US 20140338931A1

(19) **United States**

(12) **Patent Application Publication**

Mori et al.

(10) **Pub. No.: US 2014/0338931 A1**

(43) **Pub. Date: Nov. 20, 2014**

(54) **LIQUID WET CHEMICAL FIRE EXTINGUISHING SPRAY**

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(21) Appl. No.: **14/288,037**

(22) Filed: **May 27, 2014**

Related U.S. Application Data

(63) Continuation-in-part of application No. 12/440,551, filed on Mar. 9, 2009, now abandoned, filed as application No. PCT/US2007/019009 on Aug. 29, 2007.

(60) Provisional application No. 60/843,866, filed on Sep. 11, 2006.

Publication Classification

(51) **Int. Cl.**

A62C 13/64	(2006.01)
G01L 19/08	(2006.01)
A62C 5/02	(2006.01)

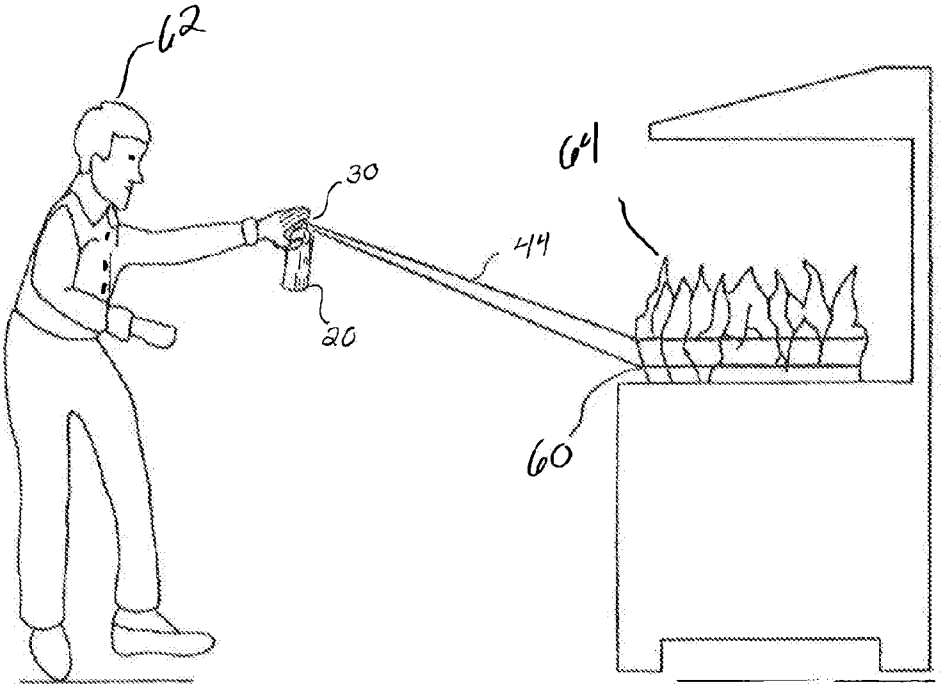
(52) **U.S. Cl.**

CPC . ***A62C 13/64*** (2013.01); ***A62C 5/02*** (2013.01); ***G01L 19/08*** (2013.01)

USPC **169/71**; 222/23; 116/212

(57) **ABSTRACT**

An aerosol fire extinguisher for dispensing a liquid wet chemical fire extinguishing agent, and a composition for the liquid wet chemical fire extinguishing agent, where the liquid wet chemical fire extinguishing agent is rated for class A, B, C and K fires. The fire extinguisher includes a container and a valve assembly affixed to the container. A hag is positioned within the container, where the bag includes an output tube connected in fluid communication to the valve assembly. An actuator is connected in fluid communication to the valve assembly opposite the output tube, where. the actuator has an elongated output orifice. A liquid wet chemical fire extinguishing agent is disposed within the bag and a propellant is disposed within the container, wherein the bag isolates the liquid wet chemical fire extinguishing agent from the propellant. The: configuration of the elongated output orifice expels the liquid wet chemical fire extinguishing agent in a substantially planar pattern onto the fire.



