of this study. The earliest was essentially defined as "A theatrical stage platform having arranged thereon a plurality of rotatable scenery-carrying supports."² A pivoted ceiling piece was also included in the patent for purposes of providing a common ceiling for all scenery units.

²Stephen S. Horn, United States Patent # 1,432,463, 1922.

The German theatre architect Max Hasait, whose name appears on a number of patents, invented a rotary stage which consisted of a large, drum-like body.³ Within the base of the body were a number of wheels on which the stage pivoted, and a rail on which the wheels ran. The abridgement for Hasait's patent also contains a reference to sections which were capable of being raised and lowered.

In a 1932 article, Harold Burriss-Meyer described such a stage in Berlin:

Perhaps the best revolving stage now in use is in the Volksbühne in Berlin. The tracks on which this stage revolves are some ten feet below the stage floor and the stage is trapped and divided so that sections up to one half of the stage may be raised, lowered, or set at an angle. On this stage The Comedy of Errors has been played without intermission.⁴

Charles E. Pressley's rotary stage patent contains specifications for construction very similar to those mentioned in modern stagecraft books.⁵ A pivotal king pin, radially arranged stringers pivoting on the king pin, and flooring sections arranged on the outer portion of the stringers are included in the abridgement drawing which should be familiar to any reader of a modern stagecraft text.

A final patent for a single rotary stage is designed to be placed on a non-moveable stage floor.⁶ This patent was granted to Graeme E. Young in 1945. Instead of being circular in shape, a substantially

³Max Hasait, United States Patent # 1,491,951, 1924.

⁴Harold Burriss-Meyer, "Mechanical Aids to Production," Theatre Arts Magazine, XVI (April, 1932), pp. 324-325.

⁵Charles E. Pressley, United States Patent # 1,819,656, 1931.

⁶Graeme E. Young, British Patent # 595,091, 1945.

octagonal shape is used. This allows four sets to be used at once on the turntable, as the four longer sides are designed to be placed parallel to the proscenium arch. The four somewhat shorter sides alternate with the longer edges around the perimeter of the rotary stage and are the positions where the masking and supportive portions of the stage structure would be anchored.

Several systems of multiple rotary stages employing two turntables have been patented. Three of them differ slightly in the manner of arrangement of the pivoting scenery on the turntables. The turntables in all such patents are arranged laterally, with the stage center portions of both turntables being visible to the audience regardless of the position of the off-stage portions.

The earliest two-turntable device was patented by Graeme E. Young in 1934.⁷ It carries scenery which is substantially supported by superstructures which are supported at the center of each platform. The superstructures are tall poles and the scenic unit is supported by having its center-most edge fastened to the pole. The outer edge of the scenic unit contains a cable which is fastened to the top of the pole. The completed unit looks much like a carousel.

The most detailed of the two-turntable devices, patented in both the United States and Great Britain in 1939, contained some fifty-four different elements in the patent drawings. It is very similar in principle to the previous device, but lacks the tall center poles. The patent

⁷Young, United States Patent # 1,985,707, 1934.

. . . provides for a succession of scenes each composed generally of a back wall, two side walls and a floor portion. The scene sections which are adapted to form successively the back wall and side walls of a number of scenes are arranged in two complementary assemblages of scene sections . . . pivotally mounted near the centers of rotation of the rotatable platforms. . . . The scene sections of each assemblage are each rigidly secured against one edge to a longitudinal upright support . . . and these supports are joined to each other by hinges . . . thus permitting the scene sections to be opened and closed similarly to the pages of a book.⁸

Other devices for book-type scenic arrangements which do not employ turntables have been patented and differ only in minor details. The first contains two posts which serve as the pivoting points for a series of scenic units similar to those described above.⁹ The second consists of a series of double-faced flats which are hinged together.¹⁰ The flats are supported by a brace which secures the last flat and all other flats are hinged to it.

The last device to be patented using two turntables also employs mirrors or similar reflectors.¹¹ The mirrored panels specified in the patent granted to F. Shipman are placed on the rotary platforms and are aligned so that the downstage edge of each is near the proscenium arch. The upstage end is placed near up center stage in such a manner that it is aligned with the edge of an apex portion. The apex portion continues the lines formed by the reflecting panels to their juncture and contains

⁸E. Gilbert, L. Sillman, and E. A. Barber, British Patent # 644,003, 1939 and Gilbert, United States Patent # 2,182,757, 1939.

⁹Helen Dryden, United States Patent # 1,612,858, 1927.

¹⁰Peter Clark and George Vail, United States Patent # 1,883,573, 1932.

¹¹F. Shipman, British Patent # 619,708, 1946.

the basic elements of whatever scenery the entire structure is to reflect. A number of apices are arranged on tracks in the upstage area so that scene changes can be rapidly effected by changing apices.

A similar device by Mildred Knapp Shipman was patented in 1942.¹² It is identical in principle to the previous device but differs in that the apices are changed by pivoting them into position rather than moving them on tracks.

One year previously, Mrs. Shipman had been granted a patent for another reflecting panel system.¹³ This system changes scenes by pivoting the entire structure into position in the proscenium opening in the manner of the scenery 'books' discussed previously.

A stage which combines rotary motion with vertical motion was patented by Busby Berkeley for use in his elaborate musical spectacles.¹⁴ A number of concentric stages, three in the patent drawing, surround a central stage element. The central stage portion may be raised or lowered as well as rotated.

Similar principles have been used by other stages which differ in that the areas which surround the central, stationary stage are used for displaying scenery rather than musical extravaganzas. An early example was patented in 1916.¹⁵ This patent specifies a stage with a central, fixed portion. The central area is surrounded by a rotatable annular section which is divided into ten areas. Five such areas can

¹²Mildred Knapp Shipman, United States Patent # 2,280,315, 1942.

¹³Mildred Knapp Shipman, United States Patent # 2,266,089, 1941.

¹⁴Busby Berkeley, United States Patent # 1,979,363, 1934.

¹⁵G. Dehmel, British Patent # 137,837, 1916.

be brought into position immediately upstage of the proscenium arch carrying stage settings. The remaining five areas, which alternate with the scenery-bearing sections, are adapted to the width of the proscenium and designed to give added depth to the stage. When the latter areas are used, the setting, including a cyclorama, is positioned in the central platform and is viewed by the audience across the open space on the annular ring. A modification of the above stage was made some thirty years later.¹⁶ In the later version, the rotatable stage is composed of a series of flexible members or carriages. A further modification in principle is suggested in the latest patent for such a device by making both the annular portion and the central portion rotatable.¹⁷ The patent drawings in this 1968 patent show only six divisions on the annular ring. The walls of such divisions are arranged radially with respect to the center of the central stage and span the width of the proscenium at the circumference of the annular portion.

Two unusual devices have employed the rotating stage principle, but have changed the plane of rotation from the horizontal to the vertical. The Blackburn patent of 1922, the earlier patent, places at least two stage settings bottom-to-bottom along an axis which parallels the proscenium.¹⁸ To change scenes, the entire assemblage is rotated about the axis, dropping the first scene below the stage level and raising the second setting to the level where it may be viewed by an audience.

¹⁶G. Ramon, British Patent # 639,112, 1944.

¹⁷Oswaldo Mola, United States Patent # 3,383,810, 1968.

¹⁸A. E. and R. Blackburn, British Patent # 190,950, 1922.

A similar device in the form of a large hollow cylinder with one end open to the audience.¹⁹ Patented in 1933, the cylinder is supported on its circumference and a number of platforms are installed within the cylinder, forming a polygon (a hexagon in the patent drawing) in cross section. On each platform, a setting is firmly affixed in such a manner that all elements remain in place when the platform is moved from the horizontal. To change scenes, the cylinder is rotated so that the desired setting appears in the proscenium opening when its floor platform is level.

Only one patent was discovered in the period of this study for a jackknife stage.²⁰ The 1945 patent specifies that a castored platform be attached to a pivot secured to the stage. The periphery of the platform corresponds partially or fully to the plan outline of one or more settings which are placed upon it. Alternatives listed in the specifications suggest placing the pivot point in the center of a rotary stage, placing the point other than at the center, constructing the platform as one unit or a number of units joined together, and using some units of the platform to replace others as part of scene changes.

There are a number of designs for stages that have been patented employing various types of elevators. Perhaps the most interesting devices are those which use a great number of individual elements to form an almost infinite variety of levels on the stage.

¹⁹Boris S. Glagolin, United States Patent # 1,893,167, 1933.

²⁰Ramon, British Patent # 623,987, 1945.

The earliest such patent discovered was issued in 1934 and indicates no specific number of independently vertically moveable sections.²¹ However, it does indicate that the sections are to be of at least two different widths. Included are means to cause the tops of each section to slant in a number of directions. By use of this device, a designer could create stepped, flat, or sloping floors at any level. Such architectural features as columns, walls, and doorways can also be suggested.

"Vertically adjustable prism-like elements" were specified in a patent issued for similar equipment to one M. A. Bourbounnais in 1963.²² This later patent is not limited to on-stage usage. The entire interior floor of a hexagonal theatre is constructed of such prisms. This arrangement makes possible myraid arrangements for flexibly combining areas for the audience, stage, and scenery in the manner described. Moveable elements are also to be installed on the ceiling in order to enable the acoustical properties to be altered at will.

This new concept in theatre architecture, in a modified form, has been put into practice in the Modular Theatre at the California Institute of the Arts at Valencia. As a result of efforts to produce a modern theatre which is truly flexible in all three dimensions,

. . . the Modular Theatre is a totally flexible cube within the architectural cube provided by the architect. . . . The entire floor consists of 4-foot square modules that rise on air-supported piston columns.

²¹Pericle Ansaldo, United States Patent # 1,966,698, 1934.

²²M. A. Bourbounnais, British Patent # 995,518, 1963.

The floor modules are 6-inch-deep steel-reinforced, wood platforms that can be raised in 6-inch increments to a height of 10 feet. Fitted with step units, they become aisles; for seating they are equipped with units of two swivel seats secured by drop-in pins. Guardrails lock onto the platforms and aisle lights plug into the floor. The stage can be any shape or any height, with combinations limited only by the 4-foot module.

The adjustable pistons are mechanically simple: a stainless steel seamless tubing within a casing is raised by compressed air and secured by a steel pin through it at floor level. Air holes are beneath a plug at one edge of each platform so that one can be raised without disturbing its neighbor.²³

Another group of elevator stages was designed for effecting scene changes in proscenium theatres by means of lowering the acting area of the stage floor below the stage level. Three of these patents differ only in minor details.²⁴ All make provisions for the below-stage level to contain several rooms adjacent to the elevator shaft. In such rooms, scenery is set on wheeled wagons which can be rapidly moved onto the lowered elevator and raised to stage level.

A group of inventions which were patented later refined and adapted the elevator principle from the cable-controlled devices of the previous group to hydraulic control. Perhaps the most ambitious of the later patents was the development, by Lloyd Brown, of a theatre structure which is apparently a series of four elevators, each carrying a quarter of the stage.²⁵ Surrounding the stage is a series of four auditoriums, each abutting the central stage in one of its quadrants.

²³"Training Tomorrow's Pros," Progressive Architecture, LI (December, 1970), pp. 72-73.

²⁴H. Andre, British Patent # 172,921, 1920, Dragutin Zabaratz, United States Patent # 1,404,919, 1922, and Max Hasait, United States Patent # 1,544,150, 1925.

²⁵Lloyd Brown, United States Patent # 1,559,739, 1925.

Below the auditorium level, the specifications call for a series of work rooms, foyers, and communication facilities.

A more sophisticated patent for an elevator stage was issued in 1968.²⁶ It includes means for raising and lowering the central stage arrangement. The unique feature of this later patent is the specification of the means by which a protective guard rail raises into position surrounding the open elevator shaft as the elevator descended and then disappears as the elevator ascends again.

Another recent patent, granted to Howard D. Wolfe, is unique in that it is for a central staging elevator device which does not lower into the floor to effect scene changes.²⁷ Instead it rises to a position in a chamber above the audience. The upper chamber has a number of rooms adjoining the elevator opening. The scenery for an arena production can be moved quickly from a room to the raised stage.

ANNULAR STAGES

Annular stages of the type which surround the seating area of the auditorium are infrequently found in theatres. The simplest form of an annular stage was patented in 1919.²⁸ It moves in front of a fixed audience position as a single unit. It could be used in conjunction with a fixed stage as in the specifications for one patent. This particular patent also mentions one advantage of an annular stage; rehearsals may take place simultaneously in the several compartments of the stage.

²⁶William Altier, United States Patent # 3,399,887, 1968.

²⁷Howard D. Wolfe, United States Patent # 3,404,494, 1968.

²⁸M. Raspe, British Patent # 146,103, 1919.

The above stage was moveable. A further development in such stages allowed the annular stages to remain stationary and caused the audience to pivot to face the proper portion of the stage. Both the United States and Great Britain granted patents to Adelar Perrottet and Erwin Stoecklin for their development of a theatre structure which rotates the centrally located audience.²⁹ It also includes means for altering the inclination of the seating area. Associated elements of the design cause acoustically designed devices to move so they always remain behind the audience.

Corwin S. Rife's theatre construction, patented in 1968, shows a patent drawing in which

. . . a plurality of stages are arranged around a seating area. The seats are arranged so that they can be moved to face in different directions and the vertical elevation of the seats can be changed so that the patrons can view any of the stages.³⁰

In addition to the above features, an earlier patent for a theatre includes a device which would raise or lower the entire audience area to the desired level.³¹ This patent, issued in 1932, specifies that hydraulic means are to be used.

One of the infrequent applications of such annular stages can be found in Grenoble, France. Both audience and stage can be rotated in the Maison de la Culture. The audience area is situated within an ovoid shape reminiscent of the Total Theatre scheme of Walter Gropius.

²⁹Adelar Perrottet and Erwin Stoecklin, British Patent # 677, 383, 1950, and United States Patent # 2,700,798, 1955.

³⁰Corwin S. Rife, United States Patent # 3,394,505, 1968.

³¹Arthur J. Moulton, United States Patent # 1,868,068, 1932.

One end of the ovate plan is a fixed scenic area surrounded by projection screens and backstage space. The control room for sound, light and turntables, is suspended, capsule-like above the audience so that projections can be spread completely around the interior to create a total environment, and the audience can be 'enveloped by the spectacle.'³²

A semi-annular stage was patented also. Carmine Vitolo's invention places the audience area substantially within the semi-circular arc of the stage.³³ The innermost wall of the stage is broken in front of the audience by a rather conventional-appearing proscenium arch. An outer wall placed on the same arc as the first, but with greater diameter, provides a cyclorama effect. The scenery is placed on curved tracks which run between the two walls and is stored in spaces at the sides of the auditorium when not in view of the audience.

HYBRID STAGES

To this point, moveable stages with a single dominant method of movement have been discussed with a few exceptions. There were, however, several patents granted for stages which combined two or more of the above methods into quite unique structures.

An adaptable stage, patented in Great Britain, had a mainstage portion behind the proscenium arch.³⁴ A three-sided 'pit' area extends from the proscenium arch into the main stage area. An auxiliary stage portion is fitted under the central section of the main stage and can be drawn forward to thrust slightly forward of the proscenium arch.

³²"Futuristic French Mechanized Theatre," Progressive Architecture, LI (December, 1970), p. 59.

³³Carmine Vitolo, United States Patent # 1,896,652, 1933.

³⁴Cinema Combine, Ltd., and F. Jones, British Patent # 169,058, 1920.

Flanking this auxiliary stage is a pair of pivoting extensions which can also be swung out to occupy the area between the side of the auxiliary stage and the proscenium arch. By means of the auxiliary stage and the extensions, the stage floor can be extended to the position of the apron of conventional proscenium stages.

A further development is shown in a 1934 patent granted to Graeme E. Young.³⁵ He invented a jackknife stage platform which pivots on a fulcrum secured to the upstage wall of the theatre. Such a device requires a generous amount of offstage space since it is divided into two sections, both of which are of such lateral dimensions that they fill the proscenium opening and carry a turntable of substantial size. When the stage left portion of the stage is in the proscenium opening, the stage right portion is occupying the upstage area of the stage right wing space and the scenery which it carries can be changed. To present a new setting, the entire platform is pivoted so that its stage right portion is in the proscenium arch and its stage left portion is in the stage left wings. The use of a jackknife stage platform facilitates scene changes, and the rotary stages in both halves provide additional flexibility.

An example of extreme flexibility in scene shifting is provided by a device which added a new dimension.³⁶ The fourth patent of Graeme E. Young's to be considered was granted for a hexagonal stationary stage which is surrounded by six moveable platforms of the same size. The moveable stages each carry a rotary portion. When firmly abutted to

³⁵Young, United States Patent # 1,949,232, 1934.

³⁶Young, United States Patent # 2,136,833, 1938.

each other, three of the individual moveable units' sides are in contact with those of adjoining units, forming a stage of considerably larger proportions than the stationary platform. A total of six turntables can thus be used when all of the units are in place. Individual units can also be moved to facilitate minor scene changes without disturbing the position of the others.

Another moveable rotary stage consists of a turntable surrounded by a substantially circular platform.³⁷ Within this device, patented in 1935, is a series of motors designed to turn the rotary portion. Another set of motors and a series of guides and casters may cause the entire structure to move forward and backward.

The patent abstract for another of Max Hasait's inventions is very succinct:

A stage system comprising rotary stages, means for moving said stages vertically into compartments situated above and below the normal stage floor, and means for moving the said stages in a direction parallel to the stage opening and at right angles thereto in each of the said compartments.³⁸

This perhaps comes closest to the ultimate in stage floor platform movement; within one patent, all six directions of movement plus rotary stages are included.

A similar patent, granted in 1928, only lacks the large-scale vertical movement.³⁹ It provides tracks for moving wagons to the right and left and also upstage and downstage. Vertical movement is employed to a slight degree as the wagons can be lifted slightly at the juncture of the tracks to permit their wheels to be aligned with the crossing set of tracks.

³⁷William C. Barnard, United States Patent # 2,003,573, 1935.

³⁸Hasait, United States Patent # 1,542,299, 1925.

³⁹Jack A. Partington, United States Patent # 1,670,739, 1928.

For a theatre with little wing space, an invention was patented in 1933 which allows scenery to be stored in a rather unique manner.⁴⁰ Settings on wagons are built with foldable floors in such a manner that one setting can be moved offstage from a position in the proscenium opening and run up tracks on the offstage wall. At the same time, another setting is moved off the opposite wall and onstage.

A unique arrangement of a building with several auditoriums was patented in 1968.⁴¹ The main stage of the structure has two seating areas; one immediately adjacent to the stage, and another some what removed from it. The adjacent seats are in a fixed position facing the stage. The outer area of seating is arranged in a number of pivoting units. Further removed from the stage is a series of smaller stages, the number equal to the number of pivoting seating units. A number of arrangements are thus possible; all of the seats can be turned toward the main stage, all of the pivoting units can be facing their own little stages, or some combination of the two can be used. A partition attached to each of the pivoting seating units will act in conjunction with the walls of each of the little stages to provide sound-proof separations when the little stages are in use and to seal them off when the seating units are facing the main stage.

FLYING EQUIPMENT

In addition to moveable stages, a common method of moving scenery in a properly equipped theatre is by flying it. The earliest

⁴⁰Jack Potter Stockton, United States Patent # 1,903,948, 1933.

⁴¹Wendell E. Rossman, United States Patent # 3,399,501, 1968.

patent for such a flying device concerns the effects of flying scenery.⁴² Included in the specifications of the patent issued to Peter E. Paoli in 1918 are a scrim and means to illuminate the area behind the scrim. However, the patent is rather vague with reference to means for raising the scenic drops. The patent drawing indicates an ordinary hemp set with no counterweight shown. The scenic drops appear to be relatively small, however, and perhaps it was felt that no counterweights would be necessary.

Flying systems usually have counterweights of some sort to balance the weight of the scenery. The scenic units are attached to a number of lines running from the top of the scenery through a series of pulleys at the top of the stage house and then to the counterweight system. Even when correctly balanced, such systems often pose a problem, in that when a heavy piece of scenery is moved, it takes an effort to stop the built-up momentum. Such a problem can be solved by an invention patented in 1921. This device limited the movement of the counterweight arbor by a set of adjustable springs.⁴³

A modification to the counterweights which balanced the load on the lines was the elimination of the various block-type weights. They were replaced, according to a 1925 patent, by a hopper which carries a load of lead shot and is equipped with a valve means at its lower extremity to enable its weight to be adjusted.⁴⁴

⁴²Pater E. Paoli, United States Patent # 1,273,111, 1918.

⁴³Bullivant's Engineering & Contracting Co., Ltd., and T. Bullivant, British Patent # 177,297, 1921.

⁴⁴Anton Mazzanovich, United States Patent # 1,556,535, 1925.

Another type of counterweight system employs a rather unusual configuration of lines and pulleys explained in a 1923 patent.⁴⁵ In a device for raising and lowering a motion picture screen onstage, the lines running through the head block are not attached to the top of a counterweight arbor. Instead they are fastened to a cable which is an integral part of the system. The cable is fastened to the grid-iron at its upper end, then runs down through a pulley at the top of the counterweight arbor, up through the head block, down to a pulley at the lock rail, up through a pulley at the bottom of the arbor and down to the lock rail again where it is securely fastened. The arbor is not hanging freely but is secured to the wall in a tracked carriage.

A device patented in the final year of the study combines a counterweight system for a light batten with a unique device for controlling the electric cables.⁴⁶ The cables are mounted on a reel assembly with two portions which are spirally wound in opposite directions. Such a configuration enables simultaneous winding or unwinding of the two ends of the cable.

In 1953, Paul M. Fischer was granted the first patent to be issued for electrical winch controls specifically designed for use in theatrical flying systems.⁴⁷ The major concern in this first such patent was for the control system which caused all of the winch motors to run in the same direction simultaneously.

⁴⁵J. W. Cawdery, British Patent # 220,412, 1923.

⁴⁶James W. Kuebler, United States Patent # 3,514,586, 1970.

⁴⁷Paul M. Fischer, United States Patent # 2,626,375, 1953.

George Izenour was granted a patent in 1960 for refined controls for a series of reversible winches which can operate each line in each group of lines simultaneously to smoothly raise and lower scenery units.⁴⁸ Known as the 'Synchronous Winch System,' it has been installed in theatres such as the Hofstra College Theatre, the Dallas Theatre Center, and Harvard's Loeb Theatre. At Hofstra,

Control by one operator is made possible by a moveable console. . . . Here the technician may, by means of a patch panel, cross-connect up to six winches for synchronous operation. He can also set both the top and bottom trim with precision. . . . Not only does this mean that one competent technician can manage all the scene changes, it also means that he can hang and trim a full stage traveller complete with drapes, without any help.⁴⁹

Izenour also received a patent for subsequent devices which further refined parts of the original system.⁵⁰

Between the dates of Izenour's first and second patents, Richard A. Drew patented a similar device.⁵¹ Drew's patent specifies the use of a counterweight system, while Izenour's does not. Drew's electric motors are connected to the counterweight arbors. Through a system of clutches activated by an energizing current, the unique feature of this patent, the scenery may be moved without regard for the balance between the counterweights and the scenery. An alternative clutching arrangement permits the scenery to be moved only when the counterweights approximately balance the scenic unit.

⁴⁸George C. Izenour, United States Patent # 2,942,879, 1960.

⁴⁹Glenn Loney, "Hofstra's Mechanical Stagehand," Theatre Arts Magazine, XLVII (July, 1963), pp. 67-68.

⁵⁰Izenour, United States Patent # 3,345,066, 1967.

⁵¹Richard A. Drew, United States Patent # 3,165,296, 1963.

Various little devices which make up parts of any rigging system have also been patented. A pulley over which the suspension ropes of scenery passes was patented in 1925.⁵² The pulley was adjustable in that it could be moved from one location to another. Lockable cams permitted the unit to be placed on a track or on the floor and firmly positioned. A scenery trimmer is generally regarded as being a rather simple chain with a snap hook. However, a device that can be adapted for use with three, four, and five line sets was patented in 1923.⁵³ It contains a three-pulley multiple block. The desired number of lines, up to five, can be attached to the eyes which are attached to the cable which runs through the pulleys on the multiple block.

Designed to overcome problems of slack in suspended cables is a tray-like device patented in 1925.⁵⁴ The tray is designed to fasten to the wall or floor in the vicinity of the pin rail. The slack portion of the cables or lines is then contained within the receptacle and does not present a hazard.

SUSPENDED TRACKS

The concept of a suspended track of some sort is different from a hanging batten (such as is found in a flying system) in that suspended tracks do not change their position relative to the stage floor. It is

⁵²Coliseum Syndicate, Ltd., and H. Crocker, British Patent # 254,484, 1925.

⁵³Henry A. Connelly, United States Patent # 1,473,336, 1923.

⁵⁴A. Hauck, British Patent # 260,959, 1925.

possible to move them parallel or perpendicular to the proscenium arch, but they are generally not moved in a vertical plane.

Two patented devices present the concept of suspended tracks in the form of rollers. The first, patented in 1917, is extremely broad in scope.⁵⁵ It contains twenty-seven claims each containing specifications for a wide variety of combinations of border rolls, cyclorama rolls, and supporting frames. However, the underlying principle is that of suspending border cloths and/or scenic drops from rollers onto which they may be wrapped when not in use.

A further development is the combination of a series of rollers which was granted a British patent in 1922.⁵⁶ The rollers are supported by discs at each end of a connecting shaft. The shaft and discs are turned to bring the scenic roller into position for display. The unit is then unrolled, allowing the drop carried on the roller to be lowered into the view of the audience.

A pair of curved suspended tracks was patented by Edward Gilbert in 1950.⁵⁷ The straight onstage portion of the track is approximately over center stage and is perpendicular to the proscenium arch. The downstage portion of the track is curved approximately 135 degrees toward the offstage area and the offstage end of the track points into an upstage corner. A series of scenic panels is suspended from the tracks and the offstage end of such panels are connected to a conveyor

⁵⁵Fredrick M. Smith and William A. Robinson, United States Patent # 1,247,888, 1917.

⁵⁶B. Wheelwright, British Patent # 202,076, 1922.

⁵⁷Gilbert, United States Patent # 2,504,926, 1950.

means attached to the track. The conveyor is located within the angle of the curvature of the tracks in such a manner that all portions of the track are substantially parallel to the closest portion of the conveyor. The settings to be displayed consists of a backwall in two parts and two sidewalls. The panels bearing the scenery are double-faced so that a panel which has been a portion of the backwall can be moved around the curve in the track and into the sidewall position, thus displaying the scenery on its reverse side.

A device designed to move on such a suspended track was patented in 1930 by Arthur Fredricks.⁵⁸ It includes means for movement, such as a series of casters which fit onto the track, and means to initiate movement. A cable is attached to each end of the track and has a flexible loop between points on the carriage. The loop is so arranged that pulling one side of the loop forces the device to move in that direction. A shaft is suspended from the casters. A horizontal member is attached to the shaft for the purpose of supporting scenic panels.

An earlier patent granted to Arthur Fredricks was for a similar, but simpler device.⁵⁹ His 1925 patent specified a device which is suspended from a cable rather a track.

ADJUSTABLE PROSCENIUMS

A number of patents were granted for devices which adjust the size of the screens and/or proscenium arches in theatre. Perhaps the

⁵⁸Arthur R. Fredricks, United States Patent # 1,772,661, 1930.

⁵⁹Fredricks, United States Patent # 1,548,522, 1925.

most straightforward patent refers to its patent drawing in its claims.

The proscenium opening is made adjustable in size by arranging the sides . . . to slide inwards, . . . and the top . . . to drop to the position shown. . . .⁶⁰

Apparently no further description of how the sliding and dropping is to be effected was considered to be necessary.

Max Hasait was granted another patent which specifies that the upper portion of the proscenium arch is to be vertically moveable.⁶¹ The ends of such an upper portal are designed to ride in recesses in the sides of the proscenium arch.

The next invention for altering the top and sides of the proscenium was patented in 1932. Ruth Brenner was the inventor of a number of horizontal panels which are placed at the top of the arch and a number of vertical panels which are placed at the sides.⁶² The panels are moveable in such a manner that the size and/or shape of the proscenium can be modified.

Another 1932 patent is one of three which specify means by which scenic screens may be rolled and unrolled on vertically mounted rollers.⁶³ The 1932 patent and one granted two years later both specify a supportive frame and means for rolling and unrolling the screens. An earlier patent, issued in 1922, concerns only a rolling mechanism.

⁶⁰Andre, British Patent # 169,947, 1920.

⁶¹Hasait, United States Patent # 1,452,424, 1923.

⁶²Ruth Brenner, United States Patent # 1,848,692, 1932.

⁶³Earl J. Vallen, United States Patent # 1,857,673, 1932, F. W. Woods and G. Leyton, British Patent # 405,907, 1934, and Fritsch & Sohn, British Patent # 200,103, 1922.

Similar to the devices for rolling scenic screens is a mechanism which was patented in England by H. Andre.⁶⁴ It provides a cyclorama which can be handled in a similar manner. A curved track and two drums containing the curtain and the necessary rope are the essential features of this invention.

A modification to the above patent by its inventor is designed to adjust the track in a number of ways.⁶⁵ Such adjustments include flying it or otherwise removing it from the stage; hinging it in a variety of locations; the rope which carries the curtains may be permanently mounted inside the track; etc. In general, the invention is made adaptable to a wider range of situations. The previous description of the modified cyclorama track is quite similar to the specifications for yet another patent granted to Max Hasait.⁶⁶ A curved, semi-elliptical rail, means for moving the curtain along the rail, and adjustable support of the track are common to both.

A dome-shaped cyclorama is apparently stretched into shape by a number of frames in a device patented in England in 1920.⁶⁷ The frames in this case are moveable so that all of them are gathered on the same line when they are to be flown.

