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Lunde et al.

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(54) **APPARATUS FOR PRODUCING A FIRE SPECIAL EFFECT**

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(51) **Int. Cl.**

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F21S 10/04	(2006.01)
A63J 25/00	(2009.01)
F17C 7/04	(2006.01)

(52) **U.S. Cl.**

CPC ***A63J 5/025*** (2013.01); ***A63J 5/023*** (2013.01); ***A63J 25/00*** (2013.01); ***F17C 7/04*** (2013.01); ***F21S 10/04*** (2013.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

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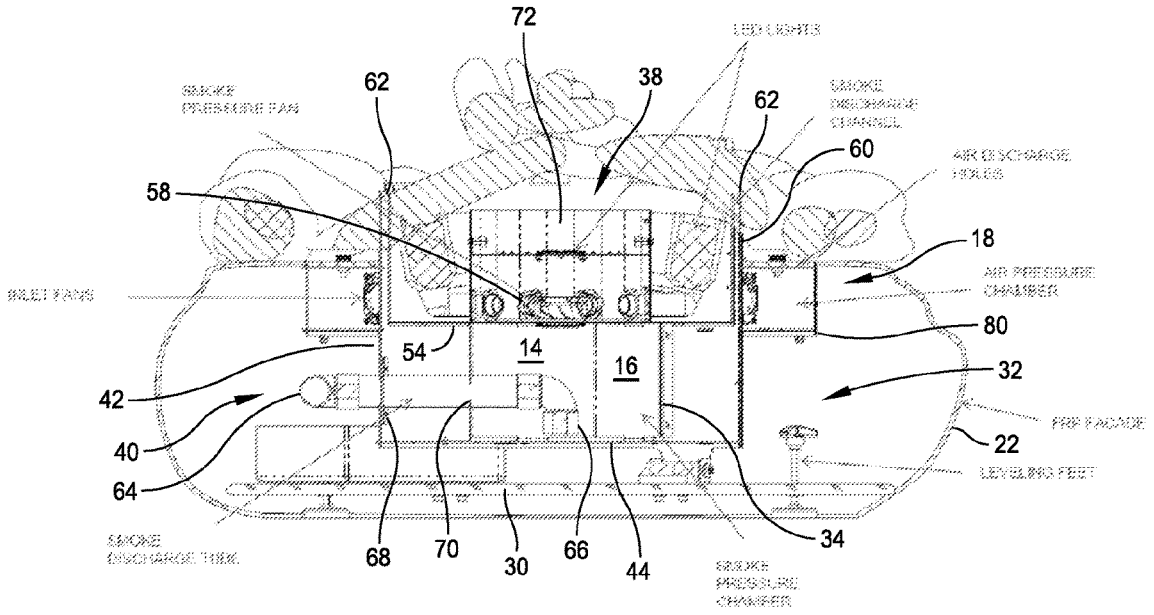
(57) **ABSTRACT**

The invention is directed to an apparatus for use in producing a simulated flame/fire effect using steam or theatrical smoke. In one embodiment, the apparatus includes an first chamber for receiving steam or theatrical smoke, an annular second chamber that surrounds the first chamber and defines an annular closed-loop slot through which a closed-loop sheet of steam or theatrical smoke exits, a passageway for conveying smoke from the first chamber to the annular second chamber, a lighting structure for projecting light onto the steam or theatrical smoke exiting the annular slot, and an air modulator for modulating the position of the steam or theatrical smoke exiting the slot.

20 Claims, 10 Drawing Sheets



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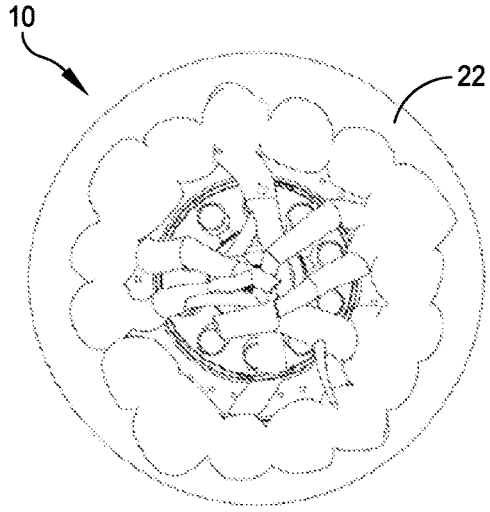