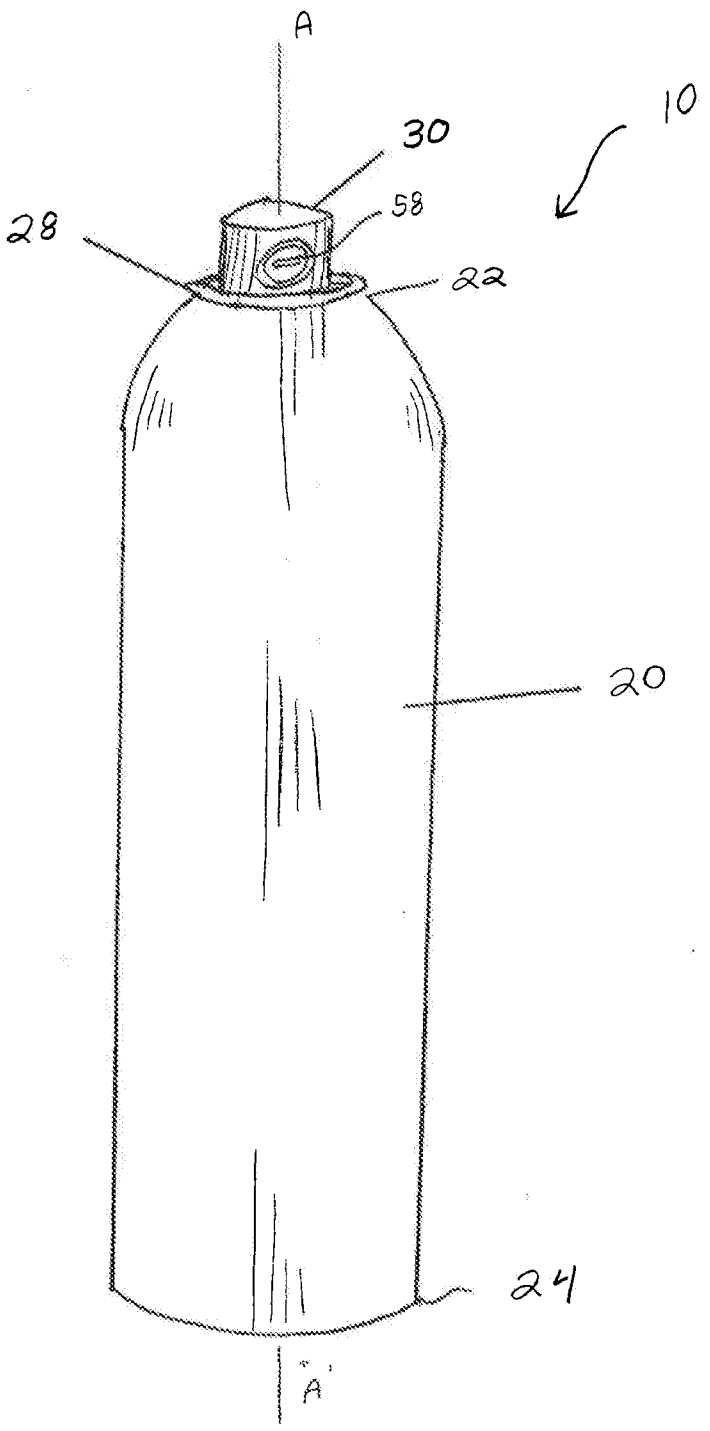


FIG. 1

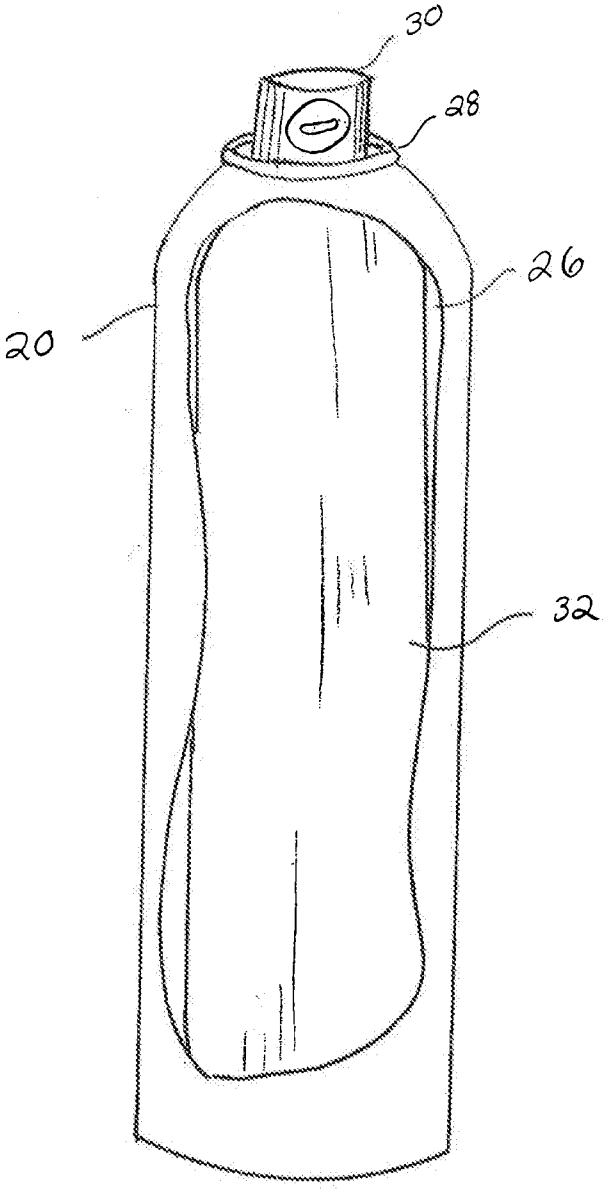


FIG. 2

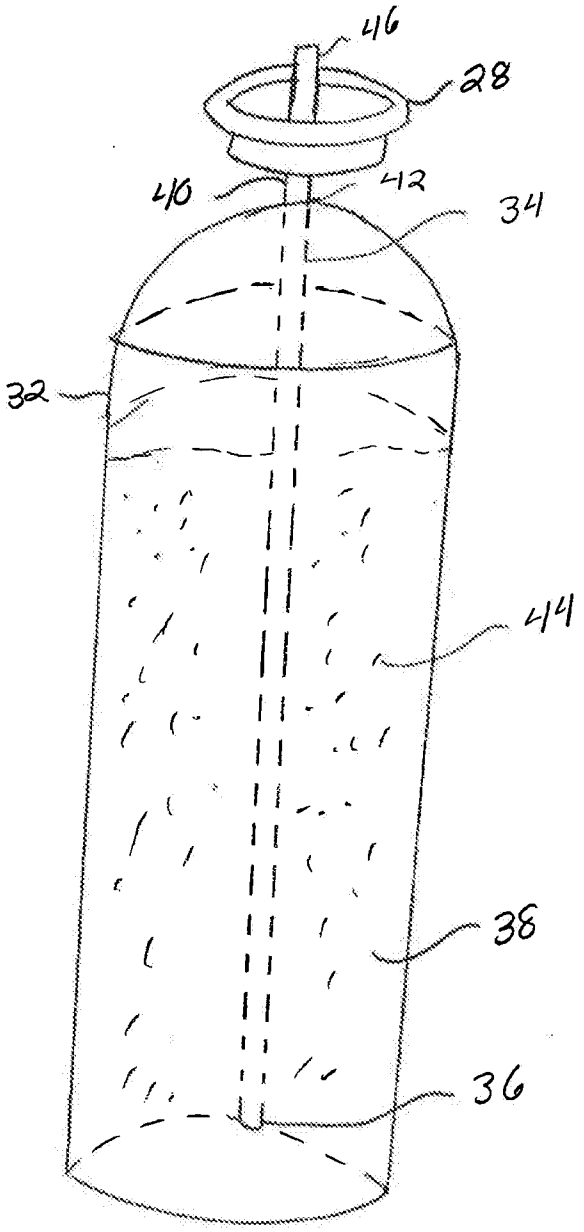


FIG. 3

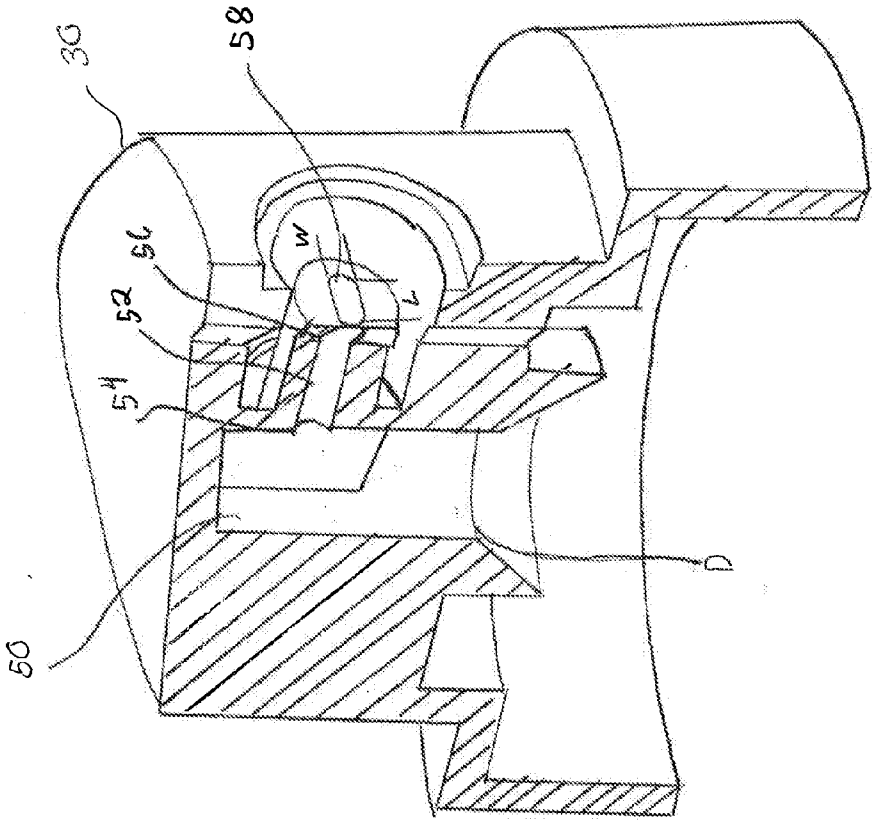


FIG. 4

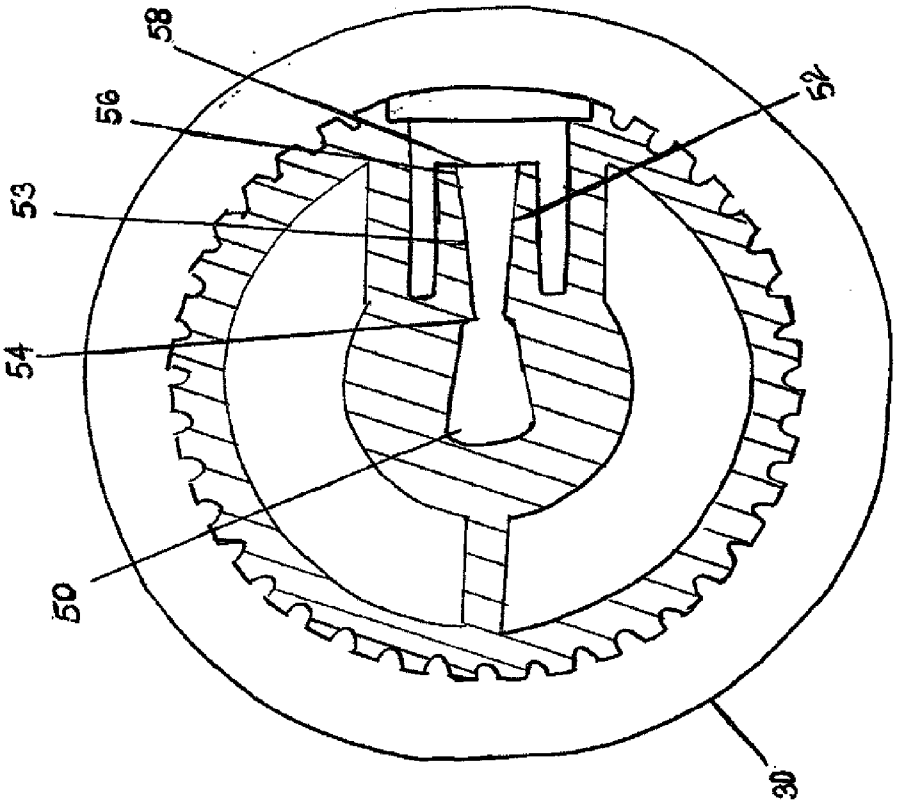


FIGURE 4A

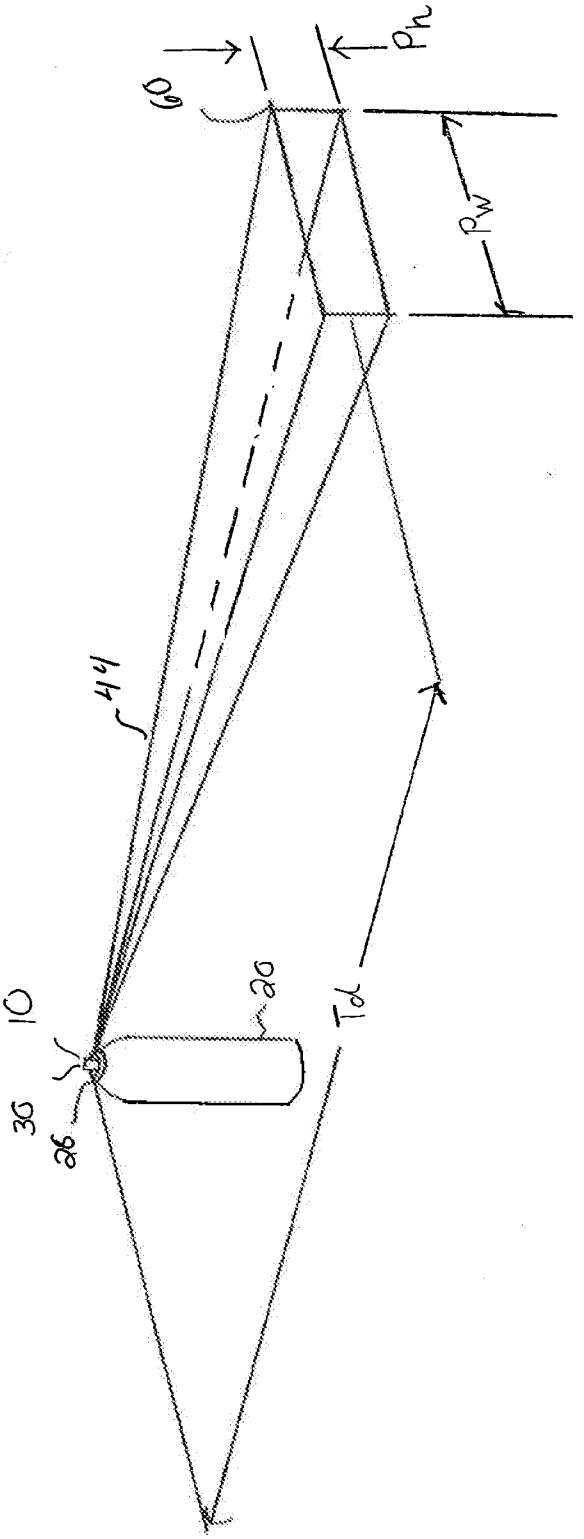


FIG. 5

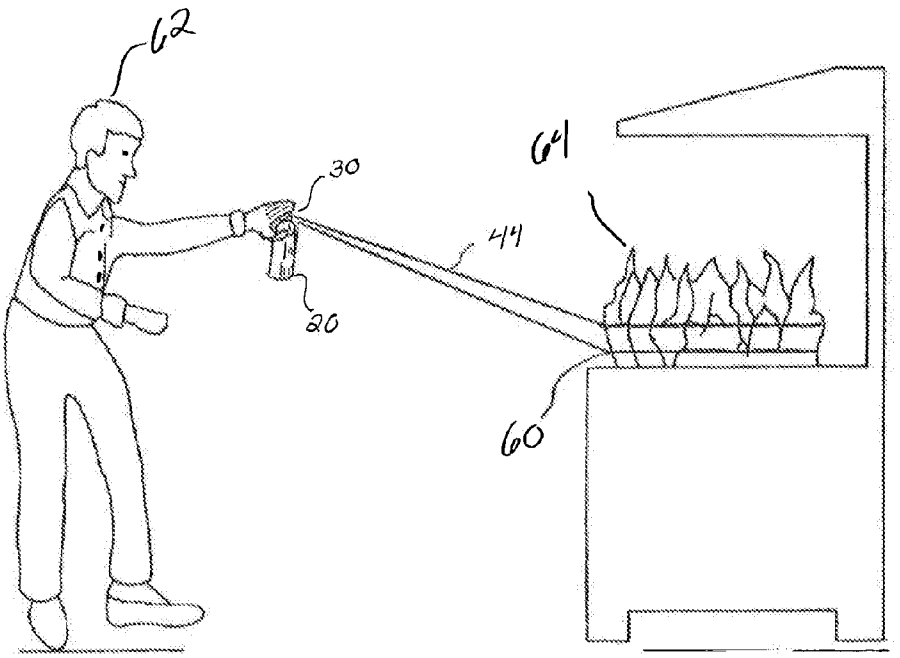


FIG. 6

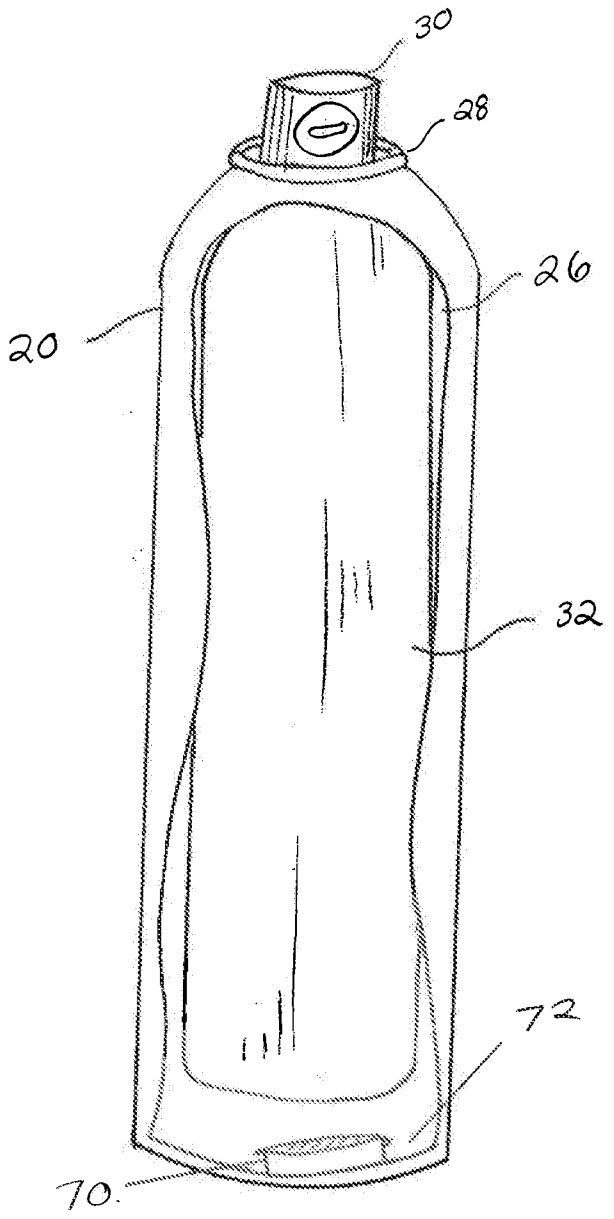


FIG. 7

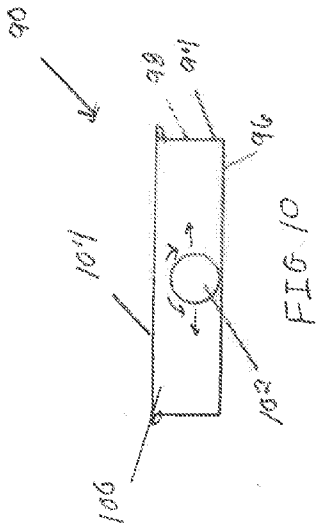


FIG. 10

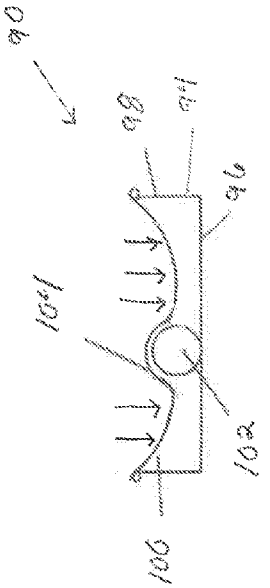


FIG. 11

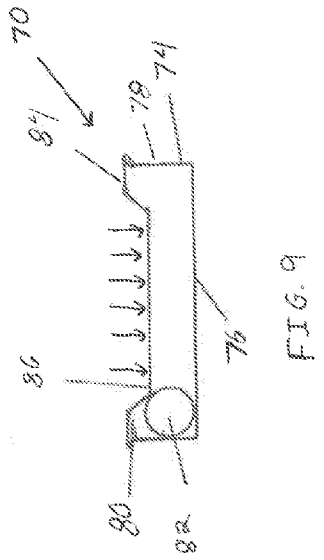


FIG. 9

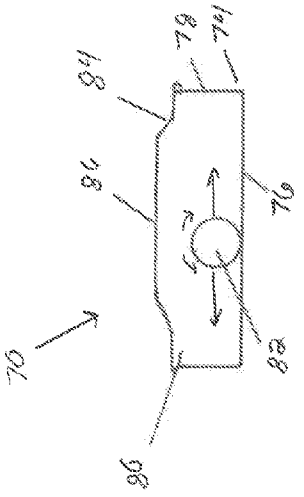


FIG. 8

LIQUID WET CHEMICAL FIRE EXTINGUISHING SPRAY

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is a Continuation-in-Part of U.S. application Ser. No. 12/440,551 entitled LIQUID WET CHEMICAL FIRE EXTINGUISHING SPRAY , filed on Mar. 9, 2009, which claims the benefit of U.S. Provisional Application No. 60/843,866 for LIQUID FIRE SUPPRESSANT, filed on Sep. 11, 2006, the content of which is herein incorporated by reference in its entirety.

FIELD OF THE INVENTION

[0002] The disclosure relates to an aerosol hand held fire extinguisher, and more particularly, to an aerosol hand held fire extinguisher for dispensing a liquid wet chemical fire extinguishing spray and the composition thereof.