CURTAIN RIGGING

A number of inventions have been patented for raising and lowering drapes, blinds, and curtains. One is attached to the curtain in such a manner that the material is gathered in folds at the top as

⁶⁴Andre, British Patent # 166,833, 1920.

⁶⁵Andre, British Patent # 169,422, 1920.

⁶⁶Hasait, United States Patent # 1,435,390, 1922.

⁶⁷Akt.-Ges. R. P. Waagner, L. & J. Biro, and A. Kurz, British Patent # 171,979, 1920.

the curtain is raised.⁶⁸ Such an adaptation results in a "brail"⁶⁹ curtain which is gathered at the top rather than at the bottom.

Two British patents for tableau curtains employ electric motors. The earliest patent (1921) provides for a steady rate of drawing the curtain into the usual tableau configuration.⁷⁰ The later patent, issued in 1934, includes means for opening the curtain laterally as it is being drawn into the festooned tableau position.⁷¹ A rather involved system of counterweights, lines and pulleys of various sizes enable the system to work smoothly, according to the patent specifications.

When a large contour curtain is draped according to the specifications of a 1929 British patent, it can be drawn to form a variety of configurations.⁷² The curtain is made substantially larger than the proscenium opening. Its lower, weighted edge is connected at intervals to independently operable cables. The cables, substantially in the same plane as the curtain, pass over a series of pulleys, and are fastened to a windlass or cleats. By altering the length of the various cables, different contours of the curtain may be produced. The proscenium curtain in the Radio City Music Hall is effectively of this type.

Other patents regarding curtains refer mainly to the tracts along which the curtains are drawn. A 1927 British patent is for a device which extends a curtain along a track by means of rollers which are attached to a "lazy-tongs" device.⁷³ The extendable lazy-tongs are

⁶⁸W. Andress and C. F. Neumann, British Patent # 148,073, 1919.

⁶⁹W. Oren Parker & Harvey K. Smith, Scene Design and Stage Lighting, (2d ed.; Holt, Rinehart, and Winston, Inc., 1968), pp. 240-241.

⁷⁰A. H. Oliver and W. E. Clarke, British Patent # 178,580, 1921.

⁷¹G. S. and R. G. Hall, British Patent # 418,910, 1934.

⁷²F. E. Weidhaas, British Patent # 328,844, 1929.

⁷³J. S. Knight, British Patent # 303,940, 1927.

moved by a worm gear attached to an electric motor.

Also in 1927, W. E. Kimber was issued the first of three patents for methods of folding and unfolding theatre curtains.⁷⁴ The first patent by this inventor is quite simple in scope. A curtain in which folds begin at the following or past pleat and continue to the first or leading pleat is designed to reduce wear and tear on the curtain.

Kimber's second patent, granted in 1928, is for a device to assist in the stopping of a curtain panel at a predetermined point.⁷⁵ By means of an inverted U-shaped carrier arranged within a U-shaped track, a portion of which is inclined, a panel's stopping point is fixed by the opening of the pleats in the curtain.

In 1934, W. E. Kimber's final patent for curtain tracks was granted.⁷⁶ This specified an L-shaped track which carried the curtain. Humps or cams on the upper surface of the track were designed to assist in the folding and unfolding of the curtain as it was drawn open and closed.

A British patent was granted in 1929 for a device for suspending a set of double curtains.⁷⁷ It consists of an over-lapping pair of tracks. The curtain cord runs through the longitudinal center of the tracks. A series of cylindrical bobbins are affixed to the cord in

⁷⁴W. E. Kimber, British Patent # 300,602, 1927.

⁷⁵Kimber, British Patent # 320,665, 1928.

⁷⁶Kimber, British Patent # 400,218, 1934.

⁷⁷G. S. Hall, British Patent # 332,074, 1929.

such a manner that they remain resting on the cord and moving with it unless they are prevented from doing so by contacting another bobbin. Each bobbin has a projection reaching below the track onto which the curtain panel is affixed. By motion of the cord, the bobbins carrying the curtain are caused to move along the tracks.

William Lemle patented a "Theatre-curtain-operating mechanism" in 1920.⁷⁸ Mr. Lemle's apparatus consists of an endless chain. The chain is driven by a reversible electric motor and a series of gears which have been developed to raise and lower curtains.

In 1946, a British patent was granted to B. J. van der Stigchel for a unique curtain-operating mechanism.⁷⁹ A stage curtain is opened and closed according to whether a type of pneumatic mechanism is operated by a pressure fan or suction fan.

British patents have been granted to inventors of curtain riggings which are of such a nature that they may be either portable or installed to modify an existing theatre. The earliest apparatus, patented in 1934,⁸⁰ is a track which is designed to support a heavy theatrical curtain. It is supported by two vertical members and a set of guy wires. The operating mechanism for moving the curtain is a windlass which is mounted on one of the vertical supports.

The second such structure was patented in 1952.⁸¹ It is constructed of tubular steel legs which are connected by a series of struts

⁷⁸William Lemle, United States Patent # 1,340,066, 1920.

⁷⁹B. J. van der Stigchel, British Patent # 631,181, 1946.

⁸⁰J. Stones, Ltd., T. Phillips, and F. Whittle, British Patent # 417,959, 1934.

⁸¹G. B. Kalee, Ltd., British Patent # 714,996, 1952.

similar to a modern television antenna mast. Two or more of such mast-like elements support a similarly-constructed horizontal structure. The horizontal member can be adapted to carry either a motion picture screen or a theatre curtain and its associated rigging.

To control the theatre lights simultaneously with the curtain, one may employ any of four devices patented by British inventors between 1918 and 1920. The earliest, developed by C. E. Falconbridge and J. W. Lewsley, is operated by a large electric motor which controls the curtain.⁸² As it reaches the end of an opening or closing sequence, it causes a switch to move so that the next time the motor is activated, the curtain will move in the reverse direction. The motor automatically stops when the curtains are completely opened or closed. The controlling of the lights is effected by the curtain motor driving a pulley which is connected to a dimmer in such a ratio that the dimmer moves from full up to blackout as the curtains move from open to closed. The remaining three patents, granted to A. H. Oliver and J. O. Dunabin,⁸³ G. K. Jensen,⁸⁴ and another to Falconbridge and Lewsley,⁸⁵ are quite similar to the one described above, differing only in degree of mechanical and electrical sophistication.

In this chapter, all of the devices discussed have one characteristic in common. They are attached in some way to a building in their

⁸²C. E. Falconbridge and J. W. Lewsley, British Patent # 124,622, 1918.

⁸³A. H. Oliver and J. O. Dunabin, British Patent # 155,107, 1919.

⁸⁴G. K. Jensen, British Patent # 170,997, 1920.

⁸⁵Falconbridge and Lewsley, British Patent # 169,909, 1920.

function. They were designed as part of the theatre building structure, not as part of the stage decoration.

One device has been patented, however, which has been developed as part of the scenic units and which cannot be classified in an earlier chapter of this study as a part of the construction of scenic units. Granted a British patent in 1959, this apparatus is a casted framework which is freely moveable by itself.⁸⁶ It was designed to be releasably attached to the scenery at intervals along its length and includes a series of jacks which are to be simultaneously raised or lowered to raise or lower the scenic unit. Provisions are also made for hydraulic jacks to be affixed to the apparatus to augment or replace the mechanically-operated lifting mechanism.

All of the above equipment was developed as individual units to be used independently of other equipment not specified in the individual patent. However, it has become common practice to use different and perhaps widely differing means to move the scenery within the context of any single production. One of the first productions within the time of this study to solve scene shifting problems by a variety of methods was The Patriot, Alfred Neumann's drama of the life and times of Czar Paul I of Russia. The producer, Gilbert Miller, hired Norman Bel-Geddes to design the eight-scene play which was produced at the Majestic Theatre in New York in 1928.

That The Patriot was to be done at all on an American stage occasioned some critical comment concerning the potentially hazardous

⁸⁶Packman Machinery, Ltd., and British Broadcasting Corporation, British Patent # 874,272, 1959.

scene changes which were common on the New York stage. It was felt that seven long scene changes would destroy the dramatic continuity which was essential to the plot.

It is an extremely dramatic piece and its force depends upon quick changes. Suspense begins in one scene, continues in a second, and concludes in a third. These were run almost continuously. A conspiracy starts in a prison, the mutiny spreads to the army in a different place, the paraders march through a street . . . until the increased number reach the outside of the palace, when they scale its walls, and enter the Czar's bedroom. Here each scene was only part of the whole. Each was continuous and one led without interruption to the action of the next. Imagine what will happen to this climax if waits for scene changes interrupt its natural and necessary flow. No drama can stand up under many and frequent waits, a fact which has destroyed many fine European dramas in this country.⁸⁷

Four months after Alexander Dean expressed such concern, Oliver M. Sayler was able to report that Bel-Geddes had successfully solved the problem of The Patriot in New York.

. . . [the] problem was solved in the first place by 'flying' intact the heaviest scene . . . weighing several tons. Next two platforms were constructed running on 30 noiseless casters and pivoted at each side of the proscenium arch to roll into place at the curtain line as desired.

The unique feature of the stage mechanism . . . consists in the exact dovetailing of a scene within a scene on each of the two pivoting platforms. The original scenes are solidly constructed on these platforms, while above each of them an 'inner' scene, also solidly built, 'flies' until the time comes when it is lowered quickly into position and rolled before the footlights.⁸⁸

In addition, a picture accompanying Mr. Sayler's article shows an upstage elevator being used to carry props and furniture between the

⁸⁷Alexander Dean, "The Stage and the Play," The Drama, (December, 1927), pp. 71, 96.

⁸⁸Sayler, p. 249.

stage level and an under-stage storage space.

Thus, in 1928, a flying apparatus, two jackknife stages, and an elevator stage were used in one production. By these means, Norman Bel-Geddes was able to overcome potentially serious problems, and the eight scenes of The Patriot were shifted quickly and smoothly at the Majestic Theatre.

CONCLUSION

Two significant trends are apparent from the information contained in this chapter. The first is the increasing sophistication of mechanical and electrical equipment. This is indicated particularly by the advances shown in the area of stage rigging. Peter E. Paoli's 1918 patent drawing shows a simple hemp set. In later years, a wide variety of counterweighted rigging patents were granted. This development culminated in the patenting, in 1953, by Paul M. Fischer, of a device to control the operation of an electrical winch for purposes of moving theatrical scenery. George C. Izenour's Synchronous Winch System was patented in 1960 and its refinements in 1967. Stage rigging patents have covered devices greatly differing in sophistication between Paoli and Izenour.

Of the eighty-six patents discussed above, sixty of them were granted in the first two decades of the study. By the mid-thirties, the number of patents for scenery shifting devices had sharply declined as had the other categories of theatrical patents. Since only twenty-six patents were issued between 1935 and 1970, it appears that the technical development of scenery shifting equipment within the period

of this study was greatest prior to 1935. This fact confirms the indication of a trend mentioned at the conclusion of the preceding chapter. Another trend toward increased sophistication in equipment is already apparent and additional confirmation of the trend will be more readily seen in the following discussion of an area in which some of the most imaginative developments have occurred: Illusionistic Devices and Effects.

CHAPTER FOUR

ILLUSIONISTIC DEVICES AND EFFECTS

The stage has long been regarded as a place of illusions and magic. Audiences throughout history have been asked to willingly suspend their disbelief and accept as reality many things they know to be unreal. The ancient Greeks used a crane to convey the gods between heaven and earth.¹ Nicola Sabbattini and Joseph Furtenbach have given us descriptions and drawings of the crashing waves, moving clouds, 'glories,' sea monsters, and 'hells' of the Renaissance stage.² The Twentieth Century stage has created many effects with the use of electricity. In general, audiences, playwrights, and directors have made considerable demands upon the ingenuity of the theatrical inventor to create illusions of the realistic or of the fanciful.

This chapter deals with illusions and with the various devices by which they have been created. The means for creating illusions vary from apparently simple constructions of pieces of scenery or properties to highly sophisticated electrical equipment.

From 1916 through 1970, a total of thirty-five United States and twenty-four British patents were issued for devices that were illusionistic in nature as earlier defined. Patents for such devices fall generally into four categories and there are a number which defy categorization.

¹A. W. Pickard-Cambridge, The Theatre of Dionysus at Athens (Oxford, England, 1966), p. 127.

²The Renaissance Stage, ed. Barnard Hewitt (Coral Gables, Florida, 1958).

The largest single group of patents is concerned with the changing of the appearance of scenery, costumes, or objects by means of light color. Light of a given color enables certain details to be visible and others to be obscured. Another color of light projected onto the same surface would greatly change its appearance by emphasizing different details. Another important group was comprised of inventions for the purpose of providing the illusion of motion on the stage. Some rather complicated devices were discussed which literally unfolded the scenery. Simplicity was the key to other inventions such as an endless rope running between two pulleys.

A third significant group of a number of similar patents concerned itself with the various containers which possessed 'magical' properties. Ingenious inventors have given to the theatre intricate systems of sliding panels, dark drapes, mirrors, and opaque liquids.

The final category of patents consisted of those devices for suspending a performer or object with no visible means of support and perhaps providing motion as well. With one exception, such illusions were accomplished by means of wires or cables of some sort. The lone exception provided the invisible support by an electromagnetic field.

The remaining patents do not form any significant groups. They do, however, include scenery which concealed actors, means for dissolving one scene into another, glowing screens, devices for producing sparks, cutting devices, sound devices and effects, and various types of illusionistic costumes.

CONCEALMENT

Simple scenic construction was employed in scenes where it was necessary for an actor to replace another onstage without the change

being noticed by the audience. There are two devices patented by the same inventor which allowed such a change to be effected. The first was a stage setting which contained a rear wall from which another wall projected directly downstage toward the audience.³ The projecting wall was of some thickness and contained a doorway which extended completely through it. The upstage portion of the door frame was constructed so that it could be opened in the manner of a narrow door. The downstage portion of the door frame was not enclosed, thus furnishing access from the doorway to the interior of the downstage portion of the projecting wall. As the first actor entered the doorway in the projecting wall, he moved downstage into the interior of the wall as the second actor moved from behind the rear wall, through the upstage edge of the doorway and onstage as though he were the first actor just crossing from one side of the stage to the other.

The second device for surreptitiously changing actors is a bench or a sofa with a changeable seat.⁴ The first actor lay on the seat portion of the bench in view of the audience. The seat was hinged at the front edge in such a manner that when the rear edge of the seat was released, the seat would pivot downward, allowing the first actor to roll down and behind the bench, out of sight of the audience. The second actor lay on a corresponding seat which was behind the bench and was hidden by its upright back. The back of the bench and the hidden seat were firmly affixed perpendicularly to each other and pivoted at

³Richard Walton Tully, United States Patent # 1,281,719, 1918 and British Patent # 138,881, 1918.

⁴Tully, United States Patent # 1,281,718, 1918, and British Patent # 138,881, 1918.

their juncture. At the appropriate moment, the seat on which the first actor lay was released, allowing him to disappear from the view of the audience. At the same time, the second actor was pivoted into view by moving the back portion of the bench down and forward into the original seat position and the hidden seat up into the back position. The second actor was then lying on the bench in the same position as the first.

Various devices were invented for the purpose of concealing an actor or object from the audience while apparently producing some magical feat involving that body or object. Perhaps the most famous of such devices was the box which enclosed a person while he was apparently sawn in two.⁵ The patent specifications for such a box belie the illusion. The box was divided into two parts as was the table on which it was placed. The ends of the box were removeable and contained aperatures for a person's head and hands at one end and his feet at the other. One person was concealed within the table and substituted his feet for those of the first person who was drawn up in one compartment of the box with his head and hand protruding. The box was sawn in two, strips of wood actually being cut, panels were then inserted into the open ends of the two halves, and the two halves of the box were then separated, completing the illusion. The process was then reversed to discover the original person in the box, his 'severed' halves having been 'magically' reunited with no ill effects. The two halves of the box were connected by a system of hooks which allowed the box to be lifted in one piece.

⁵H. Goldin, British Patent # 245,857, 1924.

In a similar manner, a mechanical contrivance which resembled a large doughnut (approximately four feet in diameter) permitted a person to apparently assume impossible contortions.⁶ The hollow annular housing was placed immediately downstage of a platform on which the person was placed in such a manner that his torso could be seen through the center of the ring. Other actors or mannikins concealed within the 'doughnut' extended their limbs and head through apertures in the annular housing in such a manner as to give the impression of extreme and unusual body positions.

Three patents were found for box-like structures which permitted persons or objects to enter and/or leave unobserved by the audience.⁷ These devices were similar in principle and made use of dark curtains and, hopefully, low lighting on the stage. Two of them employed mirror elements which reflected the image of the dark curtains to maintain the illusion of non-existent walls. The above patents did not specify sizes or explicit decor of such structures, as did a fourth patent for a similar device which was to resemble a phonograph cabinet which possessed similar 'magic' properties.⁸

The most recent patent for an illusionistic container was granted in 1956.⁹ A rather ordinary-looking box contained two rollers. Apertures in the upper and lower surfaces allowed strips of material to be passed into or out of the box. An illusion of magic was created by

⁶Edward M. Massey, United States Patent # 2,034,407, 1936.

⁷Fergus Greenwood, United States Patent # 1,760,842, 1930, Ernst Pfannekuchen, United States Patent # 2,155,767, 1939, and United States Patent # 1,207,042, 1918.

⁸William S. and Louise E. Johnson, United States Patent #1,297,473, 1919.

⁹M. A. Burdin, British Patent # 778,771, 1956.

inserting a plain strip in the upper aperture and causing it to be wrapped on one roller. The illusion was completed by drawing out from the bottom aperture a printed strip which had previously been wrapped on the second roller. By such means, the illusion was created of the material being printed as it passed through the box.

Two other containers for illusions employed liquids. The first was a tank which could be mysteriously filled and emptied by means of concealed external controls.¹⁰ The second tank could be filled and emptied in a similar manner and also possessed means by which objects could be moved to and from the bottom of the tank.¹¹ In addition, the latter tank had provisions for filling only its hollow walls with liquid and then rendering the liquid opaque.

INVISIBLE SUSPENSION

A number of inventions which produced the illusion of weightlessness and/or a flying motion have been patented. Perhaps the most complicated of such inventions surreptitiously substituted a draped human for a living actor.¹² Then, by means of concealed cables and threads, the draped form was made to rise and float about the stage.

Another rather involved rigging system allowed an actor to move not only vertically and horizontally in one plane, but also to change the plane of his movement.¹³ The unique feature of this device

¹⁰Garfield P. Smith, United States Patent # 1,330,452, 1920.

¹¹Ebenbzer B. Hurford, United States Patent # 1,266,476, 1918.

¹²Howard Thurston and Harry Jansen, United States Patent # 1,613,254, 1927.

¹³Erich Rach, United States Patent # 1,229,519, 1917.

was the use of two parallel sets of rigging, one upstage of the other, with a total of at least four lines being attached to the actor's harness, thus permitting great variety of flying movements.

A simple invention patented by Myron Orton, produced the illusion of a performer being carried through the air by a flying bird and was unique in that the patent specified the use of a bird or other flying creature.¹⁴ The actor was suspended by a simple rigging system then drawn across the stage while holding the legs or back of a bird which would presumably cooperate and flap its wings appropriately.

The latest patent found for flying equipment is the simplest in concept.¹⁵ A 1969 patent specified a suspended carriage which moved laterally across the stage. Attached to such a carriage was a simple system of pulleys which allowed the suspended actor to move vertically as well as horizontally in a fixed plane over the stage.

Similar in intent to the invisible suspension equipment was a patented device which allowed a performer to make long jumps. A long, 'invisible' wire was suspended from a coil spring which was "adjusted in relation to the load on the wire in such a manner that its frequency of oscillation is twice that of the free pendulum."¹⁶ By such means, the device supported much of the jumper's weight as he leaped, thereby allowing him to cover greater distances.

¹⁴Myron Orton, United States Patent # 1,262,553, 1917.

¹⁵Peter S. Foy, United States Patent # 3,476,385, 1969.

¹⁶L. A. Legros, British Patent # 187,783, 1921.

One patent for invisible suspension devices did not make use of wires or cables of some sort. A 1940 British patent specified magnetism.¹⁷ An alternating magnetic field was created by appropriate positioning of a number of electromagnets and a conducting body of spherical or other form was held suspended in such a field. The patent also specifies means for causing the suspended body to rotate or assume a tumbling motion.

MOTION ILLUSIONS

Two United States patents were granted for devices which produced the illusion of motion by the use of moving scenic curtains or belts mounted upon rollers. The first employed both an endless belt in a horizontal plane similar to a treadmill and a vertically placed endless belt as a moving scenic vista to the rear of the first.¹⁸ A second system was designed with a stationary object such as an automobile being flanked by a pair of vertical belts which converged behind the stationary vehicle.¹⁹ The motion of the scenery painted on the rotating belts produced the illusion that the vehicle was moving down a road toward the audience.

Substantially the same effect of motion was produced by a pair of inventions which made use of a type of collapsible scenery to represent a surface over which an object was travelling.²⁰ Relative

¹⁷British Thomson-Houston Co., Ltd., British Patent #535,871, 1940.

¹⁸Joseph A. Cunningham, United States Patent #1,600,039, 1926.

¹⁹Jack Norworth, United States Patent # 1,841,844, 1932.

²⁰Langdon McCormick, United States Patent # 1,324,680, 1919, and United States Patent # 1,350,614, 1920.

motion between the surface and the object was produced and means were provided whereby the size of the moving object could be increased or diminished as necessary.

Making use of the same principle as the previous pair of devices, a rather detailed and complicated invention was patented in the first year of this study for the purpose of producing the illusion of a large group of mobile objects advancing toward the audience.²¹ The example cited in the patent specification was a group of mounted cavalry troops cresting a hill and moving down the hill toward the audience. Five groups of figures were employed. The first group was placed in the position furthest upstage and consisted of painted silhouettes moved in such a manner as to suggest their moving over the crest of the hill. The next group was slightly larger and moved in the manner of galloping horses. The third, fourth, and fifth groups of figures took on additional details, size, and three-dimensionality so that the last group, closest to the audience, was composed of actors astride very realistic horse dummies which moved in a quite natural manner. The painted illusion of receding ground as well as some of the movements of the figures was produced by a series of belts and gears.

Another patent was granted to Myron Orton for an invention which produced the illusion of motion without any moving background, but made use of the endless belt principle.²² A flexible tightrope was

²¹L. J. Carter, British Patent # 102,125, 1916.

²²Orton, United States Patent # 1,310,963, 1919.

stretched between two pulleys, one of which was higher than the other, and a performer walked upon the tightrope in the manner of a treadmill.

Another device for producing a motion illusion was a structure similar to a small stage.²³ A performer entered the structure and produced the illusion of walking across it by manipulating artificial legs which were exposed to the view of the audience, rather than exposing his own legs to vies.

The illusion of one object passing through another was produced by means of an invention which employed one or more segmented rings.²⁴ The rings were manipulated by concealed means so that their open segments were aligned so as not to impede the movement of an object through an apparently solid body.

A device was patented in 1920 for inducing mysterious movements in a ball which had no visible means of locomotion.²⁵ The surface on which the ball moved was covered with a cloth. Beneath the cloth was a ring in which the ball rested and concealed strings attached to the ring provided the motive power.

DISSOLVE ILLUSIONS

A number of other inventions for creating unusual illusions for the theatre have been patented. A pair of chambers arranged at right angles to each other were designed to contain objects which were to give the appearance of dissolving into each other.²⁶ A sheet of glass

²³Thurston, United States Patent # 1,586,863, 1926.

²⁴I. S. deFerran, British Patent # 826,157, 1957.

²⁵G. Dickson-Kenwin, British Patent #170,501, 1920.

²⁶Cus Rogers and Nicholas E. Polytes, United States Patent # 1,391,854, 1921.

was placed diagonally at the mouths of the chambers which were independently lighted. By controlling the lighting, the glass would act as a mirror and allow the objects to apparently dissolve into one another.

A very similar device combined images on a glass screen.²⁷ The screen was placed with its lower edge at the bottom of the proscenium opening and its upper edge rearwardly inclined. From the top, a scenic slide could be projected onto it and from the rear, images of actors. By controlling the lighting, a dissolve effect could again be attained.

Two directly aligned and reversibly but identically furnished rooms separated by a glass wall were also patented for producing optical illusions by William H. Chandlee.²⁸ Again, the effects obtained depended on the lighting and the transparent/reflective properties of the glass.

Two mirrors which reflected parts of two compartments into one image were included in a later invention by Mr. Chandlee.²⁹ The 1935 patent specified a series of three compartments. The patent drawing showed a dressing table with a mirror in the central compartment. The mirror was not flat but was comprised of two sections, each arranged to reflect a portion of the scenery contained in the flanking compartments. The image in the dressing table mirror was therefore determined by the arrangement of the elements in the other two compartments.

²⁷E. J. Marston and H. A. Smith, British Patent # 145,638, 1919.

²⁸William H. Chandlee, United States Patent # 1,699,345, 1928.

²⁹Chandlee, United States Patent # 1,996,457, 1935.

In 1947, C.W. Hansel was granted a patent for an arrangement of a stage so that a plurality of reflected images could be combined.³⁰ A performer on a stage could be viewed directly. A series of overhead mirrors allowed the audience to also see a birdseye view. The stage itself might have been translucent and have an image projected onto it either directly or by a series of mirrors. The limitations of such an arrangement would seem to be those of the designer's imagination.

A similar mirror device employed a series of curved mirrors to reduce the reflected images in size.³¹ One mirror was placed so that its curvature was at right angles to the other, thus reducing the reflected images both in height and width. The resultant images was reflected through a reduced proscenium arch to the audience.

The impression of motion picture action onstage was produced by an invention which made use of projection screens.³² By means of a series of lenses, the image of the action on a stage was projected onto a translucent screen in view of the audience. Such an image was then briefly blacked out at substantially regular intervals to produce the illusion of a motion picture.

An interesting illusion was created by another effect which consisted of a moveable screen which had a phosphorescent surface.³³ The shadow of a person or object was thrown onto the screen for a

³⁰C. W. Hansel, British Patent # 653,809, 1947.

³¹William Heerschaft, United States Patent # 1,785,347, 1930.

³²Ferinand J. Oebbeke, United States Patent # 1,339,279, 1920.

³³Harry Robert Law, United States Patent # 1,543,931, 1925.

sufficient time to permit the unshadowed areas of the screen to begin glowing. The lights were then extinguished and the glowing screen was then removed from the screen, thus creating the illusion that the object itself was leaving the scene.

APPARENT VISUAL ALTERATIONS

In the 1920's, many devices were patented which employed the principle of coloring scenery and/or costumes with hues taken from distinct parts of the spectrum. The appearance of such scenery was distinctly altered in subsequent scenes by merely changing the color of the lighting in order to render visible a different scene painted on the same surface.³⁴

The creation of illusions by matching pigment and light has produced noteworthy spectacles such as Madame Pavlova's ballet, Dionysus, which was designed and lighted by Nicholas de Lipsky in London in 1921. In an interview, de Lipsky explained that

. . . two sketches are painted on one canvas and are then separated by use of lights which obliterate the tones of one or the other. The whole principle is to secure true harmony between light, color, and design.³⁵

The costumes of the actors could also be changed in appearance in similar fashion.³⁶ Performers were costumed in garments which displayed bands or zones of distinct colors. They were then lighted with

³⁴Nicholas V. deLipsky, United States Patent # 1,462,537, 1923; N. deBoudkowsky, British Patent # 168,880, 1920; Cameleon Soc. Anon., British Patent # 196,899, 1922; and E. deLipsky, British Patent # 213,828, 1923.

³⁵P. J. Nolan, "Painting With Light," Literary Digest, LXXI:XI (December 10, 1921), pp. 23-24.

³⁶Nicholas V. deLipsky, United States Patent # 1,462,536, 1923; W. J. Rickets and A. W. Sharman, British Patent # 237,006, 1924; and N. H. Martinez, British Patent # 313,457 and # 313,464, 1927.

a changing sequence of identical colors. By means of the pattern of the colors on the costumes and the movement of the light, a number of apparent effects could be created. The effects included spinning waves running off the top or bottom of the figure, alternating checkered patterns, etc. Additional patents were also granted for a series of signs which changed their messages or appearances according to the same principle.³⁷

SPARKING DEVICES

Two appliances were patented by Stephen Goldini in 1916 which produced the illusion of a shower of sparks appearing around the feet of a performer. The first device employed two electrical mats, one positively charged, the other negatively, on which the performer moved.³⁸ The mats were equipped with bristling metallic surfaces. The shoes worn by the performer were connected by flexible wires and had electrically conductive soles. As the performer made and broke the electrical circuit repeatedly during a dance or walk of some sort, a shower of sparks was produced.

Goldini's second device made use of a treadle placed over an arrangement of metallic and abrading members.³⁹ When the performer stepped on the treadles, his weight forced the treadle downward. Such a motion was transmitted through a series of gears to a metallic wheel

³⁷H. M. Rasmussen, British Patent # 302,159, 1927; and Martinez, British Patent # 313,462 and # 313,463, 1927.

³⁸Stephen Goldini, United States Patent # 1,178,444, 1916.

³⁹Goldini, United States Patent # 1,183,554, 1916.

which was spun. As the weight on the treadle increased, the metallic wheel was forced into contact with an abrasive plate, thus producing a shower of sparks.

A more direct invention for producing sparks consisted of a device which forced pieces of steel into contact with a rapidly rotating emery wheel.⁴⁰ This device was able to produce sparks intermittently or in a steady shower, depending on the manipulation of appropriate controls.