FIG. 1A

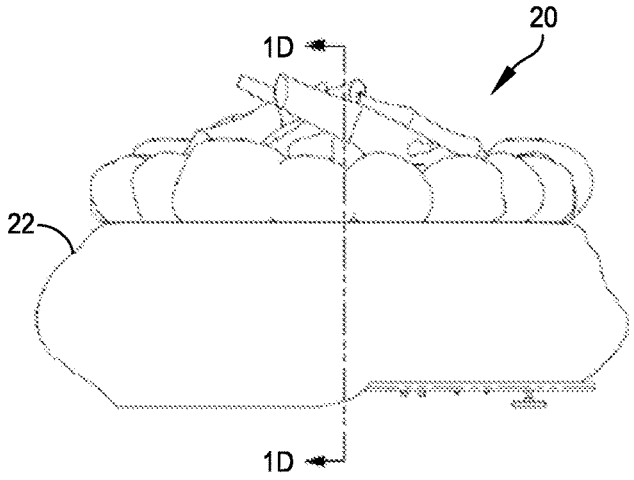


FIG. 1B

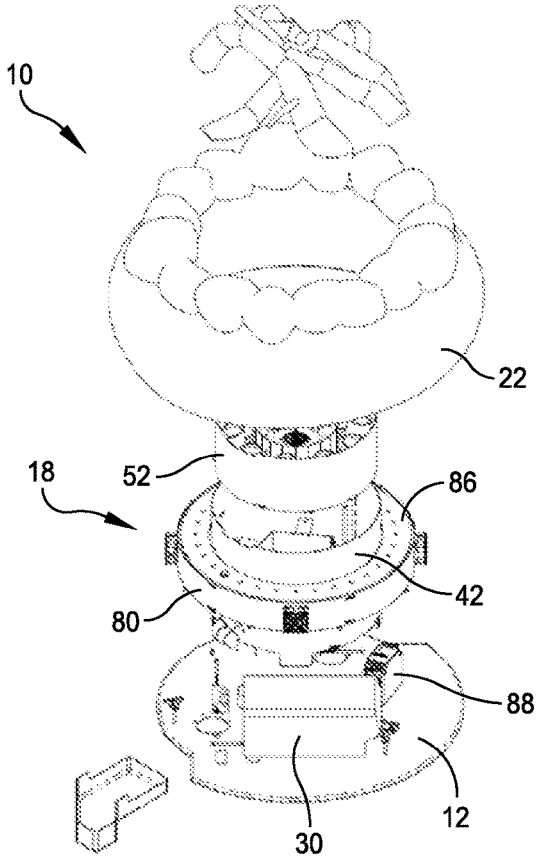


FIG. 1C

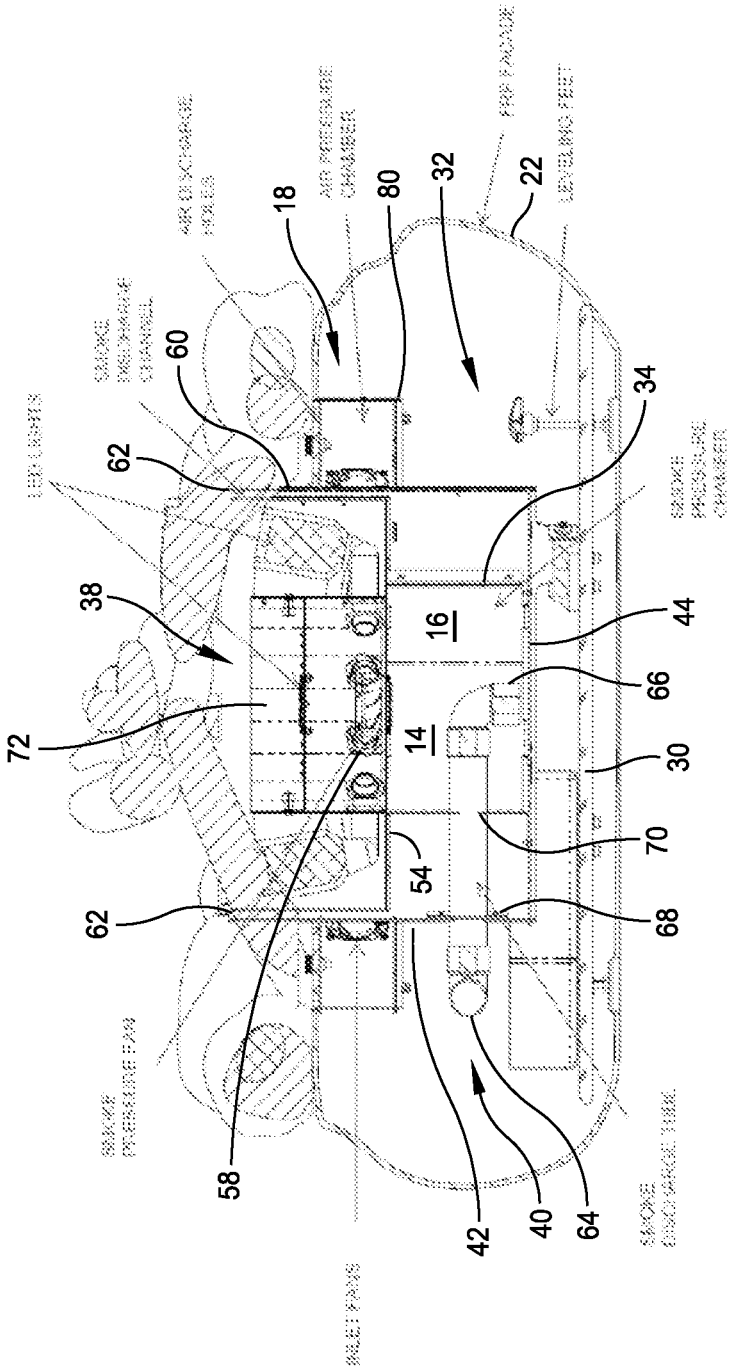


FIG. 1D

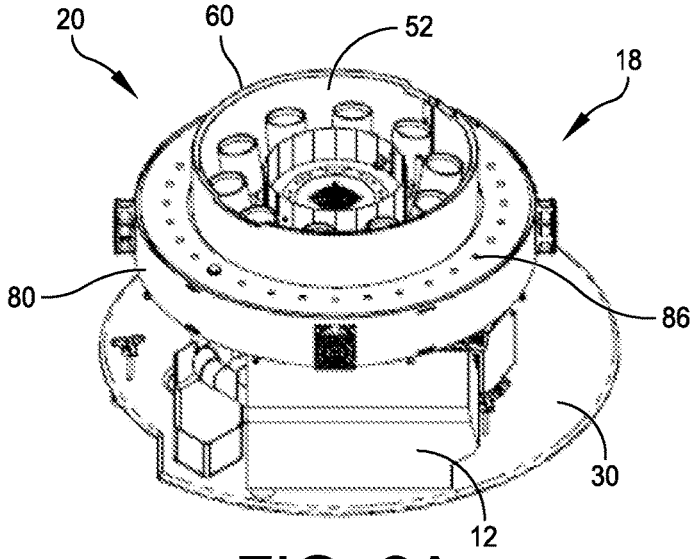


FIG. 2A

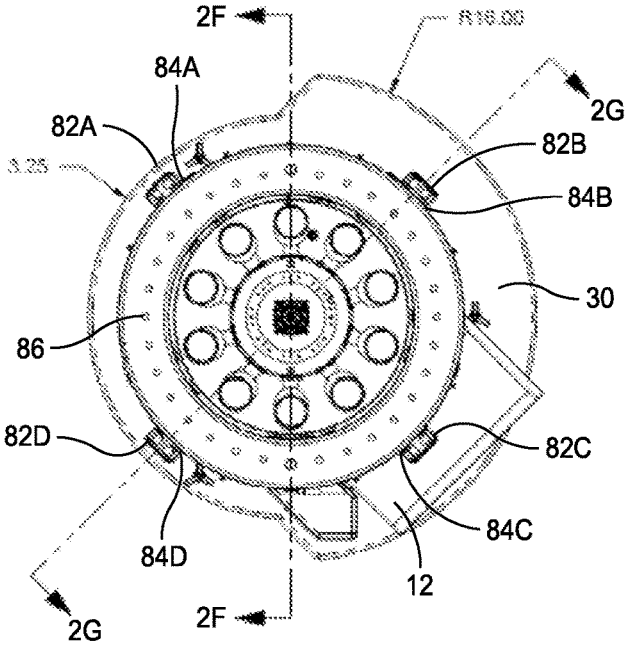


FIG. 2B

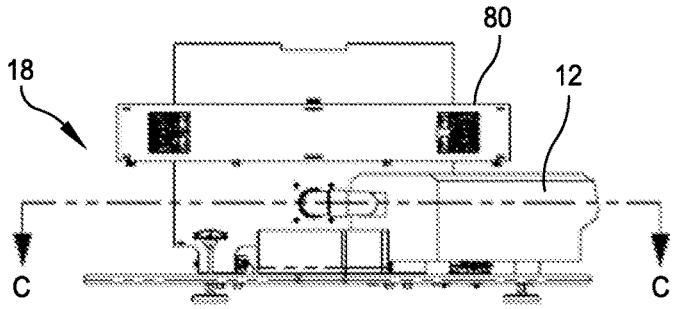
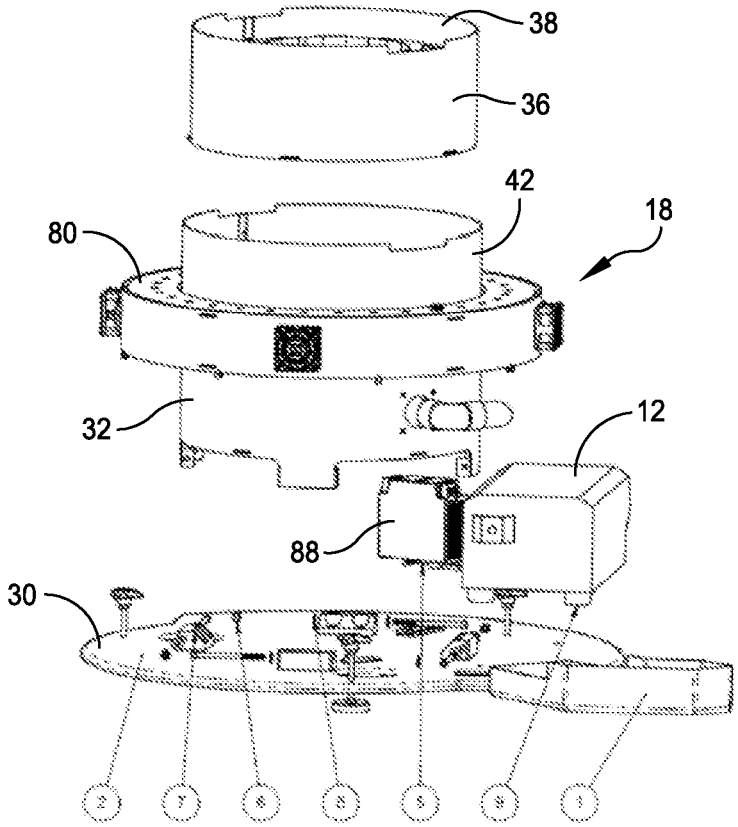


FIG. 2C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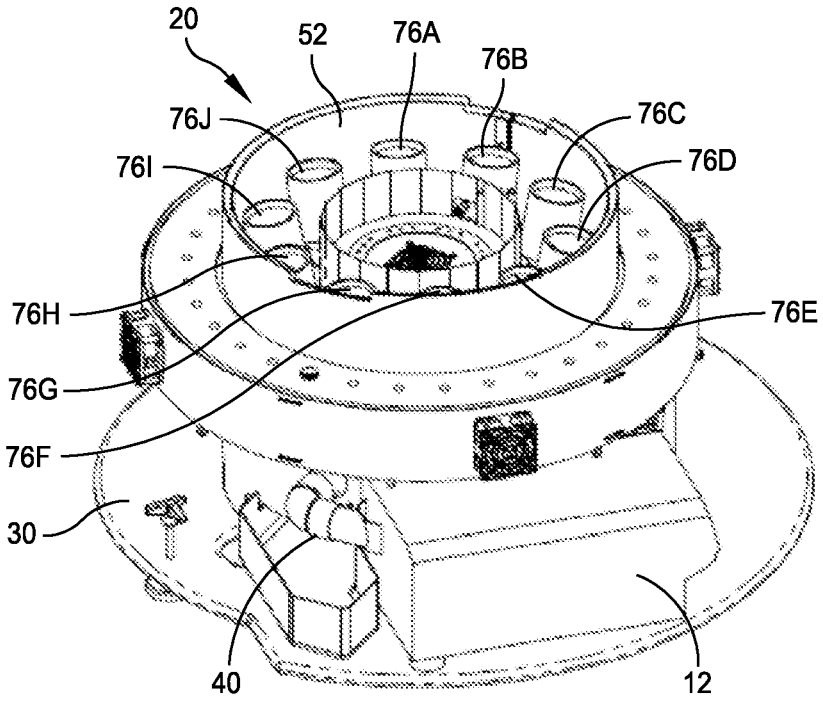
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FIG. 2E