BACKGROUND OF THE INVENTION

[0003] Fires can be categorized in the United States into five basic classes: Class A fires are fires in ordinary combustible material, eg., wood, cloth, paper, rubber, and many plastics; Class B fires are fires in flammable and combustible liquids, gases, and greases; Class C fires are fires that involve energized electrical equipment where the electrical non-conductivity of the extinguishing media is of importance; Class D fires are fires that involve combustible metals; and Class K fires are fires that involve cooking oils or fats. In each of the classes, the formation and continuation of the fire requires three basic elements; heat, fuel, and an oxidizing agent. By removing one of these elements the fire can be extinguished.

[0004] Different types of portable fire extinguishers have become useful in extinguishing the different classes of fires. The most common types of portable fire extinguishers are; water, CO_2, and dry chemical, where each of these types has its usefulness on different classes of fires. For Class A fires water and dry chemical fire extinguishers are recommended. For Class B and C fires CO_2 and dry chemical extinguishers are recommended. For Class D fires dry chemical extinguishers are recommended. For Class K fires wet chemical extinguishers are recommended.

[0005] However, each of these types of extinguishers has its own disadvantages. For example, you would never use a water extinguisher on a cooking oil, grease or electrical fire. As water is insoluble with cooking oil or grease, the water will cause flare up spreading the oil or grease, the flames and making the fire bigger. Similarly, as water is a good conductor of electricity, the use of this on an electrical fire can be dangerous for the user. Furthermore, water extinguishers tend to be pressurized with oxygen.

[0006] CO_2 extinguishers contain carbon dioxide, a non-flammable gas, and are highly pressurized. The pressure is so great that it is not uncommon for bits of dry ice to shoot out the actuator (nozzle).

[0007] Dry chemical extinguishers are filled with chemicals that leave a residue. In B:C type dry chemical extinguishers, the residue can be corrosive, difficult to clean and must be cleaned immediately to prevent damage to surrounding materials. In A:B:C type dry chemical extinguishers, the residue can be sticky, difficult to clean and damaging to surrounding materials.

