United States Patent

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[54] **LIGHT DISPLAY INSTRUMENT**
19 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **84/464,** 353/98
[51] **Int. Cl.** **A63j 17/00**
[50] **Field of Search** 84/464; 353/98

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ABSTRACT: A device for producing esthetically pleasing patterns of light which is controllable like a musical instrument. The device includes an elastically stretchable reflective mirror surface which is spaced from a high intensity light source. A collimating and focusing lens is interposed between the reflective surface and the light source so that light beams emanating from said light source and reflected from said reflective surface are focused st a point within an aperture defined in the cabinet of the device. A dynamic image display may be produced by applying localized pressures to the reflective surface thereby distorting the reflected pattern. These localized forces may be applied by sound waves, manual pressure and the like. Further interesting effects are obtainable by varying the optical characteristics of the light beams as they pass through the focal point as by the use of light filters or masks.

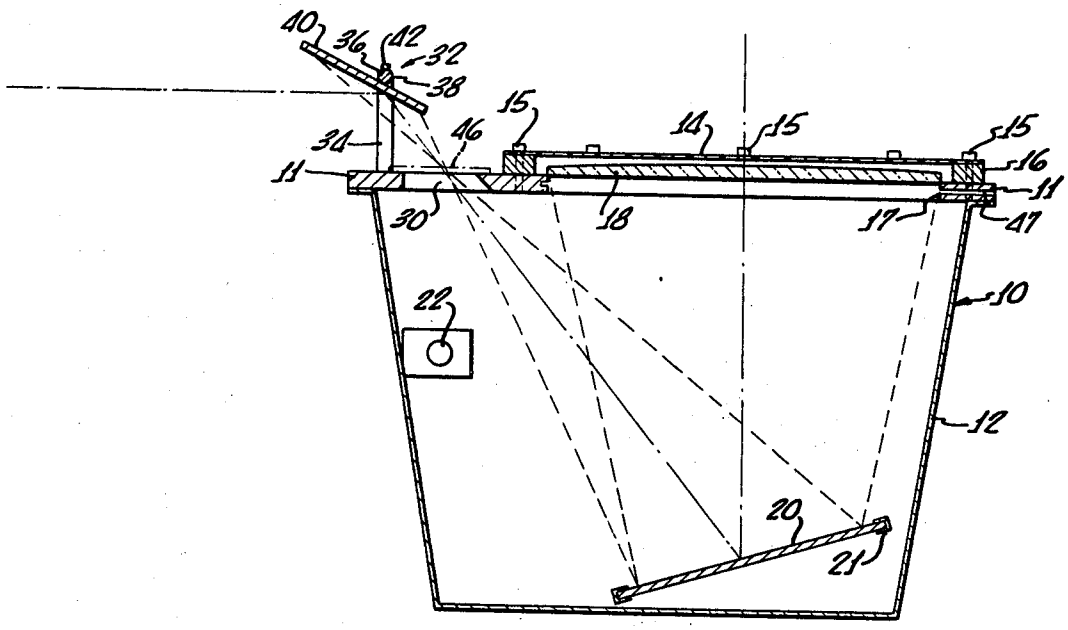
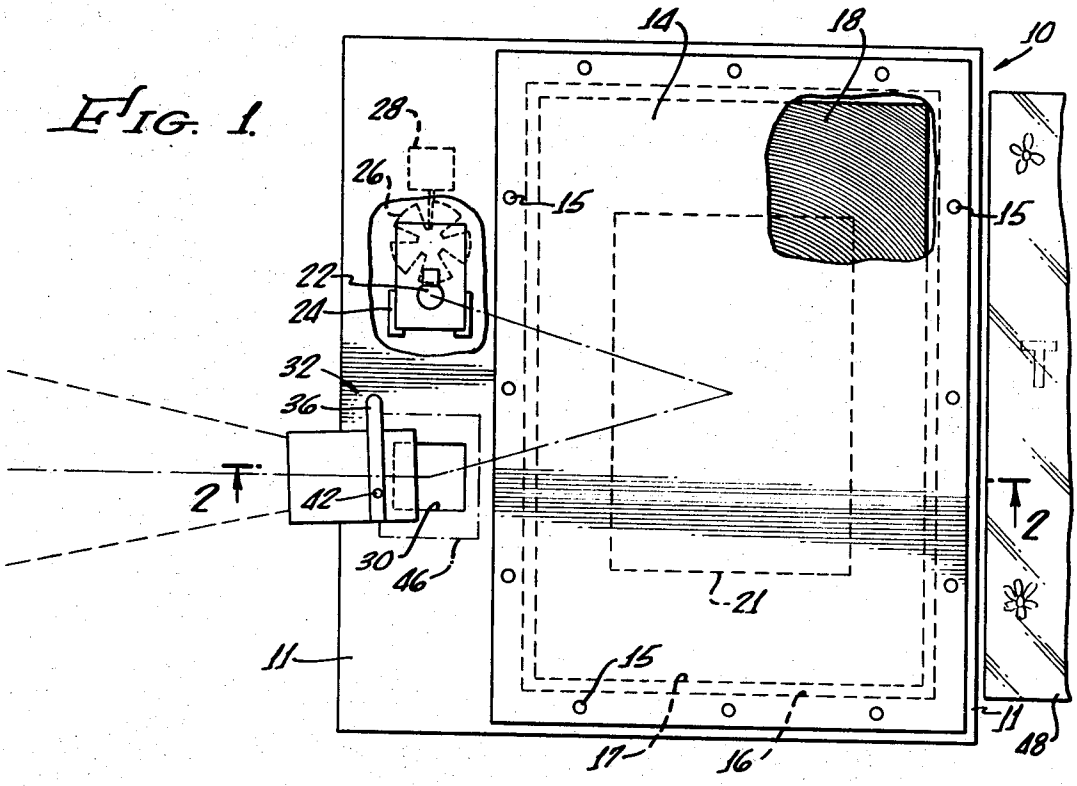


FIG. 1.