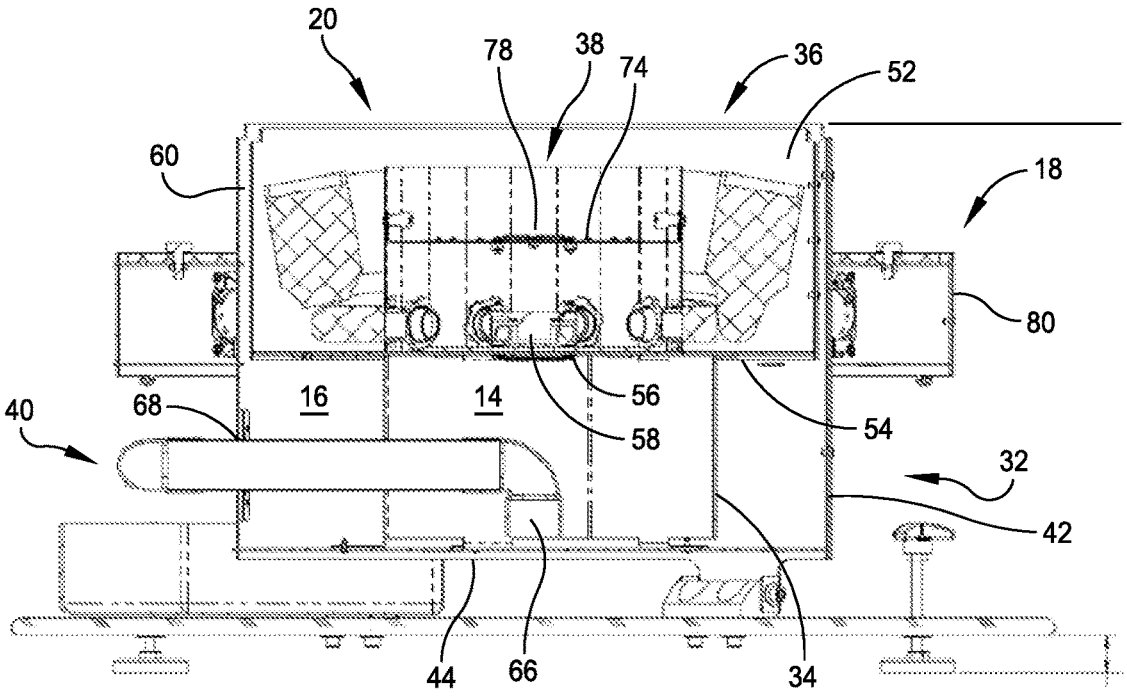
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FIG. 2F

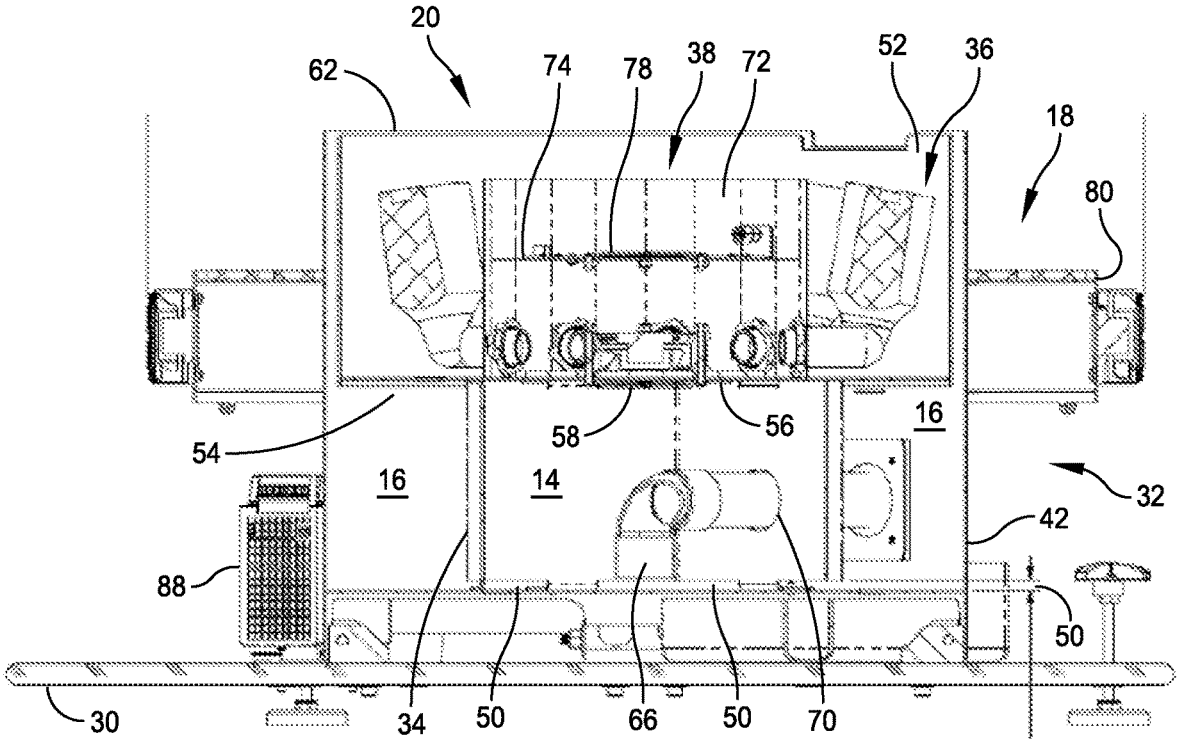
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FIG. 2G

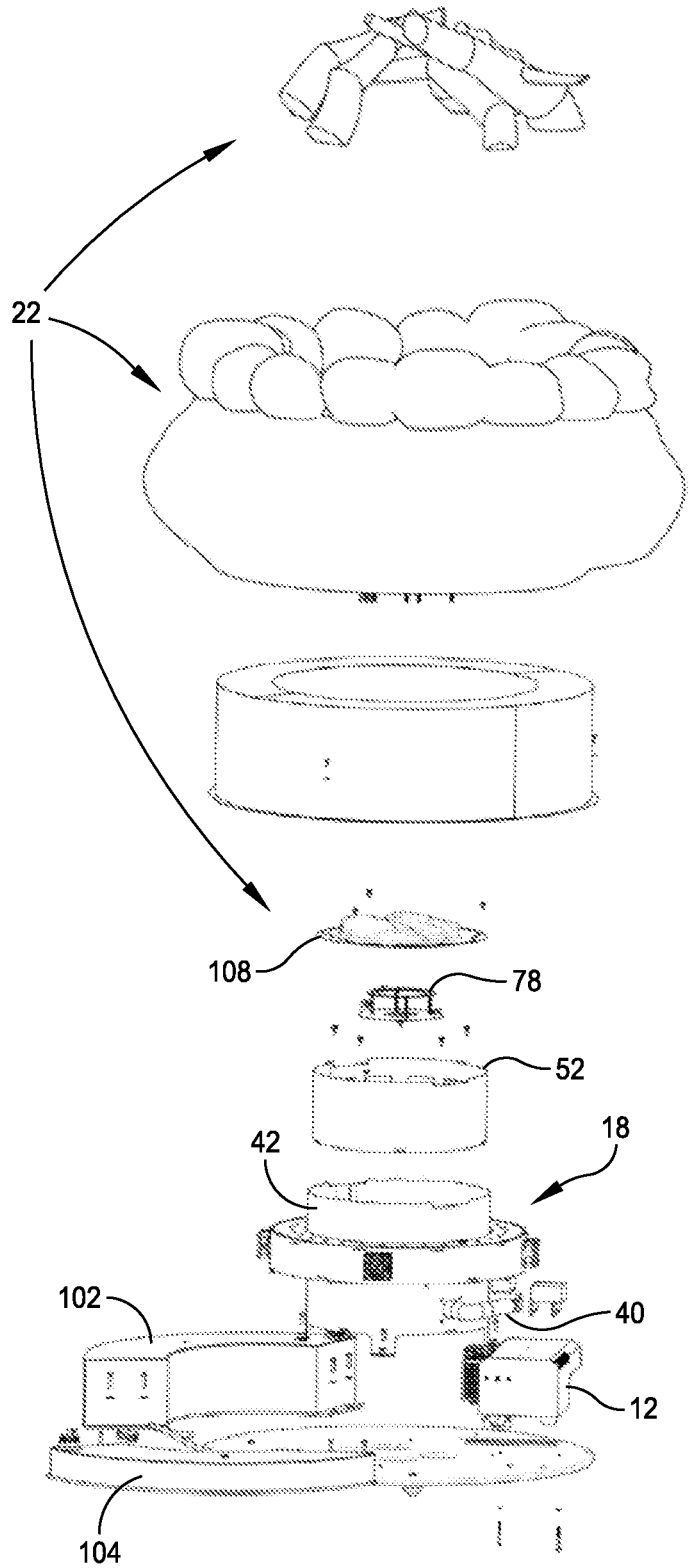

FIG. 3A

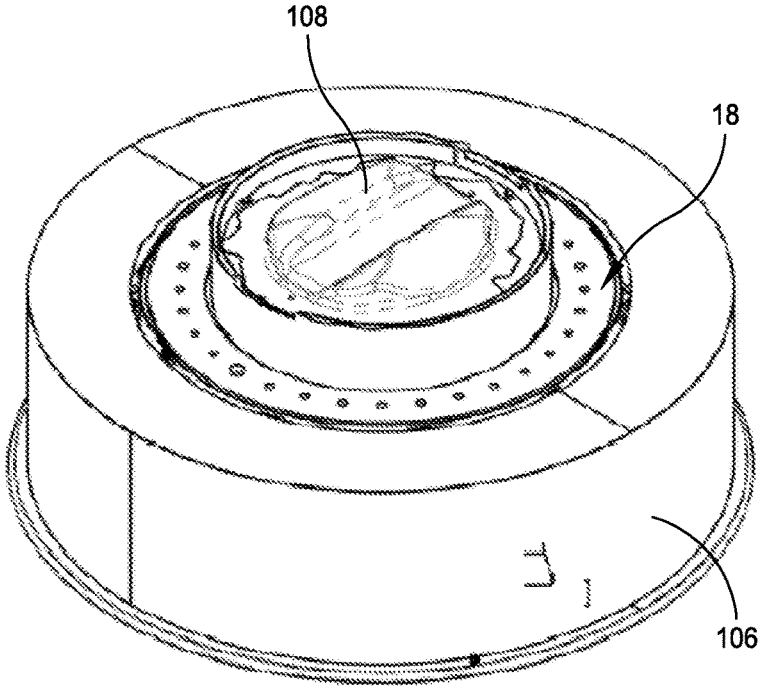
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FIG. 3B