SUMMARY OF THE INVENTION

[0008] The present disclosure recites an aerosol fire extinguisher for dispensing a liquid wet chemical fire extinguishing spray. The fire extinguisher includes a container and a valve assembly affixed to the container. A bag is positioned within the container, where the bag includes an output tube connected in fluid communication to the valve assembly. An actuator (nozzle) is connected in fluid communication to the valve assembly opposite the output tube, where the actuator has an elongated output orifice. A liquid wet chemical fire extinguishing agent is disposed within the bag and a propellant is disposed within the container, wherein the bag isolates the liquid wet chemical fire extinguishing agent from the propellant.

[0009] The liquid wet chemical fire extinguishing agent includes the following ingredients:

[0010] $CH_3CHOHCO_2H$ (Lactic Acid);

[0011] KOH (Potassium Hydroxide); and

[0012] H_2O.

[0013] The liquid wet chemical fire extinguishing spray can further include: K_2CO_3 (Potassium Carbonate) and $KHCO_3$ (Potassium Bicarbonate).

[0014] In an exemplary embodiment, the liquid wet chemical fire extinguishing agent can include:

$CH_3CHOHCO_2H$ (Lactic Acid)	17-43 vol. %
KOH (Potassium Hydroxide)	18-48 vol. %
K_2CO_3 (Potassium Carbonate)	0-23 vol. %
$KHCO_3$ (Potassium Bicarbonate)	0-23 vol. %
H_2O	Balance of volume

[0015] In a method of using the fire extinguisher to extinguish a fire, the elongated orifice is directed at the fire. The actuator is depressed to open the valve. The liquid wet chemical fire extinguishing agent is expelled onto the fire, where the elongated output orifice expels the agent in a substantially planar pattern.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] A more complete understanding of the present disclosure, and the attendant advantages and features thereof, will be more readily understood by reference to the following detailed description when considered in conjunction with the accompanying drawings wherein:

[0017] FIG. **1** depicts a front isometric view of a fire extinguisher including the liquid wet chemical fire extinguishing spray of the present disclosure;

[0018] FIG. **2** depicts a front isometric sectional view of the fire extinguisher of FIG. **1**;

[0019] FIG. **3** depicts a bag of the fire extinguisher of FIG. **1**;

[0020] FIG. **4** depicts a cross sectional view of a fluid dispensing actuator of the present disclosure;

[0021] FIG. **4**A depicts a top cross sectional view of the fluid dispensing actuator of FIG. **4**;

[0022] FIG. **5** depicts a substantially planar spray pattern of the fire extinguisher of FIG. **1**;

[0023] FIG. **6** depicts a method of using the fire extinguisher of FIG. **1**

[0024] FIG. **7** depicts a front isometric sectional view of the fire extinguisher of FIG. **1** including a pressure indicator;

[0025] FIG. **8** depicts a side sectional view of an embodiment of a pressure indicator in a first position;

[0026] FIG. **9** depicts a side sectional view of the pressure indicator of FIG. **8** in a second position;

[0027] FIG. **10** depicts a side sectional view of an another embodiment of a pressure indicator in a first state; and

[0028] FIG. **11** depicts a side sectional view of the pressure indicator of FIG. **10** in a second state.

DETAILED DESCRIPTION OF THE INVENTION

[0029] The present disclosure is directed to an aerosol fire extinguisher for dispensing a liquid wet chemical fire extinguishing spray, and a composition for the liquid wet chemical fire extinguishing agent, where the agent is rated for class A, B, C and K fires. The liquid wet chemical fire extinguishing agent is dispensed though an actuator having an elongated output orifice. The configuration of the elongated output orifice expels the liquid wet chemical fire extinguishing agent in a substantially planar pattern onto the fire. Additionally, the actuator dispenses the liquid wet chemical fire extinguishing agent through the elongated output orifice at a reduced particle size, where the reduced particle size is sufficiently small to increase the air gap between particles and decrease or eliminate the electrical conductivity of the dispensed liquid wet chemical fire extinguishing agent in Class C fires.

[0030] Referring now to the drawing figures in which like reference designators refer to like elements, there is shown in FIGS. **1** and **2** a fire extinguisher **10**. The fire extinguisher **10** include a substantially cylindrical container **20** having top and bottom ends **22** and **24**, and defining a hollow interior space **26**. A valve member **28** is positioned on and affixed to the top end **22** of the container **20**. A fluid dispensing actuator (nozzle) **30** is connected to the valve member **28**.

[0031] Referring to FIGS. **2** and **3**, a bag **32** is positioned within the interior space **26** of the container **20**. The bag **32** includes an output tube **34** having a first end **36** positioned within the interior **38** of the bag **32** and a second end extending **40** from a top end **42** of the bag **32**. The top end **42** of the bag **32** is sealed about the output tube **34**, such that the contents **44** of the bag **32** are isolated from the interior space **26** of the container **20**. The second end **40** of the output tube **34** is connected to the valve member **28**, such that the valve member **28** is in fluid communication with the contents **44** in the interior **38** of the bag **32**.

[0032] The bag **32** can be a non-permeable bag, preventing the passing or diffusion of liquids or gases through the bag. Additional exemplary bags **32** are described in U.S. Pat. No. 5,169,037 and U.S. Reissue Pat. No. RE35,540, the contents of which are herein incorporated by reference in their entirety.

[0033] The valve member **28** includes a downwardly extending stem **46** to which the fluid dispensing actuator **30** is connected. A downward depression of the fluid dispensing actuator **30** depresses the downwardly extending stem **46**, opening the valve member **28**. In this manner, the contents **44** of the bag **32** are free to flow through the output tube **34**, the downwardly extending stem **46**, an ultimately through the fluid dispensing actuator **30**. Since the operations of the valve member **28** are well known in the prior art, they will not be described herein.

[0034] The hollow interior space **26** of the container **20** is charged with a pressurized gas (propellant) **48**, such that the bag **32** and contents **44** are maintained under pressure. In this manner, a depression of fluid dispensing actuator **30** opens the valve member **28**, resulting in a release of the contents **44** from bag **32** through the fluid dispensing actuator **30**. Furthermore, as the bag **32** is sealed from the interior space **26** of the container **22**, no propellant **48** is released from the interior space **26** of the container **20** with the contents **44** of the bag **32**.

[0035] Referring to FIG. **4**, a cross-sectional view of the fluid dispensing actuator **30** is provided. The fluid dispensing actuator **30** includes a first passageway **50** configured to connect the fluid dispensing actuator **30** to the downwardly extending stem **46** of the valve member **28**. The interior diameter D of a first end **51** of the first circular passageway **50** is sized to securely receive the downwardly extending stem **46** therein, thus securing the fluid dispensing actuator **30** to the valve member **28**.

[0036] The fluid dispensing actuator **30** includes a second passageway **52** having a first end **54** in fluid communication with the first passageway **50** and a second end **56**. The second end **56** of the second passageway **52** fauns an output orifice **58**. The output orifice **58** is elongated, having a length L greater then its width W. The second passageway **52** includes a transition region **53**, expanding to the second passageway **52** from the first end **54** to the second end **56**, forming the output orifice.

[0037] Referring to FIG. **4**A, the transition region is a substantially linear transition region **53** from a substantially circular first end **54** to the second end **56**, the elongated output orifice **58**. However, it is completed that the transition region **53** can be non linear. For example, the transition region **53** can include arcuate sidewalls, forming an arcuate transition from the first end **54** to the second end **56** of the second passage **52**. Alternatively, the transition region **53** can be a step transition region where the second passageway **52** transitions from the first end **54** to the second end **56** utilizing a step pattern, namely a changing of the second passageway's **53** geometry at discrete interval.