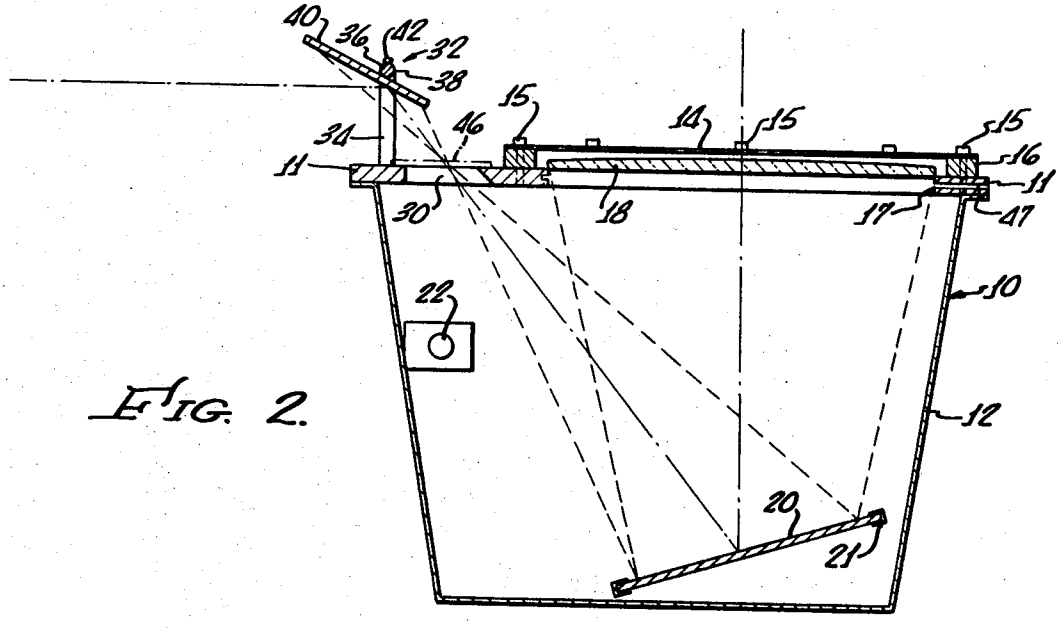


FIG. 2.

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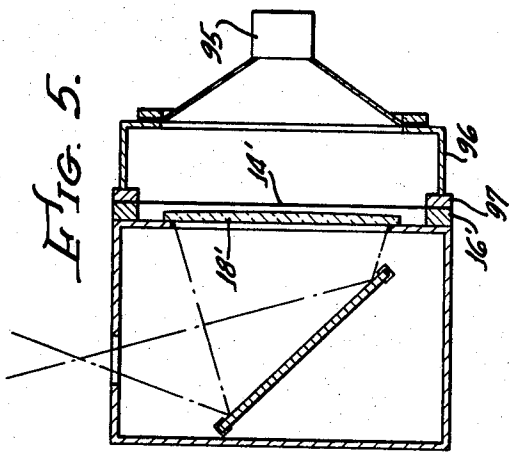


FIG. 5.

