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Al Thawad

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(54) **FIRE EXTINGUISHING BALL**

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A62C 8/00 (2006.01)

(52) **U.S. Cl.**
USPC **169/36**; 169/9; 169/11; 169/19; 169/26; 169/35; 169/56; 169/57

(58) **Field of Classification Search**
USPC 169/9, 11, 19, 26, 35, 36, 54, 56, 169/57, 60
See application file for complete search history.

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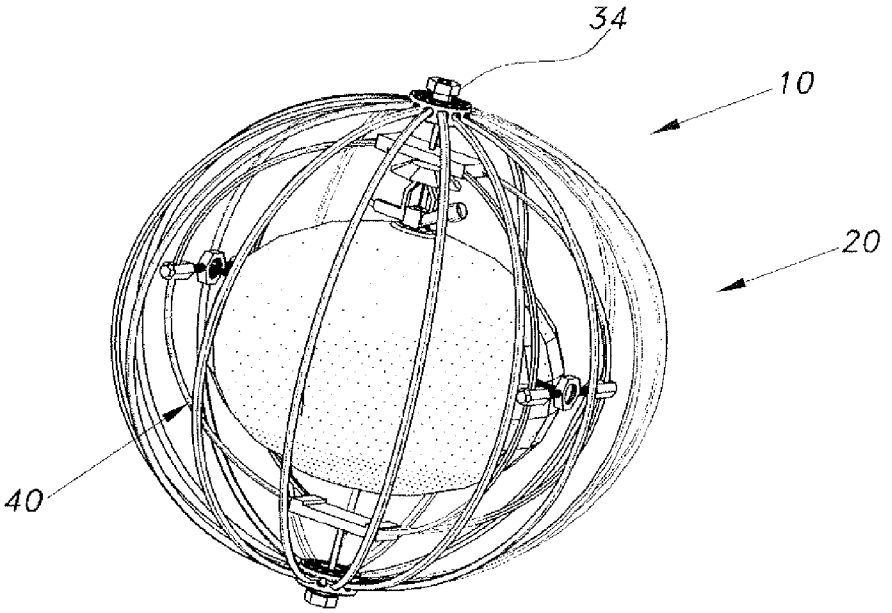
(57) **ABSTRACT**

The fire extinguishing ball includes an outer ball cage, an inner ball cage freely rotatable within the outer ball cage about one axis, and an internal fire extinguishing assembly carried by the inner ball cage and freely rotatable therein about a different axis. The internal fire extinguishing assembly includes a hollow ball-shaped body containing compressed gas and fire extinguishing agents. A valve assembly attached to the top of the body permits refilling of the body and dispersion of the contents during operation. The internal fire extinguishing assembly is connected to the inner ball cage so that the valve assembly will be disposed on top when the fire extinguishing ball is at rest. The ball can be tossed or rolled towards fires in difficult to reach areas. Exposure to heat opens the valve in the valve assembly to thereby disperse the contents of the body and extinguish the flames.