[0038] Referring also to FIG. **1**, the elongated output orifice **58** is depicted on the fluid dispensing actuator **30**, where the length L of the elongated output orifice **58** is oriented substantially orthogonal to a longitudinal axis A of the container **20**. In this manner, the elongated output orifice **58** dispenses the contents **44** in substantially planar pattern, where the planar pattern is substantially orthogonal to the longitudinal axis A of the container **20**.

[0039] However, it is contemplated that the orientation of the elongated output orifice **58** on the fluid dispensing actuator **30** can be non-orthogonal to the longitudinal axis A of the container **20**. In exemplary embodiments, the length L of the elongated output orifice **58** can be parallel, at an acute angel, or at an obtuse angle with the longitudinal axis A of the container **20**. It is further contemplated, that the elongated output orifice **58** can be rotateably connected to the fluid dispensing actuator **30**, such that the orientation of the length L of the elongated output orifice **58** with respect to the longitudinal axis A of the container **20** is adjustable.

[0040] Alternatively, a nozzle cap can be rotateably connected to the fluid dispensing, actuator **30**. The nozzle cap can includes a plurality of different nozzle orifices, such that the nozzle cap can be selectively rotated to align a specific orifice with the second end **56** of the second passage **52**. The plurality of different nozzle orifice can include different sized, shaped, and oriented orifices.

[0041] Referring to FIG. **5**, in operation when the fire extinguisher **10** is positioned a distance T_d from a target area, the elongated output orifice **58** expels the contents **44** of the bag

32 in a substantially planar pattern **60** at the target area, where the planer pattern **60** has a planar width P_w greater then the planar height P_h.

[0042] In an exemplary embodiment, the first end **54** of the second passageway **52** has a diameter of about 0.035 in.+/−0.0010 in. The output orifice **58** has a length L of about 0.075 in.+/−0.010 in. and a width W of about 0.035 in.+/−0.010 in. Where the transition region **53** is substantially linear transition region from the first end **54** of the second circular passageway **52** to the output orifice **58**. When the fire extinguisher **10** is positioned a distance T_d of about 48 in. from a target area, the elongated output orifice **58** expels the contents **44** is a substantially planar pattern **60** at the target area, having a planar width P_w of about 12 in. and a planar height P_h of about 3 in.

[0043] The contents **44** of the bag **32** is liquid wet chemical fire extinguishing agent formulated to extinguish small fires, such as house hold cooking oil or grease fires, grill fires, electrical fires, automobile file, and the like. As previously discussed, the bag **32** isolates the liquid wet chemical fire extinguishing agent **44** from the propellant **48**. In this manner, the propellant **48** is not dispensed with the liquid wet chemical fire extinguishing agent **44**, which reduces instance of "flare up" upon an initial application of the liquid wet chemical fire extinguishing spray **44** on a fire.

EXAMPLE 1

[0044] The liquid wet chemical fire extinguishing agent **44** includes the following ingredients:

$CH_3CHOHCO_2H$ (Lactic Acid)	17-43 vol. %
KOH (Potassium Hydroxide)	18-48 vol. %
H_2O	Balance of volume

EXAMPLE 2

[0045] The liquid wet chemical fire extinguishing spray **44** includes the following ingredients:

$CH_3CHOHCO_2H$ (Lactic Acid)	17-43 vol. %
KOH (Potassium Hydroxide)	18-48 vol. %
K2CO3 (Potassium Carbonate)	0-23 vol. %
KHCO3 (Potassium Bicarbonate)	0-23 vol. %
H_2O	Balance of volume

EXAMPLE 3

[0046] The liquid wet chemical fire extinguishing agent **44** includes the following ingredients:

$CH_3CHOHCO_2H$ (Lactic Acid)	27.892 vol. %
KOH (Potassium Hydroxide)	33.687 vol. %
K2CO3 (Potassium Carbonate)	7.366 vol. %
KHCO3 (Potassium Bicarbonate)	3.925 vol. %
H_2O	Balance of volume

EXAMPLE 4

[0047] The liquid wet chemical fire extinguishing agent **44** includes the following ingredients:

$CH_3CHOHCO_2H$ (Lactic Acid)	28.11 vol. %
KOH (Potassium Hydroxide)	33.56 vol. %
K2CO3 (Potassium Carbonate)	7.55 vol. %
KHCO3 (Potassium Bicarbonate)	21.54 vol. %
H_2O	Balance of volume

[0048] In a further embodiment, the liquid wet chemical fire extinguishing agent **44** can include a foaming agent formed of an aqueous solution including a surfactant. The surfactant can be a detergent or other known commercial foam producer. Additional surfactants are disclosed in U.S. Pat. Nos. 4,359,096; 4,536,318; 4,599,188; and 4,565,647 the contents of which are incorporated by reference in their entirety.

EXAMPLE 5

[0049] The liquid wet chemical fire extinguishing agent **44** with foaming agent includes the following ingredients:

$CH_3CHOHCO_2H$ (Lactic Acid)	17-43 vol. %
KOH (Potassium Hydroxide)	18-48 vol. %
Fire Extinguishing Foam	0-22 vol. %
H_2O	Balance of volume

EXAMPLE 6

[0050] The liquid wet chemical fire extinguishing spray **44** with foaming agent includes the following ingredients:

$CH_3CHOHCO_2H$ (Lactic Acid)	17-43 vol. %
KOH (Potassium Hydroxide)	18-48 vol. %
K2CO3 (Potassium Carbonate)	0-23 vol. %
KHCO3 (Potassium Bicarbonate)	0-23 vol. %
Fire Extinguishing Foam	0-22 vol. %
H_2O	Balance of volume

EXAMPLE 7

[0051] The liquid wet chemical fire extinguishing agent **44** with foaming agent includes the following ingredients:

$CH_3CHOHCO_2H$ (Lactic Acid)	27.892 vol. %
KOH (Potassium Hydroxide)	33.687 vol. %
K2CO3 (Potassium Carbonate)	7.366 vol. %
KHCO3 (Potassium Bicarbonate)	3.925 vol. %
Fire Extinguishing Foam	6.927 vol. %
H_2O	Balance of volume

EXAMPLE 8

[0052] The liquid wet chemical fire extinguishing agent **44** with foaming agent includes the following ingredients:

$CH_3CHOHCO_2H$ (Lactic Acid)	28.11 vol. %
KOH (Potassium Hydroxide)	33.56 vol. %

-continued

K2CO3 (Potassium Carbonate)	7.55 vol. %
KHCO3 (Potassium Bicarbonate)	21.54 vol. %
Fire Extinguishing Foam	6.71 vol. %
H_2O	Balance of volume

[0053] The Fire Extinguishing Foam agent can include the following ingredient:

H_2O	95-99 vol. %
Surfactant	1-5 vol. %

[0054] Referring to FIG. **6**, in a method of use the fire extinguisher **10** is used to extinguish a kitchen cooking fire. The user **62** holds the container **20** in one hand, directing the output orifice **58** of the fluid dispensing actuator **30** toward the fire. The user depresses the fluid dispensing actuator **30**, opening the valve member **28** to dispense the liquid wet chemical fire extinguishing agent **44** onto the fire through the output orifice **58**. The liquid wet chemical fire extinguishing agent **44** is expelled in a substantially planar pattern **60** directed at the fire **64**. As the liquid wet chemical fire extinguishing agent **44** and the propellant **48** are isolated, only the liquid wet chemical fire extinguishing agent **44** is dispensed into the fire, thus reducing the change of a flare up.