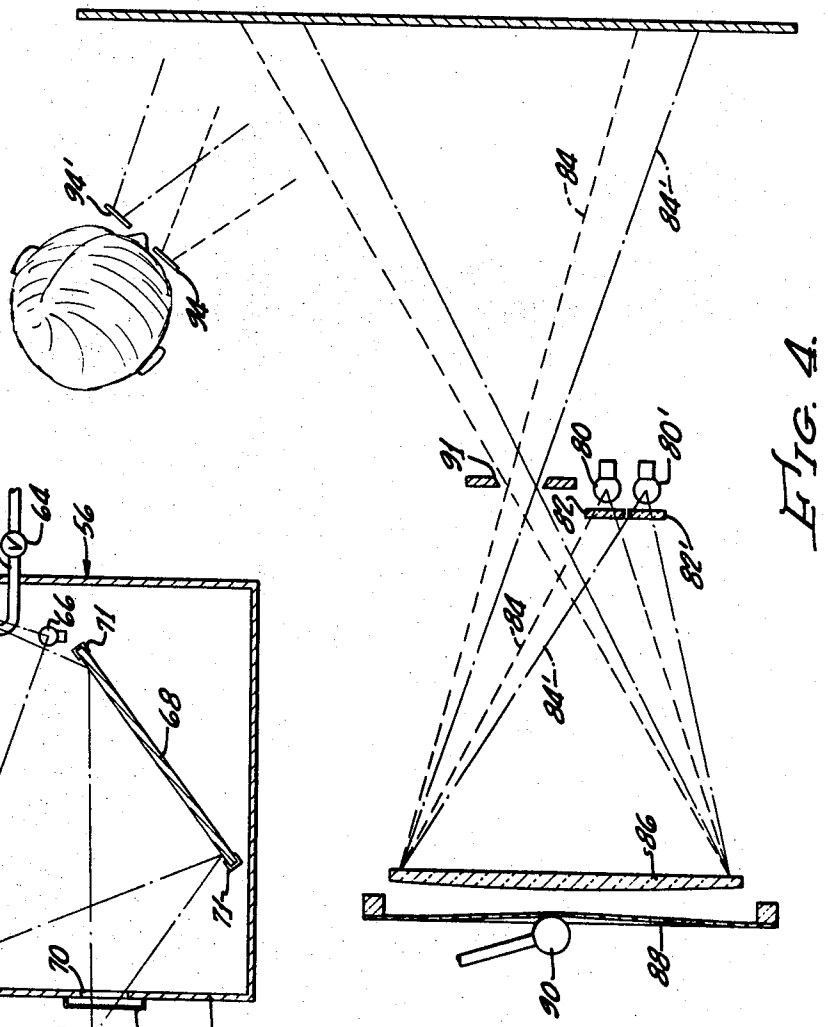


FIG. 4.

FIG. 3.

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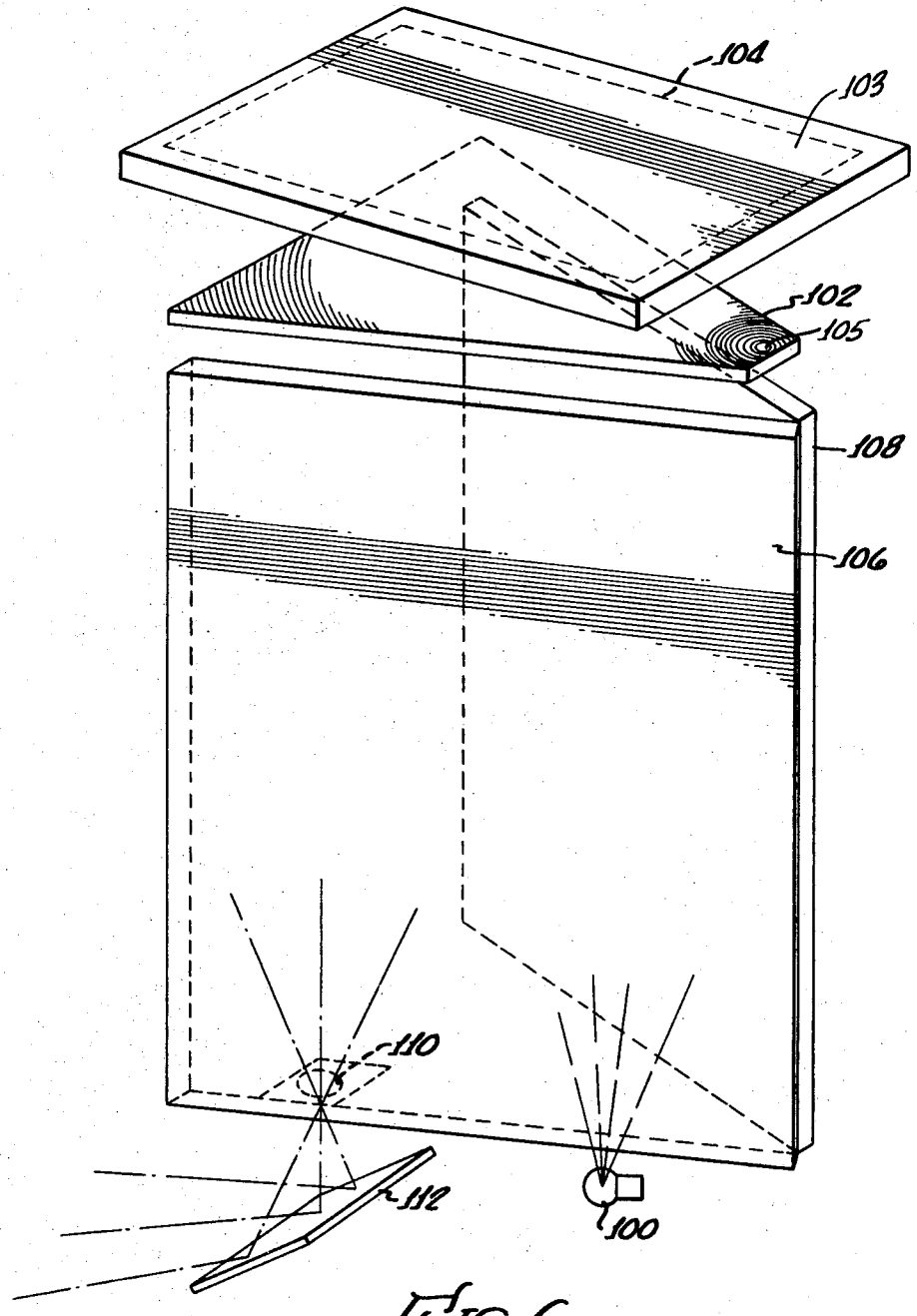


FIG. 6.