ILLUSIONISTIC EQUIPMENT

The illusion of a filmy enclosure surrounding an object was the result of the operation of three devices which varied only in the shape of their construction.⁴¹ A base, containing a motor, supported a framework structure. The framework, when rotated rapidly, produced the illusion of a film enclosure.

Two rather interesting devices are unique in that they were only patented appliances producing their respective illusions. The first, a pair of shears, produced the illusion of cutting.⁴² A moveable carrier was secreted in a compartment in one of the blades. The compartment contained a scrap of the material that was apparently being cut by the shears. When the shears were used, the scrap of material was allowed to fall from its compartment, producing the illusion of

⁴⁰H. Guerard, British Patent # 227,432, 1924.

⁴¹Roy J. Pomeroy, United States Patent # 1,332,918, 1920; and George W. Hanlon, United States Patent # 1,365,989, and # 1,365,990, 1921.

⁴²J. A. Petrie, British Patent # 191,661, 1922.

actual cutting. The second unique device conveyed the impression of a bottomless container.⁴³ A pitcher or bottle was supported by means which allowed it to appear to rest on a table or counter and also to be pivoted upward into a pouring attitude. A liquid was pumped into the pitcher through a pipe in the pivot support and flowed out of the pitcher into a cup of similar receptacle. The cup was then drained through a hole in its bottom and the liquid was transferred back to a tank from which it could be pumped into the pitcher once more.

Three patents relating to costumes dealt with various illusions. A face the size of a human torso and designed to be worn thereon can best be described by the text of the patent abstract itself:

A costume for securing theatrical illusions comprising in combination: an inconspicuous foundation garment; ornamentation carried by said foundation in imitation of the features of a face large enough to cover the front of the torso, with the eyes at locations corresponding to the breasts of a female torso . . . said features including an imitation mouth having a horizontal slit between the lips thereof; a flexible tongue in said imitation mouth; and inconspicuous wearer-controlled means for moving said tongue manually out, through said slit and holding it extended in any direction.⁴⁴

Another costume illusion device had a waistband on which was mounted a type of track.⁴⁵ Through a rather sophisticated method shown in the patent drawing, the appliance imparted a rotary motion to any garment fastened to the track.

The third costume device was a hood-like canopy which was placed over the head of a figure.⁴⁶ The hood was divided into two halves from

⁴³Deutsche Gasgluhlich-Auer-Ges., British Patent # 249,829, 1925.

⁴⁴June E. Carter, United States Patent # 3,074,714, 1963.

⁴⁵Henry Skremka, United States Patent # 1,398,158, 1921.

⁴⁶A. & M. McCann, British Patent # 141,121, 1919.

front to rear. A spring bolt arrangement could be activated by a concealed handle to cause the flaps of the hood to fall away from the head of the figure. The patent abridgement specified that the hood was to be covered with flowers.

SOUND DEVICES

Relatively few sound producing devices were patented between 1916 and 1970. A total of only seven patents were issued for mechanical devices which have as their primary aim the production of original sound effects or to aid in the dissemination of such effects throughout an auditorium.

Two British inventors patented devices in 1924 for the production of wind and storm noises. Both machines employed fan-like elements as the major source of sound. The simpler of the two consisted of thin, perforated fan blades which caused a wind sound to be produced when the blades were turned.⁴⁷ The second device consisted of a fan which resembled a spoked wheel almost completely enclosed by a casing.⁴⁸ An air inlet was located near the hub of the fan and a number of outlets were arranged on the top surface of the casing. Each outlet contained a sound producing device such as a small rotary fan or a disk with oblique holes. Further sounds could be produced by mounting another fan over the intake port. The sound produced by the motor-driven fan within the casing could be modified by varying the speed of the motor, by the types of devices placed over the inlet and outlets, and by various adjustments of such devices.

⁴⁷A. Cashmore, British Patent # 244,567, 1924.

⁴⁸T. Kay, British Patent # 230,956, 1924.

A mechanized version of the use of coconut shells to suggest galloping horses also contained provisions for beating a drum in time with the hoofbeats.⁴⁹ A frame held a drum which carried a series of pivoted arms which were arranged in such a manner as to engage levers in a rhythmic pattern. The levers were affixed to coconut shell halves which were mounted above a soundboard. When the drum was rotated, the pivoted arms engaged the levers and forced the hollow shells downward onto the sound board in a rhythmic pattern, thus producing the sound of hoofbeats. A similar arrangement of levers which carried drumsticks permitted drum cadences to be produced.

The above device, patented by C. H. Dent, was a step in the right direction, according to the thinking of A. A. Hopkins. Writing in the Scientific American, Mr. Hopkins described a number of sound producing devices used prior to 1920, and concluded

There has been little improvement in them in the last 50 years, and it really seems as though there is a field for some inventor to get up a universal sound machine the component parts of which could be operated from one central point.⁵⁰

Unfortunately, such a machine was never patented if, indeed, it was ever invented.

A device which combined sound and visual effects was developed as a free-hanging target device.⁵¹ A striker member was concealed in the surface beneath the target such as the ground or a table-top, and

⁴⁹C. H. Dent, British Patents # 127,446, 1918.

⁵⁰A. A. Hopkins, "Noise Makers of the Stage," Scientific American, CXXII (January 17, 1920), p. 80.

⁵¹Clyde R. Powell, United States Patent # 2,097,091, 1937.

was operated by a spring mechanism. As a gun was fired, the spring was released, and the striker member snapped over, similar to a mouse-trap's action, striking the target portion. The illusion created, both aurally and visually, was that the target had been struck by a bullet.

A piece of equipment (included here because it is a portion of a patented device discussed earlier in Chapter Two) produced the sound of a hissing, crackling fire.⁵² Concealed within the lighted simulation of glowing logs was a slowly rotating member having long, flexible, and resilient finger-like projections which came in contact with an immobile surface. The appropriate sound effects were produced by the rotating fingers brushing across the immobile surface.

The final two devices dealt not with the actual production of sound, but rather with the means by which sound could be projected into the auditorium from the stage. The earliest patent was for a series of shutters which was placed over the unused orchestra pit.⁵³ That dead-air space was effectively sealed off and the sound was then reflected toward the audience. The second patent combined a ventilation scheme with sound distribution.⁵⁴ By discharging a current of air from the region of the stage toward the rear of the theatre, the inventor claimed that the density of the air in the auditorium would be materially increased. Since sound travels more effectively in a denser medium, the acoustical efficiency of the auditorium would be greater. The dense air would be vented at the rear upper portion of the theatre.

⁵²Herman Nielsen and Stephen S. Valliant, United States Patent # 3,526,984, 1970.

⁵³J. P. Henry, British Patent # 194,440, 1921.

⁵⁴Ray E. Vanderbush, United States Patent # 1,823,479, 1931.

Because of the extremely small number of patents granted for sound devices and effects during the period of the study, it is impossible to determine any significant developments. While a study of sound-producing devices which are included in musical classifications would perhaps prove more fruitful, such classifications are, by definition, outside the scope of this study.

CONCLUSION

A trend regarding recent patents in sound is obvious. Only one sound device was patented within the last 33 years of this study, and that patent, was included here only because it was an integral part of a theatrical device so classified.

Two significant trends are apparent in this chapter. The first is the increasing sophistication of electrical equipment. This is indicated particularly by the development of the principles of changing appearances of scenery or costumes by controlling the color of the light. The other trend is the increase in the number of inventions which employ electricity in some manner. Both of these developments require an advancing state of electrical control.

In this chapter, only nine of the fifty-nine patents for illusionistic devices were granted after 1930. Thus, it is again apparent that the technical development of the modern theatre within the period of this study was most patented prior to 1930.

CHAPTER FIVE

CONCLUSION

Interesting developments were noted among all the categories of patented devices and effects. Many scenic effects employed some means of light projection, either alone or in combination with other scenic apparatus or with live actors. Color Music devices combined two art media into one, with varying degrees of success, according to the reviews. Several means of scenery construction were patented. These ranged from collapsible unit frames with elasticized coverings to folding houses. Stage vehicles included motorcycles, aircraft, and a flaming automobile. A number of water effects included waterfalls, falling rain, and falling snow. Several appliances were patented for the purpose of providing moving reflected images in a light show which may form the background for a rock band.

From 1916 through 1970, a total of 286 patents were granted by the British Patent Office and The United States Patent Office for scenic and illusionistic devices and effects for the theatre. Of this total, 135 were granted for scenic devices and effects, eighty-five for devices for shifting scenery, sixty-six for illusionistic devices and effects.

Two major trends appeared in the course of this study. The first was the increase in sophistication of the mechanical and electrical components of the patented inventions. Within many groups of similar devices, this trend is obvious. In Chapter Two, for instance, the 1917 warship turret stage vehicle is mechanically simple compared to the

technology required to assemble the flaming car patented in 1967. The group of patents for flying and rigging scene shifting devices contained in Chapter Three varies in complexity from a 1918 simple hemp set to the refinements of the Synchronous Winch System in 1967. Chapter Four's illusionistic 'invisible suspension' equipment varied from a 1917 apparatus which carried an actor in a harness by means of a thin wire to a 1940 patent which suspended an object by means of an electromagnetic field.

The later patents, in general, made greater use of the more advanced technology which was available at the time of their invention. This is not to suggest that the earlier inventions were naive and simplistic in nature. The Color Music devices, for instance, were generally patented prior to 1930. Yet they display an ingenious arrangement of keyboards, light sources, color media, electric switches of various types, and projection apparatus. However, due to the electrical and mechanical technology of their time, they are very bulky and cumbersome as shown in photographs.¹ Yet, within the confines of post-World War I technology, they are very ambitious and relatively sophisticated mechanisms.

Similarly, a sophisticated application of light and pigment principles and their associated devices led to the practice of changing appearances by changing the hue of the lighting. In the 1920 decade, such spectacles as Madame Pavlova's ballet, Dionysus, was produced by

¹Adrian Bernard Klein, Coloured Light: An Art Medium; Being the Third Edition Enlarged of "Colour Music", The Technical Press, Ltd., London, England, 1937, Plates 11, 12, 13, 14A, 14C, 15 and 16.

Nicholas de Lipsky's practice of coloring scenery or costumes with a specific pigment. The pigment's hue would change under certain lighting conditions, thus altering the appearance of the surface on which it was applied.

Despite instances such as the above, the general trend was from the simpler devices toward the more sophisticated applications of electric and mechanical apparatuses. "Flying systems, adjustable stages, even kinetic walls and ceilings are the stuff of the theatre. Technology has become part of the theatrical performance."²

The second major trend involved the number and chronological distribution of the patents. Of the 286 patents which came within the definitions of this study during the fifty-five year period 1916-1970, 207 were granted prior to 1935. This trend is clearly indicated by the evidence in each chapter. Eighty-four of the 135 scenic device patents were granted within the first twelve years of this study. Sixty scenery shifting devices were patented in the first two decades; only twenty-six after 1935. Only ten of the sixty-six illusionistic patents included herein were issued after 1930.

There were several factors which influenced such a decline. The audience's entertainment dollar more frequently bought motion picture tickets after Al Jolson appeared in The Jazz Singer in 1927. This new art form seriously challenged the drawing power of the legitimate theatre.

Perhaps the most serious influence was produced by the Depression of the 1930s. This economic crisis affected the entire economic situation in Europe and England as well as in the United States. In the

²Forrest Wilson, "Editorial," Progressive Architecture, LI (December, 1970), p. 47.

face of such a crisis, little money was spent on theatrical improvements.

There is an old theatrical axiom which suggests that eras which have produced dramatic works of great literary quality are not noted for their advances in the technical areas of theatre. The works of the Greeks and of William Shakespeare were performed on stages which were technically quite simple. Realism and Naturalism came into prominence within simple box sets.

Conversely, the Renaissance theatre produced an amazing number of spectacular displays, but little literature of enduring value. In the first thirty years of this century, many inventions were developed to meet the demands of the 'New Stagecraft,' but the period is not generally known for great dramatic literature. More recently, American musical comedies have called for scenic spectacle but their literary quality is not highly regarded.

It is undeniable that one finds the majority of the patents in the early years of this study. On the basis of the above axiom, one could conclude that early Twentieth Century American and British drama relied heavily on mechanical contrivances. However, it would be naive to conclude that the drama of the period was of lesser quality. It can be more effectively argued that more recent American and British drama is of better literary quality. Also, there are fewer patents found in the later years of this study. The obvious conclusion is that more recent drama relies less on newly patented mechanical contrivances.

Since 1965, the downward trend in number of patents granted per year, which took place in the late 1920s and the early 1930s, has

apparently been reversed. This trend can best be indicated by considering the number of patents granted within each five-year period of the study. From 1916 through 1920, sixty-eight devices were patented. 1921-25: eighty-two; 1926-30: thirty-three; 1931-35: twenty-five; 1936-40: thirteen; 1941-45: nine; 1946-50: nine; 1951-55: eleven; 1956-60: eight; 1961-65: seven. However, from 1966 through 1970, eighteen scenic and illusionistic devices and effects were granted patents. Both British and United States patents experienced such a trend; there was no significant difference between them.

These trends follow by a few years, but parallel, the trends in theatre construction, particularly in the United States. The last theatres of Broadway's building boom were built in 1927 and opened in 1928.³ In Washington, D. C., the National Theatre Building was completed in 1922. Washington had no new theatres built until the Arena Stage opened in 1962.⁴ Similarly, in New York, the building hiatus was ended by, among others, Lincoln Center and the ANTA theatre in 1962. The early 1960s also saw the construction of the Tyrone Guthrie Theatre in Minneapolis, Minnesota, and the Alley Theatre in Houston, Texas, in addition to other regional theatres. Such recent efforts as this recent building boom offer additional evidence that the physical and technical aspects of theatre began to regain attention in the 1966-70 period of the study.

³Ward Morehouse, "Broadway Had A Building Boom," Theatre Arts, XLIV (January, 1960), pp. 80, 84.

⁴"Arena For A Resident Company," Progressive Architecture, XLIII (February, 1962), p. 125.

Some of the patented inventions, particularly the more spectacular ones, were obviously 'gimmicks' with little value beyond the specific application for which they were invented. However, many patented devices continue to provide valuable basic services to theatrical technology. The conclusion to be drawn here is that the vast majority of patenting has been done to protect an inventor's contribution to the increasing sophistication of theatre technology. To label such contributions as 'gimmicks' is to grossly misunderstand their importance.

Unfortunately for scholars seeking direct relationships between a patented device and its use in a theatrical production, backstage methods, whether patented or not, are only rarely mentioned in reviews or articles. There seem to be two reasons for such omissions. First, perhaps new and relatively unproven equipment was not used. The standard equipment is assumed to be familiar to the reader. Secondly, such devices are, by their very nature, very secondary in importance to the actors and the script. Since most theatrical reviews and articles concentrate on the actors and the script, it is perhaps not surprising that even vague references to backstage matters are only occasionally found.

It has been the purpose of this study to trace the development of the scenic and illusionistic aspects of physical and technical theatre from a historical point of view as documented in the United States and British patents for the period 1916-1970. This study has provided an original historical view of the evolution of much modern theatre equipment and also of physical and technical theatre history as reflected through the patents. It has made available to both theatre scholars

and practitioners information which might prove helpful to them; (1) in determining a style of production for plays of the period; (2) in mounting authentic reproductions of such plays; and (3) as a source of inspiration and information for the theatre technician in construction and use of a wide variety of scenic and illusionistic devices. Whenever possible, data concerning the actual use of the patented devices was provided. In addition, a general relationship between theatre technology and the literary quality of contemporary drama was developed.

This study has also documented many developments in theatre technology in addition to two distinct trends. The first such trend was the general development of patented devices from relatively simple apparatuses to equipment which is quite sophisticated mechanically and/or electrically. The second trend was the decline in number of patents granted during the late 1920s and the early 1930s. From approximately 1935 through 1965, relatively few patents were granted for scenic and illusionistic devices and effects for the theatre. This lack of patenting merely indicates less frequent documentation of developments of theatre technology, not the lack of such progress. During the last five years of the study, however, the number of such patents increased. The architectural and theatrical movements which caused such an increase also inspired Forrest Wilson to editorialize "the theatre and architecture are passing through a period of unprecedented infiltration of ideas and experiment."⁵ This seemed to be a good omen and allowed this study to end with an optimistic view toward many patents for scenic and illusionistic devices and effects for the theatre in the future.

⁵Wilson, p. 47.

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APPENDIX A

DEFINITIONS OF PERTINENT PATENT CLASSIFICATIONS

UNITED STATES PATENT CLASSIFICATIONS

CLASS 20: WOODEN BUILDINGS.

CLASS DEFINITION:

(Since this class was modified in 1953, the original definition was not available at the time of this study. However, from a study of the subclass definitions, it may be concluded that this classification included certain features of wooden buildings. Such features pertinent to this study include facilities for the gathering of a number of people, stages, and audience seating areas.)

SUBCLASSES:

1. Structures and accessories peculiar to buildings which do not clearly fall into any of the other building classes or subclasses.
 - 1.12 Buildings specialized to accomodate assemblages of persons and such accessories thereof as are not otherwise classifiable.
 - 1.123 Patents showing construction of theatre stages, but not relating to means for scenic or lighting effects.
 - 1.126 Units and subcombinations thereof not otherwise classified which provide tiered shelves or seats for seating spectators.

CLASS 46: AMUSEMENT DEVICES, TOYS.**CLASS DEFINITION:**

This class, which is specific under Class 272, Amusement and Exercising Devices, includes patents relating to devices whose purpose is for the amusement or recreation, principally of children, and which are commonly called toys or playthings, unless such devices are by analogy or structure or by other functions classified in other classes. Working models or devices called toys, but which is made of sufficient size would be operative devices are not found in this class but are classified in the appropriate classes for such operative devices. This class takes toys, simulating guns in form, which neither detonate an explosive nor project a missile, and miscellaneous cap detonating devices not simulating firearms.

SUBCLASSES:

12. Toys under the class definition relating to buildings, lighthouses, fireplaces, and parts thereof.
13. Devices under subclass 12 in the form of theatres and parts thereof, such as the stage.

CLASS 52: STATIC STRUCTURES, e.g., BUILDINGS.

CLASS DEFINITION:

This is the residual class for static structures. It includes on site erected structures generally identified by terms such as: civil engineering, public works, shelter, housing, buildings or masts and other related components used in such structures, e.g., panels, beams, columns, etc. Also, included are selected structurally similar components, such as, table top panels, poles, posts, window sash elements or door panels even though not disclosed as specialized as components of a building structure. Also, are included processes, machines and implements used in the construction of such structures which are not elsewhere provided for.

SUBCLASSES:

6. Subject matter under the class definition specialized to the presentation of an attraction or accommodation of an audience group, such specialized structure including (1) an arrangement of seats or slopes relative to the locus of the attraction, (2) a structure having means peculiar to the accommodation of the audience or (3) a stage, screen or area of activities which aid in the presentation of or serves as the locus of the attraction.
7. Structure under subclass 6 including a movable floor or platform particularly related to a proscenium or to a seating arrangement for viewers.
8. Structure under subclass 6 relating to a particular arrangement of seats relative to the enclosure or area of the presentation or attraction.
9. Structure under subclass 8 including a section of seats mounted for movement with respect to another section or to the floor upon which it rests.
10. Structure under subclass 9 wherein the shifting of the section is accomplished by, or aided by means releasing stored or generated energy, e.g., motor, etc.

CLASS 254: PUSHING AND PULLING IMPLEMENTS**CLASS DEFINITION:**

This class includes implements for applying a push or a pull directly to an object to be moved or upon which pressure or tension is to be exerted. It comprises jacks (including lifting jacks, floor jacks, stump extractors, and analogous implements), stretchers (including belt, carpet, and wire stretchers), hoisting trucks, and cable hauling apparatus.

With the exception of some patents in cable hauling apparatus, this class does not include the power-applying elements of machines such as pumps or presses, not the adjusting elements of articles, such as tables and chairs. It may, however, include supports of general application not elsewhere classifiable when they comprise means for hoisting the load-carrying portion of the support.

Implements for performing compressing operations upon material--e.g., clamps and bundling devices--are excluded, also devices for merely grasping or engaging with something to be moved, unless regarded as a mere attachment for or element of the pushing or pulling element.

Pushing or pulling implements of the jack or crow-bar type, including those having special engaging features, which engage between spring elements only will be classified in Class 254.

SUBCLASS:

141. Derrick hoists especially designed for raising and lowering theatre-curtains and the like.

CLASS 272: AMUSEMENT AND EXERCIZING DEVICES

CLASS DEFINITION:

This class is generic for amusement and exercising, and includes devices whose purpose is amusement, recreation, exercising, gymnastics, or athletics, unless they are classified in other classes. It includes apparatus used at amusement parks and in theatres, unless otherwise classified, also houses, arenas, and elevators where the sole function is amusement.

SUBCLASSES:

1. Miscellaneous amusement devices under the class definition not otherwise provided for.
2. Amusement devices under subclass 1 in the form of buildings or parts of buildings the sole function of which is amusement.
8. Amusement devices under subclass 1 for giving a person either a physical or an optical illusion.
9. Illusion devices under subclass 8 wherein the illusion is carried out on a stage of a theatre.
10. Stage illusion devices under subclass 9 in which the illusion is perfected by projected picture or lighting effects.
11. Stage illusion devices under subclass 9 comprising stage setting.
12. Stage illusion devices under subclass 11 in which the illusion permits a person, animal, or other object to travel at an apparently rapid pace.
13. Stage illusion devices under subclass 9 in which the illusion is effected by the use of mirrors.
14. Stage illusion devices under subclass 9 which simulate the natural sound of some animal or object.
15. Stage illusion devices under subclass 9 which simulate rain, snow, or fire.
16. Illusion devices under subclass 8 which simulate a trip.
17. Illusion devices under subclass 16 where the trip is in a passenger-carrying device.

18. Illusion devices under subclass 17 effected by projected picture scenery.
19. Illusion devices under subclass 8 comprising mazes or labyrinths.
20. Illusion devices under subclass 8 in which the illusion is effected by pyrotechnic device.
21. Amusement devices under subclass 1 used on a theatre stage.
22. Stage appliances under subclass 21 comprising the shiftable elements of a stage setting which go to make up a stage scene.
23. Devices under subclass 22 relating to guides, braces, and clips for securing in position these shiftable elements.
24. Stage appliances under subclass 21 comprising mechanical means for suspending persons or things in the air in connection with a theatre stage.
25. Stages appliances under subclass 21 commonly known as stage properties.
26. Devices under subclass 25 relating to tanks for water used to display aquatic acts.

BRITISH PATENT CLASSIFICATIONS

The British patent system does not include detailed definitions of classes. It uses only brief descriptive titles.

There have been two major reorganizations of the British patent system within the period of this study; one in 1930-34 and one in 1962. The material listed under the class titles includes the present division and heading, the former group and heading initiated in 1930-34, and the original class.

BUILDINGS, ETCETERA; KINDS, ETCETERA.

Present	Former	Original
E1 A	A	20 (1)

CONJURING, ETCETERA.

Present	Former	Original
A6 H	XV F	132 (3)

AMUSEMENT AND EXERCIZING APPARATUS

Present	Former	Original
A6 M	XV A,B,M	132 (1)

TOYS, ETCETERA.

Present	Former	Original
A6 S	XV G	132 (1)
	XV S	132 (3)

APPENDIX B

A COMPLETE CHRONOLOGICAL LISTING OF PATENTS

BRITISH PATENTS

- 100,918, W. E. Grant, 1916.
A semicircular drum-like device for holding color media in relation to an electric light source.
- 102,125, L. J. Carter, 1916.
A theatrical appliance for producing the illusion of mounted troops cresting a hill and advancing toward the audience.
- 102,938, B. M. Giroux, 1916.
A curtain painted to resemble a volcano and containing means for producing tremors, smoke, and landslides. (United States Patent # 1,196,104).
- 107,380, A. B. Hector, 1916.
A Color Music device which may control the intensity of the light by means of piano key electrical contacts or by a switch actuated by the bellows of a wind-pressure instrument.
- 109,263, A. B. Hector, 1916.
A Color Music device employs mercury switches and an octave-coupler.
- 110,071, P. H. Boggis, 1917.
Flame effects are produced by a series of streamers which were agitated from below by a current of air.
- 110,856, A. Collins, 1917.
A portable rotating spiral staircase for stage use.
- 116,621, B. F. Kelsey, 1917.
An effect of a single large candle flame produced by the use of streamers which are shaped to form the shape of a flame when agitated from below by a stream of air.
- 124,622, C. E. Falconbridge and J. W. Lewsley, 1918.
A mechanism for controlling the curtain and the lights simultaneously.
- 127,446, C. H. Dent, 1918.
Gallopings horses and other rhythmic sounds created by the use of pivoted levers attached to a drum which is turned.
- 134,443, C. J. Tritschler, 1919.
A searchlight apparatus enclosing a light source in a box which has a slit of the same shape as the projected searchlight beam. (United States Patent # 1,332,084).
- 134,687, C. J. Tritschler, 1918.
An airship, appearing in the night sky, catches fire and crashes.

- 136,514, E. d'Arcy and J. F. P. Hill, 1919.
A stage screw is attached by means of a flange to the foot iron of a stage brace to prevent its loss.
- 137,837, G. Dehmel, 1916.
A stationary stage surrounded by an annular stage which may be rotated. The annular stage may be divided into five scenery-carrying sections which alternate with five open sections.
- 138,880, R. W. Tully, 1918.
A stage setting allows one actor to take the place of another by means of a hollow wall and a door. (United States Patent # 1,281,719).
- 138,881, R. W. Tully, 1918.
A stage device allows one actor to take the place of another by means of a sofa with a hinged seat and back. (United States Patent # 1,281,718).
- 141,212, A. McCann and M. McCann, 1919.
Hinged flaps cover the head of the figure and may be arranged to fall and expose the head when released by a concealed mechanism.
- 141,366, R. W. Tully, 1918.
A device for producing the effect of drifting fog onstage by means of a scrim and sidewardly moving lights. (United States Patent # 1,281,720).
- 141,614, E. J. R. Atkinson, 1919.
A stage and screen combination wherein the stage floor slopes up to and adjoins the lower edge of the projection screen.
- 145,638, E. J. Marston and H. A. Smith, 1919.
A projection apparatus whereby part of the picture is seen by reflection in an inclined glass screen and part directly through the glass.
- 146,103, M. Raspe, 1919.
A rotary annular stage surrounds the auditorium and is divided into sections.
- 148,073, W. Andress and C. F. Newmann, 1919.
A brail curtain which allows the material of the curtain to fold from the top downwards as the curtain is raised.
- 155,107, A. H. Oliver and J. O. Dunabin, 1919.
A mechanism for controlling the curtains and lights simultaneously.
- 156,506, Schwabe and Company, 1919.
Troughs contain a smoke or fog producing compound and also heating coils in the walls to produce such an effect.

- 162,663, Schwabe and Company, 1920.
Moving cloud effects are produced by a series of interacting projectors, each of which produces a different image.
- 163,084, J. Blascheck, 1920.
A foldable scenic house unit is reduced in size for easy transport and storage.
- 166,833, H. Andre, 1920.
A cyclorama curtain track rail with special means designed to provide noiseless operation.
- 168,880, N. deBoudkowsky, 1920.
One or more pictures were painted over each other on the same surface and are rendered visible by changing the hue of the illuminating light.
- 169,058, Cinema Combine, Ltd. and F. Jones, 1920.
An adaptable stage has a center section which slides under the center of the main stage portion and two lateral extensions which pivot under the sides of the main stage to remove the apron portion of the stage floor.
- 169,422, H. Andre, 1920.
An adjustable track for a cyclorama as described in British Patent # 166,833 above is made adjustable in all directions.
- 169,909, C. E. Falconbridge and J. W. Lewsley, 1920.
An apparatus for controlling the curtain and lights simultaneously.
- 169,947, H. Andre, 1920.
The proscenium opening of a theatre is made adjustable in size by means of moveable panels.
- 170,501, G. Dickson-Kenwin, 1920.
A ball is made to travel over a cloth without any visible means of motion by placing it above the ring which can be moved by concealed strings between the cloth and the surface on which the cloth rests.
- 170,997, G. K. Jensen, 1920.
An apparatus for controlling the lights and the curtain simultaneously.
- 171,979, Akt.-Ges. R. P. Wagner, L. & J. Biro, and A. Kurz, 1920.
A dome-shaped cyclorama which may be folded and flown.
- 172,921, H. Andre, 1920.
An elevator stage on which scenery wagons are moved from the elevator to upstage or offstage position on either the stage level or below it.
- 174,747, A. B. Klein, 1920.
An artificial source of light is broken into the spectrum by means of prisms and the portion to be projected is determined by controls on a keyboard.

- 176,310, Schwabe & Company, 1921.
Lightning effects are produced by a screen with a series of jagged openings in front of a flash lamp.
- 177,297, Bullivant's Engineering & Contracting Co., Ltd., and T. Bullivant, 1921.
A counterweight system for flying scenery is modified by spring stops which limit the movement of the counterweight arbor.
- 178,413, M. Hasait, 1921.
A device for producing theatrical scenery by optical projection.
- 178,580, A. H. Oliver and W. E. Clarke, 1921.
A method of opening and closing stage curtains which includes counterweights and a electric motor.
- 180,203, Smith & Co., Ltd. and G. J. and J. G. S. Smith, 1921.
A theatrical curtain for advertisements wherein a part of the curtain is opaque and the advertised matter is translucent and is illuminated either from the back or the front.
- 181,347, A. S. Cushman, 1921.
A bundle of white streamers is agitated by an air current and lit by an intermittent light beam of varying colors.
- 181,598, S. P. Thompson, 1921.
A device for simulating an airplane flight in which the aircraft structure is suspended from a mast by a series of cables.
- 183,223, S. G. Nash, 1921.
A method of creating an imitation grass surface.
- 183,640, C. W. Holcroft, 1921.
A device for simulating an airplane flight in which the aircraft is supported by a cradle-like means which allows a variety of attitudes to be imparted to the aircraft.
- 187,783, L. A. Legros, 1921.
A suspension device supports a portion of a performer's weight by means of an 'invisible' cable, thus allowing him to make longer jumps.
- 190,950, A. E. and R. Blackburn, 1922.
A rotary stage has sets joined bottom-to-bottom along a horizontal axis and rotates in a vertical plane rather than a horizontal plane to change sets.
- 191,661, J. A. Petrie, 1922.
Shears which have concealed compartment for use in producing the illusion of cutting.