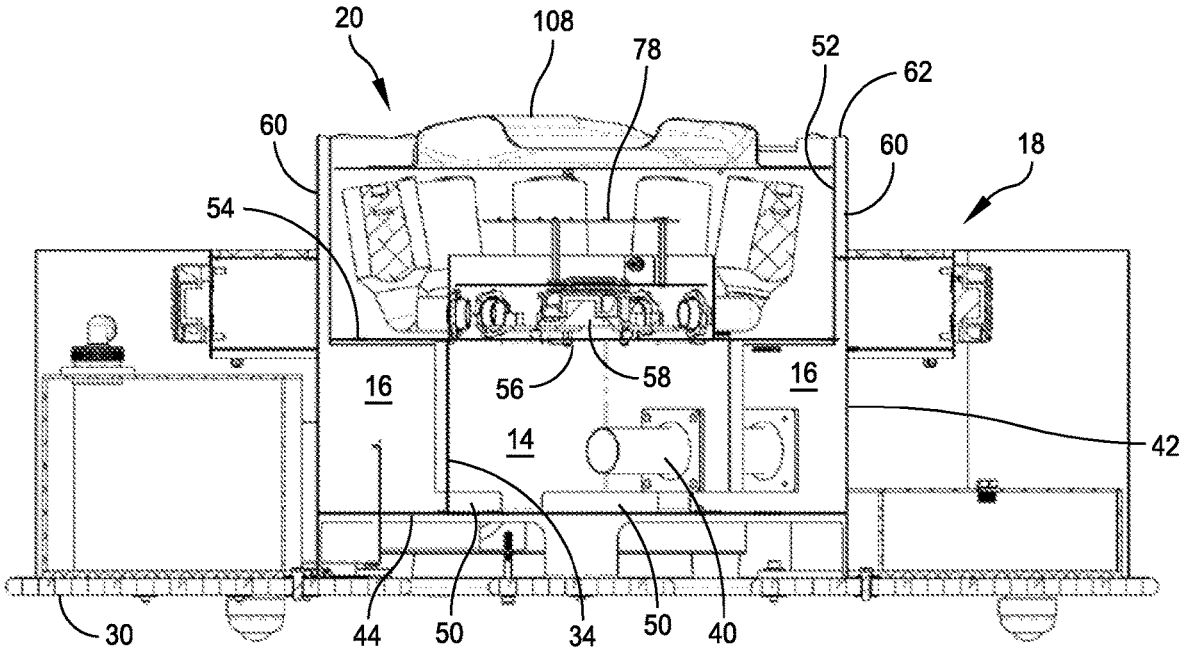
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FIG. 3C