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LIGHT DISPLAY INSTRUMENT

BACKGROUND OF INVENTION

This invention relates to a device for producing esthetically pleasing displays of light for viewing alone or in conjunction with music. The device is capable of operation in an artistic manner similar to a musical instrument.

There is an increasing interest in correlating the musical product of contemporary dance band combos with a visual interpretation or effect of the music. Typically the visual effect has been provided by light projecting machines which portray various notes or the tempo of the music in colors or patterns displayed on appropriate surfaces adjoining the musical group. Generally the projectors for such images are operated independently of the musical instruments which make up the group, although some electronic systems have been devised which may be operated in conjunction with musical instruments such as with a piano keyboard. Typically these devices include extensive electrical circuitry or mechanical control systems for varying the projected images in accordance with the music.

A typical projector of this sort includes control circuitry and mechanically operated cam devices for varying the projected light and varying the pattern of the images projected therefrom. A patterned reflective surface is used with such device and distorted into various configurations by the mechanically operated cams or other means mounted on the apparatus and synchronized with the music. Such a device requires a patterned reflector which must be changed for each musical rendition to vary the visual interpretation of the music. Additionally, with this type device the reflector is moved in a controlled manner which depends upon the internal mechanism of the device. Thus, to vary this controlled manner of movement of the reflector member, it is additionally necessary to reprogram the device for synchronization with various musical renditions.

In contrast to this type of a programmed projection apparatus, there is a need for a device which will provide a visual interpretation which corresponds to the tempo, rhythm, or beat of a musical rendition by directly associating the visual projector with the mood or sounds produced by the musical group. To esthetically accomplish such an association, it is necessary to provide a visual projector which can be controlled directly by the musical artist or by a nonmusical member of the group who can develop a skill in visually interpreting the music. The projecting apparatus must be capable of sensitive control of the projected light displays to visually interpret the mood and tempo of the musical number.

It has also been found that in order to better represent the effect of the visual interpretation of the music, it may be necessary to provide a device capable of projecting a three-dimensional image. Such a device provides an interesting supplement to the effect of varying the projected light display.

Additionally, it has been found that there is a need for a visual interpretation imaging projector which provides greater contrast and sensitivity than those devices presently available and which can be readily adapted to changing musical moods, tempos and numbers. Such a device should also be operable independently of the music for displaying reflected light in an artistically controlled manner.

SUMMARY OF INVENTION

This invention is directed to a light displaying device which basically comprises a light source, a stretchable flexible reflecting surface, a means for focusing the light rays as they emanate from the reflective surface and means for varying the path of light as it passes from the flexible reflecting surface through the focal point of the focused light.

Such optical systems including a focusing lens are generally known as Schlieren-type optical systems and have been found to produce exceptional contrasts and characteristics of the projected light when combined with the stretchable, resilient mirror.

The device may utilize a Fresnel lens which is mounted adjacent a resilient, elastically stretchable drum head having a reflecting surface on at least a portion of the inner side thereof. In this instance, the flexible mirror formed by the drum head may be a portion of a percussion instrument such as a snare drum, base drum, kettledrum and the like. The reflected light display is distorted by bending and stretching the resilient drum head during its use as a musical instrument or if the reflecting surface is not a part of a musical instrument it may be used independently by an artist who renders his own visual interpretation of the music. This may be accomplished by deforming the reflective drum head by hand or with suitable force applying means such as cushioned or regular drumsticks. The resilient drum head may be produced from any flexible material having a reflective coating thereon. For example, a high strength polyester film such as the polyethylene terephthalate polymer Mylar, which is formed the condensation reaction of ethylene glycol and terephthalic acid, having a reflective metallized surface thereon may be used. The reflective surfaces may also be applied by coating or lamination. It is also possible to use thin flexible metallic reflectors such as aluminum or stainless but these materials are not as effective as the synthetic films since they are not elastically stretchable by a sufficient distance to provide the variations obtainable with the resin films. Typically the polyethylene terephthalate polymers have elongations of 120 percent and tensile strengths on the order of 25,000 p.s.i.

Colored filters, stenciled patterns, masks and other means may be used at the focal point of the rays emanating from the mirror reflecting surface so that the operator can rapidly change the appearance, intensity and configuration of the projected light in time with the music with which the device is associated. Transparencies may be inserted in the device over or under the lens and projected to provide impressionistic distortable images or the name of the group for example.

In another embodiment of the device of this invention, the flexible mirror can be curved so that the light rays are focused by the configuration of the mirror alone. This may be accomplished by making the flexible reflecting surface as one side of a closed, valved, airtight chamber. The other side may be formed by a flat, transparent, plate glass member. The mirror is deformed into a flattened or oblate hemispheroid by pumping air or an inert gas into the chamber. It has been found that the flexible reflector so formed into a curved mirror still retains its flexibility so that it can be resiliently deflected to distort the reflections emanating therefrom.