- 193,812, C. Parolini, 1922.
A scrim-like projection screen for allowing crossfades from film to live action.
- 194,440, J. P. Henry, 1921.
A sound deflector is placed over the empty orchestra pit to eliminate that dead air space and reflect sound from the stage toward the auditorium.
- 196,326, G. Robson, 1921.
An apparatus allows screen and stage entertainment to be combined. The screen contains a black central portion in which the performer stands and the slides have a blank portion in a corresponding area on the slide.
- 196,899, Cameleon Soc. Anon., 1922.
Different scenes may be shown to be on the same surface by means of different pigments and different lighting.
- 189,384, J. A. Tayler, 1922.
A Color Music device controls the color of light by means of electromagnetic relays controlled from a keyboard.
- 199,688, C. Parolini, 1922.
A motion picture screen is placed in the proscenium opening and may be made opaque by moving it so as to bring a denser or more open weave into view as well as by lighting effects.
- 200,103, Fritsch & Sohn, 1922.
An apparatus for shifting theatrical curtains by means of specially designed capstans and cables.
- 202,076, B. Wheelwright, 1922.
Theatrical drops and screens are stored on rollers and may be displayed by unrolling them. Provisions are also made for grouping such rollers.
- 210,537, British Thomson-Houston Co., Ltd. and H. C. Wheat, 1922.
A series of slides are joined end to end to pass in front of a projector.
- 212,498, General Electric Co., Ltd. and B. Dean, 1923.
Cylindrical slides are illuminated from within and may be rotated to produce a moving effect.
- 213,828, E. deLipsky, 1923.
A series of scenes are painted on screens and changed by the different colors of the illumination.
- 214,272, J. R. Robertson, 1923.
An apparatus for producing sound from photographic film which activates the sound gate and thereby produces light in a series of rarified gas tubes.

218,039, H. R. V. Addenbrooke, 1923.

A revolving, mirrored lantern also may be rigged to dispense carnival novelties.

219,776, M. M. Miles, 1923.

A Color Music device for the display of colors consists of the colors having a mathematical relationship to the wavelength of the accompanying musical notes.

220,254, A. Klein, 1924.

A motorcycle stage vehicle.

220,412, J. W. Cawdery, 1923.

A theatrical projection screen and accompanying flying rigging which allows it to be moved out of the proscenium opening.

227,432, H. Guerard, 1924.

Sparks are produced by this device which consists of a motor-driven emery wheel against which pieces of steel are forced.

227,534, B. Irwin, 1923.

Means for introducing a number of transparent color screens into the beam of light from a projector allow a variety of images to be produced upon a screen.

227,737, Blau-Vogel Russisch-Deutsche Theatre Ges, 1924.

A series of flaps are colored on one side to blend with the walls of the set and which contain a design on their reverse side which appears when the flaps are dropped.

230,956, T. Kay, 1924.

A siren-like device for producing wind effects.

236,272, W. J. Nash, 1924.

A process for producing imitation grass matting.

237,006, W. J. Rickets and A. W. Sharman, 1924.

Costume and scenery surfaces are to be colored so that their appearances may be changed by the color of the illumination.

244,567, A. Cashmore, 1924.

A fan-like device for producing wind sounds consists of thin, perforated blades driven by a series of sprockets and a chain.

245,857, H. Goldin, 1924.

A box for a magic demonstration in which a person is apparently sawn in two.

246,399, H. F. Maynes, 1925.

Apparatus to give the visual impression of a train travelling past scenery.

247,619, A. Molloy and F. Molloy, 1924.

A Color Music device for controlling lights by means of a keyboard of a musical instrument.

249,829, Deutsche Gasgluhlicht-Auer-Ges, 1925.

An apparatus for automatically filling and discharging receptacles for liquids.

252,396, A. Jullet, 1925.

A stage constructed to provide a projection screen on one side and a stage setting on the other side.

254,484, Coliseum Syndicate, Ltd. and H. Crocker, 1925.

A pulley has means to allow it to be firmly affixed to the grid, floor, or walls of a theatre.

254,925, R. Neppach and W. Voss, 1925.

A plurality of transparent panels are arranged one behind the other and scenic elements are painted on each to provide a stage setting.

260,595, A. Hauck, 1925.

A tray-like receptacle for storing the slack portion of cables in the backstage area.

274,468, A. B. Hector, 1926.

A Color Music device arranges the light sources in a logarithmic spiral.

278,272, R. Lisatz and R. Geyling, 1927.

An arrangement of screens and projectors for projected scenery which allows actors to move near the screen.

283,536, R. Geyling and P. Planer, 1927.

A device produces lighting effects by projecting light through a medium which has a considerable dimension in the direction of the projected rays.

284,902, A. Heinz, 1927.

A scenic tower element with rotatable tiers, fountains, foliage, lighting, and other ornaments.

285,161, J. G. Walker, 1926.

A screen for projected scenery has a lower portion which may contain elements such as doors and/or windows.

287,379, J. T. Doyle, 1927.

An apparatus for projecting light of changing colors onto a screen is comprised of a number of color filters which are arranged in the light beam.

291,901, C. S. M. Paikes, 1927.

A complicated system for producing changing scenic effects divides the stage into various areas and provides means for illuminating various screens.

300,602, W. E. Kimber, 1927.

A curtain drawing mechanism is arranged so that the folding of the curtain begins at the following or past pleat.

302,159, H. M. Rasmussen, 1927.

Theatrical scenes are illuminated in turn by light rays, the colors of which would make white light if blended together.

302,807, T. J. Digby and A. O. Gibbons, 1927.

An effect of sunlight or moonlight rays is created by a number of opaque bars on a transparent face of the box which contains the light source.

303,940, J. S. Knight, 1927.

A curtain operating mechanism is powered by an extendable "lazy-tongs" device which is operated by a worm gear.

304,854, H. C. Terrett and P. H. Scott, 1927.

A color changing illuminating device has one color disc which carries one panel of each primary color and another disc which has opaque portions at least as large as one of the color panels.

313,457, N. H. Martinez, 1927.

Scenic elements are displayed in different primary colors for viewing when illuminated by light rays of a corresponding light color.

313,462, N. H. Martinez, 1927.

A means of dividing a theatre stage into zones, each of which is lighted by different colored illumination so that scenery and costumes which move from zone to zone appear to change color.

319,389, British Thomson-Houston Co., Ltd., S. F. Davies, L. J. Davies, and H. W. H. Warren, 1928.

A flickering flame effect produced by reflecting light from the surface of a body of mercury which may be agitated by a magnet.

320,665, W. E. Kimber, 1928.

A complicated means of constructing an apparatus for carrying and opening and closing a theatre curtain.

328,844, F. E. Weidhaas, 1929.

A system of several independently controlled cables being used to open and close a drape which allow it to form a number of configurations.

- 332,074, G. S. Hall, 1929.
A track for a theatrical curtain which is constructed of two parallel tubes.
- 400,218, W. E. Kimber, 1932.
A modification of 300,602, this is a curtain track with a series of cams on its upper surface and additional means of construction which are quite involved.
- 405,907, F. W. Woods, 1933.
A portable scenic screen with a plurality of sections, one of which may be a projection screen while the other portions carry scenic effects.
- 411,112, W. Burrows and R. L. Burrows, 1932.
Designs may be produced on a rearwardly illuminated screen by placing loose pieces of fabric between the lamp and the screen.
- 417,959, T. Phillips and F. Whittle, 1934.
An independent structure for support for theatrical curtains includes its own vertical and horizontal supports.
- 418,910, G. S. Hall, 1934.
A curtain operating mechanism in which the curtains are drawn laterally and simultaneously festooned.
- 513,310, C. H. A. Gamain, 1937.
A planetarium-type device for giving the visual impression of interstellar space, the bodies therein being rendered visible by luminous paint in beams of fluorescent light.
- 524,134, J. A. P. Bax, 1939.
A hollow scenic unit consisting of a frame and a covering.
- 535,871, British Thomson-Houston Co., Ltd., 1940.
A device in which the invisible suspension illusion is created by an electromagnetic field.
- 580,425, A. P. Smith, 1944.
A portable scenery unit comprising a mutilated cylinder which may be entered.
- 595,091, G. E. Young, 1945.
A moveable stage portion which allows for the changing of scenery.
- 601,464, R. G. Hall, 1945.
A stage brace with a pivotal foot iron.
- 605,499, J. Currie, 1945.
A waterfall apparatus in which the water is pumped up to a tank at the top of the structure then runs down through a series of pools, streams, etc., until it reaches the lowest tank from which it is pumped to the top again.

619,708, F. Shipman, 1946.

Reflective sheets form a V-shape onstage with the open portion toward the audience and reflect scenic elements which are placed in the apex.

623,987, G. Ramon, 1945.

A moveable stage platform on casters the outline of which corresponds to part or all of the outline of the floor plan of a plurality of the scenes mounted on it.

625,230, D. & P. Studios and A. Ackland-Snow, 1947.

A theatrical firearm which produces a mizzle flash by means of a gaseous mixture and a sparking mechanism controlled by the trigger mechanism.

630,506, P. Morrey and W. W. MacArthur, 1947.

A process for forming woven asbestos cloth impregnated with sodium silicate into scenery, models, props, etc., by means of heating.

631,181, B. J. van der Stigchel, 1946.

A stage curtain is opened or closed according to whether a motor driven pressure or suction fan is used.

639,112, G. Ramon, 1944.

Scenery is mounted on platforms which are moveable along a rail which is secured to the stage in this modification to 137,837.

644,003, E. Gilbert, L. Sillman, and E. A. Barber, 1947.

A system of changing scenery by means of two interacting turntables and an overhead carrier.

653,809, C. W. Hansel, 1947.

A system of mirrors which permit viewing a stage from a variety of angles.

677,383, A. Perrottet and E. Stroecklin, 1950.

A theatre plan in which the audience is seated in a central rotatable area and may be turned to face any portion of the annular stage.

678,082, O. Heller, 1948.

A reflected rain effect is created by running a stream of water downward over a mirrored surface and directing the reflection onto a scenic background.

707,877, Minister of Supply, 1950.

A light source within a glass sphere may be used to create a planetarium-type display.

714,996, G. B. Kalee, Ltd., 1952.

An independently supported structure for curtain tracks or projection screens.

- 719,560, A. M. Low and T. C. Arnold, 1953.
Color effects are produced by projecting light through a fluid film or a body formed by colored liquids.
- 749,434, J. P. Hoppe, 1953.
A variety of apparatus for producing moving light effects having reflecting surfaces whose outline is shaped to resemble all or part of an animate figure of some sort.
- 778,771, M. A. Burdin, 1956.
A conjuring device in the form of a box into which a strip of material is inserted from the top and a printed strip is withdrawn from the bottom.
- 826,157, I. S. deFerran, 1957.
A conjuring device which allows two objects to move along intersecting paths and apparently pass through each other.
- 874,272, Packman Machinery Ltd. and British Broadcasting Corporation, 1959.
A scenery shifting apparatus consisting of a series of jacks and casters which can be raised and lowered simultaneously to raise and lower the scenery.
- 881,681, R. Alswang, 1960.
A series of two screens which can be moved toward or away from each other to facilitate the showing of motion pictures or the presence of live actors.
- 907,704, Packman Machinery Ltd., 1960.
A cylinder-like container which is designed for tumbling and releasing artificial snow to produce a simulated snowfall.
- 952,059, A. I. Cohen, 1960.
An elaborate apparatus for producing optical effects and light shows which has a variety of hydraulic, electric, and mechanical means to produce the lighting effects.
- 964,250, J. Currie, 1963.
Another waterfall device which allows water to flow from an uppermost tank through a series of waterways to the lowest tank from where it is pumped to the highest tank again.
- 995,518, M. A. Bourbonnais, 1963.
This theatre plan specifies that the floor and ceiling be constructed of a series of prism-like elements which can be easily moved to alter the shape of the theatre.

1,184,697, H. E. Cameron, 1967.

A Color Music device in which the keys are sensitive to magnetically patterned gloves.

1,197,895, T. Norland, 1967.

A device which comprises at least four identical modules which are interconnected by hinges and may be used as readily transformable scenery for a stage set.

UNITED STATES PATENTS

- 1,178,444, Stephen Goldini, 1916.
In an apparatus for electrical dancing, electrically charged mats interact with special shoes worn by a performer to produce a shower of sparks around the performer's feet.
- 1,183,554, Stephen Goldini, 1916.
Another spark-producing mechanism which consists of a rotating wheel which is placed beneath a treadle in such a manner that a performer's weight on the treadle will force an abrasive member against the wheel, producing sparks.
- 1,186,292, Charles F. deSoria, 1916.
A simple projection mechanism providing for a slide of a scenic background to be placed in the focus of a projecting apparatus.
- 1,186,451, Frank D. Thomas, 1916.
A device for combining three-dimensional scenic objects and projected effects.
- 1,196,104, Benjamin M. Giroux, 1916.
A curtain painted to resemble a volcano and containing means for producing tremors, smoke, and landslides. (British Patent # 102,938).
- 1,229,519, Erich Pach, 1917.
A flying apparatus comprised of two sets of rigging, one upstage and one downstage, which support a performer and allow him to move upstage and downstage as well as laterally.
- 1,230,877, John H. M. Dudley, 1917.
The turreted great guns of a warship, one turret being able to be pivoted out over the heads of the audience.
- 1,247,888, Fredrick M. Smith, 1917.
A system of gears and pulleys allows a series of scenic borders to be stored on rollers above the stage and then unrolled into the view of the audience.
- 1,262,553, Myron Orton, 1917.
A flying mechanism in which a performer rides in a harness and holds the legs of a flying bird to give the impression that the bird is carrying the performer across the stage.
- 1,266,476, Ebenezer B. Hurford, 1918.
A container having 'magical' properties in which the walls may be filled with liquid which is then rendered opaque.

1,272,820, George G. Long, 1918.

A stage shadowgraph which is comprised of a frame, a screen, and a light source so mounted as to throw a shadow onto the screen.

1,273,111. Peter A. Paoli, 1918.

An apparatus which was designed for the purpose of creating various scenic effects and included the first scenery flying apparatus herein discovered.

1,279,042, Howeward Thurston, 1918.

A cabinet for use in 'magic' acts which has a dark lining, hinged doors, and lighting means which contribute to mysterious illusions.

1,281,718, Richard Walton Tully, 1918.

A stage device which allows one actor to take the place of another by means of a sofa with a hinged seat and back. (British Patent # 138,881).

1,281,719, Richard Walton Tully, 1918.

A stage setting which allows one actor to take the place of another by means of a hollow wall and a door. (British Patent # 138,880).

1,281,720, Richard Walton Tully, 1918.

A device for producing the effect of drifting fog onstage by means of a scrim and sidewardly moving lights. (British Patent # 141,366).

1,295,374, Fredrick C. Rockwell and Wilbur M. Davis, 1919.

A system of projected scenery in which details of the scenery are painted on the screen and the general form of the objects are provided by projection means.

1,197,473, William S. Johnson and Louise E. Johnson, 1919.

An imitation phonograph cabinet which has an open bottom and an opening in its top through which a person's head may protrude.

1,301,963, Myron Orton, 1919.

A tightrope apparatus which has an endless rope running through a pair of sheaves and upon which a performer may produce the illusion of motion as on a treadmill.

1,304,649, Jutta Bell-Ranski, 1919.

A type of stage scenery in which the objects are created by weaving fabric strips through netting to produce a rough texture.

1,324,630, Howard Thurston, 1919.

A variety of elements which may be used to create the illusion of a stage vehicle approaching the audience are described.

- 1,324,680, Langdon McCormick, 1919.
A device which produces the illusion of motion onstage by creating relative motion between an object and the surface over which it is moving.
- 1,330,452, Garfield P. Smith, 1920.
A type of tank for stage illusions which includes means for surreptitiously emptying and filling it.
- 1,332,084, Conrad Joseph Tritschler, 1920.
A searchlight apparatus produces its effect by enclosing its light source in a box which has a slit of the same shape as the projected searchlight beam. (British Patent # 134,443).
- 1,332,085, Conrad Joseph Tritschler, 1920.
An object positioned against a projection screen contains means for displaying the object in its natural light and then illuminating it as if it were on fire.
- 1,332,918, Roy J. Pomeroy, 1920.
A globe formed of an open framework produces the effect of a filmy sphere when it is rapidly rotated.
- 1,339,279, Ferdinand J. Oebbecke, 1920.
Through a system of lenses, a scene played on a stage is projected onto a ground glass screen and is then interrupted rapidly to produce the illusion of a motion picture.
- 1,340,066, William Lemle, 1920.
A counterweighted curtain-operating mechanism in which the motive power is supplied by a winch.
- 1,345,168, Mary Hallock Greenewalt, 1920.
A disc carrying a number of color elements may be rotated into proper position in front of a light source and means are provided for controlling the intensity of such illumination.
- 1,350,614, Langdom McCormick, 1920.
A refinement of United States Patent # 1,324,680 which adds means for expanding or collapsing the surface relative to which an object is moving.
- 1,365,989, George W. Hanlon, 1921.
A star formed of an open framework produces the effect of a filmy enclosure when rapidly rotated.
- 1,365,990, George W. Hanlon, 1921.
A "rotatable skeletonized frame" of any shape produces effect of a filmy enclosure when rapidly rotated, similar to United States Patent numbers 1,365,989 and 1,332,918.

1,372,969, Langdon McCormick, 1921.

A projection system which projected shadows of objects on a screen from the rear and projected the details from the front.

1,388,706, Alexander Burnett Hector, 1921.

A Color Music device which relates to means for closing electrical circuits when a key is depressed and also for coupling a plurality of such keys together.

1,391,854, Gus Rogers and Nicholas E. Polytes, 1921.

The arrangement of two chambers at right angles to each other and a glass sheet placed diagonally at the mouths of the chambers. Crossfading effects are produced by the manipulation of the lights in each chamber.

1,398,158, Henry Skremka, 1921.

A belt-like device surrounding the waist of the wearer to which is attached a means for supporting some type of garment and imparting a rotary motion to the garment.

1,404,919, Dragutin Zabarat, 1922.

A theatre stage which employs a series of elevators and wagons for changing scenery.

1,406,663, Richard Lovstrom, 1922.

The light projection apparatus of one version of a Color Music device which produces its effects by means of moving the lamp and filament relative to the color medium and the lens.

1,419,191, Edna H. Acker, 1922.

Two pylon-type towers support a tight wire for use by performers. The wire has spaced electrical conductors for the purpose of energizing apparatus carried by the performers.

1,419,848, George W. Hanlon, 1922.

A clamping and bracing device which supports scenic borders and wings and is affixed to the stage floor.

1,429,802, Charles F. Thompson, 1922.

An advertising curtain which is substantially opaque and has translucent portions arranged so as to depict lighted windows, advertising signs, and street lights when lighted from the back.

1,432,463, Stephen S. Horn, 1922.

A rotary stage which includes a curved ceiling piece which can be moved to provide a ceiling for each setting.

1,432,552, Alexander Burnett Hector, 1922.

The keyboard for a Color Music device arranges different hues of light to be displayed by different octaves and the lights controlled by the keys of different octaves progress geometrically in intensity relative to the increases in the sounds produced by such keys.

1,432,553, Alexander Burnett Hector, 1922.

A Color Music device which arranges the lights in a double-rainbow pattern with the violets being at the end of the scale and the reds in the middle.

1,432,601, George Kelly, 1922.

An adjustable stage brace which attaches to the scenic unit by extending through a hole in a portion of the unit.

1,435,390, Max Hasait, 1922.

A cyclorama track substantially in the shape of half of an ellipse and able to be adjusted.

1,449,170, William A. Fowler, 1923.

A stage setting which may be changed by changing the billboard signs on a drop.

1,451,046, William Maxwell, 1923.

A shadow-type of projection which employs two or more light sources. The light rays from one source are interrupted by an opaque body.

1,452,424, Max Hasait, 1923.

A series of adjustable scenic panels which are used to alter the shape and size of the proscenium opening.

1,462,536, Nicholas V. deLipski, 1923.

A system of changing the appearance of a surface by altering the color of the illumination.

1,462,537, Nicholas V. deLipski, 1923.

A modification of the above patent which contains detailed descriptions of the process as applied particularly to scenery.

1,473,336, Henry A. Connelly, 1923.

A scenery trimmer apparatus adapted for use with three, four and five line sets.

1,474,567, Frank A. Beard, 1923.

A frame containing a rearwardly inclined panel is equipped with means for discharging a stream of water downward over the panel as a second panel is moved across the first, concealed by the water.

1,481,132, Mary Hallock Greenewalt, 1924.

A Color Music device which combines light and sound for aesthetic expression. This device combines sound and colored light which have emotional values.

1,482,831, Walter L. Ackerman, 1924.

A method of projected scenery which consists of first illuminating a three-dimensional object from the rear to produce a silhouette and then lighting it from the front to reveal its true nature.

1,485,594, John L. Carroll, 1924.

A system of collapsible scenery in which beveled tongues on the top members fit into grooves in the side members and elasticized canvas covers are anchored to the frames by a number of clamps.

1,490,471, Harry Robert Law, 1924.

A scenic apparatus which modifies the proscenium opening consists of a group of parallel panels suspended immediately upstage and onstage of the proscenium arch.

1,491,951, Max Hasait, 1924.

A rotary stage containing an elevator is of a drum-like shape and rests on a series of rails below the stage level.

1,500,507, Leon Levy, 1924.

In a scenic flat, a star trap is included in a hole on a plate which is moveably attached to the flat frame and is the means whereby the hole in the plate is concealed.

1,535,782, Frank O. King, 1925.

A scenic effect in which a reflected scene is depicted by a series of relief images mounted on a mirrored surface.

1,542,299, Max Hasait, 1925.

Perhaps the most ambitious of all moveable stage patents herein included, this patent specifies movement of stages vertically, laterally, up-and downstage, and in a rotary manner with the same device.

1,543,931, Harry Robert Law, 1925.

The illusion that an object is being removed from the scene is created by projecting a shadow of the object onto a phosphorescent surface until the surface begins glowing, removing the light, and then removing the screen.

1,544,150, Max Hasait, 1925.

This patent specifies an elevator stage and locates a number of compartments for scenery storage near the elevator shaft.

1,548,522, Arthur Remy Fredricks, 1925.

A device shaped like an inverted T, the upper end of which is attached to a cable above the stage, and the lower end holds a drapery panel.

1,549,778, Richard Lovstrom, 1925.

A Color Music projection device which creates the moving light effect by lighting one of several lamps which are each positioned slightly differently relative to the lens.

1,554,650, Paul Fetching, 1925.

The 'ground' for a plant arrangement is created by covering supports with screen, inserting tubes through the screen, covering the screen with earth-colored fabric, and inserting the stems of plants into the tubes.

1,556,535, Anton Mazzanovich, 1925.

A theatrical counterweight system which employs a hopper which can be easily loaded and unloaded in place of the usual counterweights.

1,559,739, Lloyd Brown, 1925.

A theatre structure which involves a central vertically moveable stage which is shared by four adjacent auditoriums.

1,564,272, William E. Price, 1925.

A portable stage frame which supports a temporary proscenium arch or scenic wing and border arrangement.

1,586,863, Howard Thurston, 1926.

An illusion device for producing an illusion of walking.

1,600,039, Joseph A. Cunningham, 1926.

A combination of a treadmill and a back screen with a scenic view which is geared to the treadmill so that the background travels as fast as the treadmill.

1,612,858, Helen Dryden, 1927.

A system of theatrical scenery which has a plurality of upright posts to which double-faced flats are hinged in such a manner that a side flat of a box-type set may be pivoted to form half of a back wall.

1,613,254, Howard Thurston and Harry Jansen, 1927.

A means of producing a theatrical illusion which consists of suspending a draped human form by means of wires and causing it to move about the stage area.

1,649,689, Max Hasait, 1927.

A system of projected scenery which employs a translucent screen and projectors both upstage and downstage of the screen.

1,654,873, Mary Hallock Greenewalt, 1928.

In conjunction with a Color Music device, a system of moving assorted color media into and out of the beam of light from a projector.

1,670,739, Jack A. Partington, 1928.

A system of tracks for scenery-bearing wagons which enables the wagons to move laterally as well as upstage and downstage and change from one set of tracks to the other at their juncture.

1,699,345, William H. Chandler, 1929.

Two rooms placed end to end and separated by a transparent wall and identically but reversibly furnished are used to produce theatrical illusions by controlling the lighting in each.

1,728,860, Alexander Burnett Hector, 1929.

A Color Music device in which the lights are controlled from a musical keyboard and are arranged in the form of a logarithmic spiral.

1,756,565, Conrad B. Maurer and Howard P. Maurer, 1930.

A simulated waterfall device which consists of a scenic piece made to resemble a cliff and a rotating endless belt, simulating water, which is caused to move downward on the front of the unit, thus creating the simulation of a waterfall.

1,760,842, Fergus Greenwood, 1930.

An apparatus for theatrical illusions consists of a box which is connected to a tube which runs behind the curtains and which has a mirrored outer surface to reflect the image of the curtains, thus concealing the tube's nature.

1,772,661, Arthur R. Fredricks, 1930.

Hanging from a box girder which extends across the stage is a track on which is mounted a carriage which supports an inverted T member. The lower end of the T member supports a curtain or a scenic drop.

1,785,347, William Herrschaft, 1930.

A system of curved mirrors produces an image reduced in size according to the curvature of the mirrors.

1,819,656, Charles E. Pressley, 1931.

A rotary stage consisting of a pivotal center pin, radially arranged stringer members, a number of casters, and flooring material mounted on the stringers is of a form found in stagecraft texts.

1,823,479, Ray E. Venderbush, 1931.

The unique feature of this patent is its use of a current of air flowing from the stage into the auditorium as a means for ventilation and also designed to improve the acoustical properties of the structure.

1,825,497, Thomas Wilfred, 1931.

This patent specifies an unusual configuration of screens used in his lighting effects display. The curved screens resemble two sails.

1,841,844, Jack Norworth, 1932.

A scenic apparatus which produces the illusion of motion by a series of moving scenic screens on endless belts which move from the down-stage corners of the stage and converge behind an object at center stage.

1,848,692, Ruth Brenner, 1932.

A system of moveable proscenium panels which may be used to alter the size and shape of the proscenium opening.

1,857,673, Earl J. Vallen, 1932.

This patent specifies the method to be used to display a curtain or screen of some sort which is mounted on a roller.

1,868,068, Arthur J. Moulton, 1932.

A central moveable auditorium which is surrounded by a stationary annular stage.

1,883,573, Peter Clark and George Vail, 1932.

A stage setting comprised of a plurality of page-like double-faced flats which are hinged to a vertical member and may be turned to change scenery.

1,893,167, Boris S. Glagolin, 1933.

A rotary stage which moves in a vertical plane rather than a horizontal one.

1,896,652, Carmine Vitolo, 1933.

A theatre structure in which the backstage area extends around the sides of the auditorium in an arc.

1,903,948, Jack Potter Stockton, 1933.

A theatre stage area with little wing space allows the use of laterally moving wagon elements by hinging the wagons and fastening the scenic elements securely to them so that the offstage wagon may be run up tracks on the offstage wall.

1,908,203, Thomas Wilfred, 1933.

A light projection apparatus for use with a Color Music device which employs a series of lenses to produce a pattern of light which is of maximum intensity in the center and dimmer near the edges.

1,949,232, Graeme E. Young, 1934.

A jackknife type stage which is pivoted on a point at the center of the rear wall of the stage and carries two turntables.

1,966,690, Pericle Ansaldo, 1934.

A number of independently vertically moveable stage sections can be combined in a wide variety of configurations to produce a stage floor with a number of levels.

1,971,150, John J. Anderlick, 1934.

A waterfall simulating device which has a bowl-like base, a port on which hangs over part of the bowl, and a helical member which may be rotated to give the illusion of falling water.

1,973,454, Thomas Wilfred, 1934.

A light display device which is operated by bands of color on a motion picture film which passes through a film gate, thus causing an electrical current to activate other light projectors.

1,979,363, Busby Berkely, 1934.

A series of concentric rotary stages which also can be raised and lowered.

1,985,707, Graeme E. Young, 1934.

A large revolving stage with runways above the various parts of the stage.

1,996,457, William H. Chandlee, 1935.

An illusion device of three compartments, the center one containing a mirror to reflect the scenic elements in the other two compartments.

2,003,573, William C. Barnard, 1935.

A moveable stage platform, containing a turntable, which can move up- and downstage as well as laterally, depending on the placement of guides for its wheels.

1,034,407, Edward M. Massey, 1936.

A stage illusion apparatus which consists of a table-like platform and a howwow annular housing placed between the table and the audience.

2,052,178, Fox D. Holden, 1936.

A system of scenery construction which employs interchangeable frame elements and coverings which can be affixed to the frame by means of clamps.

2,097,091, Clyde R. Powell, 1937.

A device which provides the illusion of a target being struck by a projectile.

2,116,114, Giuseppe Guidorossi, 1938.

A combination of projectors, rear projection screens, a flat-sided rotatable drum carrying several ground row elements, and wing and border scenery which is used to change scenery in several manners.