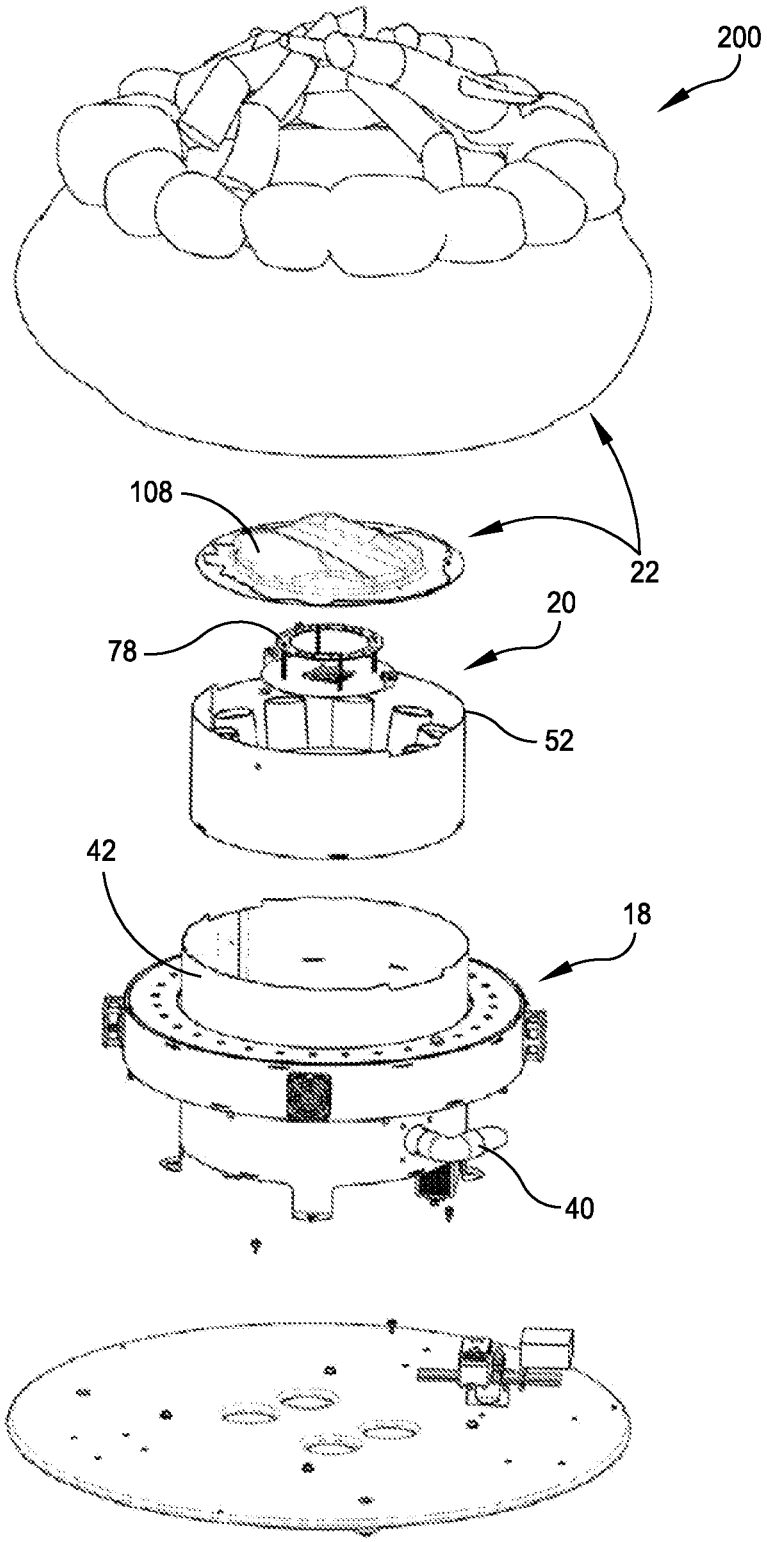

FIG. 4A

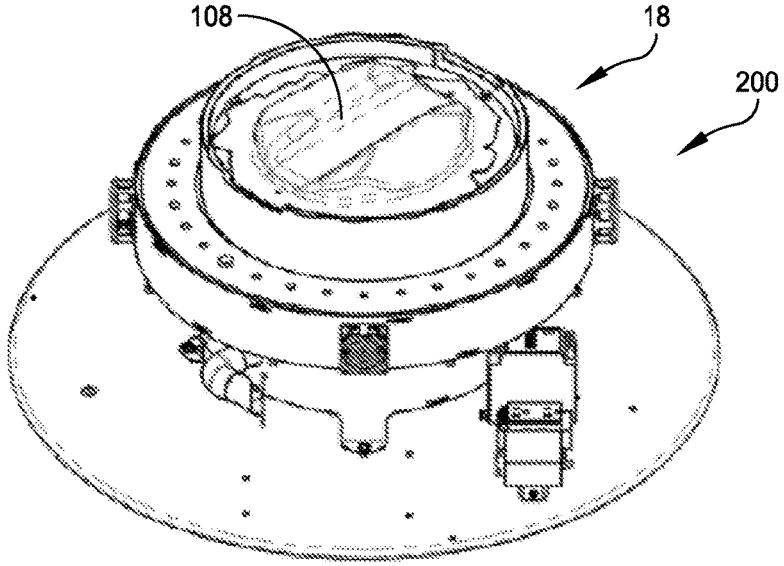

FIG. 4B

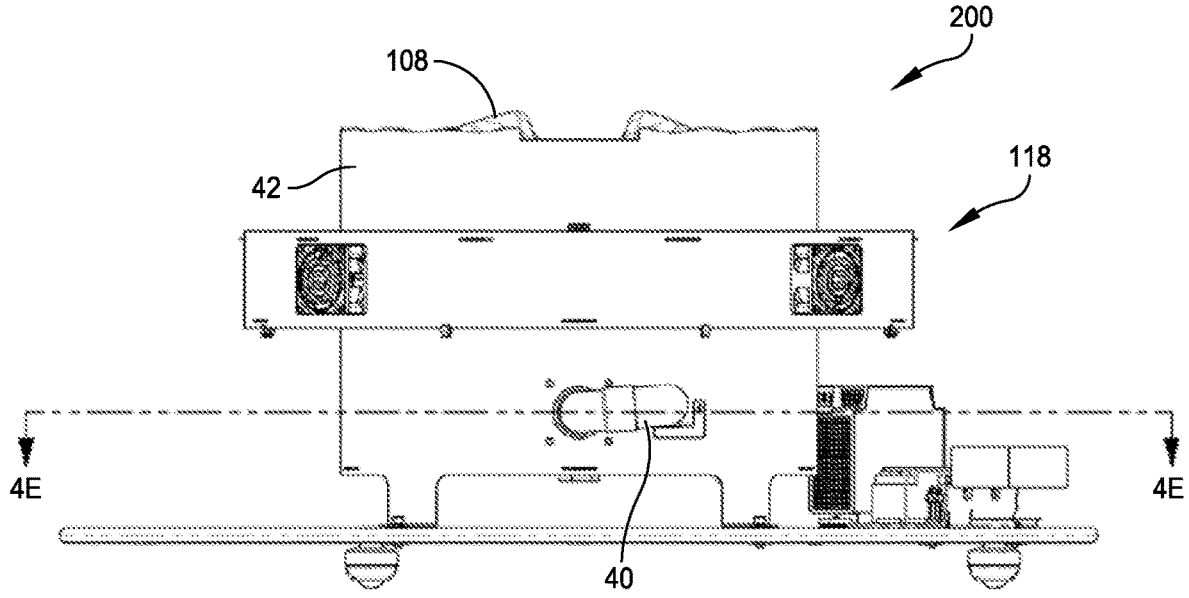

FIG. 4C

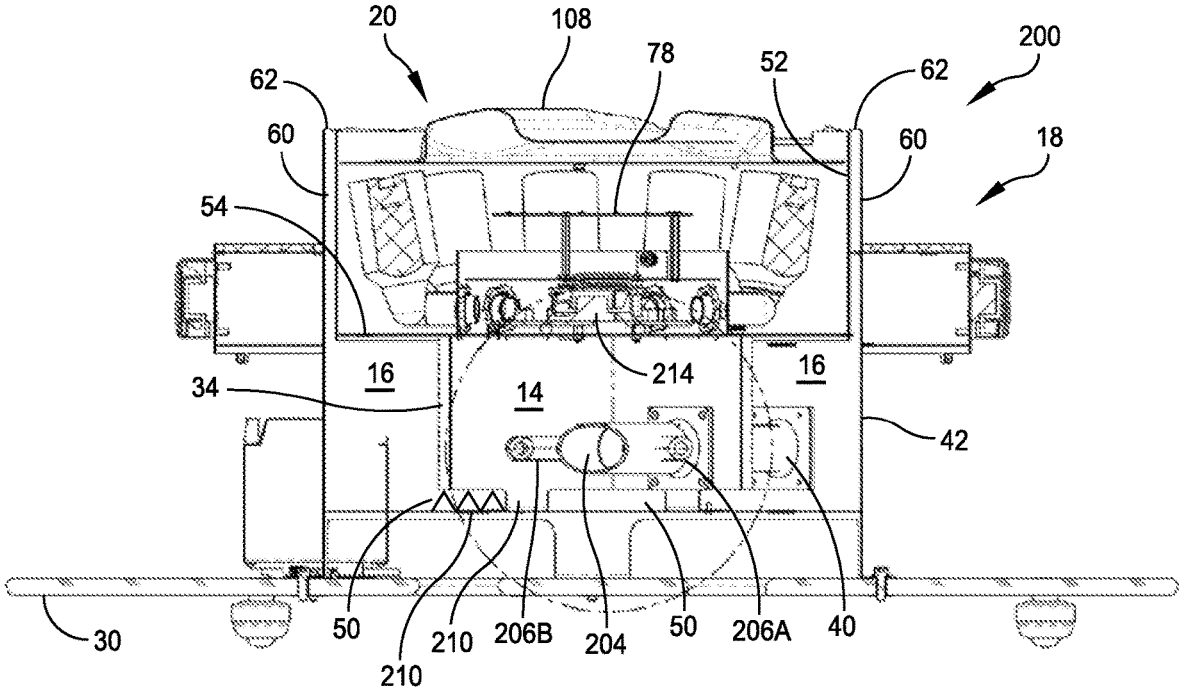
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FIG. 4D

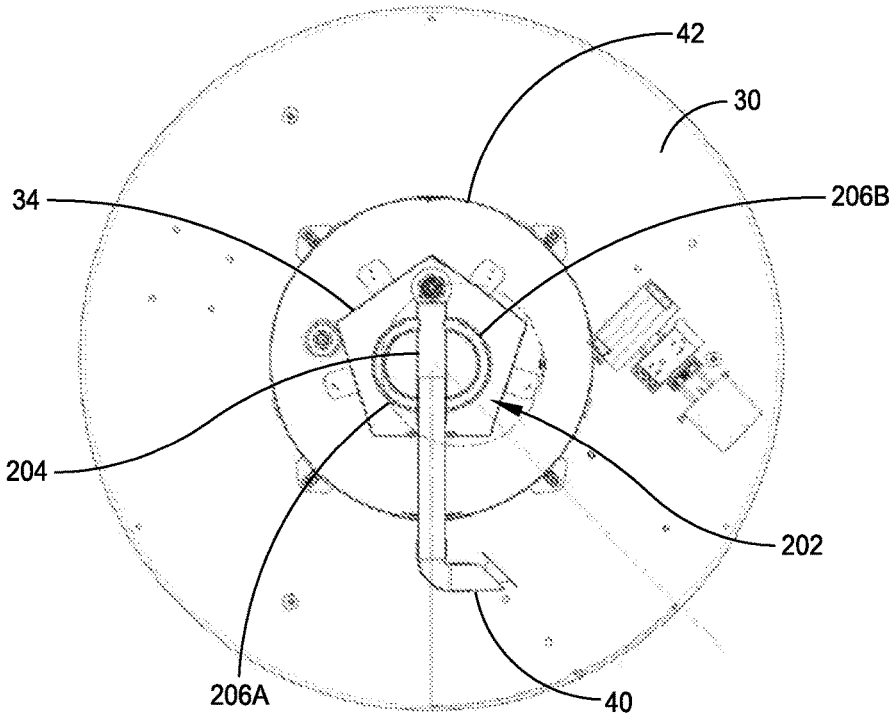
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FIG. 4E

APPARATUS FOR PRODUCING A FIRE SPECIAL EFFECT

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. provisional patent application No. 62/585,483, entitled "Simulated Fire Effect Using Theatrical Smoke" and filed on Nov. 13, 2017, which application is incorporated by reference into this application in its entirety.

FIELD OF THE INVENTION

The present invention is directed to a special effect device and, more specifically, to a special effect for producing a simulated flame or fire effect.

BACKGROUND OF THE INVENTION

The use of a simulated fire or flame is desirable in many applications. For instance, in many theme park attractions (e.g., volcano, battle scene and disaster scenes), the use of a simulated flame or fire is preferred relative to a real flame or fire for a number of reasons. For instance, a real flame or fire must typically be located a substantial distance from an audience to prevent members of the audience from coming into contact with the fire or flame. Further, with respect to attractions that are located indoors, a real flame or fire produces heat and smoke that typically require additional air conditioning and ventilation. In contrast, several types of simulated flame or fire effects can be located close to an audience and do not typically impose the air conditioning and ventilation requirements of a real flame or fire.

There are many types of devices for producing simulated flames or fire. For example, one type of device blows strips of colored material, such as silk, up into the air and shines an appropriately colored light onto the strips. From a distance, these devices provide a reasonably convincing simulated flame or fire. At the other end of the spectrum are devices that provide a television or video monitor with a signal of a pre-recorded fire or flame. Such devices are impractical in theme park applications that require a flame or fire that extends over a distance that is greater than the typical width and height of a video monitor or television. Yet a further type of device involves the use of a screen of atomized water and the projection of an image or light on the screen that creates the illusion of a flame or fire. Also known are devices that generate use theatrical smoke or steam in creating the illusion of a fire or flame. Among these devices are the devices disclosed in U.S. Pat. Nos. 6,685,574, 6,802,782, 6,953,401, and 7,762,897.

SUMMARY OF THE INVENTION

The invention disclosed herein is directed to an apparatus for creating a fire or flame special effect using steam or theatrical smoke where the apparatus needs to facilitate the illusion of a fire/flame over a relatively large two-dimensional area. In such an application, a relatively even distribution of steam or theatrical smoke is required to produce a convincing fire/flame effect. An example of an application requiring a simulated fire/flame needed over a relatively large two-dimensional area and a relatively even distribution of steam or theatrical smoke to be convincing is a simulated campfire that is two to three feet in diameter.