The use of a Schlieren-type optical system with an aperture located at the focal point of the reflected rays enhances the contrast between light and dark regions or colored regions of the reflected pattern. Additionally, the sensitivity of the reflecting surface is amplified by the use of the Fresnel lens and the Schlieren optical system. The Schlieren-type system further enables the use of simple means for varying the light pattern which is projected from the device with the use of colored filters, stencils, and other such means. By the use of additional flat reflecting mirrors the flexible mirror can be located at practically any position desired and the produced light pattern can be directed any appropriate direction from the device. For example, the flexible mirror may be in a horizontal plane as a snare drum head or kettledrum head and the emanating light rays may be reflected behind the performer on a screen or wall surface.

Normally the flexible mirror will undergo slight vibrations in response to the tempo and beat of the music. The musical sound produces a vibration of the mirror which varies in amplitude with the intensity of the sound so that the reflected representation is dependent upon the variations of the music with which the device is associated. This effect can be amplified by suitably coupling an electroacoustical transducer such as a speaker to the flexible mirror. The speaker may be driven by signals from live or recorded music. In this instance the vibrational effects of the mirror are amplified by the direct connection of the speaker to the mirror. For example, the

speaker and mirror may form the opposite sides of a closed sound box.

It has also been found that a three-dimensional light pattern can be formed by the use of dual Schlieren-type optical system and appropriate filters. For example two light sources may be employed one of which is red in color the other of which is green in color. The reflected pattern through the Fresnel lens and the Schlieren aperture when viewed with colored glasses is a three-dimensional configuration and produces some unusual effects not observable with other systems. Alternatively, rather than using the red and green colored glasses and filters, crossed polariod filters may be employed with corresponding polariod glasses to produce the double images which are viewed individually by each eye for producing the three-dimensional effect.

Interesting effects are also producible with a modification of the optical system discussed. This modification employs Kaleidoscope flat mirrors which are inserted longitudinally between the light source and the resilient reflecting mirror. By using the Kaleidoscope mirrors, a brilliant display of light patterns may be produced by small variations of the surface configurations of the resilient mirror. These Kaleidoscopic designs literally dance on the projection screen as they appear, disappear and reappear with variations in the intensity and pitch of the associated music. Such a vivid visual representation and interpretation of musical compositions has heretofore not been producible with existing light projection devices.

A feature of the display device of the present invention is to project in a controlled manner a vivid, sharp, esthetic, dynamic light display which may be correlated with music or used independently.

Another feature of the device of this invention is to provide a light display projector which can be artistically controlled by a skilled performer to provide a visual interpretation of associated music.

Yet another feature of the device of this invention is that it can be used to project lettering or images from a transparency onto a remote surface and to subsequently distort the projected image.

Still another feature of this invention is to provide a device which projects a visual representation of a musical composition and which may be included as an integral portion of a musical instrument.

Another feature of the display device of this invention is to provide a light projector which projects a controllable light image and in which the reflecting surface is resilient so that it may be varied in accordance with deformations induced therein and in which the system includes means for rapidly varying the pattern, color and configurations of the projected rays.

Yet another feature of this invention is to provide an esthetically pleasing light display projector which is a sensitive instrument with which artistic performances can be given.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a plan view of a light projecting device constructed in accordance with this invention;

FIG. **2** is a sectional view taken substantially along lines **2–2** of FIG. **1**;

FIG. **3** is a sectional view through a device constructed in accordance with another embodiment of this invention and having a curved flexible mirror without a collimating lens;

FIG. **4** is a diagrammatic view of another arrangement of the optical system for use in a light display device constructed in accordance with this invention;

FIG. **5** is a sectional view through another embodiment of the light display device connected to an electroacoustical transducer for operation thereby; and

FIG. **6** is a diagrammatic view of an optical system for use in a light display device constructed in accordance with another embodiment of this invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to FIG. **1**, it can be seen that in the preferred embodiment the display device cabinet **10** may be of a generally rectangular, boxlike configuration. The cabinet, as best shown in FIG. **2**, includes a top wall **11** and sidewalls **12** which may be tapered to enhance the overall appearance. A thin, resilient, flexible, substantially rectangular mirror **14** is mounted on top of the image display device cabinet **10** on a suitable frame **16**. The mirror may be adhesively attached or clamped to the upper, side and lower surfaces of the frame **16** by suitable means such as bolts **15** which are circumferentially spaced about the mirror for adjusting the tension therein. The frame **16** is mounted about a substantially rectangular opening **17** in the top **11** of the display cabinet **10**. A suitable focusing and collimating lens **18** is disposed subjacent the mirror **12** over the opening **17** of the cabinet. The lens **18** may be any focusing and collimating lens. A Fresnel lens is preferred since it is not as large and heavy as other lenses having comparable focusing power.

A reflecting mirror **20** is fixedly mounted near the lower portion of the cabinet **10** at an acute angle to the bottom of the cabinet. The mirror **20** may be mounted by a fixed frame or brackets **21** for holding it in place. Any suitable means for maintaining the mirror in this fixed position can be used.

As best shown in FIG. **1**, a small, high intensity lamp **22** is mounted at the front portion of the cabinet **10**. The lamp **22** may be a high intensity tungsten filament lamp which is fixed in the front portion of the cabinet by suitable brackets **24**. As shown in FIG. **1**, a cooling fan **26** may be mounted adjacent the lamp **22** with an accompanying small motor **28** for preventing the temperature of the lamp from getting too high. The fan **26** may be mounted on a pivotable arm so that it can be swung in front of the light path from the lamp **22** to the mirror **14**. In this position, the blades of the fan **26** periodically interfere with the light emanating from the lamp **22** to provide an intermittent flashing light stroboscope effect.