2,136,833, Graeme E. Young, 1938.

A system of six hexagonal moveable platforms, each carrying a turntable, which may be moved in relation to a central hexagonal platform for purposes of changing scenery.

2,147,648, Norman R. Greathouse, 1939.

Theatrical scenery is augmented by the use of a screen which moves across the audience's view and on which is projected a motion picture which is synchronized with the extent of the screen visible to the audience.

2,155,767, Ernst Pfannekuchen, 1939.

A mirrored structure which conceals an entrance in a stage setting from the view of the audience.

2,182,757, Edward Gilbert, 1939.

A stage setting comprising two or more turntables and a series of adjointedly hinged, double-faced flats which may be turned, page-like, to form a number of scenic vistas.

2,211,353, George Solkover, 1940.

An outdoor scene which contains a body of water is created onstage by means of a mirrored surface and a background which is to be reflected.

2,254,650, Anton F. Grot, 1941.

A stage construction to simulate the appearance of a body of water by means of shifting light and shadow patterns.

2,266,089, Mildred Knapp Shipman, 1941.

A series of reflective walls are hinged to a vertical member near the center of the rear wall of the stagehouse. Such walls may be moved to reflect different scenic elements.

2,280,315, Mildred Knapp Shipman, 1942.

A pair of reflective walls extend from the sides of the proscenium opening their juncture upstage center. Scenic elements to be reflected may be inserted onstage through slits in the walls.

2,405,766, Walter R. Spohn, 1946.

A motion picture screen is constructed with an opening such as a window or a door to allow live actors to interact with the filmed scene.

2,504,926, Edward Gilbert, 1950.

A set of curved rails above the stage support a series of double-faced flats which may be moved to form the side walls and the back walls of a box setting.

2,624,578, William J. Lancaster, 1953.

A circular device surrounding a central stage contains tanks and venting apparatus for forming chemical gas, smoke, or vapor.

2,626,375, Paul M. Fischer, 1953.

This patent is for the earliest device discovered for moving curtains or drops by means of controlled electric winches.

2,646,280, Frank P. Evers, 1953.

A tightwire apparatus in which the two masts are separated by a horizontal member at their center and the upper wire for the performers is tightened by drawing the lower ends of the masts closer together.

- 2,670,956, Albert Ganz, 1954.
A backdrop containing a rainbow simulation and a track on which figures of birds may be caused to move on an arc around the perimeter of the rainbow.
- 2,684,244, Lorimer P. Brooks, 1954.
A fireplace flame is simulated by an irregular reflective surface rotating behind simulated logs and being lit by a light of the appropriate color. (Reissued #24,399 in 1957).
- 2,700,798, Adelar Ferrottet, 1955.
A theatre structure in which the audience area is centrally located and rotatable to face any portion of the annular stage. The audience area is also tiltable.
- 2,707,103, Oskar Fischinger, 1955.
A device for producing light effects in which the light is projected in front of and substantially parallel to a reflective sheet which may be deformed to produce the necessary effects.
- 2,725,230, Phillip Weintraub, 1955.
A light projection apparatus which achieves its effects by means of a variety of curved and flat mirrors which modify the light beam.
- 2,731,264, Charles R. Dockum, 1956.
A projector for composing in color and form in which the effects are achieved by means of a plurality of film strips, at least one of which is moved in a horizontal manner.
- 2,942,879, George C. Izenour, 1960.
This is the original patent for Izenour's Synchronous Winch System.
- 3,011,781, James D. Avery, 1961.
A flaming car illusion is produced by the ignition of flammable fuel which is fed through a series of pipes mounted around the body of a car.
- 3,035,836, Dale McCulley, 1962.
A system of presenting integrated live and filmed dramatic action which employs projection screens in conjunction with stage settings.
- 3,074,741, June E. Carter, 1963.
A patent for a costume device which is representation of a face of such a size as to be worn on a female torso.
- 3,084,933, Ralph Alswang, 1963.
A theatrical setting for creating dissolve illusions which employs motion picture screens which may be quickly shifted.

3,085,799, Ralph Alswang, 1963.

A device for integrating filmed and live action which employs a scrim near the audience and a highly reflective rear screen which may be brought near to the scrim for use as a motion picture screen and then moved upstage to form the backdrop for the live action.

3,165,296, Richard A. Drew, 1963.

An electromechanical curtain moving device which is operated by electric winches attached to the counterweight arbor.

3,237,937, John P. Hoppe, 1966.

A unit, comprised of a flexible sheet which may be given a variety of forms, which is designed to produce animated lighting effects by reflecting light from a concentrated source onto a screen.

3,243,183, Candirus De Scranage, 1966.

An artificial snowfall machine which consists of a perforated cylinder which tumbles white flakes and allows them to fall through the perforations slowly.

3,259,386, John S. Rush, 1966.

A method of switching from a projected scene to a corresponding live scene onstage by means which center on a rapid movement of the projection screen.

3,345,066, George C. Izenour, 1967.

This is Izenour's patent for improvements on his Synchronour Winch System.

3,383,810, Oswaldo Mola, 1968.

A theatre structure which contains a rotary stage and an annular stage which also may be moved around the central stage.

3,394,505, Corwin S. Rife, 1968.

A theatre structure in which a plurality of stages are arranged around a central seating area. The direction and elevation of each seat may be altered.

3,399,501, Wendell E. Rossman, 1968.

A theatre structure which contains a main stage and a plurality of smaller stages arranged around the periphery of the auditorium.

3,399,887, William Altier, 1968.

A central stage apparatus which lowers the central stage below the surrounding floor for scene changes and contains specifications for a railing which rises when the stage is lowered and disappears into the floor when the stage is raised.

3,404,494, Howard D. Wolfe, 1968.

A theatre structure in which the audience is seated on all sides of a central stage which is mounted on an elevator so that it may be raised to a ceiling opening so that scene changes may be made in the attic.

3,415,512, Jack Burnbaum, 1968.

A snowfall simulating device in the form of an artificial Christmas tree which conveys artificial snow from its base to a deflector on top of the tree.

3,415,513, Jack Burnbaum, 1968.

Virtually identical to the previous patent, differing only in the shape of the deflector used.

3,442,508, Tibor Rudas, 1969.

A motion picture screen which is comprised of several flat parallel stretchable strips placed adjacent to each other so that an actor may move between them by pressing against the strips to create temporary openings.

3,476,385, Peter S. Foy, 1969.

A flying apparatus in which the performer's vertical motion can be controlled as well as his lateral motion.

3,494,614, Hugh N. Taylor, 1970.

A snowfall simulating display lighting assembly which consists of a light beam reflecting off an irregular mirrored surface which rotates so as to give the visual impression of falling snow.

3,514,586, James F. Kuebler, 1970.

A stage lighting system having a light batten with a counterweight system and a specially designed reel for handling the electric cable.

3,526,984, Herman Nielsen and Stephen S. Valiant, 1970.

A fireplace noise simulator which consists of a series of long, resilient, finger-like members which are slowly rotated by a motor and caused to brush across an abrasive surface, producing the fire noise.

APPENDIX C

A SELECTION OF COMPLETE PATENTS AND DRAWINGS

Patented July 24, 1923.

1,462,537

UNITED STATES PATENT OFFICE.

NICOLAS V. DE LIPSKI, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO ELAINE
HALE PHILLIPS, OF NEW YORK, N. Y.

CHANGEABLE SCENIC EFFECT.

Application filed April 12, 1922. Serial No. 551,950.

To all whom it may concern:

Be it known that I, NICOLAS V. DE LIPSKI, a citizen of Russia, residing at New York city, New York, have invented certain improvements in Changeable Scenic Effects, of which the following is a full and complete specification.

My invention relates to color scenes or designs of that particular character in which the subjective or visual appearance of the picture is changed through the medium of different colored lights successively projected thereon, whereby different scenic effects may be produced for especial use in connection with theatrical performances.

In the present instance I obtain a change in the scene, picture, or design, through the peculiar manner of painting the subject of the transformation, whereby there is represented—as seen by white light—a plurality of separate and distinct scenes, figures, or designs in different colors and in which certain colored objects or parts of one scene, picture or design are superimposed on colored objects or parts of another scene, picture or design; selecting for the purpose combinations of colors that will properly blend or become neutralized to clearly present to the eye either scene or colored picture according to the color of the light projected on to the original painting in illuminating the same.

The primary object of my invention is to provide a changeable scene of this character for particular use in connection with theater appliances so as to obviate the necessity and consequent interruption of shifting the scenes as usually practiced, although as will be hereinafter explained the arrangement or peculiar scheme of painting the original or basic subject may be employed for producing changeable advertising signs that will be effective in attracting attention to the sign.

A further object of my present invention is to provide an arrangement for producing theatrical scenery whereby a plurality of different scenes may be presented to the eyes of the spectators in a quick and effective manner by simply changing the colors of the illumination and source from which the colored lights are thrown or projected, special means being employed in this instance in connection with the scheme of painting to produce the desired effect.

With these principal objects in view my invention is hereinafter fully explained, and what I claim as new and desire to protect by Letters Patent is more specifically set forth in the appended claims.

In the accompanying drawings illustrating the adaptability of my invention:

Fig. 1 is a view showing a scene designed for theatrical purposes as it appears in white light, the view being lined to indicate the different colors that may be employed in producing the different effects under change in color of illumination.

Fig. 2 is a view of the same scene as it will appear to the eye when subjected to illumination by red light.

Fig. 3 is a view of the same combination scene as it will appear by blue light illumination.

Fig. 4 is a view of an advertising sign as it appears under a white light, being also lined to indicate the colors employed.

Fig. 5 is a view of the advertising sign as it appears when illuminated by blue light.

Fig. 6 is a view of the same advertising sign as it appears illuminated by red light.

Figs. 7 and 8 illustrate a modification or special application of my invention in connection with theatrical scenery.

As will hereinafter appear the general scheme of my invention may be applied to various uses or situations wherein a changeable scene, picture or design is required, as for instance in connection with different theater appliances as scenes, images, articles and other paraphernalia, in connection with pictures illustrating different scenes on a single sheet or ground, and in connection with signs to be employed in advertising; therefore any specific designation in the specifications and claims should be understood to apply to other subjects to which the invention may be obviously applied.

In carrying out my invention to produce two different scenes visible to the eye when the painting is successively illuminated by different colored lights, as for instance such a painting or combination scene as illustrated in Fig. 1 of the drawings, the characteristics of the two scenes are first sketched or outlined, then one of said scenes is painted with colors that will correspond substantially with the subject of that particular scene and give the desired effect when illuminated by red light, after which the other

scene is painted with colors and hues superimposed that will combine with the colors and hues of the scene first painted to not only present to the eye an entirely different scene when illuminated by blue light but also become neutralized by the red light, the effect in each instance being produced by superimposed colors and hues or combination thereof which may overlap one another; that is to say a part of an object in the scene last painted—to appear under blue light—may be composed of one color or hue and another part thereof of another color or hue and each superimposed on colors or hues in the first picture with which they will become neutralized.

In the example of an original or basic scene, such as shown in Fig. 1 of the drawings, it will be noted that the color used in painting the background or sky 10 is light red or pink, the color of the foreground 11 is light green with parts thereof, as 12, a slightly darker shade of green to represent shadows. The larger trees and bushes, 13 and 14, are painted blue with darker splotches to give lights and shadows enhanced by certain parts of the scene later painted and hereinafter referred to, while the smaller trees 15 are outlined in dark brown with the foliage 16 in light green and certain parts of said trees, as 17, which are superimposed on the pink background and green foreground, painted a red color to become neutralized under red illumination. For the same purpose the saplings 18 and 19 are painted red. When the picture or combination scene is painted in colors such as hereinbefore designated and illuminated by red light the background or sky will appear red of a hue giving the impression of a sunset scene, the two larger trees, bushes and foreground will appear dark neutralizing the superimposed portions of the smaller trees while those portions of the smaller trees which overlap the background or sky and foreground and are painted red are also neutralized, thus presenting to the eye a typical summer scene at sunset, as illustrated in Fig. 2. On the other hand when the basic picture shown in Fig. 1 is illuminated by blue light projected thereon the scene is immediately changed to a winter moonlight scene, the larger trees 13 disappearing, the background or sky changing to purple, the smaller trees clearly outlined, and the foliage 16 and foreground 11 changing to substantially white to give the impression of snow, all as illustrated in Fig. 3. This is a simple illustration of the effect produced by painting a picture with superimposed colors combined in such a manner as to become neutralized one with respect to the other in the different scenes under the influence of the different colored lights; and

although I have in this example of the application of the general color scheme employed certain colors it will be understood of course that other primary colors will produce similar effects, and in like manner colors may be employed to produce changeable scenes when illuminated by colored lights other than those mentioned, as for instance a green light. It will be apparent, also, that a wider range in scenery effect may be had by a more elaborate basic scene or picture, and to provide stage settings for theatrical performances the back-drop, side-drops or flies may be likewise suitably painted in carrying out the general scenery effect; and of course the settings at one side of the stage may be painted in colors or hues to be brought out in one color-light and the settings at the other side in colors or hues which will be brought out in another color-light, in which instance the two colored lights would be projected separately on the different settings, the latter being painted to harmonize when illuminated in this manner; for instance an interior scene may be represented in which one side of the room is supposed to be artificially lighted while the other is in the moonlight coming through windows. Obviously, therefore, the color scheme when employed for this purpose is susceptible of providing a variety of stage effects, in which the change from one scene to another is quickly accomplished, and to produce a greater variety of changes in scenery in a single setting I have devised a special arrangement of scenery, hereinafter described.

By reference to Figs. 4 to 6, inclusive, it will be seen how the color scheme may be applied in producing an effective advertising medium or sign to change the subject-matter alternately thereby causing pleasant sensations to the observers as well as calling attention to the advertisement. In the form of advertisement illustrated I propose to have the silhouette 20, constituting one of the principal objects of the sign in the present instance, painted a pale green, and the other principal object or subject-matter comprising the words "Pear's soap de luxe" painted in colors or hues which will properly combine with the silhouette and background 21 to appear and disappear according to the color of the light projected on to the sign, as shown the background being painted red, the letter "P" and words "soap de luxe" being dark brown to neutralize with the background under blue light, and the letters "ear's" and mark painted a shade of green that will likewise neutralize with the silhouette in blue light. The part 22 of the hat is purple with the corners 23 of said hat painted a light blue; while the frame may be painted different shades of yellow, as indicated in said draw-

ings. When this sign is illuminated by blue light the silhouette will stand out boldly and appear white in contrast with the background and the words "Pear's soap de luxe" will be absorbed in the picture or invisible to the eye while the portions 22 of the mat will blend with the background 21 showing the corners 23 a paler blue and the frame 24 in substantially white and pale yellow, all as illustrated in Fig. 5. Conversely, when the sign is illuminated by red light the words "Pears soap de luxe" will stand out boldly in dark brown or black and all the other painted portions of the sign will appear red, the frame only being distinguishable in different shades, giving the effect shown in Fig. 6. In this instance the painting will in a white light have the appearance shown in Fig. 4, in blue-light the appearance shown in Fig. 5, and in red light the appearance shown in Fig. 6, so that there are practically three changes, and of course the lights are to be projected on to the sign in succession. As stated in reference to the changeable scenes shown in Figs. 1 to 3 hereinbefore described the advertising sign may be also painted in different combinations of colors and hues and elaborated as to subject-matter. The advantages of an advertising sign of this character will of course be obvious.

In adapting the color scheme for the purpose of giving a greater variety of changes of scenery for theatrical purposes I have devised the arrangement shown in Figs. 7 and 8 in which there is provided a transparent screen 25 located near the front of the stage and on which is painted combinations of colors and hues superimposed as described with reference to Figs. 1, 2 and 3, so that the red and blue lights 26 and 27 in the foot-lights may be projected thereon from in front to give two changes of scenery, and in the rear of this transparent painted screen or curtain there are stage settings, as the flies 28 and back-drop 29 similarly painted with scenes that will be changed when the red and blue lights 30 and 31 in the rear of the transparent screen are successively lighted; it being understood of course that when either the red light 30 or blue light 31 is projected the lights 26 and 27, or footlights, are extinguished so that the scenes on the stage settings 28 and 29 will be seen through said transparent screen, at which time the said screen may be rolled up. The colored lights 30 and 31 may be provided with a reflector 32 to direct the light on to the stage settings in the rear of the transparent screen or curtain 25. By providing this special arrangement at least four changes of scenery may be made without interruption between the changes, for it is accomplished merely by changing the color of light projected suc-

cessively on the transparent screen and on the stage settings in the rear of the same.

From the foregoing description it will be clearly seen that the scheme of painting for scenery, pictures, signs, &c., may be used in a variety of situations, and in carrying out the scheme it is only necessary to use combinations of colors and hues that will give the required color sensations for the scenes depicted and illuminated by red and blue light respectively, the colors and hues being superimposed wherever necessary so that some will be neutralized by others under red light and other colors and hues that will neutralize under blue light; and therefore I do not confine myself to those primary colors herein designated as others may be used to produce similar effects.

I claim:—

1. Scenery for stage settings comprising one scene painted in colors and superimposed shades of color to produce the visual effect of said scene in colors and hues when subjected to a colored light and a second scene painted in colors and superimposed shades of color combining with and overlapping the colors and shades of color of the other scene to harmonize and neutralize therewith in producing the visual effect of said second scene in colors and hues when the scenery is subjected to light of another color from that producing the first mentioned scene, the colors for the two scenes being so applied that each scene is distinctly visible to the eye independently of the other under the influence of the colored lights, respectively.

2. Scenery for stage settings comprising a transparent screen with a plurality of scenes painted thereon in sets of colors superimposed and combining to produce the visual effect of the separate scenes successively when subjected to different colored lights successively; together with stage settings in the rear of the transparent screen and likewise painted with sets of colors superimposed and combining to produce the visual effects of the separate scenes successively when subjected to different colored light successively.

3. Scenery for stage settings comprising a transparent screen with a plurality of scenes painted thereon in sets of colors superimposed and combining to produce the visual effects of the separate scenes successively when subjected to different colored lights successively, colored lights in front of said screen to produce the aforementioned effects, stage settings in the rear of the screen likewise having a plurality of scenes painted thereon in sets of colors superimposed, and colored lights also in rear of the transparent screen for projection upon the last mentioned stage settings, as herein shown and described.

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4. Scenery for stage settings comprising back-drop and flies on which one scene is first painted in colors and shades of colors according to the illumination used in producing the visual effect of said scene. In color and tones and upon which stage settings a second distinctive scene is painted in colors and superimposed shades of colors according to the illumination of another color to bring out this latter scene in colors and tones, the colors and superimposed shades of colors for the two scenes being combined to harmonize and neutralize whereby each scene is distinctly visible to the eye independently of the other under the influence of the colored lights, respectively; together with a transparent drop curtain in front of the aforementioned stage settings and upon which two composite scenes are painted in colors and superimposed shades of color or in like manner to the painting of the stage settings, foot-lights of different colors in front of the drop curtain, colored lights in the rear of said drop curtain and shielded from the latter to throw the light on the stage-settings, and means for controlling the illumination from the colored lights respectively.

NICOLAS V. DE LIPSKI.

July 24, 1923.

1,462,537

N. V. DE LIPSKI

CHANGEABLE SCENIC EFFECT

Filed April 12, 1922

3 Sheets-Sheet 1

Fig. 1.

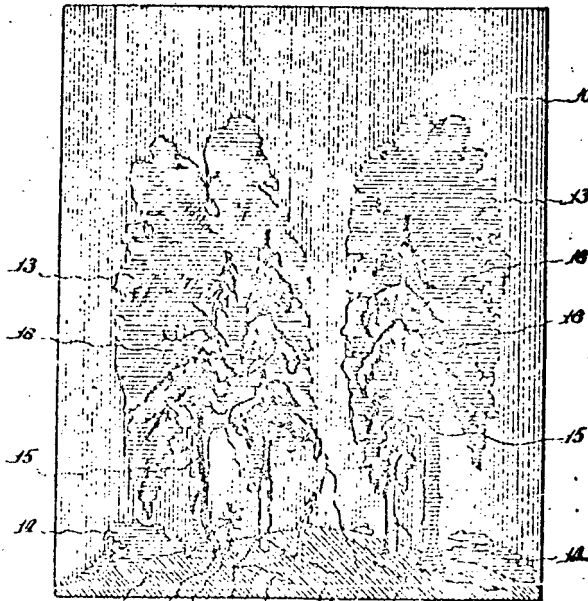


Fig. 2.

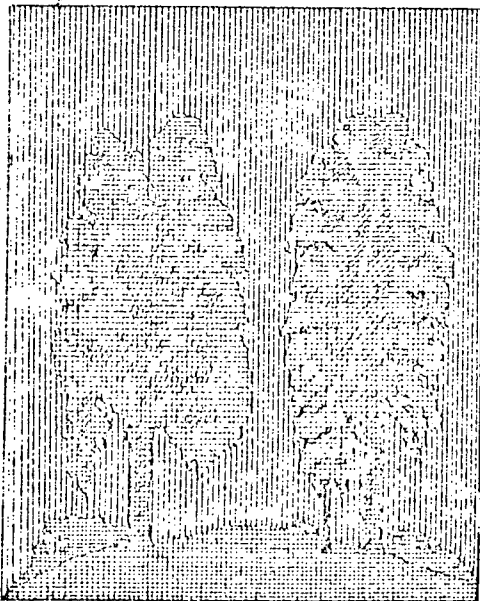


Fig. 3.



Nicolas V. de Lipski
INVENTOR.

By-

Horace S. Ball

ATTORNEY

July 24, 1923.

1,462,537

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CHANGEABLE SCENIC EFFECT.

Filed April 12, 1922

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Fig. 4.

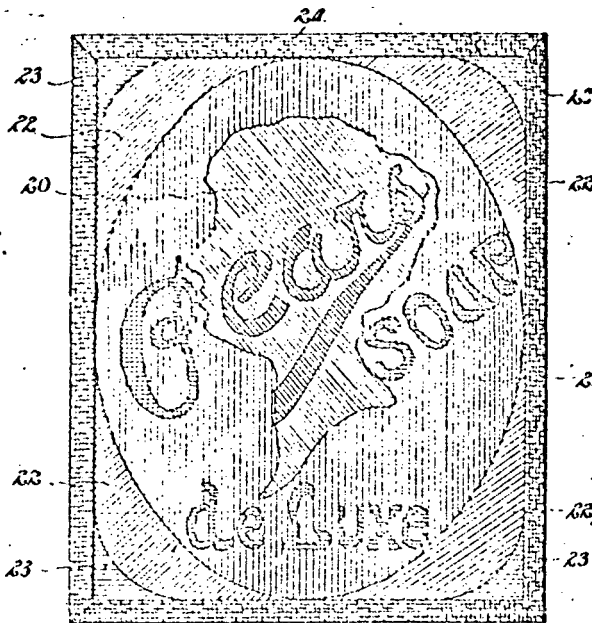


Fig. 5.

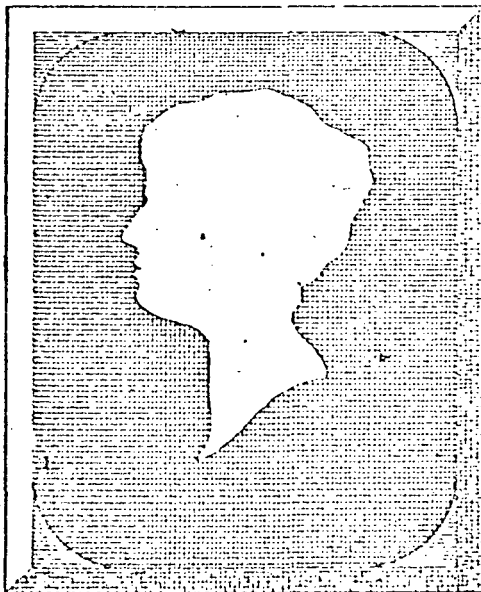
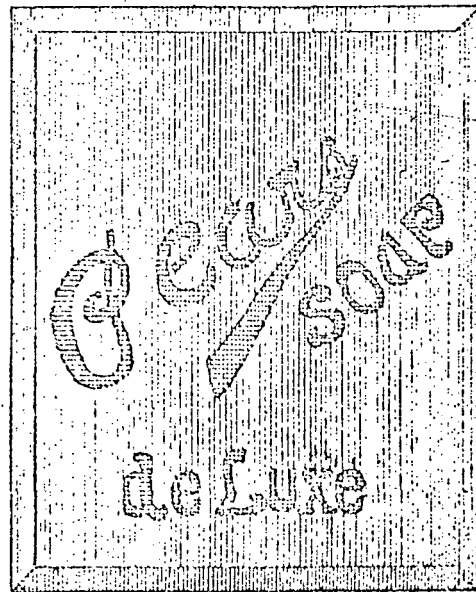


Fig. 6.



Nicolas V. de Lipski.
INVENTOR.

BY *W. Corcoran & Co.*
ATTORNEY

July 24, 1923.

1,462,537

N. V. DE LIPSKI

CHANGEABLE SCENIC EFFECT

Filed April 12, 1922

3 Sheets-Sheet 3

Fig. 7.

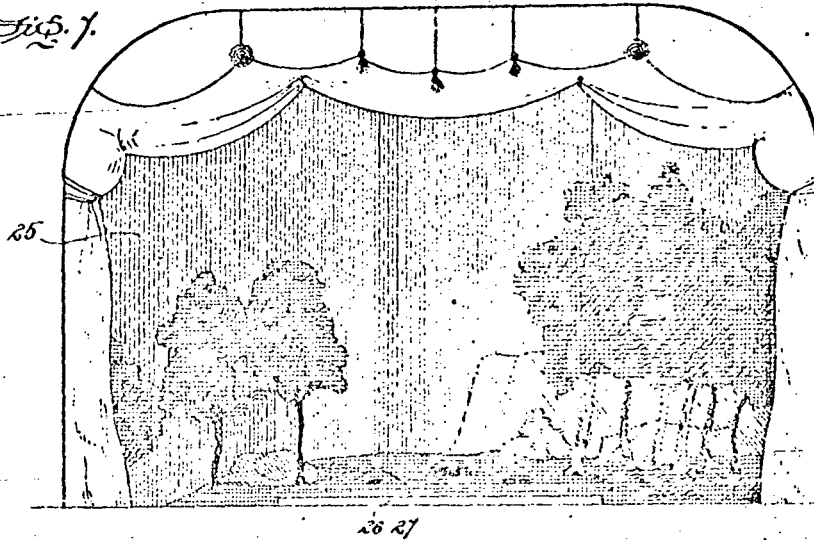
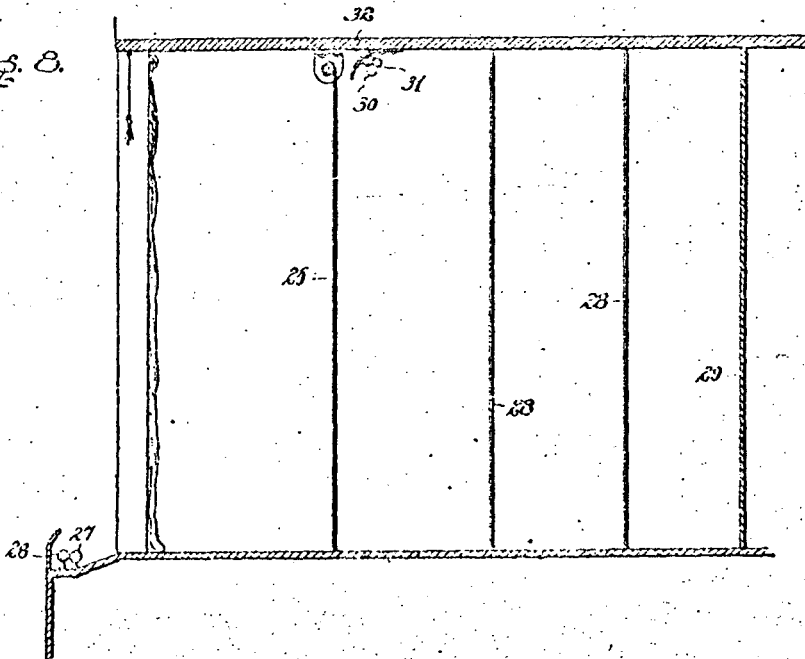


Fig. 8.



Nicolas V. de Lipski.
INVENTOR.

By *Wm. C. Beall*
ATTORNEY.

Patented June 16, 1925.

1,542,299

UNITED STATES PATENT OFFICE.

MAX HASAIT, OF DRESDEN, GERMANY, ASSIGNOR TO AKTIEBOLAGET ARS., OF STOCKHOLM, SWEDEN, A CORPORATION.

ROTARY STAGE

Application filed December 24, 1921. Serial No. 524,635.

To all whom it may concern:

Be it known that I, MAX HASAIT, a citizen of Germany, residing at Furstenstrasse 1, Dresden, Germany, have invented certain new and useful Improvements in or Relating to Rotary Stages, of which the following is a specification.

As is well known, the usual rotary stages consist of a plate occupying about the whole stage and adapted to be rotated about an axis stationary in relation to the stage house. Such rotary stages may be used for the mounting of several, for instance three or four, sceneries, representing inner rooms or minor landscapes and permitting rapid changes of scenery. The latter advantage will however be lost, if the number of sceneries is greater or if the scenery comprises a more extensive landscape, particularly such one represented by a rounded back-scene, or a room occupying the whole stage. In order to effect a rapid change of scenery also in such cases so-called displaceable stages or stage carriages have been proposed instead of the rotary stages, each of said stage carriages supporting a single complete scenery and adapted to be exchanged for another stage carriage by being displaced sideways. Also in this case, however, the number of sceneries mounted simultaneously is limited by the local circumstances of the stage house which is capable of containing only a minor number of stage carriages.