In one embodiment, the apparatus includes a pipe for providing a stream of gas, first chamber for receiving a stream of gas the pipe and a second chamber that surrounds the first chamber. As such, the second chamber can be characterized as an annular chamber. The second chamber also defines an annular closed-loop slot for directing a closed-loop sheet of gas into the ambient atmosphere. As should be appreciated, the sheet of gas has a somewhat opaque characteristic that, when light is projected onto the sheet of gas, reflects that light and thereby facilitates the creation of a simulated flame or fire. In this regard, two gaseous substances that can be used to produce the simulated flame or fire effect are steam and theatrical smoke. The apparatus also includes a passageway for conveying the gas from the first chamber to the second chamber. The passageway can also be characterized as being annular and can be a single continuous passageway or comprised of multiple sub-passageways that define a closed-loop. In operation, the apparatus causes a relatively even steam or theatrical smoke received in the first chamber to pass through the passageway and through the annular closed-loop slot. A lighting structure that creates the appropriately colored light or lights is projected onto the closed-loop sheet of gas that exits the closed-loop annular slot to establish the desired color or colors for the fire/flame effect. For instance, in the case of a simulated campfire, the lighting structure will typically project red and yellow colors onto the closed-loop sheet of gas.

Depending on the application, the closed-loop sheet of gas may need to be modulated to create a convincing simulated flame/fire effect. In one embodiment, the apparatus further includes an air modulator for blowing air at the closed-loop. In a particular embodiment, the air modulator includes a third annular chamber that is positioned adjacent to the closed-loop annular slot and defines a plurality of orifices that are positioned to direct streams of air at the closed-loop sheet of gas exiting the closed-loop annular slot. The air modulator employs one or more fans to force air into the third annular chamber and out through the orifices. In another embodiment, the apparatus includes a "skin" with one or more portions of the skin positioned adjacent to closed-loop annular slot so as to affect movement of the gas exiting the slot. For instance, in the case of a "campfire skin," the skin may include simulated logs or rocks that are positioned adjacent to the annular closed-loop slot and affect the manner in which those portions of the annular sheet of gas adjacent to the logs or rocks move after exiting the annular closed-loop slot.

In an embodiment of the apparatus in which theatrical smoke is employed in creating the simulated flame/fire effect, the relatively even distribution of the flow of the theatrical smoke from the first chamber to the second chamber has been found to be enhanced by positioning the end of the pipe that injects the theatrical smoke into the first chamber such the smoke is directed at the bottom surface of the chamber. Further, a fan is employed to facilitate the movement of the theatrical smoke out of the first chamber, through the passageway and into the second chamber. In contrast, in an embodiment of the apparatus in which steam is employed in creating the simulated flame/fire effect, the relatively even distribution of the flow of the steam from the first chamber into the second chamber has been found to be enhanced by directing the steam away from the bottom surface of the chamber. In a particular embodiment, the steam is also distributed within the first chamber by employing a manifold with multiple orifices for injecting the steam at various locations throughout the first chamber. In a

particular embodiment, the manifold is located farther from the bottom surface of the first chamber than the passageway.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1**A and **1**B respectively are a top view and side view of an embodiment of a special effect device for producing a simulated flame or fire effect using theatrical smoke to simulate a campfire;

FIG. **1**C is an exploded view of the embodiment of the special effect device shown in FIGS. **1**A and **1**B;

FIG. **1**D is a cross-sectional view of the embodiment of the special effect device shown in FIGS. **1**A and **1**B;

FIGS. **2**A-**2**C respectively are perspective, top, and side views of the special effect device shown in FIGS. **1**A and **1**B without the exterior "skin" that causes the device to appear as a campfire;

FIG. **2**D is an exploded view of the special effect device, as shown in FIGS. **2**A-**2**C;

FIG. **2**E is a perspective view of the special effect device shown in FIGS. **2**A-**2**C;

FIGS. **2**F-**2**G are cross-sectional views of the special effect device, as shown in FIGS. **2**A-**2**C;

FIGS. **3**A-**3**C respectively are an exploded view, perspective view, and cross-sectional view of a second embodiment of a device for creating a flame effect using theatrical smoke; and

FIGS. **4**A-**4**E respectively are an exploded view, perspective view, side view, side cross-sectional view, and vertical cross-section view of an embodiment of device for creating a flame effect using steam.

DETAILED DESCRIPTION

With reference to FIGS. **1**A-**1**D and **2**A-**2**G, an embodiment of a special effect device **10**, which is hereinafter referred to as device **10**, that uses theatrical smoke to produce a simulated flame or fire effect is described. Generally, the device **10** includes a theatrical smoke generator **12**, a smoke distributor and pressurizer chamber **14** (hereinafter chamber **14**), a smoke curtain chamber **16** (hereinafter chamber **16**), a smoke curtain disrupter system **18**, a light system **20**, and an outer skin **22** that conveys the appearance of the wood and rocks that might be associated with a campfire. Generally, operation of the device **10** involves the production of theatrical smoke by the smoke generator **12** and the reception of the produced smoke in the chamber **14**. The chamber **14** operates to distribute the smoke over a 360° angular extent and apply pressure to the smoke so as to move the smoke into the smoke curtain chamber **16**. The smoke curtain chamber **16** operates so that the smoke received from the chamber **14** is directed so as to produce a relatively thin curtain of upwardly extending smoke over a 360° angular extent. The smoke curtain disrupter system **18** operates to produce moving air that is applied to the thin curtain of upwardly extending smoke produced by the smoke curtain chamber **16** so as to disrupt the curtain of smoke, thereby causing the smoke to move in a manner similar to the movement associated with an actual flame or fire. The light system **20** produces light of a desired color or colors that is applied to the curtain of smoke exiting the chamber **16** so as to simulate the color or colors of an actual fire or flame. For the simulation of a campfire, the light system **18** produces red-orange light and yellow light with the red-orange light applied to the lower portion of the smoke curtain and the yellow light applied upper portion of the smoke curtain. However, a different color or combination of colors can be produced and applied to the curtain of smoke, if needed or desired.

With continuing reference to FIGS. **1**A-**1**D and **2**A-**2**F, the device **10** is described in greater detail. The device **10** includes a base **30** for engaging a ground surface and supporting other elements of the device, an outer housing **32** that is supported by the base **10**, a lower inner housing **34** that is supported by the outer housing **32**, an upper inner housing **36**, a light housing **38**, and a conduit **40** for transporting theatrical smoke from the smoke generator **12** into the chamber **14**. The outer housing **32** includes a side wall **42** and a bottom wall **44**. The lower inner housing **34** has five side walls **48**A-**48**E and is supported such that bottom edge of each of the side walls is spaced a small distance from the bottom wall **44** of the outer housing **32** so as to define a gap **50**. The upper inner housing **36** includes a side wall **52** and a bottom wall **54**. The bottom wall **54** defines an opening **56** for accommodating a fan **58** that is used to pressurize the housing **14**.

The smoke distribution and pressurizer chamber **14** is formed from the inner lower housing **34**, a portion of the bottom wall **44** of the outer housing **32**, and a portion of the bottom wall **54** of the upper inner housing **36**.

The smoke curtain chamber **16** if formed by the side wall **42** of the outer housing **32**, a portion of the bottom wall **44** of the outer housing **32**, the side walls **48**A-**48**E of the lower inner housing **34**, the side wall **52** of the upper inner housing **36**, and a portion of the bottom wall **54** of the upper inner housing **36**. A portion of the side wall **42** of the outer housing **32** and the side wall **52** of the upper inner housing **36** define a slot **60** with a 360° extent and an outlet port **62**. In operation, the slot **60** receives theatrical smoke and conforms the smoke so that the smoke exiting the outlet port **62** extends upwardly in a thin curtain in the absence of obstructions above, or disturbances to the atmosphere above, the outlet port **62**.

The conduit **40** extends from a first end **64** that is operatively engaged to the smoke generator **12** to a second end **66** that is disposed in the chamber **14**. In the illustrated embodiment, the conduit **40** extends through a first hole **68** in the outer housing **32** and through a second hole **70** in the lower inner housing **34**. If needed or desired, any gap between the conduit **40** and the outer housing **32** and any gap between the conduit **40** and the lower inner housing **34** can be closed with sealant, gaskets, or other devices known to those skilled in the art. The second end **66** of the conduit **40** is disposed in the chamber so that the theatrical smoke exiting the conduit is directed at the bottom wall **44** of the outer housing **32** and directed at a location that is approximately the geometric center of the pentagon defined by the sides wall **48**A-**48**E of the lower inner housing **34** or the circle defined by the side wall **42** of the outer housing **32**.

The light housing **38** includes a side wall **72** and a porous cross-wall **74** that each serve to support a number of light fixtures. More specifically, the light housing **38** supports high-intensity LED light fixtures **76**A-**76**J that are substantially located between the light housing **38** and the side wall **52** of the upper inner housing **36**. Further, the porous cross-wall **74** of the light housing **38** supports one or more high-intensity LED light fixtures **78**. The porous cross-wall **74** is sufficiently porous so that the fan **58** can draw air from the ambient environment through the wall and apply this air to the pressurization of the chamber **14**.