[0055] The container **20**, bag **32**, and fluid dispensing actuator **30** combination provide the additional benefit of having an increased discharge time when compared to small volume extinguishers. For example, a small volume dry chemical fire extinguisher, such as a 1 lb. 2B:C or 5B:C fire extinguisher, has a discharge time of about eight seconds. In contrast, where fire extinguisher **10** is sized to contain fourteen fluid ounces (14 fl oz) of the liquid wet chemical fire extinguishing agent **44**, the fire extinguisher **10** has a discharge time of about thirty-two seconds, roughly four (4) times that of the small volume extinguishers.

[0056] Similarly, a large volume fire extinguisher, such as a 5 lb. 3A 40B:C fire extinguisher has a discharge time of about thirteen seconds. In contrast, where fire extinguisher **10** is sized to contain fourteen fluid ounces (14 fl oz) of the liquid wet chemical fire extinguishing agent **44**, the fire extinguisher **10** has a discharge time of about thirty-two seconds, roughly two and a half (2.5) times that of the large volume extinguisher.

[0057] Referring to FIG. **7**, the fire extinguisher **10** can further include an internal pressure indicator **70**, the placement of which can preclude the need for an external pressure indictor or an pressure probe position through a sidewall of the container **20**. The pressure indicator **70** can be mounted to an inner surface **72** of the interior space **26** of the cylindrical container **20**. The pressure indicator **70** is configured to determine whether a pressure in the container **20** is above or below a specified operational pressure. If the pressure in the container is below the specified operational pressure, the pressure indicator **70** can provide an indication to a user

[0058] Referring to FIGS. **8** and **9**, in an embodiment the pressure indicator **70** includes a base **74** having a bottom surface **76** with an upwardly extending cylindrical wall **76** defining an interior space **78** and an open end **80**. A ball **82** is positioned within the interior space **78** of the base **74**, where a substantially rigid cover **84** is utilized to seal the open end **80** of the base **74**. The substantially rigid cover **84** includes a moveable section **86** which is selectively positinable between a first position and a second position. In the first position, as shown in FIG. **8**, the ball **82** is free to move within the base **74**, causing a rattling sound when shaken. In the second position, as shown in FIG. **9**, the moveable section **86** of the substantially rigid cover **84** is pressed against the ball **82**, preventing movement of the ball **82** within the base **74** when shaken.

[0059] The positioning, movement, of the moveable section **86** of the substantially rigid cover **84** is caused by a pressured differential between the pressure within the sealed pressure indictor **70** and the pressure outside the sealed pressure indicator **70**. When the pressure inside the sealed pressure indicator **70** is greater than pressure outside the sealed pressure indicator **70**, the pressure differential moves the moveable section **86** into the first portion. When the pressure inside the sealed pressure indicator **70** is less than pressure outside the sealed pressure indicator **70**, the pressure differential moves the moveable section **86** into the second portion.

[0060] In an exemplary method of use, the pressure indicator **70** is used to verify that there is sufficient pressure in the container **20** to operate the fire extinguisher **10**. The ball **82** is sealed, with the substantially rigid cover **84**, in the base **74**, where the pressure in the sealed pressure indictor **70** is at the operating pressure, for example at 95 PSA. The moveable section **86** of the substantially rigid cover **84** is moved to the first position. To move the moveable section **86** of the substantially rigid cover **84** from the first position to the second position an external pressure greater then about 95 PSI is required to overcome the internal pressure in the pressure indicator **70**.

[0061] With the pressure indicator **70** mounted to the inner surface **72** of the interior space **26** of the cylindrical container **20**, the fire extinguisher **10** is pressurized with propellant to about 130 PSI. As the pressure of the propellant is in excess of the internal pressure of the pressure indicator **70**, namely 95 PSI, the moveable section **86** is moved from the first position to the second position, preventing movement of the ball **82** within the pressure indicator **70**. If over time, or through use, the pressure of the propellant falls below the 95 PSI internal pressure of the pressure indicator **70**, the moveable section **86** of the substantially rigid cover **84** moves from the second position to the first position, freeing the ball **82** for movement within the pressure indicator **70**.

[0062] In this manner, a user can verify that the pressure in the fire extinguisher **10** is above an operating pressure by shaking the fire extinguisher **10**. Specifically, a rattling sound, caused by a movement of the ball **82** within the pressure indicator **70**, would indicate that the pressure in the fire extinguisher **10** is below the operating pressure. A lack of a rattling sound, indicating that the ball **82** is captured with the pressure indicator **70**, would indicate that the pressure in the fire extinguisher **10** is at or above the operating pressure.

[0063] Alternatively, the moveable section **86** can be biased to the first position, such that an external pressure greater then a biasing force is required to move the moveable section **86** from the first position to the second position. When the external pressure is below the biasing force, the moveable section **86** is biased from the second position to the first position.

[0064] In an exemplary method of use, the pressure indicator **70** is used to verify that there is sufficient pressure in the container **20** to operate the fire extinguisher **10**. The ball **82** is sealed, with the substantially rigid cover **84**, in the base **74**, where the pressure in the sealed pressure indictor **70** can substantially equal to atmospheric pressure, or at least less

than the operating pressure. The moveable section **86** of the substantially rigid cover **84** is biased to the first position. To move the moveable section **86** of the substantially rigid cover **84** from the first position to the second position an external pressure greater then about 95 PSI is required to overcome the biasing force.

[0065] With the pressure indicator **70** mounted to the inner surface **72** of the interior space **26** of the cylindrical container **20**, and the fire extinguisher **10** is pressurized with propellant to about 130 PSI. As the pressure of the propellant is in excess of the required extern pressure to overcome the biasing force, namely 95 PSI, the moveable section **86** is moved from the first position to the second position, preventing movement of the ball **82** within the pressure indicator **70**. If over time, or through use, the pressure of the propellant falls below the required external pressure of 95 PSI, the moveable section **86** of the substantially rigid cover **84** moves from the second position to the first position, freeing the ball **82** for movement within the pressure indicator **70**.

[0066] In this manner, a user can verify that the pressure in the fire extinguisher **10** is above the operating pressure by shaking the fire extinguisher **10**. Specifically, a rattling sound, caused by a movement of the ball **82** within the pressure indicator **70**, would indicate that the pressure in the fire extinguisher **10** is below the operating pressure. A lack of a rattling sound, indicating that the ball **82** is captured with the pressure indicator **70**, would indicate that the pressure in the fire extinguisher **10** is at or above the operating pressure.

[0067] Referring to FIGS. **10** and **11**, in another embodiment the pressure indicator **90** includes a base **94** having a bottom surface **96** with an upwardly extending cylindrical wall **96** defining an interior space **98** and an open end **100**. A ball **102** is positioned in the interior space **98** of the base **94**, where a flexible or semi-rigid cover **104** is utilized to seal the open end **100** of the base **94**. At least a portion of the flexible or semi-rigid cover **104** is moveable between a first state and a second state. In the first state, as shown in FIG. **10**, the ball **102** is free to move within the base **94**, causing a rattling sound when shaken. In the second state, as shown in FIG. **11**, at least a portion of the flexible or semi-rigid cover **104** is compressed against the ball **102**, preventing movement of the ball **102** within the base. **94** when shaken.