The object of this invention is to prevent the abovenamed inconveniences by making the rotary stage displaceable sideways thus rendering it capable of being exchanged for another similar rotary stage or nonrotary stage part. By this the number of sceneries mounted simultaneously will be multiplied, because of each rotary stage supporting several sceneries, and besides a room mounted in front of the scene-opening can be rapidly removed by displacing the rotary stage and inserting instead thereof a stage part supporting an extensive landscape or another greater room.

According to the invention the rotary stage may be displaced horizontally or vertically or in both directions successively. The horizontal movement may be effected by mounting the rotary stage in a stage car-

riage adapted to be moved from the main stage to a side stage or a rear stage. To effect the vertical movement the rotary stage may be connected with a hoisting appliance by means of which the stage may be raised and lowered. To effect the double movement the carriage supporting the rotary stage is lowered by the aid of an elevator into the space below the main stage and moved sideways in any direction.

The opening in the main stage caused by the displacement of the rotary stage may be closed by another similar rotary stage, a stage carriage, a stage part movable sideways or stage parts movable up and down and consisting of one or more portions independent of one another. On said stage carriages, stage parts etc. the stationary and movable sceneries representing extensive landscapes, large rooms and the like are suitably mounted.

It has also been proposed, in order to effect a rapid change of scenery, to dispose in the theatre several rotary stages supporting stationary and movable sceneries etc. and each representing a scene. Such rotary stages are movable sideways and backwards in order to allow variation of the size of the scene. Between such rotary stages of course a considerable part of the main stage has to remain unoccupied, and if sceneries should be placed on this part of the stage they would not move upon changing the scene by rotating the rotary stages. On account thereof hindering restrictions in the scene arrangement will be caused. The rotary stage constructed according to the present invention differs from such rotary stages in that it consists of a single plate occupying about the whole stage, allowing a quite unrestricted arrangement of the sceneries, because of all the objects placed on the stage moving upon the rotation of the same.

In the annexed drawings one form of embodiment of the invention is diagrammatically shown.

Fig. 1 is a horizontal section of the stage building above the stage floor. Fig. 1^a is a horizontal view showing the rail arrangement according to Fig. 1. Fig. 2 shows a section of the lower machinery compartment taken parallelly to the proscenium opening. Fig. 3 is a section at right angles to the pro-

scenium opening and Fig. 4 a section along the line *a-b* of Fig. 3.

The system according to the invention is shown in Fig. 1. The carriage A is located at the proscenium opening I in the central compartment of the stage, the carriage B in the right hand compartment or side stage E, and the carriage C in the left hand side stage F, while no carriage occupies the back stage D.
 5 If now a scene shifting be desired, the carriage A is moved into the back stage D,
 10 and the carriage B is moved out of the side stage E to the compartment D. If a further scene shifting be desired, the carriage B is moved back into the right hand side stage E, and the carriage C is moved to the compartment D at the proscenium opening I. A rotary stage may be arranged within each carriage, said stage consisting of a drum-shaped body 2, Fig. 2, running by means of rollers 3 on a circular rail 4. The drum-shaped body 2 carries a circular platform H rotating with the body 2. The said rotary stage is located within a carriage consisting of four standards 5 of frame-work rigidly connected to one another and carrying by means of rotary forks 7 rollers 6 which run on rails 10. The four framework standards 5 form a casing carrying at the top the stage floor G, which is located about the rotary stage, Fig. 2, said floor G being moved together with the carriage.

Fig. 1^a shows the rail device on which the carriages according to Fig. 1 run. At the crossing points circular turn-plates 8 are located carrying short rail pieces 9, said plates with the rail pieces being turned in any convenient known manner according to the desired direction of movement of the carriages, the forks 7 with the rollers 6 being turned simultaneously, said plates being adjusted according to Fig. 1^a for moving the carriage A into the back stage D.

The carriages may also be lowered and then another carriage moved into the space previously occupied by the lowered carriage. To that end a movable support 11, Fig. 2, is provided consisting of frame-work and sliding by means of guides 12 on the standards 27, known lifting devices, such as hydraulic or electric motors, plungers or the like being used. Placed on the said support 11 are rails 13 and four turning plates 8 having short rail pieces 9 constructed in accordance with the turning plates and rails as in Fig. 1^a. In all of the compartments located at the sides of the movable support 11 and also in the compartments in front of and at the back of said support rails 14 are arranged providing for moving the carriages in the lower compartment in the same way as is the case in the level of the stage floor.

If the support 11 be lowered, as shown in the lower parts of Figs. 2 and 3, the rails 10 at the stage floor must again be connected.

To that end the rails 10^a, Fig. 2, for running backward and forward are connected to blocks 15 carried by supports 16 rotatably mounted in bearings 17 and moved and held in position by curved racks 18 meshing with gear wheels having cranks 19. If the cranks be turned, the supports 16 with the rails 10^a will be moved to the position 20 shown by dotted lines.

The fore and rear rails 10^b, Figs. 2 and 3, with the turning plates 8^a are also placed on supports 21 secured to levers 22, which are journaled in bearings 23 and held by curved racks 24 meshing with gear wheels having cranks 25. In turning the cranks 25 the levers 22 will be lowered to the position 26 shown by dotted lines. If the support 11 is to be moved upwards to the rail device 10, the rails 10^b are swung towards the sides and the rails 10^b upwards, whereby the rail device for moving the carriages in the level of the stage floor is again restored.

All carriages may be constructed similar to the carriage G. However, carriages may be built which have no rotary stages. It is apparent from the drawing that a great number of carriages with or without rotary stages may be used facilitating all sceneries belonging to a performance to be erected before the commencement of said performance. The scene shifting is obtained by moving the carriages as described, it being noted that three or four sceneries may be erected on each rotary stage, which are brought in front of the proscenium opening by turning the rotary stage.

Rail devices similar to that shown in Fig. 1^a for moving the carriages in the level of the stage floor may be arranged also in the lower compartment and above the stage floor.

Several floors may be erected in the lower compartment, in which the carriages may be moved, and to that end the movable support may only be capable of moving into the lowermost floor.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. A stage system comprising rotary stages, means for moving said stages vertically into compartments situated above and below the normal stage floor, and means for moving the said stages in a direction parallel to the stage opening and at right angles thereto in each of said compartments.

2. A stage system comprising rotary stages arranged on carriages, means for moving said stages vertically into compartments situated above and below the normal stage floor, and means for moving the said stages in a direction parallel to the stage opening and at right angles thereto in each of said compartments.

3. A stage system comprising rotary

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B

stages arranged into carriages, means for moving said stages vertically into compartments situated above and below the normal stage floor, and means for moving the said stages in a direction parallel to the stage opening and at right angles thereto in each of said compartments.

In testimony whereof I affix my signature in presence of two witnesses.

MAX HASAIT.

Witnesses:

EMORY H. LORD,
JOHN W. BULKLEY.

June 16, 1925.

1,542,299

M. HASAIT
ROTARY STAGE

Filed Dec. 24, 1921.

3 Sheets-Sheet 1

Fig. 1.

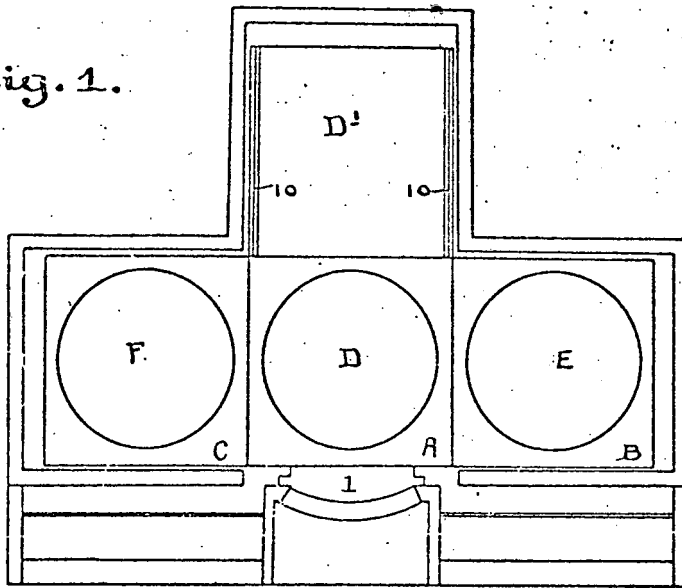
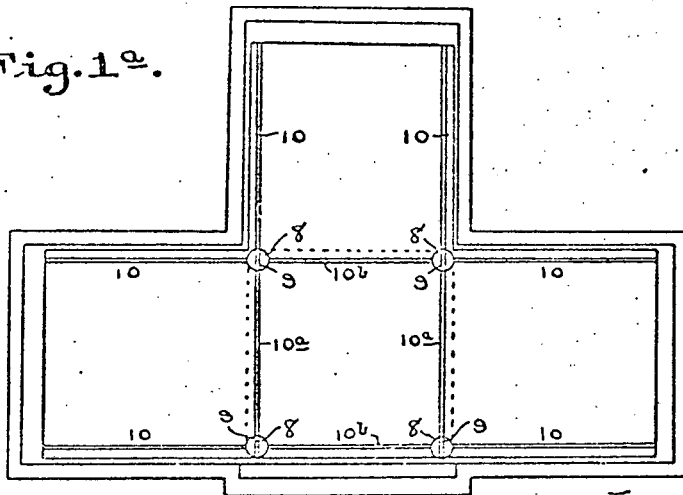


Fig. 1^a.



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June 16, 1925.

1,542,299

M. HASAIT

ROTARY STAGE

Filed Dec. 24, 1921

3 Sheets-Sheet 2

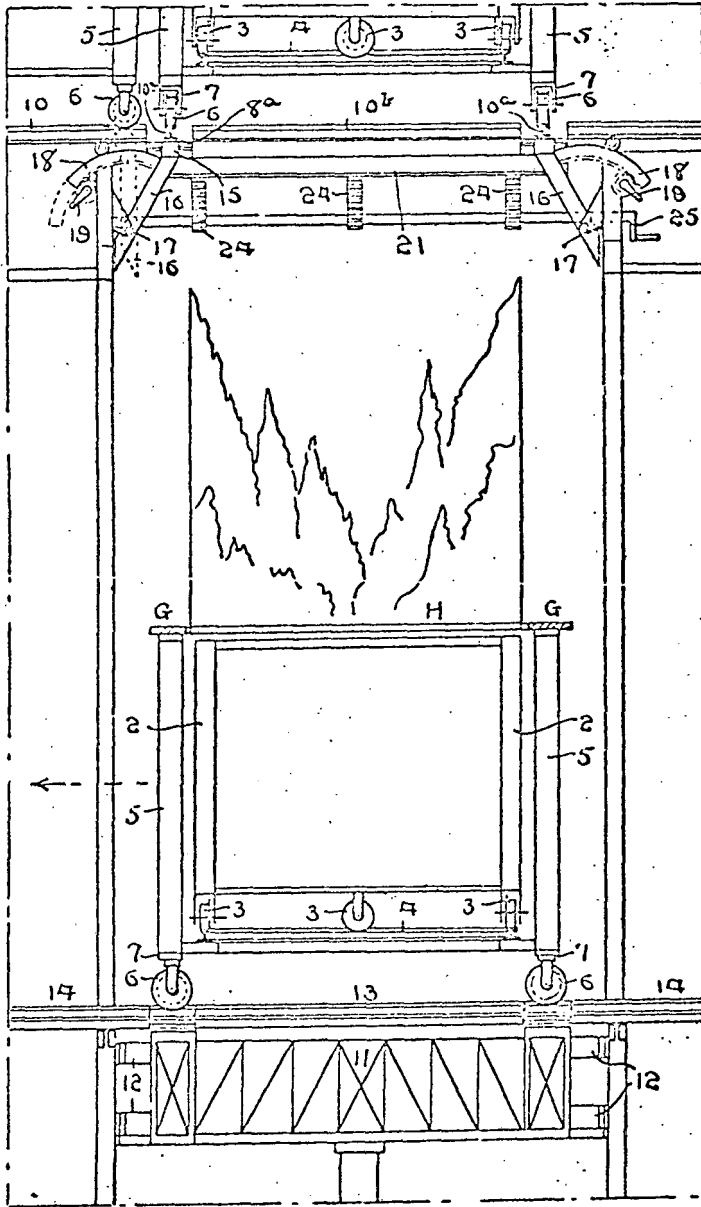


Fig. 2.

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ROTARY STAGE

Filed Dec. 24, 1921

3 Sheets—Sheet 3

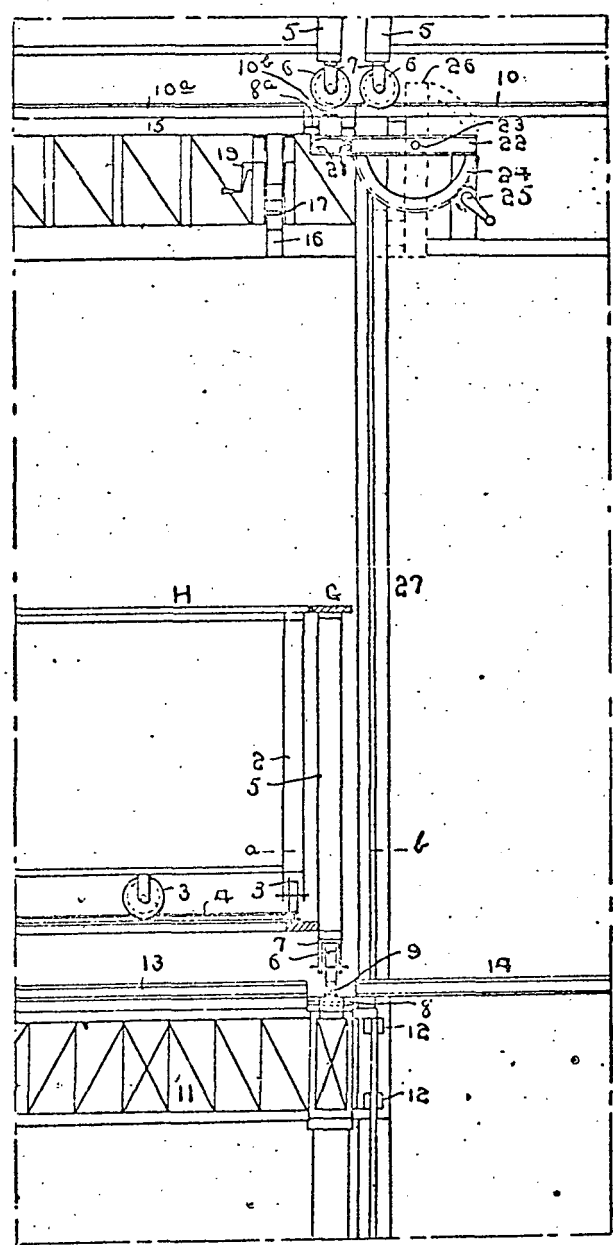
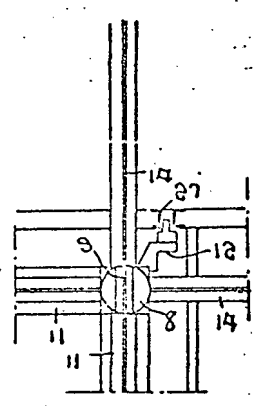


Fig. 3.

Fig. 4.



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Patented Sept. 17, 1929

UNITED STATES PATENT OFFICE

ALEXANDER BURNETT HECTOR, OF GREENWICH, NEAR SYDNEY, NEW SOUTH WALES,
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PRODUCING COLOR MUSIC AND OTHER SPECTACULAR LUMINOUS EFFECTS

Application filed July 7, 1927, Serial No. 204,086, and in Australia July 15, 1926.

This invention has reference to improvements in, and relating to the production of color music or the harmony of color and musical sounds, and other spectacular effects, and apparatus therefor in which the movements of the keys of a piano, piano player, organ, or other keyboard are made to operate a series of switches and/or relays so as to display or project colored lights in such manner as to harmonize with musical sounds.

The main object of the invention is to express more effectively by means of lights the emotions of a musician, through the keyboard of a musical instrument or the like. There may be used in some instances, a silent keyboard, that is, without the agency of sound, to produce luminous displays.

The invention consists briefly of the arrangements and/or projection of colored lights according to a color scale of treble and bass notes and in apparatus whereby the mechanism of piano players, organs, or other keyboard instruments may be conveniently utilized to obtain the desired effects, and in means for the reflection and diffusion of light and the production of shadows.

It is well known that if the space occupied by the normal spectrum be divided, the various colors occupy different proportions of this space. The ratios of each color may be determined and form the basis for a color scale.

Advantage is taken of this to construct what is termed a color scale of treble and bass notes.

In applying the color scale to the keys of a keyboard musical instrument I start at the lowest bass note and proceed upwardly.

The scale or ratio of the spectrum colors may be arranged over the various keys and octaves in several ways.

In applying the lighting effects the use of a spiral, known as the logarithmic spiral, the nebular hypothesis, the aurora borealis, or vortices is resorted to, that is to say, I have ascertained that all sound harmonics are curves or spirals and that the nearer the approximate curve or spiral is to the presentation of light, the closer the simultaneous harmonic effect of sound and light, and in

this manner the form and color of music are rendered visible. In short the analogy of the "spinning electron" is followed.

The invention, in its simplest practical form, comprises a plurality of electric lamps arranged according to the chromatic scale of colors, in segments of a circle or spiral which segments or sectors may extend from the periphery to a center, and the color in each sector is graduated or shaded from the periphery to the center. Preferably, however, one or a plurality of electric lights of graduated size is provided to correspond with one or a series of pendulums of different lengths on which said lights are mounted or carried. By these means the lights take the swinging motion of their respective pendulums imparted from the keyboard until they slow down to a state of rest or are stopped by a pedal or other means controlled from the keyboard. The pendulums may be provided with universal joints whereby a vortex, to and fro, or other rhythmic movement, may be obtained.

The pendulums and the lamps thereon may be arranged in units of seven, the size varying geometrically. Twelve of such units, when fixed in a common circle, will be arranged to form a logarithmic spiral. The lights in a series may be shrouded from the other lights in that series.

The lights or lamps may be mounted on telescopic or lazy tong mechanism to vary the intensity or area of the lighting effect.

The apparatus may be portable and the keys or hammers of a keyboard instrument may be provided with metal contact strips to close an electric circuit on their depression.

However in order that the invention may be more readily understood, reference will now be made to the accompanying drawings, wherein:—

Figure 1 is a diagrammatic view of one form of the invention showing the arrangement of lights in the form of a logarithmic spiral and the musical instruments and relay box associated therewith.

Figure 2 is a diagrammatic view showing part of the circuit arrangement for controlling the lights from a keyboard, the dis-

1,728,860

position of the lights being in the form of a logarithmic spiral shown in elevation.

Figure 3 is a diagrammatic plan view of the logarithmic spiral shown in Figure 2.

Figure 4 is a part diagrammatic inverted plan view of the arrangement of lights in groups or clusters in a dome also in the form of logarithmic spirals.

Figure 5 is a sectional view of one of the keys of a keyboard instrument, illustrating an alternative circuit arrangement for producing a sustaining effect on the lights.

Figure 6 is a perspective view of a suitable form of quick acting relay for closing the lamp circuits.

Referring to Figures 1 to 6, the piano 15 and organ 13 are electrically connected in multiple to relays in the relay box 17. The relays may be of any suitable type but are preferably of the quick acting type shown in Figure 6. Each relay is controlled by a switch operated by one of the keys of the musical instrument and is adapted to complete the circuit for the respective lamps or groups of lamps under its control.

The lamps 18, which may have reflectors 19, are arranged in the form of a logarithmic spiral, shown in dotted lines in Figures 2 and 3, and diagrammatically as clusters of lamps in Figure 4. Each turn of the spiral represents one octave and is composed of twelve lamps or groups of lamps. For a seven octave keyboard instrument a seven turn logarithmic spiral in which each turn has twelve lamps or groups of lamps would be provided.

In Figure 4 seven clusters of lights 20 are shown, each of which is controlled by the same note in the seven respective octaves of the keyboard instrument. In a similar manner the other eleven notes of each octave would each control a cluster of lights arranged in a similar way to those shown in the drawing.

Beneath each note contacts are arranged, (see Figures 2 and 5). These are adapted on the depression of a note to complete a circuit for energizing a relay whereby a lamp, or group or cluster of lamps is lighted.

Referring to Figures 1 to 4, when one of the keys 21 of the piano 15 or organ 16 is struck by a musician or mechanical player, the following circuit is completed: from battery 22, contact bar 23, contact 24, wire 25, relay 26, wires 27, 28 and 29, back to battery 22. When the above circuit is completed, the relay 26 closes contacts 30 and completes the following lamp circuit: from positive main 31, wire 32, lamp or lamps 18, wire 33, to the negative main 34.

In order to sustain a particular lamp or lamps after a particular key has been played, additional contacts 39 are provided on the relay 26 in order to effect a locking circuit for the relay, which operates as follows. Upon the closing of a pedal or like operated switch 35, a circuit is completed as follows: from

battery 22, switch 35, wires 36, 37 and 38, contacts 39, relay 26, wires 27, 28, 29, to battery 22. From the above circuit it will be seen that if a particular key is played and the respective relay contacts closed, the lamp will remain lighted provided the sustaining switch 35 is closed, causing the relay to be energized by the sustaining circuit. If the particular key returns to its normal position and opens switch 24, the particular lamp will remain lighted so long as the sustaining switch 35 is closed.

In the modified sustaining mechanism shown in Figure 5, each of the keys 21 of the keyboard instrument has a back contact member 40 which is springy and has a soft iron tip or keeper 41. A soft iron bar 42 is supported by and capable of being magnetized by an electromagnet 43 mounted above the keyboard of the instrument and extending longitudinally thereof and which when magnetized is capable of retaining the tip or keeper 41 in contact therewith once a key has been depressed, and during such time as the sustaining switch 35 is closed by a pedal or like operating means to complete an independent circuit for energizing the electromagnet 43. When a keyboard instrument is installed with the modified arrangement shown in Figure 5, the lamp circuit closing relay is energized as follows. When a particular key 21 is depressed current flows from battery 22 by way of wire 49, contact 24, screw 44, wire 45, lamp circuit closing relay 26, wires 46, 47, 48, back to battery 22. The energization of the relay 26 causes the contacts 30 to close the lamp circuit of the particular lamp or group of lamps corresponding to the note struck.

If it is desired to sustain the lamp in lighted condition, the sustaining switch 35 is closed to energize the electromagnet 43 by means of current supplied from battery 50.

This has the effect of magnetizing the bar 42 so that when a particular key is struck the back contact member 40 is raised until the tip or keeper 41 engages the magnetized bar 42 against which it is held as long as the switch 35 is closed. Current will now pass from battery 22, wires 49, 51, bar 42, contact member 40, wire 45, relay 26, wires 46, 47, 48, back to battery 22, with the result that relay 26 maintains the lighting current of the particular lamp closed as long as the sustaining switch is closed, even when the note 21 returns to its normal position.

Figure 6 illustrates one of the lamp circuit closing relays 26 which are of the quick acting type. Each relay has electromagnetic coils 51 and contacts 30 which are bridged by the keeper 52. The operating arm 53 is secured to the armature of the relay and is loosely pivoted on pins 54, adjustment being effected by the screw 55. In operation, this relay works as follows. When the coils are energized the armature is attracted, causing

the arm 53 to depress the keeper 52, and at the same time the coupling 56 raises the contacts 30 which, on engagement with the keeper, completes the circuit from terminal 57 to terminal 58. The contacts 30 are normally insulated from each other by a distance piece 59.

The lamps 18 with their reflectors 19 may be mounted on a universal joint 83 and be arranged to swing with a pendulum action when released by an electromagnet 84.

I claim:

1. In improvements in the production of color music and other spectacular luminous effects, the combination of a controlling keyboard of a musical instrument, a source of electrical energy, a plurality of circuits controlled by the keys of the keyboard, and a number of colored lights adapted to be controlled by the keys of the keyboard, said lights being arranged in the form of a logarithmic spiral.

2. In improvements in the production of color music and other spectacular luminous effects, the combination of a controlling keyboard of a musical instrument, a source of electrical energy, a plurality of circuits controlled by the keys of the keyboard, and a number of colored lights, representing a color scale corresponding to treble and bass notes, said lights being arranged in the form of a logarithmic spiral and each coil of the spiral representing one octave and comprising at least twelve lamps.

3. In improvements in the production of color music and other spectacular luminous effects, the combination of a controlling keyboard musical instrument, a source of electrical energy, a plurality of circuits controlled by the keys of the keyboard, and a number of colored lights representing a color scale of treble and bass notes, said lights being arranged in the form of a logarithmic spiral and adapted to be electrically controlled from the keyboard, and means common to each circuit for sustaining the energization of the lights at will.

4. In improvements in the production of color music and other spectacular luminous effects, the combination of a controlling keyboard musical instrument, a source of electrical energy, a plurality of circuits controlled by the keys of the keyboard, so that on depressing one of the keys of a keyboard an electrical circuit is completed, a relay in each circuit and contacting a lighting circuit for a colored lamp that forms part of a color scale corresponding to treble and bass notes arranged in the form of a logarithmic spiral, and a switch operable at will to close an independent circuit to the relays in order to sustain the lighting circuit in the closed position after the key is released and returns to its normal position.

5. In improvements in the production of

color music and other spectacular luminous effects in combination, a keyboard musical instrument, a source of electrical energy, a plurality of circuits, a series of electric lamps arranged in the form of a logarithmic spiral, at least one lamp to a key, electrical contacts closed by the keys of the musical instrument to close a circuit including a lamp and the source of electrical energy, lamp circuit closing relays, one to each key, controlled by said contacts, and a manually operated switch adapted to complete a circuit for sustaining said relays in energized condition after the keys of the musical instrument have returned to the normal position.

6. In improvements in the production of color music and other spectacular luminous effects in combination, a keyboard musical instrument, a source of electrical energy, a plurality of circuits including said source, a series of electric lamps arranged in the form of a logarithmic spiral, normally open electrical contacts one to each key adapted to be closed by the keys, lamp circuit closing relays controlled by said contacts, one to each contact and its key, a manually operated switch adapted to complete a circuit for sustaining said relays in energized condition after a key has been depressed, closed its contacts to cause the energization of the relay and been released, and sustaining means comprising a manually operated switch and relay contact adapted to close a circuit for energizing the relay.

7. In improvements in the production of color music and other spectacular luminous effects in combination, a keyboard musical instrument, a source of electrical energy, a plurality of circuits including said source, a series of electric lamps arranged in the form of a logarithmic spiral, electrical contacts, one to each key, adapted to be closed by the keys, lamp circuit closing relays controlled by said contacts, one to each contact and its key, a manually operated switch adapted to complete a circuit for sustaining said relays in energized condition after a key has been depressed, closed its contacts to the keys to cause the energization of a relay and been released, and sustaining means comprising a contact blade on each key, said contact blade having a soft iron keeper adapted to retain the contact on a closed condition when attracted by an electro-magnetic bar under the control of an electro-magnet energized by closing said manually operated switch, said contact blade completing an independent circuit for energizing the lamp circuit relay.

In testimony whereof I have hereunto set my hand.

ALEXANDER BURNETT HECTOR.

Sept. 17, 1929.