7 Claims, 5 Drawing Sheets



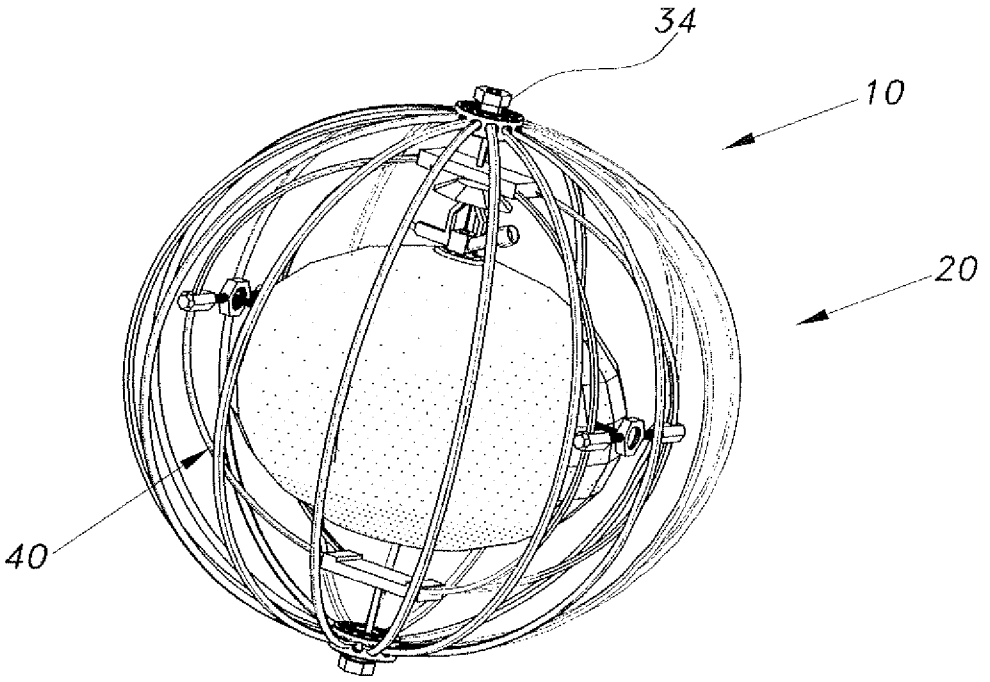


Fig. 1

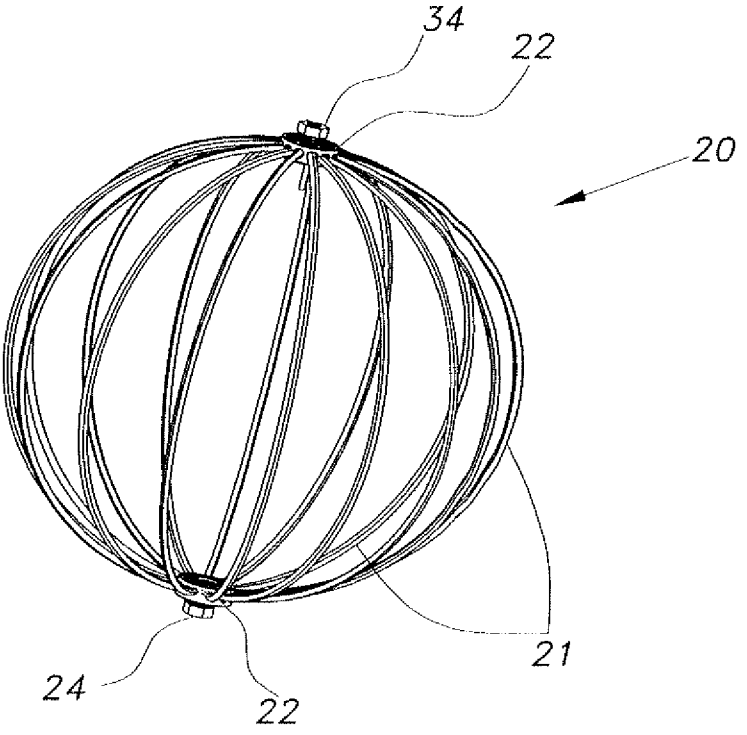


Fig. 2