[0068] The movement of the flexible or semi-rigid cover **104** is caused by a pressured differential between the pressure within the sealed pressure indictor **90** and the pressure outside the sealed pressure indicator **90**. When the pressure inside the sealed pressure indicator **90** is greater than pressure outside the sealed pressure indicator **70**, the pressure differential moves, extends, the flexible or semi-rigid cover **104** into the first state. When the pressure inside the sealed pressure indicator **90** is less than pressure outside the sealed pressure indicator **90**, the pressure differential moves, compresses, flexible or semi-rigid cover **104** into the second state.

[0069] In an exemplary method of use, the pressure indicator **90** is used to verify that there is sufficient pressure in the container **20** to operate the fire extinguisher **10**. The ball **102** is sealed, with the flexible or semi-rigid cover **104**, in the base **94**, where the pressure in the sealed pressure indictor **90** is at the operating pressure, for example at 95 PSA. The flexible or semi-rigid cover **104** is initially in the first state. To move the flexible or semi-rigid cover **104** from the first state to the second state an external pressure greater then about 95 PSI is required to overcome the internal pressure in the pressure indicator **90**.

[0070] With the pressure indicator **90** mounted to the inner surface **92** of the interior space **26** of the cylindrical container **20**, and the fire extinguisher **10** is pressurized with propellant to about 130 PSI. As the pressure of the propellant is in excess of the internal pressure of the pressure indicator **90**, namely, 95 PSI, the flexible or semi-rigid cover **104** is moved from the first state to the second state, preventing movement of the ball **102** within the pressure indicator **90**. If over time, or through use, the pressure of the propellant falls below the 95 PSI internal pressure of the pressure indicator **90**, the flexible or semi-rigid cover **104** moves from the second state to the first state, freeing the ball **102** for movement within the pressure indicator **90**.

[0071] In this manner, a user can verify that the pressure in the fire extinguisher **10** is above the operating pressure by shaking the fire extinguisher **10**. Specifically, a rattling sound, caused by a movement of the ball **102** within the pressure indicator **90**, would indicate that the pressure in the fire extinguisher **10** is below the operating pressure. A lack of a rattling sound, indicating that the ball **102** is captured with the pressure indicator **90**, would indicate that the pressure in the fire extinguisher **10** is at or above the operating pressure.

[0072] The pressures indicated in the above embodiment are only exemplary in nature, and other pressures are also contemplated.

[0073] All references cited herein are expressly incorporated by reference in their entirety.

[0074] It will be appreciated by persons skilled in the art that the present disclosure is not limited to what has been particularly shown and described herein above. In addition, unless mention was made above to the contrary, it should be noted that all of the accompanying drawings are not to scale. A variety of modifications and variations are possible in light of the above teachings without departing from the scope and spirit of the invention, which is limited only by the following claims.

What is claimed is:

1. A spray dispenser comprising:

a container;

a valve assembly affixed to the container;

a actuator connected in fluid communication to the valve assembly;

a propellant disposed within the container; and

a pressure indicator disposed within the container.

2. A spray dispenser as set forth in claim **1**, where the pressure indicator is contained entirely within the container.

3. A spray dispenser as set forth in claim **2**, further comprising a bag positionable within the container, the bag connected in fluid communication to the valve assembly opposite the actuator.

4. A spray dispenser as set forth in claim **3**, further comprising a liquid wet chemical fire extinguishing agent disposed within the bag, isolating the liquid wet chemical fire extinguishing agent from the propellant.

5. A spray dispenser as set forth in claim **4**, the liquid wet chemical fire extinguishing agent comprising:

$CH_3CHOHCO_2H$ (Lactic Acid);

KOH (Potassium Hydroxide); and

H_2O.

6. A fire extinguisher comprising:
a container;
a valve assembly affixed to the container;
a actuator connected in fluid communication to the valve assembly, the actuator having an elongated output orifice;
a liquid wet chemical fire extinguishing agent disposed within the container;
a propellant disposed within the container; and
a pressure indicator disposed within the container.

7. A fire extinguisher as set forth in claim **6**, wherein the container defines a longitudinal axis, and the elongated output orifice is substantially orthogonal to the longitudinal axis.

8. A fire extinguisher as set forth in claim **6**, wherein the actuator expels the liquid wet chemical fire extinguishing agent in a substantially planar pattern.

9. A fire extinguisher as set forth in claim **6**, further comprising a bag positionable within the container, the bag connected in fluid communication to the valve assembly opposite the actuator, wherein the liquid wet chemical fire extinguishing agent is disposed within the bag, isolating the liquid wet chemical fire extinguishing agent from the propellant.

10. A fire extinguisher as set forth in claim **6**, the liquid wet chemical fire extinguishing agent comprising:
$CH_3CHOHCO_2H$ (Lactic Acid);
KOH (Potassium Hydroxide); and
H_2O.

11. A fire extinguisher as set forth in claim **10**, wherein the liquid wet chemical fire extinguishing agent comprises:
about 17-43 vol. % of $CH_3CHOHCO_2H$ (Lactic Acid);
about 18-48 vol. % of KOH (Potassium Hydroxide); and
H_2O.

12. A fire extinguisher as set forth in claim **10**, the liquid wet chemical fire extinguishing agent further comprising a fire extinguishing foam.

13. A fire extinguisher as set forth in claim **6**, the liquid wet chemical fire extinguishing agent comprising:
about 17-43 vol. % of $CH_3CHOHCO_2H$ (Lactic Acid);
about 18-48 vol. % of KOH (Potassium Hydroxide);
about 0-23 vol. % of K2CO3 (Potassium Carbonate);
about 0-23 vol. % of KHCO3 (Potassium Bicarbonate); and
H_2O.

14. A fire extinguisher as set forth in claim **13**, wherein the liquid wet chemical fire extinguishing spray comprises:
about 28 vol. % of $CH_3CHOHCO_2H$ (Lactic Acid);
about 37 vol. % of KOH (Potassium Hydroxide);
about 7 vol. % of K2CO3 (Potassium Carbonate);
about 21 vol. % of KHCO3 (Potassium Bicarbonate); and
H_2O.

15. A fire extinguisher as set forth in claim **13**, the liquid wet chemical fire extinguishing, agent further comprising, a fire extinguishing foam.

16. A pressure indicator comprising:
a base including a bottom surface and sidewalls defining an open end.
a ball positionable in the base; and
a cover positioned over and sealing the open end of the base, wherein at least a portion of the cover is moveable between a first position and a second position.

17. A pressure indicator as set forth in claim **16**, wherein when at least a portion of the cover is in the first position the ball is free to move within the base, and when at least a portion of the cover is in the second position the ball is prevented from moving within the base.

18. A pressure indicator as set forth in claim **16**, wherein at least a portion of the cover is in the first position when an external pressure on the cover is less than an internal pressure in the sealed base; and at least a portion of the cover is in the second position the external pressure on the cover is greater than the internal pressure in the sealed base.

19. A pressure indicator as set forth in claim **16**, wherein at least a portion of the cover is biased in the first position by biasing force, and at least a portion of the cover is in the second position when an external pressure on the cover exerts a force on the cover in excess of the biasing force.

20. A pressure indicator as set forth in claims **15**, where the cover is made or a rigid, semi-rigid, or flexible material

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