The top of the cabinet **10**, near its front edge, is provided with a substantially square projecting aperture **30**. A post **32** is fixedly mounted adjacent the aperture **30**. The post **32** has a vertical section **34** and a horizontal section **36**. The horizontally extending section **36** is adapted to fit into a tubular mount **38** which is connected adhesively or by welding to a reflecting mirror **40** so that when the tubular mount **38** is fixed over the horizontally extending portion **36** of the post **32** the mirror **40** can be revolved about the horizontally extending section **36**. The mirror may be fixed in any desired position by tightening it in place by means of the setscrew **42** which bears against the horizontal portion **36** of the post **32**.

Preferably, the mirror **14** is constructed from a flexible, thin, elastically stretchable or resilient supporting material such as the synthetic high polyester resin polyethylene and terephthalate which is provided with a reflective coating such as aluminum or chromium on the underside thereof. The cabinet **10** may be constructed from any suitable material such as wood, steel, synthetic resins or other like materials. The frame **16** may be constructed from similar materials. Although a rectangular frame is shown, any configuration may be used. For example, the mirror, frame and aperture may be circular.

In operation of the device as shown in FIGS. **1** and **2** the light rays emanating from the high intensity lamp **22** pass through the collimating lens **18** and are collimated before striking the flexible reflecting mirror **14**. From the flexible mirror **14**, they are reflected back through the focusing lens **18** and coverage after reflecting from mirror **20** at the aperture **30** in the top **11** of the cabinet **10**. After passing through their focal point at **30**, the rays intersect reflecting mirror **40** and by the orientation of mirror **40** are directed upon a appropriate displaying surface **41**.

In principle, the patterns of light and their variations which are observed at the surface **41** are produced when the flexible

mirror **14** is distorted by applying pressure to the mirror **14**. The collimated beam impinging on the flexible mirror **14** is initially distorted by reflection from the mirror **14** so that a distorted beam is subsequently imaged on the remote surface. In practice the aberrations of the collimating lens **18** are such that a very poor image of the light source **22** is produced. This is desirable, however, since a great variety of patterns and colors result from the effects of these aberrations in conjunction with the distortions of the flexible mirror **14** which create and intensify the variations of patterns and colors to make an esthetically pleasing light display. Due to the erratic distribution of light at the focus of the lens **18** near aperture **30**, an enhancement of the light patterns generated by the flexible mirror **14** can be produced by introducing various members which modify the optical characteristics of the light passing through the aperture **30**. These members are generally represented by the light modifying member **46** shown in phantom lines. For example the member **46** may be one or more color filters, stencils, polarizing lenses, light masks and other such modifying members.

Attractive distribution and controlled displays of light can be achieved by skillful manipulation of the light at the focus of the light beams near the aperture **30**. These light modifying members **46** operate on various parts of the projected pattern of light in a extremely complex fashion that results in partial multiple images and severely distorted images which are actually shadow projections of the mask, stencil or filter fragments. With some skill the device can be artistically operated so as to follow the beat of music or it can be operated independently to provide a visual interpretation of music being presented simultaneously.

A horizontal slot **47** may be provided through the upper wall **11** for passing a transparency **48** (see FIG. **1**) which has images or lettering thereon. These are visible on the remote surface and may be allowed to remain when the device is operated.

The flexible reflecting mirror **14** can be actually used as a drum head so that distortions are created by a direct result of contact of the drumsticks with the mirror so that the pattern displayed by the projector changes rapidly with the drumbeats. Also this may be accomplished by coating the inner surface of a conventional drum head with a reflective coating or paint and using that surface in the place of mirror **14**. Alternatively the lower outer surface of the drum may be coated with reflective material and used as the flexible mirror in the optical system of FIG. **2**.

Referring now to FIG. **3**, it will be seen diagrammatically that the collimating and focusing lens can be eliminated if the mirror surface itself is curved and capable of focusing the light beams emanating from the light source. SURFACE ITSELF IS CURVED AND CAPABLE OF FOCUSING THE LIGHT BEAMS EMANATING FROM THE LIGHT SOURCE. The embodiment shown in FIG. **3** includes a flexible mirror **50** which is expandable outwardly. This mirror may be constructed from resilient Mylar or from any of the resilient synthetics having a reflective inner surface.

The mirror **50** is mounted on a frame **52** by wrapping the outer edges of the mirror about the frame **52** and adhesively attaching the edges to the frame. The frame **52** is in turn mounted on the upper wall **54** of the cabinet **56** of the device. A lower transparent glass plate **60** is also mounted on the upper wall **54**. A sealing resin such as a caulking compound or a silicone rubber resin is pressed intermediate the frame **52** and the plate **60** to form an airtight chamber between the plate **60** and the upper mirror **50**. The frame **52** and the plate **60** may also be bolted to the wall **54**.

The plate **60** is provided with an integrally attached glass tubular conduit **62** which has a valve **64** mounted therein. The conduit **62** may be connected to a pump or other means for supplying pressurized gases into the chamber defined between the plate **60** and the mirror **50**. Thus, to form the curved focusing mirror **50**, air is pumped into this chamber expanding the mirror **50** outwardly much like a balloon into a curved reflector configuration approximating an oblate hemispheroidal surface.