The device **10** further includes a toroidal housing **80** that engages the outer surface of the side wall **42** of the outer housing **32** and four fans **82**A-**82**D. The toroidal housing **80**

defines four fan ports **84**A-**84**D that respectively conduct the air streams produced by the fans **82**A-**82**D into the housing and a number of discharge holes **86** for discharging air from within the housing in a direction that can be used to disrupt the thin curtain of theatrical smoke produced adjacent to the outlet port **62** of the slot **60**. In operation, the fans **82**A-**82**D serve to inject sufficiently pressurized air into the interior of the housing **80** so that roughly equal streams of air exit the discharge ports **86**. In operation, the steams of air coming out of the discharge holes **86** interact with portions of the outer skin (e.g., the simulated logs and rocks) so as to produce a flow of air that disrupts the curtain of smoke produced at the outlet port **62** of the slot in a manner that substantially simulates a real fire or flame.

The device **10** further includes a power supply **88** for providing power to the smoke generator **12**, fan **58**, the lights **76**A-**76**J, light(s) **78**, and fans **82**A-**82**D.

In operation, the smoke generator **12** produces smoke that is injected into the chamber **14**. The conduit **40** causes the injection of the smoke into the chamber **14** to be directed at the bottom wall **44** of the outer housing **32** and substantially in the center of the area defined by the side walls **48**A-**48**E of the lower inner housing **34**. The pressurizing stream of air produced by the fan **58** and injected into the chamber **14** results in a roughly even distribution of the theatrical smoke through the gap **50** and into the chamber **16**. Due to the pressure produced by the fan **58**, the theatrical smoke is driven towards and through the slot **60** such that a thin curtain of smoke is produced adjacent to the outlet port **62** of the slot. The lights **76**A-**76**J and **78** are used to project the desired color or colors of the light onto the curtain of smoke so as to simulate a flame or fire. Further, the fans **82**A-**82**D and the toroidal housing **80** operate to produce streams of air around and adjacent to the outlet port **62** of the slot that disrupt the curtain of smoke in a fashion that simulates a flame or fire.

It should be appreciated that the various chambers and housings associated with the device **10** can be realized in a number of different ways. Further, the orientation and/or size of various elements of the device **10** can be altered to accommodate a particular application. For instance, an outer skin that simulates a structure, such as a house, could be employed in place of the campfire simulating outer skin **22**. Alternatively, the outer skin **22** could be eliminated in certain applications in which the device need only be positioned adjacent to some other structure to be effective.

With references to FIGS. **3**A-**3**C, a second embodiment of a special effect device that uses theatrical smoke to produce a simulated flame or fire effect, hereinafter device **100**, is described. Device **100** has many of the same elements as are in device **10**. Consequently, elements of device **100** that substantially correspond to elements in device **10** will be given the same reference numbers. Device **100** includes a smoke distributor and pressurizer chamber **14** (hereinafter chamber **14**), a smoke curtain chamber **16** (hereinafter chamber **16**), a smoke curtain disrupter system **18**, a light system **20**, and an outer skin **22** that conveys the appearance of the wood and rocks that might be associated with a campfire (skins that have the appearance of some kind of fire event other than a campfire are feasible). Further, the chamber **14** receives theatrical smoke that is conveyed from a theatrical smoke generator **12** to the chamber **14** via a conduit or pipe **40**. A fan **58** that causes air to pass through an opening **56** into the chamber **14** is used to pressurize the chamber so as to force the theatrical smoke received within the chamber **14** to move from chamber **14** to chamber **16** via a gap **50** and on into an annular slot **60**. The theatrical smoke exits the annular slot **60** at an annular output port **62** as an annular sheet of theatrical smoke. The smoke disrupter system **18** is used to modulate the annular sheet of theatrical smoke that exits the output port **62** so that the theatrical smoke takes on the "shape" of the flame or flames associated with a campfire, which is a wavy shape that tends to vary or change over time. Further, the light system **20** is used to project appropriately colored light onto the annular sheet of theatrical smoke exiting the output port **62** so as to have the color or colors of a campfire flame.

The device **100** includes a side wall **42** which forms a closed-loop, a bottom wall **44** that engages the side wall **42**, a side wall **52** that forms a closed-loop, and a bottom wall **54** that engages the side wall **52**. These side and bottom walls collectively encompass the spaces defined by the chamber **14** and the chamber **16**, including the portion of chamber **16** that defines the slot **60**. The side wall **34**, which also forms a closed-loop, separates chamber **14** from chamber **16**. Due to the closed-loop nature of the side wall **34** and the side wall **42**, the chamber **16** surrounds the chamber **14**. As such, chamber **16** can be characterized as an annular chamber. Notably, the bottom wall **44** is a bottom wall for both the chamber **14** and chamber **16**. Further, the top wall **54** is a top wall for both the chamber **14** and the chamber **16**. It should be appreciated that chambers that are separated from one another by a greater distance and with separate top walls and bottom walls are feasible. In such an embodiment, an additional wall located between side wall **42** and side wall **34** would likely be needed to define the extent of chamber **16**. Further, the gap **50** would lengthen and likely have a more toroidal-type of shape that would require an annular structure extending between separated chambers **14** and **16**.

The device **100** includes a number of structures that are not discussed with respect to device **10**. Among these structures is a tank **102** for storing the liquid used by the theatrical smoke generator **12** to create theatrical smoke and providing the liquid to the generator as needed. Further, the device **100** includes a tank **104** for collecting spent theatrical smoke that has precipitated within the chambers **14** and **16** and drained out through a hole in the bottom wall **44** to be collected in the tank **104**. Further, the device **100** includes a shroud **106** that engages the base **30** of the device **100**. The device **100** also includes a portion of the skin **22** that simulates a bed of embers, hereinafter ember portion **108**. The ember portion **108** is made of a translucent plastic material that is appropriately shaped and colored to imitate a bed of embers. In operation, the bank of LED lights **78** projects light onto the underside of the ember portion **108**. Due to colored nature of the ember portion **108**, the ember portion **108** appears to have the correct color or colors of a bed of embers even though the LED lights **78** project white light onto the underside of the ember portion. The device **100** also includes a sound box **110** that is adapted to provide an audio signal of the "crackling" sounds associated with a campfire to a speaker. The sound box **110** can be adapted to provide the sounds associated with different fire effects, if needed or desired. Further, the fans associated with the disrupter system **18** are adapted to receive scent packets that provide a "burning campfire" scent that is dispersed by the disrupter system **18**. Packets that provide the other types of scents (e.g., barbecue) are also feasible. It should be appreciated that device **10** and other embodiments of such devices can be modified to include these elements. Also, it should be noted that the end of the conduit/pipe **40** located within the chamber **14** does not direct theatrical steam at the bottom wall **44**, as in device **10**.

With references to FIGS. **4**A-**4**E, an embodiment of a special effect device that uses steam to produce a simulated flame or fire effect, hereinafter device **200**, is described. Device **200** has many of the same elements as are in devices **10** and **100**. Consequently, elements of device **200** that substantially correspond to elements in device **10** or device **100** will be given the same reference numbers. Device **200**, because steam is used in creating a simulated flame effect, does not include many of the theatrical smoke elements present in devices **10** and **100**. Among the elements present in devices **10** and **100** that are not present in device **200** are a theatrical smoke generator **12**, a tank **102** for storing the liquid used by the theatrical smoke generator **12** to create theatrical smoke, and a tank **104** for collecting spent theatrical smoke.

While the elements of device **200** that substantially correspond to the elements of devices **10** and **100** have been given the same reference numbers, it should be appreciated that several of these elements have been renamed so to be identified as steam-related elements rather than smoke-related elements. The device **200** a steam distribution chamber **14** (hereinafter chamber **14**), a steam curtain chamber **16** (hereinafter chamber **16**), a steam curtain disrupter system **18**, a light system **20**, and an outer skin **22** that conveys the appearance of the wood and rocks that might be associated with a campfire (skins that have the appearance of some kind of fire event other than a campfire are feasible). Further, the chamber **14** receives steam that is conveyed from a boiler (not shown) to the chamber **14** via a conduit or pipe **40**. The energy embodied in the steam received in the chamber **14** is sufficient to move the steam from the chamber **14** to the chamber **16** via a gap **50** and on into an annular slot **60**. As such, device **200** also does not include the fan **58** of devices **10** and **100**. The steam exits the annular slot **60** at an annular output port **62** as an annular sheet of steam. The steam disrupter system **18** is used to modulate the annular sheet of steam that exits the output port **62** so that the theatrical smoke takes on the "shape" of the flame or flames associated with a campfire, which is a wavy shape that tends to vary or change over time. Further, the light system **20** is used to project appropriately colored light onto the annular sheet of theatrical smoke exiting the output port **62** so as to have the color or colors of a campfire flame.