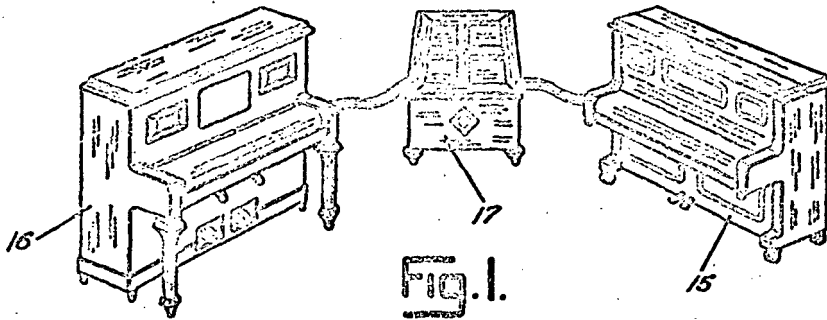
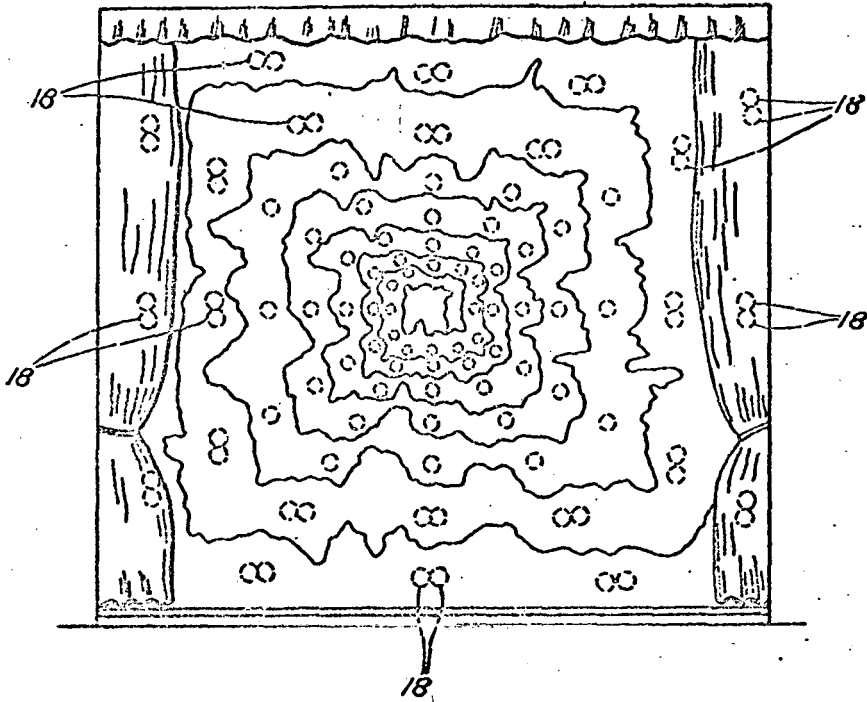
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1,728,860

PRODUCING COLOR MUSIC AND OTHER SPECTACULAR LUMINOUS EFFECTS

Filed July 7, 1927

4 Sheets-Sheet 1



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Sept. 17, 1929,

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1,728,860

PRODUCING COLOR MUSIC AND OTHER SPECTACULAR LUMINOUS EFFECTS

Filed July 7, 1927

4 Sheets-Sheet 2

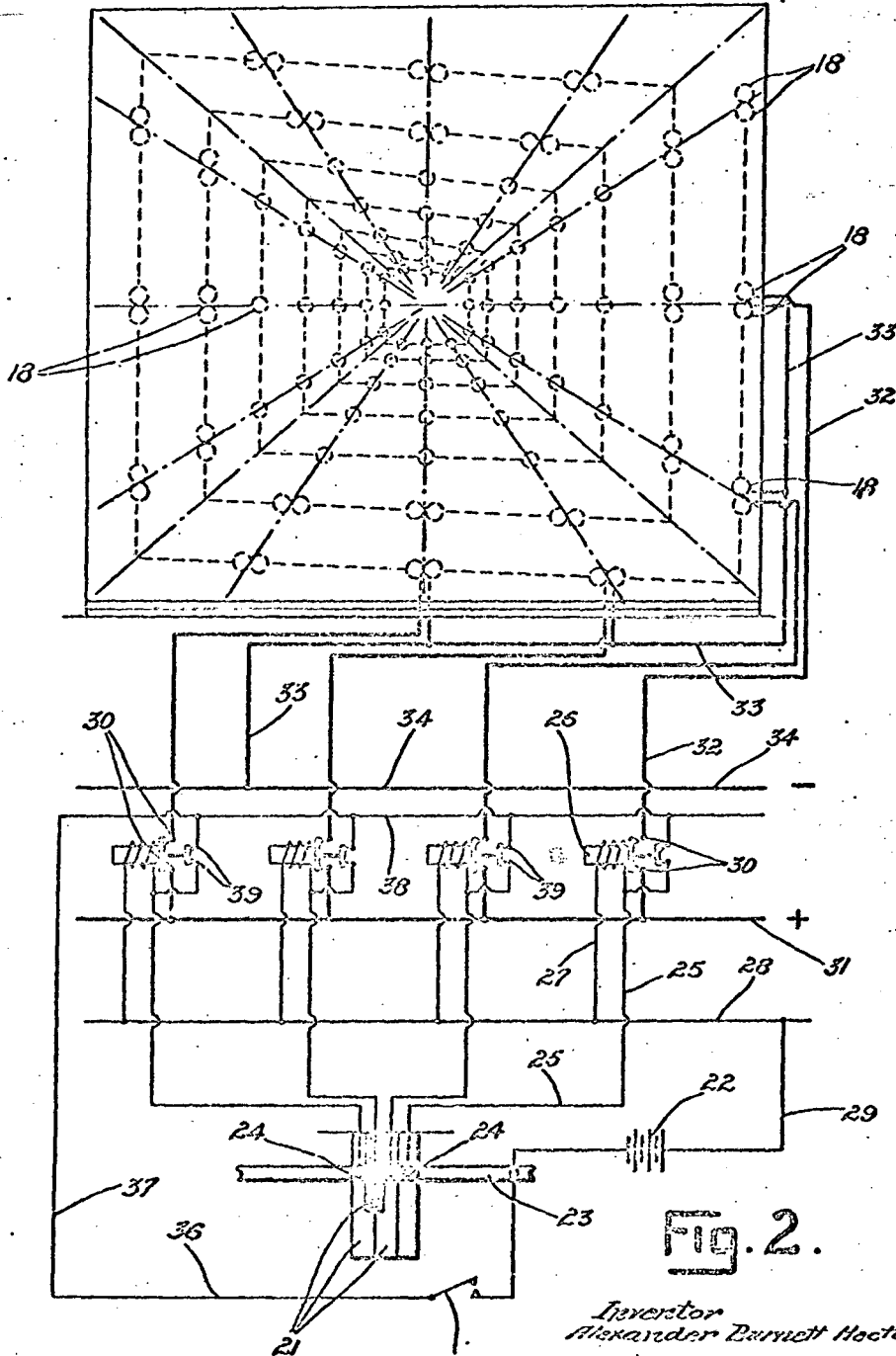


Fig. 2.

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PRODUCING COLOR MUSIC AND OTHER SPECTACULAR LUMINOUS EFFECTS

Filed July 7, 1927

4 Sheets-Sheet 3

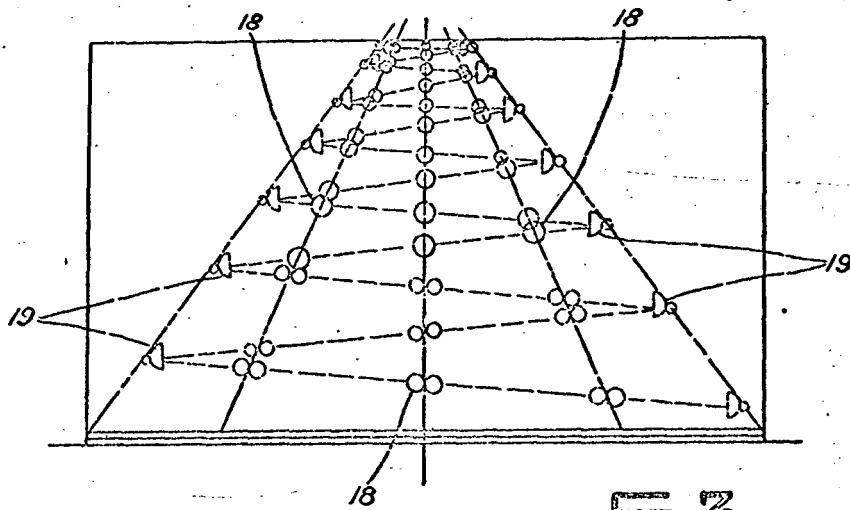
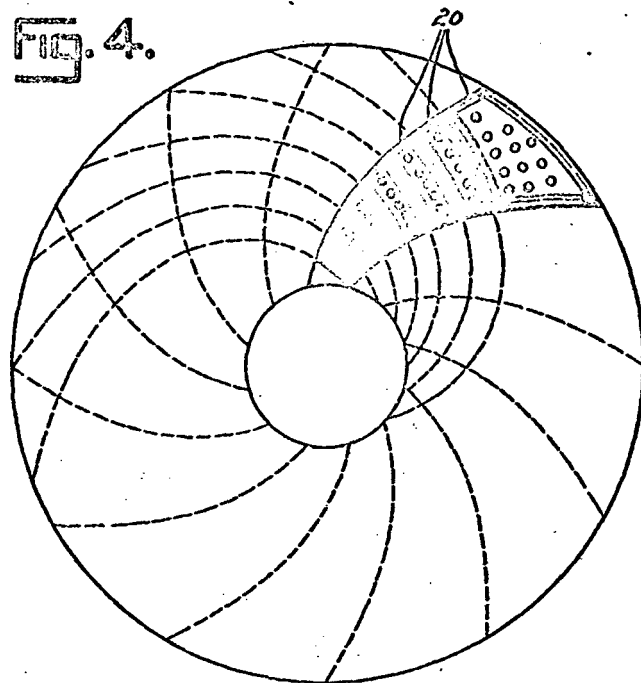


FIG. 3.

FIG. 4.



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Sept. 17, 1929.

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PRODUCING COLOR MUSIC AND OTHER SPECTACULAR LUMINOUS EFFECTS

Filed July 7, 1927

4 Sheets-Sheet 4

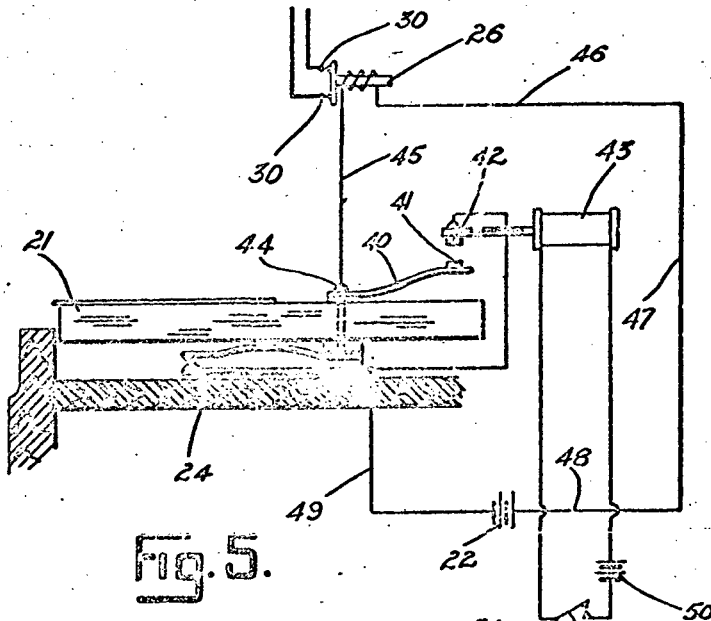


FIG. 5.

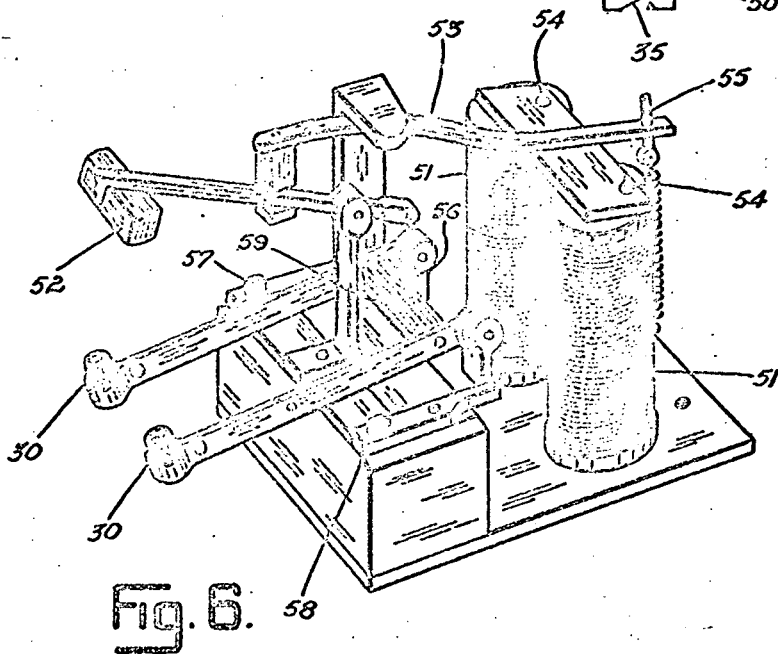


FIG. 6.

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By Samuel L. Norris,
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102,938

PATENT



SPECIFICATION

Convention Date (United States), Dec. 27, 1915.

Application Date (in the United Kingdom), Nov. 17, 1916. No. 16,510/16.

Complete Accepted, Apr. 19, 1917.

COMPLETE SPECIFICATION.

A Stage Setting.

I, BENJAMIN MARS GIROUX, Theatrical Manager, formerly of 1463, Monadnock Block, and now of 3729, Maple Square Avenue, in the City of Chicago, County of Cook, State of Illinois, United States of America, do hereby declare the nature of this invention and in what manner the same
 5 is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention belongs to that general class of devices known as stage settings, and relates particularly to apparatus for producing a new, novel and realistic setting for use in theatres or the like, wherein the setting to all intents and
 10 purposes is so realistic that it very nearly, if not entirely, in appearance approaches a natural effect or setting of nature. It may be said that the setting shown and described is intended to represent a volcano in eruption.

The invention has among its objects the production of apparatus of the kind described that is simple, efficient, realistic, and highly attractive, ornamental
 15 and entertaining.

It also has among its objects the production of a realistic scene in a most striking manner, and yet in a most simple way.

It also has among its objects the production of apparatus for the purpose set forth that may be easily and quickly set up or knocked down and conveniently
 20 transported from place to place with comparative ease.

The invention consists in a stage setting comprising in combination a substantially horizontal curtain secured to provide a fullness therein, means for agitating said curtain and means for discharging a vapor in proximity thereto to simulate steam and smoke.

25 The invention also consists in a stage setting in accordance with the preceding statement and having scenic set pieces cooperating with the substantially horizontal curtain pictorially to represent the crater of a volcano.

To complete the illusion there can be also employed in stage settings in accordance with this invention,—

30 (a) Means for throwing light effects upon the curtain and for modifying said effects.

(b) Means for controlling the point where smoke like vapours are to be released at will.

(c) Means for directing a current of air against the under side of the curtain
 35 to cause the agitating of the same.

[Price 6d.]

(d) Means for imparting different light effects upon the commingled steam and smoke.

(c) Parts connected to the curtain for relative free movement and adapted to be projected as the curtain is thrown upward.

The invention lastly consists in a stage setting representing the crater of a volcano in action, substantially as hereinafter described. 5

Referring now to the accompanying drawings:—

Figure 1 is a front elevation of the apparatus or setting with the panoramic curtain raised;

Figure 2 is a plan view of the same; 10

Figure 3 is a reduced view in elevation of set piece 1;

Figure 4 is a similar view of set piece 2;

Figure 5 is a similar view of set piece 3;

Figure 6 is a similar view of set piece 4;

Figure 7 is a similar view of set piece 6; 15

Figure 8 is a similar view of set piece 7;

Figure 9 is a similar view of set piece 5;

Figure 10 is a sectional view taken substantially on line 10, 10, of Figure 2;

Figure 11 is a sectional view taken substantially on line 11, 11 of Figure 2;

Figure 12 is a front elevation of the panoramic curtain; 20

Figure 13 is a perspective view of the rear of set piece 2, with the steam apparatus carried thereby;

Figure 14 is a similar view of set piece 1, with the clearers carried thereby.

It may be mentioned that the setting herein shown and described is particularly intended to show or represent a volcano in eruption and adapted for theatrical purposes, it being understood that the stage setting or set pieces and the cyclorama may be modified or changed to any desired extent. The appearance of the setting after the curtain has been raised is crudely illustrated in Figure 1 showing the various set pieces. The set pieces are shown detached in Figures 3 to 9, the scales being varied in the several figures. The arrangement or settings of the same is most clearly shown in Figure 2. Set piece 1 is arranged at the front of the stage, set piece 2 slightly back, set pieces 3 and 4 being arranged substantially at each end and back of the set piece 2. Set pieces 6 and 7 are arranged substantially centrally or midway down the stage, and set piece 5 near the rear, the whole being surrounded by the cyclorama 8 extended on the sides, as at 9. Other pieces 10 are arranged one on each side these being technically called tormentors, and ordinarily provided with doors to permit entrance to the front of the stage in front of set piece 1. As mentioned the arrangements and number of set pieces depends on the effect desired and what is depicted on them. 25 30 35 40

The stage is shown set or constructed back of the arch or wall 11 and the footlights 12 arranged in the usual manner. The set pieces, as usually constructed, consist of a suitable framework over which is stretched canvas, or other material suitable for the purpose, which is painted or otherwise decorated as desired. The set piece 1 is formed with supports 13 at the back arranged to support or brace the set piece in upright position and prevent its falling over. These supports are shown hinged at the back and the set piece hinged at the centre so that it may be folded up in small space for storage or shipping, or the parts detached, as may be desired. Set piece 2 is also provided with supports 14, and set piece 5 with similar supports 15, which may be arranged to be secured to the floor. Arranged between set piece 2 and set piece 5 is a sheet or curtain 18 (Figures 2, 10 and 11) of suitable material, the same being preferably red cloth that is substantially translucent. The forward end is secured or anchored at 19 (Figure 10) to set piece 2, and the back end at 20 to set piece 5, the curtain being substantially horizontal, but with the rear end preferably slightly higher than the forward end. It may be mentioned that the curtain 18 is preferably of greater length than the distance between the 45 50 55

two set pieces, or slack, so that it may be suitably agitated and rise and fall irregularly throughout its area. I have also shown several sponges 22, or other suitable equivalent for the purpose, secured to the curtain by cords 21, these sponges being blackened, or otherwise treated, are intended to represent
5 stones or boulders, which appear to be thrown up from the crater of the volcano.

Arranged below the curtain 18 is a suitable framework 23, which carries means for dispensing air currents, as shown, one or more fans 24, and also
10 arranged on the frame is a series of lights 25, a portion at least being preferably red lights. As the fans are driven the curtain 18 rises and falls irregularly and the sponges 22 are thrown up and dropped back so that with the settings arranged as shown the spectator apparently sees the crater of a volcano in violent eruption. If desired, in addition to the fans, the curtain
15 may be manually agitated by men stationed for that purpose, the same, however, positioning themselves so as not to be seen by the audience. To increase the illusion I preferably discharge a vapor, as for example, steam, adjacent the curtain 18, and also produce smoke, so that the illusion is to all intents and purposes perfect.

Referring particularly to Figures 2 10 and 13, arranged just back of the set
20 piece 2 is a steam pipe consisting of the coil 29, having a series of perforations or apertures therein. This pipe or coil is preferably hinged to the set piece as at 30, and is carried by the supports 14 when the same are open. When the supports 14 are closed against the set piece the coil may be dropped and be carried by the piece for convenience in storing or transporting. The steam
25 coil 29 is connected to a pipe 31, which is connected to pipe 32 through the union 32', pipe 32 being suitably connected to a steam generator or boiler 33 of any suitable type.

Arranged back of set piece 1 are one or more smoke pots 34, commonly called
30 clearers, the same being arranged to produce smoke by burning suitable materials or chemicals. To add to the illusion the smoke pots 34 are arranged on a movable carrier or bar 35 carried by the supports 13 (see Figures 2 and 14) the pots being moved by actuating the lever 36, suitably connected with the bar 35, or in an equivalent manner.

Arranged above the stage in the usual manner are the lights 37, shielded
35 from view by the drops 38. I also arrange a suitable light 40 back of the set piece 5, same being arranged to throw on a transparent part 39 of set piece 5, as most clearly shown in Figures 2, 10 and 1. I have shown the set piece 7 (Figure 11) provided with a frame 42, arranged to carry a platform 43, which
40 may be reached by means of the stairs 44. Lights 45 and 46 are arranged substantially as shown, the purpose of these being to throw a suitable effect on a transparent or translucent curtain 47 arranged before set piece 1.

What I have termed lights 45 and 46 are what are ordinarily known in the
45 profession as spot light lamps, and more especially sciopticon by some, which are adapted to throw light where desired, the device being equipped with suitable lenses. These lights are equipped with what are sometimes known in the trade as electric stage effects, which generally consists of a rotatable
50 disk of suitable material actuated by clock movement, by hand, or the like, the construction being that the light passes through certain portions of the disk as the same is rotated, giving the desired effects on a screen. Sometimes the light is thrown on the front of the opaque screen and sometimes from the
back on a transparent or translucent screen. By means of the effects are obtained moving clouds, water effects, rain effects, fire and smoke effects and the like. I have referred to curtain 47 as being transparent. As a matter
of fact the same is more nearly translucent. It is not necessary that the whole
55 curtain be translucent or transparent, but only the part at which the effect is to be placed, the other part being opaque. In the present case I use suitable stage effects to give a volcano effect at the desired point on the curtain. These

various effects are well known among the profession, and I do not consider it necessary to describe them in greater detail than herein given.

The transparent curtain 47 is shown in Figure 12. This illustrates, among other things, the scene shown in Figure 1, except of course, the scene is at a great distance away and consequently not shown in any way in detail. When the lights from the sciopticons (also called spot lights) 45 and 46 are thrown on the transparent curtain from the rear and manipulated, smoke may be apparently made to come from the volcano, and cloud effects obtained by apparatus commonly known as electric stage effects. In use the curtain 47 is set before all of the apparatus shown in other figures and the cast, or certain members of the company can pass before the curtain on their way to the crater of the volcano. After they pass by, the effect lights may be cut out and the curtain may then be raised so that the crater may be disclosed. I do not consider it necessary to illustrate any of the details of lighting effects, or details in shifting or raising the curtain and bringing the crater in view, as the usual practices, well known in the profession, are followed.

As the curtain is raised, that is the curtain 47, the crater of the volcano is seen, the curtain 18 not resembling a curtain, however, rising and falling due to the fans 24, the same glowing, owing to the lights 25, the vapor, or in the case illustrated, steam being discharged from the pipes 29 and smoke from the clearers 34. The lights 28 flash on and off and the imitation rocks 22 are apparently thrown up by the violent boiling in the depths of the crater. The lighting effects are arranged to give a realistic appearance, it being considered unnecessary and impossible to attempt to describe in detail the lighting effects, and to the observer or audience is shown a volcano eruption, with smoke, steam arising, and boulders rising and falling as if boiling and seething. The set pieces and cyclorama show the foreground and background, and the illusion is practically perfect. It is practically impossible to illustrate or describe the effect or illusion by pen and ink drawings or words, it being necessary to see the actual scene, or the next best thing, photographs, in order to appreciate this perfect illusion. I have shown the apparatus and those set pieces, the like of which I have employed for this purpose, it being understood that various immaterial modifications may be made, depending upon circumstances. The apparatus shown and described is that considered suitable and desirable for illustrating Mount Pelee, in the Hawaiian Islands, in the Bird of Paradise show, the cyclorama and set pieces might be varied in representing other places or scenes.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A stage setting comprising in combination a substantially horizontal curtain secured to provide a fullness therein, means for agitating said curtain, and means for discharging a vapor in proximity thereto to simulate steam and smoke, substantially as described.
2. A stage setting according to Claim 1, having scenic set pieces cooperating with the substantially horizontal curtain pictorially to represent the crater of a volcano, substantially as described.
3. A stage setting according to Claim 1 or 2 having parts connected to the curtain for relative free movement and adapted to be projected as the curtain is thrown upward, substantially as described.
4. A stage setting according to Claim 1 or 2 having means for throwing light effects upon the curtain and for modifying said effects, substantially as described.
5. A stage setting according to Claim 1 having means for controlling the point where smoke like vapours are to be released at will, substantially as described.

6. A stage setting according to Claim 1 or 2 having means for directing a current of air against the underside of the curtain to agitate the same, substantially as described.

5 7. A stage setting according to Claim 2 in which one of the set pieces supports a conduit from which the steam is discharged in proximity to the substantially horizontal curtain, said conduit being pivotally connected with said set piece so as to be movable from a position in contact with the set piece to a position outwardly therefrom, in which latter position it is supported by means also operative to hold the set piece in upright position, substantially as described.

10 8. A stage setting according to Claim 1 having means for imparting different light effects upon the commingled steam and smoke, substantially as described.

9. A stage setting to represent the crater of a volcano in action substantially as described with reference to the accompanying drawings.

15 Dated this 17th day of November, 1916.

MARKS & CLERK.

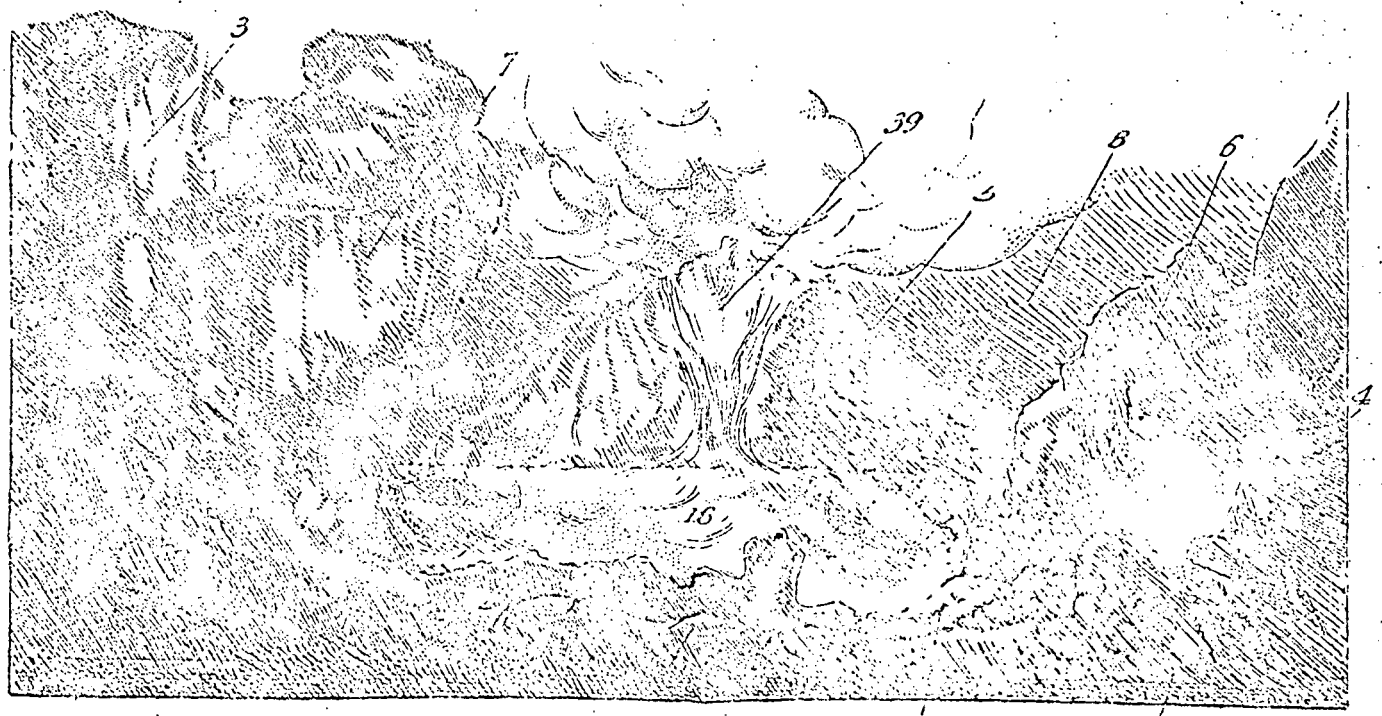


Fig. 1.

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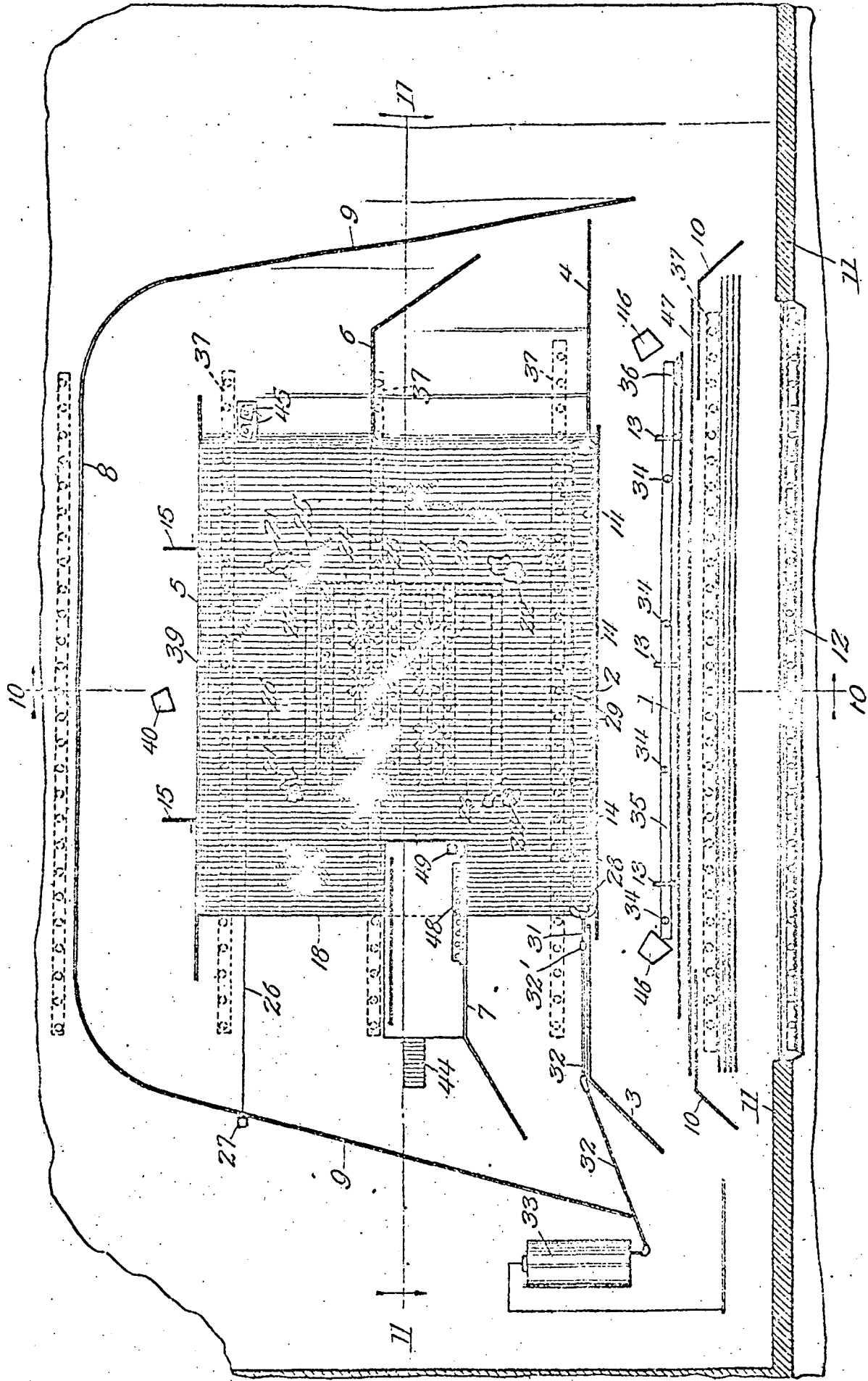
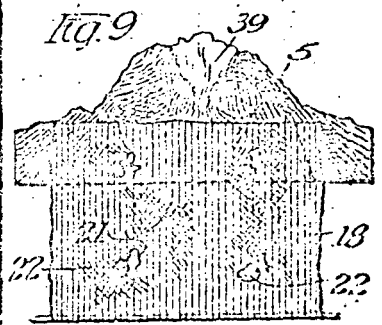
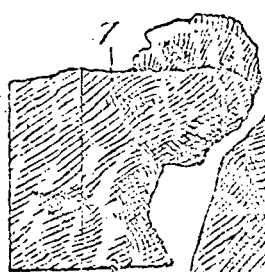
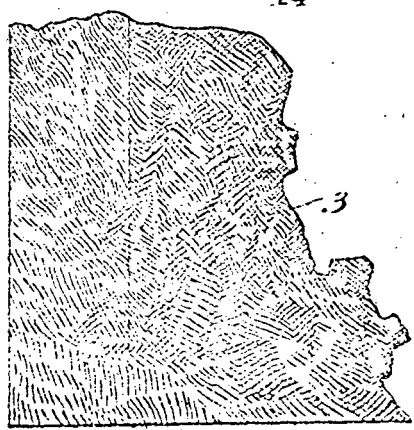
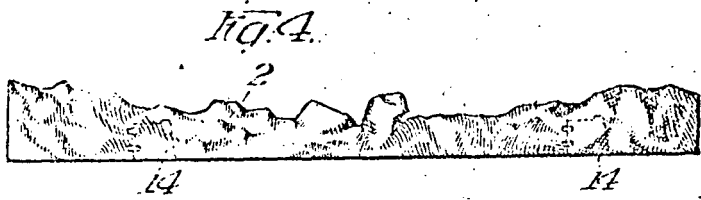
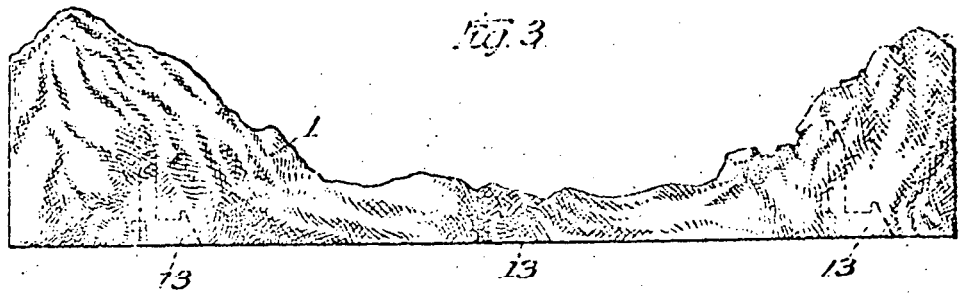


Fig. 2.