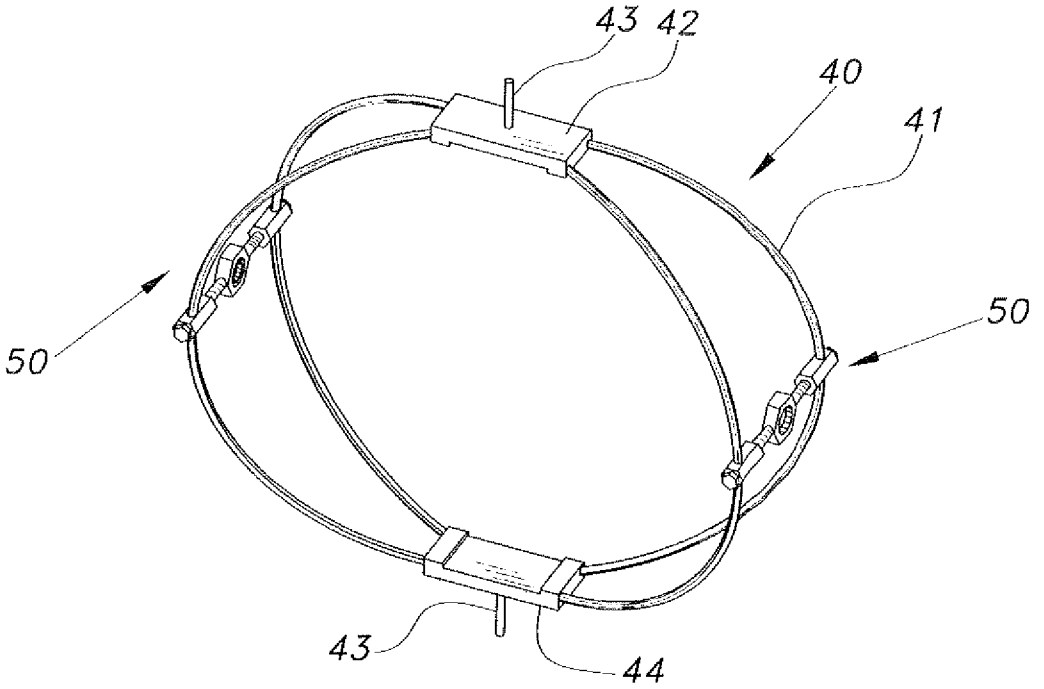


Fig. 3

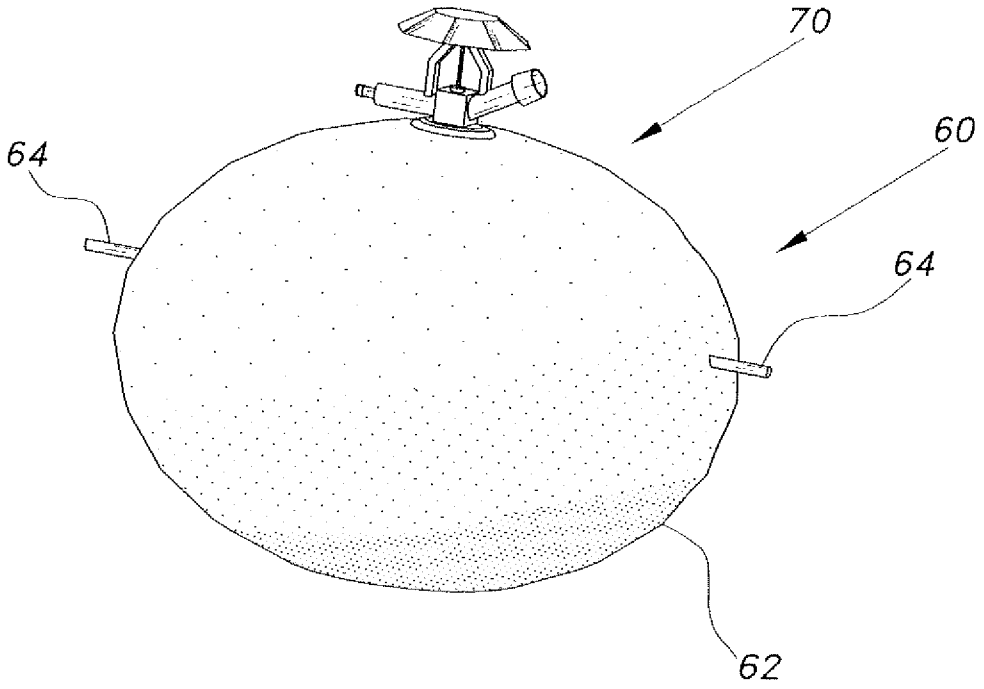


Fig. 4

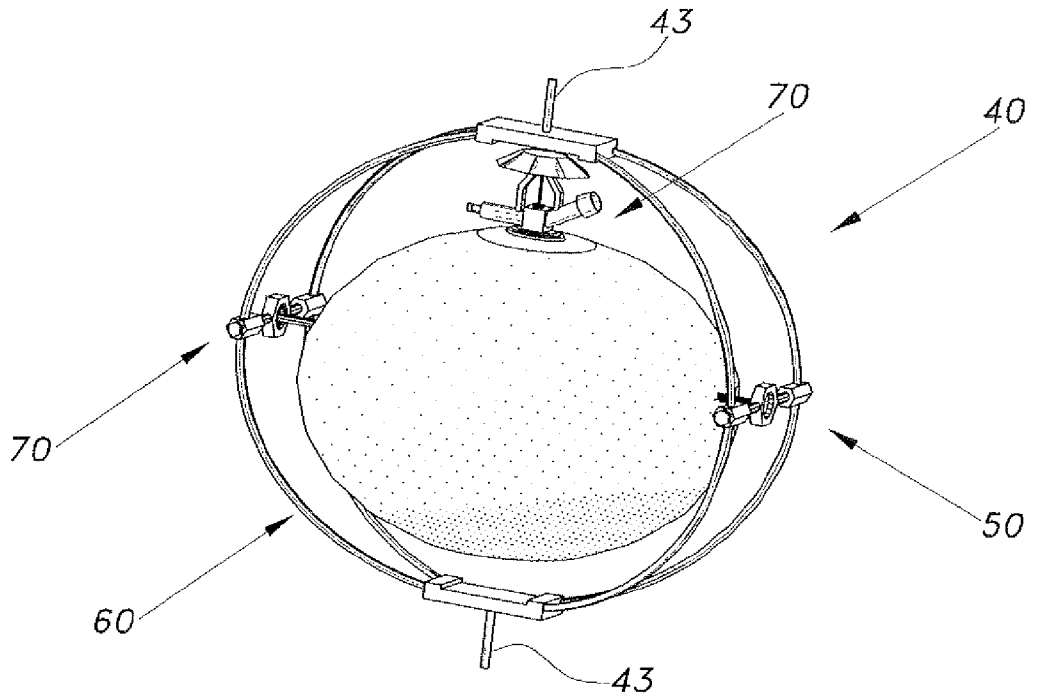