The device **200** includes a side wall **42** which forms a closed-loop cylinder, a bottom wall **44** that engages the side wall **42**, a side wall **52** that forms a closed-loop, and a bottom wall **54** that engages the side wall **52**. These side and bottom walls collectively encompass the spaces defined by the chamber **14** and the chamber **16**, including the portion of chamber **16** that defines the slot **60**. The side wall **34**, which also forms a closed-loop, separates chamber **14** from chamber **16**. Due to the closed-loop nature of the side wall **34** and the side wall **42**, the chamber **16** surrounds the chamber **14**. As such, chamber **16** can be characterized as an annular chamber. Notably, the bottom wall **44** is a bottom wall for both the chamber **14** and chamber **16**. Further, the top wall **54** is a top wall for both the chamber **14** and the chamber **16**. It should be appreciated that chambers that are separated from one another by a greater distance and with separate top walls and bottom walls are feasible. In such an embodiment, an additional wall located between side wall **42** and side wall **34** would likely be needed to define the extent of chamber **16**. Further, the gap **50** would lengthen and likely have a more toroidal-type of shape that would require an annular structure extending between separated chambers **14** and **16**.

The device **200** also includes a steam manifold **202** for injecting steam into the chamber **14**. The manifold **202** has a Φ-shape with a main tube **204** and two, curved tubes **206**A, **206**B that each have multiple laterally extending orifices for venting steam into the chamber **14** at multiple locations in the chamber **14** to facilitate a relatively even distribution of steam within the chamber **14**. It is believed that steam manifolds with other shapes are feasible, provided the manifold multiple orifices that disperse the steam at multiple locations throughout the chamber **14**. The device **200** also includes a portion of the skin **22** that simulates a bed of embers, hereinafter ember portion **108**. The ember portion **108** is made of a translucent plastic material that is appropriately shaped and colored to imitate a bed of embers. In operation, the bank of LED lights **78** projects light onto the underside of the ember portion **108**. Due to colored nature of the ember portion **108**, the ember portion **108** appears to have the appropriate color or colors of a bed of embers even though the LED lights **78** project white light onto the underside of the ember portion. Additionally, it has been found that in some embodiments of the device **200** that a flow straightener located in the gap **50** also facilitates an even distribution of steam from the chamber **14** to the chamber **16**. With reference to FIG. **4**D, a flow straightener **210** is located in a portion of the gap **50**. The flow straightener has a triangle-wave shape. However, flow straighteners with other shapes are also feasible. As should be appreciated, the gap **50** is not continuous but is composed of sub-gaps that are separated from one another by stands **212** that support the side wall **34** and other of the overly structure. The sub-gaps define the annularly extending gap **50**. In other embodiments, it may be possible to eliminate the stands **212** so that the gap is continuous. The device **200** further includes a fan **214** that is positioned to direct a flow of air at the LED lights **78** to cool the lights. While the fan **214** is in the same position as the fan **58** used in devices **10** and **100**, the fan **214** does not cause air to be injected into the chamber **14**.

The foregoing description of the invention is intended to explain the best mode known of practicing the invention and to enable others skilled in the art to utilize the invention in various embodiments and with the various modifications required by their particular applications or uses of the invention.

What is claimed is:

1. A special effect device for use in creating a simulated fire effect comprising:

a pipe for conveying a stream of gas from a first terminal end of the pipe to a second terminal end of the pipe;

an inner first chamber for receiving a stream of gas from the second end of the pipe, the inner first chamber defining a first enclosed space;

wherein the second terminal end of the pipe is located in the first enclosed space;

an annular second chamber for receiving a stream of gas from the first chamber, the annular second chamber surrounding the first chamber and defining a second enclosed space that is separate from the first enclosed space, the annular second chamber defining an annular closed-loop slot for directing a closed-loop sheet of gas into the ambient atmosphere;

a passageway for conveying gas from the inner first chamber to the annular second chamber; and

an air modulator configured to produce moving air, the air modulator configured to apply the moving air to the closed-loop sheet of gas exiting the annular second chamber, and the moving air of the air modulator configured to disrupt the closed-loop sheet of gas so as

to cause the gas to move in a manner of movement associated with actual flame or fire.

2. A special effect device, as claimed in claim 1, wherein:

the inner first chamber includes a first upper wall, a first lower wall separated from the first upper wall, and a first side wall that forms a first closed loop and is located between the first upper wall and first lower wall.

3. A special effect device, as claimed in claim 2, wherein:

the annular second chamber includes a second upper wall, a second lower wall separated from the second upper wall, a second inner side wall that forms a second inner closed loop and is located between the second upper wall and the second lower wall, and a second outer side wall that forms a second outer closed loop and is located between the second upper wall and the second lower wall.

4. A special effect device, as claimed in claim 3, wherein:

the first side wall of the inner first chamber and the second inner side wall of the annular second chamber are joined with one another so as to form a composite side wall with an upper edge and a lower edge that is separated from the upper edge, the second enclosed space extending between the composite side wall and the second outer side wall;

the first lower wall and the second lower wall are joined with one another so as to form a composite lower wall;

wherein the lower edge of the composite side wall is separated from the composite lower wall so as to define at least a portion of the passageway for conveying gas from the inner first chamber to the annular second chamber.

5. A special effect device, as claimed in claim 4, wherein:

the passageway is a plurality of sub-passageways that collectively define a sub-passageway closed loop.

6. A special effect device, as claimed in claim 3, wherein:

a first end of the passageway is located closer to the first lower wall than to the first upper wall of the inner first chamber; and

a second end of the passageway is located closer to the second lower wall than to the second upper wall of the annular second chamber.

7. A special effect device, as claimed in claim 1, further comprising:

a fan for injecting air into the inner first chamber to move gas from the inner first chamber to the annular second chamber.

8. A special effect device, as claimed in claim 2, wherein:

the second terminal end of the pipe is positioned so that gas exiting the second terminal end of the pipe is directed at the first lower wall of the inner first chamber.

9. A special effect device, as claimed in claim 8, further comprising:

a fan for injecting air into the inner first chamber to move gas from the inner first chamber to the annular second chamber, the fan adapted to cause air to move into the inner first chamber through an opening in the first upper wall.

10. A special effect device, as claimed in claim 1, further comprising:

a manifold connected to the second terminal end of the pipe and adapted to direct two or more streams of gas into the inner first chamber and away from the first lower wall.

11. A special effect device, as claimed in claim 10, wherein:

the passageway is located a first distance from the first lower wall;

the manifold is located a second distance from the first lower wall;

wherein the second distance is greater than the first distance.

12. A special effect device, as claimed in claim 1, further comprising:

an air modulator for directing air at a closed-loop sheet of gas exiting the annular closed-loop slot.

13. A special effect device, as claimed in claim 12, wherein:

the air modulator includes an annular third chamber that surround the annular second chamber, the annular third chamber defining multiple orifices with each of the multiple orifices adapted to direct a stream of air at a closed-loop sheet of gas exiting the annular closed-loop slot.

14. A special effect device, as claimed in claim 12, wherein:

the air modulator includes a fan.

15. A special effect device, as claimed in claim 13, wherein:

the air modulator includes a fan for injecting air into the annular third chamber, the fan adapted to cause air to move into the annular third chamber through an intake hole define defined by the annular third chamber and to cause air to move out of the annular third chamber through at least one of the multiple orifices.

16. A special effect device, as claimed in claim 1, further comprising:

a lighting structure adapted to project light onto a closed-loop sheet of gas exiting the closed-loop slot to create an illusion of a flame.

17. A special effect device, as claimed in claim 16, wherein:

the lighting structure includes a plurality of LED light and a fan positioned adjacent to the plurality of LED lights and, in operation, produce a stream of air to cool the plurality of LED lights.

18. A special effect device, as claimed in claim 1, further comprising:

an outer skin with at least a portion of the outer skin positioned adjacent to a portion of the annular closed-loop slot so as to affect a flow of at least a portion of a sheet of gas exiting the annular closed-loop slot.

19. A special effect device for use in creating a simulated fire effect comprising:

a pipe for conveying a stream of gas from a first terminal end of the pipe to a second terminal end of the pipe;

an inner first chamber for receiving a stream of gas from the second end of the pipe, the inner first chamber defining a first enclosed space;

wherein the second terminal end of the pipe is located in the first enclosed space;

an annular second chamber for receiving a stream of gas from the first chamber, the annular second chamber surrounding the first chamber and defining a second enclosed space that is separate from the first enclosed space, the annular second chamber further defining an annular closed-loop slot for directing a closed-loop sheet of gas into the ambient atmosphere;

a passageway for conveying gas from the inner first chamber to the annular second chamber;

an air modulator for directing air at a closed-loop sheet of gas exiting the annular closed-loop slot, the air modulator including an annular third chamber that surrounds

the annular second chamber and defines multiple orifices with each of the multiple orifices adapted to direct a stream of air at a closed-loop sheet of gas exiting the annular closed-loop slot;

a lighting structure adapted to project light onto a closed-loop sheet of gas exiting the closed-loop slot.

20. A special effect device, as claimed in claim **19**, further comprising: means for providing sound associated with a type of fire effect being simulated; and means for providing a scent associated with the type of fire effect being simulated.

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