The light beams for the high intensity light source **66** strike the curved surface **50** and are then focused, after reflecting from reflector mirror **68**, at a point **69** near an aperture **70** in a sidewall **72** of the cabinet **56**. The aperture **70** may be provided with brackets or tracks **73** for mounting suitable masks, filters and other such means for varying the optical characteristics of the light beam as it passes through the aperture **70**. The beam is then projected onto a remote screen or flat surface (not shown) for exhibiting the resultant light patterns. By depressing the mirror **56** either manually or with suitable instruments such as cushioned drumsticks, the image is distorted thus creating the desired pattern on the remote surface.

Again with this embodiment of the invention, it is possible to use as many planar reflecting mirrors such as mirror **68** as is desired and to direct the light pattern to any desired location. Additionally, the aperture **70** may be mounted on an extension in the top wall as shown in FIGS. **1** and **2**, if desired, by the use of an additional reflecting mirror for a different orientation of the planar reflecting mirrors such as **68**. In this embodiment the mirror **68** is preferably fixed in position by suitable brackets **71** which are mounted on the cabinet walls.

With the embodiment shown in FIG. **3**, the produced light pattern may be associated with a musical instrument by connecting the tube **62** to the air exhaust of a percussion instrument or to a wind instrument.

Referring now to FIG. **4**, which illustrates diagrammatically a different embodiment of the optical system for a light display projector, it will be seen that the optical system can be modified to produce a light image which appears three-dimensional when viewed through the proper viewing glasses. In this embodiment, two light sources **80** and **80'** are used. A pair of filters **82** and **82'** are disposed in front of the light sources **80** and **80'** respectively so that light emanating from the light sources **80** and **80'** are imparted with different optical characteristics. For example filter **82** may be a red filter and **82'** a green filter or they may be crossed polaroid filters. The paths of the light rays, as shown by dashed lines **84** and **84'**, are spaced slightly from each other due to the spacing of the light sources **80** and **80'**. These light rays pass through the lens **86** and impinge upon a flexible reflecting mirror **88** which is much the same as mirror **14** as discussed with respect to FIGS. **1** and **2**. The mirror may be distorted by means such as drumstick **90** to cause variations in the light reflected therefrom and unusual images on the viewing screen. As true with all the embodiments shown, different distortions are obtained by contacting different portions of the mirror **88**.

The lens **86** focuses the light at a point within the aperture **91** defined in the projection device. The characteristics of these light beams may be varied at this point by use of appropriate filters and masks as discussed previously. The light beams are projected onto a viewing surface **92** which may be a curved or flat surface capable of displaying the images projected thereon.

By the use of appropriate filters **94** and **94'** the spaced images may be viewed by an observer to provide a three-dimensional effect. The added dimension enables the viewer to observe many unusual distortions and features and other ramifications of the projected light display.

Referring now to FIG. **5**, it will be seen that the light display device of this invention can be connected directly to an electroacoustical transducer such as the speaker **95**. For example the speaker **95** may have an annular mounting adapter flange **96** around its outer edge. The lower edge of the adapter **96** may be mounted on an annular felt or rubber mounting pad **97** which fits on top of the flexible mirror **14'** over the mounting frame **16'**. The device constructed in accordance with this embodiment of the invention produces visual images which vary in accordance with the pressure produced on the flexible mirror **14'** by means of the sound waves emanating from the speaker **95**. The speaker **95** may be connected to a microphone for use with a live musical group or may be con-

nected to a recorder for correlating the image distortions with recorded music.

The optical system shown in FIG. 6 may be included in any of the embodiments discussed for enhancing the image display pattern. In this optical arrangement a high intensity light source **100** is spaced from a focusing and collimating lens **102** which may be the Fresnel-type lens discussed previously. The lens **102** is mounted subjacent a resilient, flexible light reflecting mirror **103** stretched over a frame **104**.

A pair of planar Kaleidoscope mirrors **106** and **108** are disposed along the light path between light source **100** and the Fresnel lens **102** at an acute angle to one another. An aperture **110** is provided in one wall of the projector cabinet at the focal point of the lens **102**. Light emanating through aperture **110** may be directed to an appropriate display surface my means of a planar reflecting mirror **112**.

If a Fresnel lens is used for the lens **102** its center of curvature **105** should be positioned just above the apex of the angle formed by the intersection of the mirrors **106** and **108**. As is known the Kaleidoscopic pattern is divided into six segments. It has been found that these segments will be of equal magnitude if the lens is so positioned.

These elements of the optical system are included in a cabinet such as cabinet **10** discussed with respect to FIGS. **1** and **2**. In this instance the mirrors **106** and **108** may be fixedly mounted by means of brackets along their vertical edges or at their top and bottom horizontal edges whichever is most convenient.

The use of the Kaleidoscope mirrors **106** and **108** produces an endless variety of unusual patterns in response to deformation of the flexible mirror **103** and the use of light modifying members at the aperture **110**.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by Letters Patent is:

I claim:

1. An apparatus for projecting a random light display comprising:
- a high intensity light source;
- a reflective surface disposed a spaced distance away from said light source and being resilient so that it deforms when a force is applied thereto for reflecting distorted light images from said surface;
- a Fresnel lens positioned with respect to said reflective surface so as to intercept light rays from said reflective surface for focusing said light reflected from said reflective surface; and means for directing said reflected light to a remote location after said reflected light passes through the focal point.