[This Drawing is a full size reproduction of the Circuit.]

102,938. GIROUX'S COMPLETE SPECIFICATION.



[This Drawing is a full-size reproduction of the Original.]

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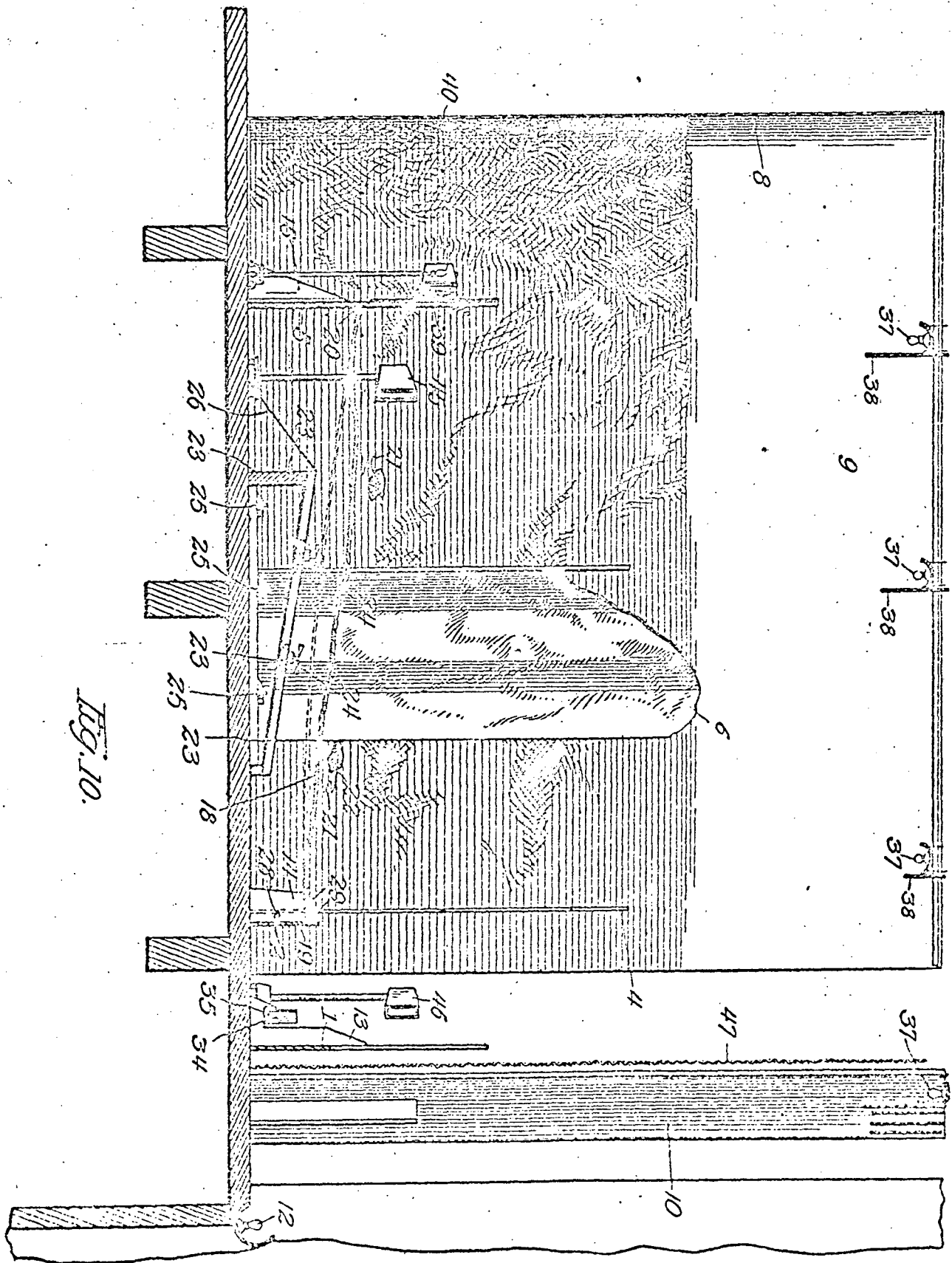


Fig. 10.

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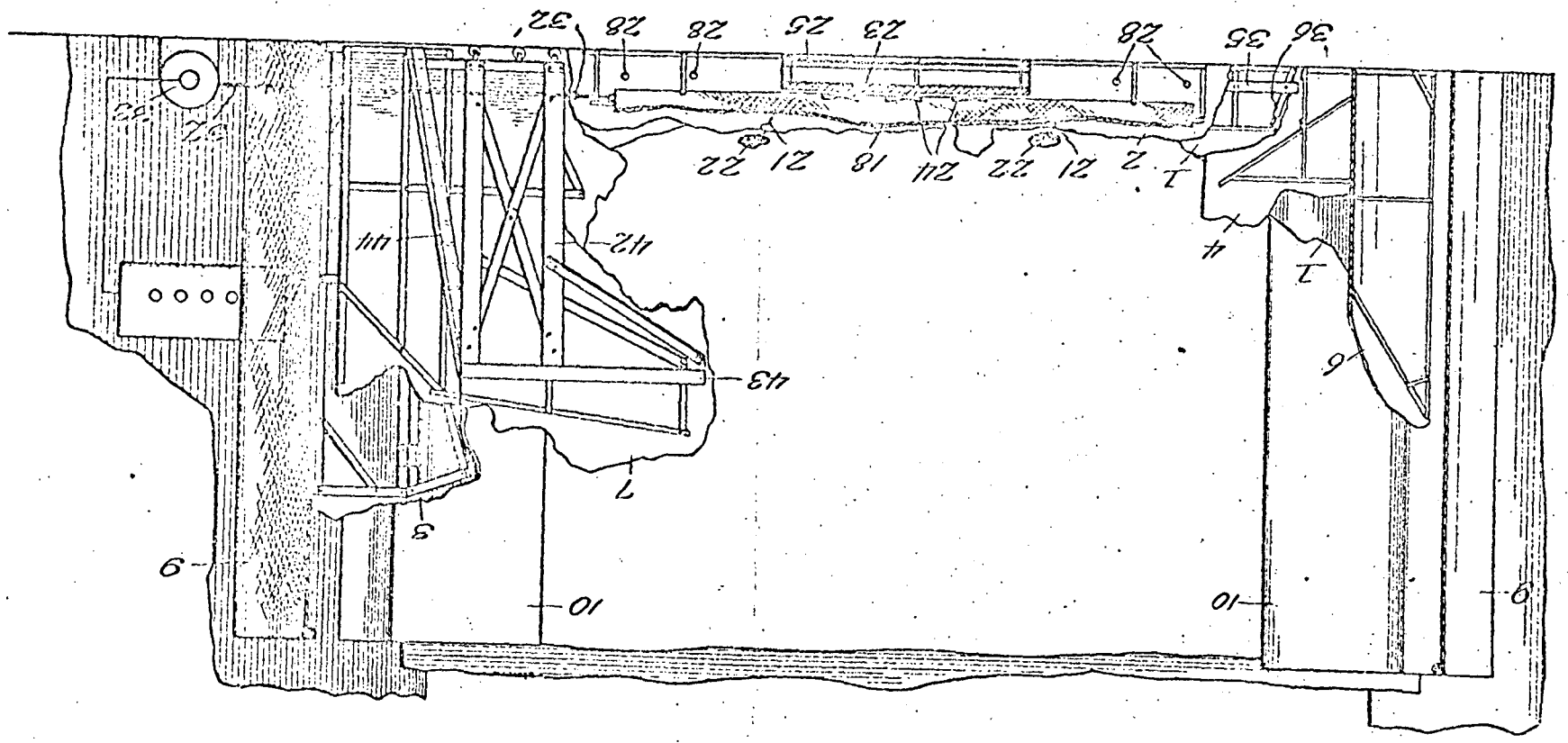


Fig. 11.

[This Drawing is a full-size reproduction of the Original]

Fig. 12.

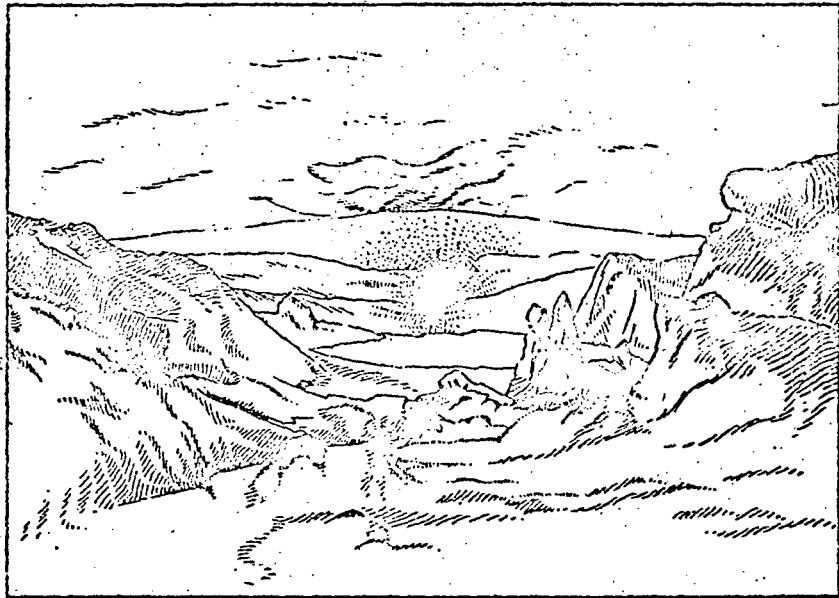


Fig. 13.

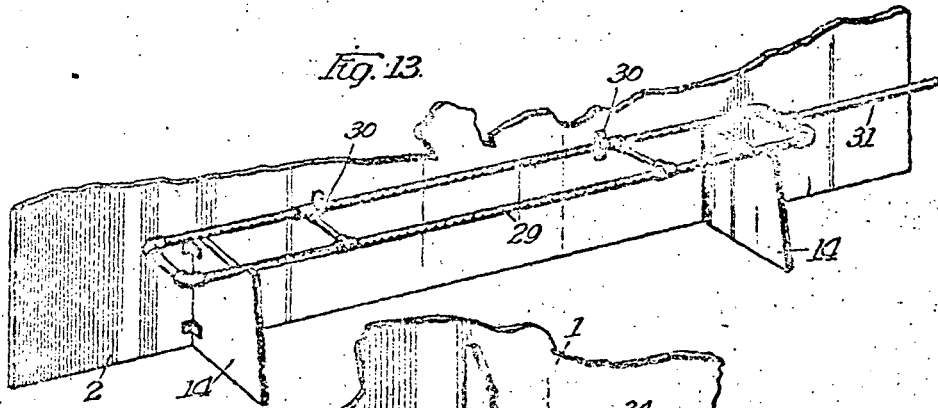
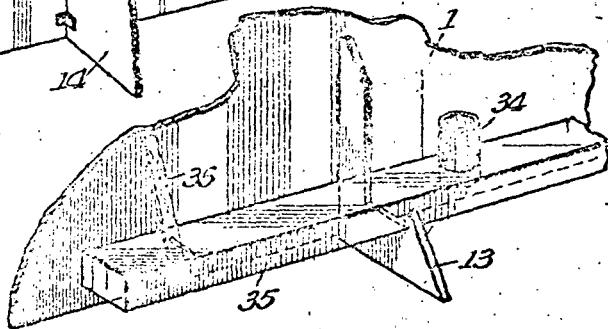


Fig. 14.



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136,514

PATENT



SPECIFICATION

Application Date, Sept. 16, 1919. No. 22,799/19.

Complete Accepted, Dec. 18, 1919.

COMPLETE SPECIFICATION.

An Improved Stage-screw for Securing Scenery-props.

We, EDWARD D'ARCY, of The Avenue, Datchet, in the County of Bucks, Actor, and JOHN FREDERICK PERCY HILL, of 3, Edith Road, Prittlewell, in the County of Essex, Stage Carpenter, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described
5 and ascertained in and by the following statement:—

Movable set-pieces of theatrical scenery are usually braced in an upright position upon the stage by means of inclined props or struts at the rear, the lower end of each prop being temporarily secured by means of a special form of wood-screw, known as a stage-screw, which is passed through a hole in the sole of an iron angle-plate or foot-iron fixed to the prop and is screwed into
10 the planking of the stage by means of a handle provided on the screw itself. In the hurry incidental to rapid changing of a scene and also during transport of the scenery from place to place, these stage-screws, being separable from the props, are liable to become mislaid and lost, thus frequently causing serious
15 inconvenience.

In order to obviate the disadvantage just referred to, by providing means whereby the screw, whilst freely rotatable relatively to the prop, is rendered normally inseparable from the angle-plate or foot-iron fixed to the prop, it has been proposed to form the shank of the screw with an annular collar which
20 is rotatably received in a corresponding groove undercut in the peripheral surface of the opening in the sole of the foot-iron; the sole, which is divided on the diameter of said opening so as to admit the collar into the groove, being halved together about the shank of the screw so as to retain the latter in
25 engagement with the angle-plate.

The present invention is directed to providing a construction which, whilst having the same object in view, shall be simpler and less expensive than the one just referred to, and free from the necessity of modifying the common type of foot-iron now in use.

For this purpose, according to the invention, the handle of the stage-screw
30 is made separable from the shank of the screw itself and is secured thereto by means of a nut engaging a threaded portion of the upper end of the shank, the shank being passed through, and prevented from turning in, a hole in a boss which forms the lower end of the handle, whilst between the lower surface of the boss and the upper surface of a flange provided on the screw itself and
35 adapted to contact with the floor of the stage, a necking is left on the shank so as to accommodate the thickness of the sole of the foot-iron and permit of the screw rotating relatively to the foot-iron.

In the accompanying drawings which illustrate one form of the invention, Figure 1 is a side elevation of the lower end of a prop secured to the floor of
40 the stage by means of the improved stage-screw. Figures 2 and 3 are respec-

[Price 6d.]

tively a side elevation and an upper end view of the screw itself, shewn separately; and Figure 4 is an inverted end view of the handle, also shewn separately.

a represents a portion of the planking of the stage; *b* the lower end of an inclined prop for supporting a piece of scenery; and *c* the usual angle-plate or foot-iron, fixed to the prop *b* by screws and having a prolongation *d* bent level to form the sole by which the prop is detachably secured to the planking *a*, the sole *d* having a hole *e* to give passage to the stage-screw.

In the example illustrated, the improved stage-screw of the present invention comprises, in addition to the usual threaded lower portion adapted to be screwed into the planking *a*, a flange *g* whereof the lower surface is made flat so as to be adapted to take a firm bearing against the planking *a* whilst the upper surface is conical as indicated so as to allow freedom for the sole *d* of the foot-iron to adjust itself upon the screw. Above the flange *g*, the shank *h* of the screw, which is adapted to pass freely through the hole *e*, is provided with a key *j* adapted to engage in a key-way *k* provided in the central aperture *m* in a boss *o* which forms the lower end of a separate loop-handle *p*, this loop-handle, when passed over the upper end of the shank *h*, being secured thereon by means of a nut *r* screwed on to a threaded portion *s* at or near the upper extremity of the shank, which is made long enough to project for this purpose beyond the boss *o*. The depth of the key-way *k* from the underside of the boss *o* is limited (see Figure 1) so as to prevent the boss from descending relatively to the shank *h* beyond a predetermined distance sufficient to permit of the sole *d* of the angle-plate being accommodated between the underside of the boss *o* and the upper surface of the flange *g* on the screw, and leave freedom for the stage-screw to rotate easily in the hole *e* in the sole of the foot-iron.

On removal of the nut *r* and handle *p* from the stage-screw, the shank *h* of the latter can be passed from beneath through the hole *e* in the sole *d* of the foot-iron, and, the handle *p* having thereafter been replaced on the shank *h* so that the key-way *k* in the boss *o* engages the key *j*, the nut *r* is screwed on to the threaded portion *s* of the shank and tightened so as to secure the handle firmly in place. By means of the handle *p*, the stage-screw can now be turned freely in the hole *e* in either direction, to attach the prop to or detach it from the planking *a* as may be required; the key *j* preventing rotation of the handle relatively to the screw so that the nut *r* is not liable to work loose but retains the handle securely in position on the stage-screw.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A stage-screw of improved construction for use in detachably securing to the floor of a theatrical stage the lower end of a prop which serves to brace a piece of scenery, wherein the shank of the screw is provided with a flange adapted to take a bearing against the planking of the stage, and the handle of the screw is made separable from the shank of the screw but is normally secured thereon at a distance from said flange so as to accommodate the sole of the foot-iron of the prop between the handle and the flange, substantially as and for the purpose set forth.

2. The improved stage-screw, substantially as described with reference to the accompanying drawings, for the purpose set forth.

Dated this 16th day of September, 1919.

A. M. & WM. CLARK,
Chartered Patent Agents,
53 & 54, Chancery Lane, London, W.C. 2,
Agents for the Applicants.

136,514. D'ARCY & another's COMPLETE SPECIFICATION

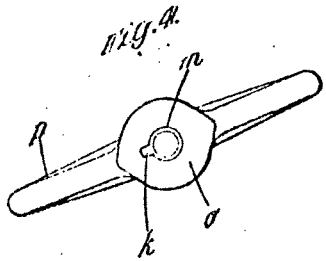
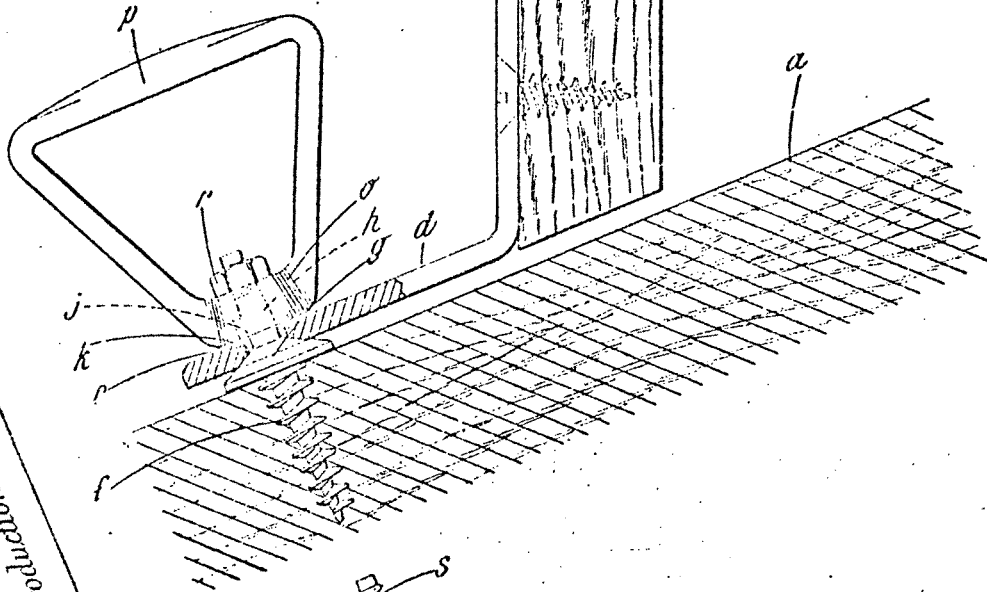
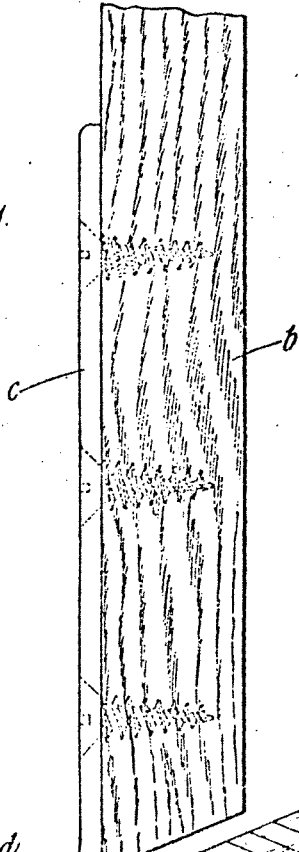


FIG. 1.



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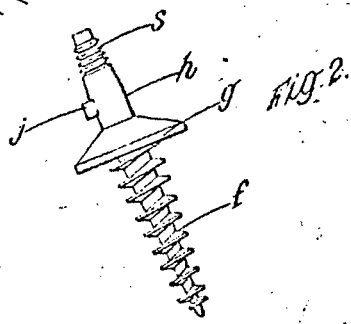
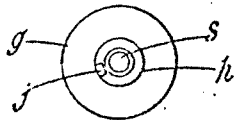


FIG. 3.



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PATENT SPECIFICATION



Convention Date (Germany): Apr. 12, 1921.

178,413

Application Date (in United Kingdom): Jan. 23, 1922. No. 1989/22.

Complete Accepted: June 29, 1922.

COMPLETE SPECIFICATION.

Improvements in Means for Representing Optically Scenery and other Objects on Stages or the like.

I, MAX HASALT, of 1, Fürstenstrasse, Openhaus, Dresden, Germany, a citizen of Germany, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to means for representing optically scenery and other objects on stages or the like by the aid of coloured shadows thrown upon curtains, hangings or the like.

The accompanying drawings illustrate several embodiments of the invention.

Referring to Figure I, representing a portion of the stage of a theatre or the like in longitudinal section, the stage is bounded by the floor *f*, the wall *g* facing the auditorium and the proscenium opening *e*. Placed on the stage is a translucent wall *a* which may be plane, cylindrical or curved in any other manner. The wall *a* consists of linen, canvas or the like and is suspended without folds in the manner commonly used in case of back-scenes or rounded curtains. Placed behind the wall *a* is a powerful source of light *c* whose luminous intensity is adjustable and the colour of which can be varied, for instance by means of filters which may be one-coloured or many-coloured in zones with gradations of the colours shading off into each other. Placed between the wall *a* and the source of light *c* are objects *b*, the shadows of which are thrown upon the wall *a*. Said shadows are lighted by means of one or more sources of light *d* which also are adjustable and coloured, for instance by means of one- or many-coloured filters. According to the relative luminous intensity of the sources of light *c* and *d* their colours appear more or less on the portions of the wall *a* lighted by the same,

said portions thus representing either only the colour of the source of light *c* or mixed colours. The portions of the wall not lighted by the source of light *c* represent on the contrary the colour of the source of light *d*. In case the objects *b* are translucent their shadows may also represent mixed colours. Even by this means the scene-mechanic is able to represent scenery in several colours.

The objects *b* may consist of solid bodies or plane surfaces and in the latter case they are suitably parallel to the wall *a*. Obviously, the distance between the wall *a* and the source of light *c* determines the relative size of the shadows, and the extension of the source of light *c* in the space determines the sharpness of the outlines of the shadows.

The objects may be transparent or wholly or in part more or less translucent or transparent, as indicated in Figure II.

As stated above the shadows of translucent objects may appear in mixed colours from the sources of light *c* or *d*. If such objects possess any colour of their own or if coloured transparent objects are used, besides their light, filtering action is to be added, causing the origin of further mixed colours. Concerning opaque objects their colour is on the whole insignificant. By colouring suitably the front face of such objects and lighting the same by white light or lighting such white front face by coloured light, this illumination being effected by other sources of light than *c* and *d*, the colour of the shadows may be further varied by the reflection of said light on the wall *a*.

The objects *b* are suitably, as is usual in case of scenery, manufactured of linen, paper, gauze, wood or the like, as indicated in Figure II, according to which the parts *h* situated in the background

consist of one layer of gauze, the middle parts *l* of several layers of gauze, and the inmost shadows of untransparent material, the space *l* being unoccupied.

5 The objects *b* may however also be manufacture of any other material. In order that their shadows shall have the appearance of solid bodies, the objects may be provided with narrow, transparent slits *m*
10 in the form of luminous lines or the like, as illustrated in Figure III, representing a bush. In this way also the effect of colour of the shadows is increased. Since the colour of the objects themselves is
15 generally not taken into consideration, they may be adapted to be easily transformed, as for instance by the arrangement of flaps, as shown in Figures IV and V, showing the transformation of a
20 column into a bush by the aid of flaps *n*. The shadows may also change their place and size on the wall *a* by moving the objects *b* or the source of light *c*, which may be used in the representation
25 of movable scenery, spiritual beings, moving vessels and the like. If persons are to walk out of the scenery arranged according to the invention, this may be effected by means of any scenery mounted
30 in front of the wall *a*, the persons coming out of the space between the latter and the wall *a*. The same effect may also be obtained by means of openings in the wall *a*, such openings being concealed by
35 walls placed behind the same and forming deep shadows which may be suitably coloured by means of the source of light *d*.

40 Instead of the source of light *c* and the objects *b* a projector apparatus having suitable diapositives or other substrata for pictures may also be used, the shadows of the pictures thus represented being
45 lighted by the source of light *d*. The effect of such an arrangement is however less satisfactory owing to the inferior brilliancy of colours, and besides a smaller angle of picture is at the disposal
50 of the operator, with the result that a very deep rear scene is necessary for the representation of a scenery occupying the whole stage.

55 Finally, instead of the translucent wall *a* an untransparent white surface may be used in certain cases, as for instance a rigid cupola back-ground, the objects *b* and the source of light *c* being placed in front of the same. Of course in such case the members *b* and *c* should be concealed
60 from the spectators by suitable means.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. Means for representing optically scenery and other objects in a stage, characterised by a translucent, transparent or untransparent wall, a source of light, which may be adjustable as to its intensity of light and colour, a number of translucent, transparent or untransparent objects, the shadows of which are thrown in the form of scenery or the like by means of the source of light upon the wall and one or more other coloured and preferably adjustable sources of light lighting the wall and the shadows on the same. 65
2. Means according to Claim 1, characterised by any number of the shadowing objects being altogether or in part translucent. 70
3. Means according to Claim 1, characterised by the translucent or transparent objects or portions of the same being coloured. 75
4. Means according to Claim 1, characterised by the surface of the untransparent objects facing the wall being coloured and lighted by white light or white and lighted by coloured light, said white or coloured lighting being effected by means of other sources of light than the sources of light such as *c*, *d*. 80
5. Means according to Claim 1, characterised by the objects being provided with narrow transparent slits in the form of luminous lines or the like. 85
6. Means according to Claim 1, characterised by the objects being transformable as to their shape by means of flaps or the like. 90
7. A modified embodiment of the means set forth in Claim 1, characterised by the fact that for one of the sources of light is substituted a projector apparatus and for the objects diapositives or other substrata for pictures. 95
8. The means for representing optically scenery and other objects on stages and the like, substantially as described with reference to the accompanying drawings. 100

Dated this 23rd day of January, 1922. 115

BOULT, WADE & TENNANT,
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E.C. 1.

Chartered Patent Agents.

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