2. An apparatus as defined in claim **1** wherein said light source and said light source and said reflective surface are mounted within a cabinet having sidewalls and opposing top and bottom walls and including means located at the focal region of said Fresnel lens for defining an aperture through which said light passes and means at said aperture for verifying the properties of said reflected light.

3. An apparatus as defined in claim **2** further including means adjacent said Fresnel lens for maintaining an image carrying transparency in the path of reflected light so that said image is projected to said remote location.

4. An apparatus as defined in claim **2** wherein said means for varying the reflected light properties comprise patterned masks for controlling the configuration of light passing through said aperture.

5. An apparatus as defined in claim **1** wherein said reflective surfa ce is associated with the head of a percussion instrument for movement therewith.

6. An apparatus as defined in claim **1** wherein said surface comprises synthetic, elastically stretchable material having a reflective coating on at least a portion thereof.

7. A apparatus as defined in claim **6** wherein said synthetic material is a polyethylene terephthalate polymer.

8. An apparatus as defined in claim **1** and further including a fan means for cooling said light source, said fan means being interposed between said light source and said reflective surface so that said fan means periodically interferes with the light passing from said light source to said reflective surface.

9. An apparatus for projecting a random light display comprising:
- a high intensity light source;
- at least one curved reflective surface disposed a spaced distance away from said light source and being resilient so that it deforms when a force is applied thereto for reflecting distorted light images from said surface and for focusing said light reflected from said resilient reflective surface;
- means at the focal region of said at least one curved reflective surface for defining an opening through which said light passes; and
- means for directing said reflected light to a remote location after said reflective light passes through a focal point.

10. An apparatus as defined in claim **9** wherein said curved reflective surface for focusing said reflected light comprises an oblate hemispheroidal curved portion on said reflective surface.

11. An apparatus for projecting a random light display comprising:
- a high intensity light source;
- a reflective surface disposed a spaced distance away from said light source and being resilient so that it deforms when a force is applied thereto, said surface forming one side of an airtight chamber and a spaced, opposing transparent member forming the other side thereof, said chamber further including means for increasing the pressure in said airtight chamber to cause the reflective surface to balloon outwardly into a hemispheroidal configuration for directing light rays reflected therefrom to a focal point; and
- means for directing the reflected light to a remote location after said reflected light passes through the focal point.

12. An apparatus as defined in claim **11** wherein said chamber includes means for providing communication with a musical instrument for varying the configuration of said surface in accordance with the pressure generated by said musical instrument.

13. A apparatus as defined in claim **1** further including a second light source disposed adjacent said light source and a pair of filters, one of said filters being interposed between each of said light sources and said reflective surface and said filters having different optical characteristics so that the light beams reflected from said reflective surface are of two different optical characteristics and when viewed through appropriate filtering members provide a three-dimensional image.

14. An apparatus as defined in claim **1** further including a pair of substantially planar mirrors disposed at an acute angle to each other and extending longitudinally intermediate said light source and said reflective surface to define an apparatus which provides a Kaleidoscope light display.

15. An apparatus as defined in claim **1** wherein said light source comprises a high intensity electric lamp and said reflective surface comprises a high strength polyester film having a reflective substance coated on one surface thereof, said film being stretched over a frame member so as to be resiliently movable when a pressure is applied to said film; said apparatus further including a flat reflective mirror for directing the light rays passing through said Fresnel lens to an aperture defined in said apparatus at the focal point of said light rays; and said apparatus further including means for directing the light rays passing through said aperture onto a remote member.

16. An apparatus as defined in claim 1 wherein said reflective surface communicates with an electroacoustical speaker through a closed chamber so that the sound waves from said speaker cause distortions of said reflective surface and produce variations in the light image reflected.

17. Means for projecting continuously changing, distorted light displays which comprise:

a reflective member comprising an elastically stretchable supporting material having a reflective surface physically connected to said supporting material so that said reflective surface moves in correlation with the movement of said supporting material, said reflective member being adapted to be deformed in a controllable manner in conjunction with a force applied to said reflective member from an external source, said reflective member deforming in accordance with localized forces applied to different parts of the supporting material so as to produce distorted, reflected light rays from said reflective member;

a reflective surface means for focusing the light rays reflected from said reflective member at a focal point remote from said reflective member;

means near said focal point for varying the optical characteristics of said light rays emanating from said reflective member; and

means for displaying said light rays as a continuously changing display on a remotely located surface.

18. An apparatus for projecting a random light display comprising:

a high intensity light source;

means defining an opening;

a resilient reflective surface disposed a spaced distance away from said light source and being stretched over said opening defining means so as to be stretchable by application of localized pressure;

a reflective surface intermediate said resilient reflective surface and a remote location for intercepting light reflected from said resilient surface and focusing said light at a point intermediate said reflective surface and said remote location; and

an aperture located proximate the focal point of the light for varying the light rays emanating from the focal point.

19. An apparatus as defined in claim 9 further including means at said opening for varying the properties of said reflected light.