Fig. 5

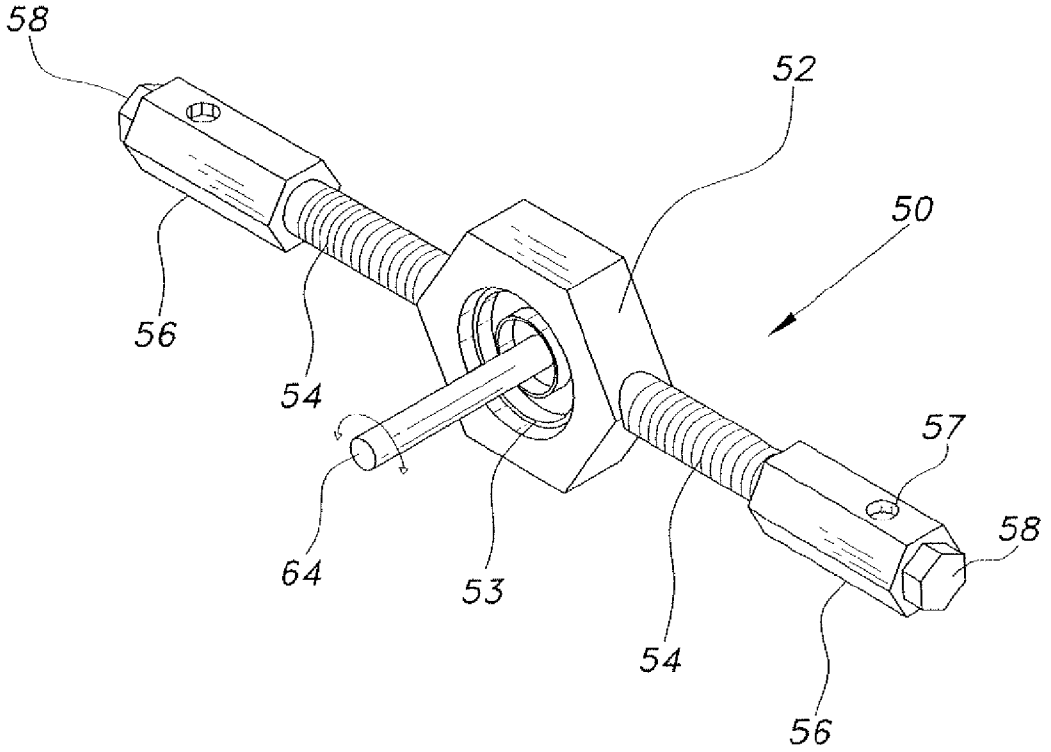


Fig. 6

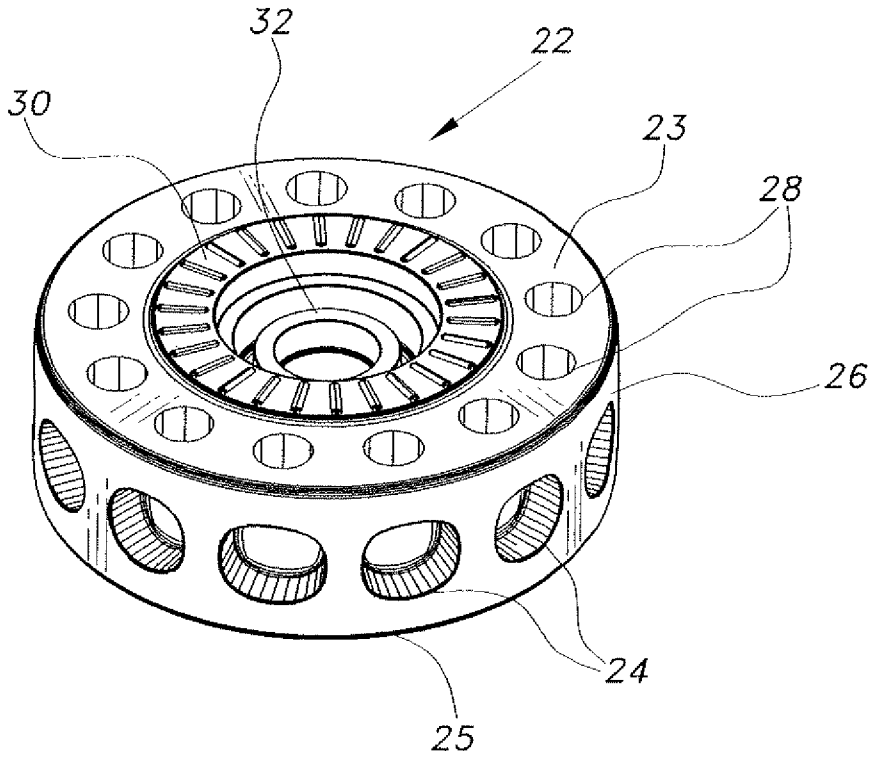


Fig. 7

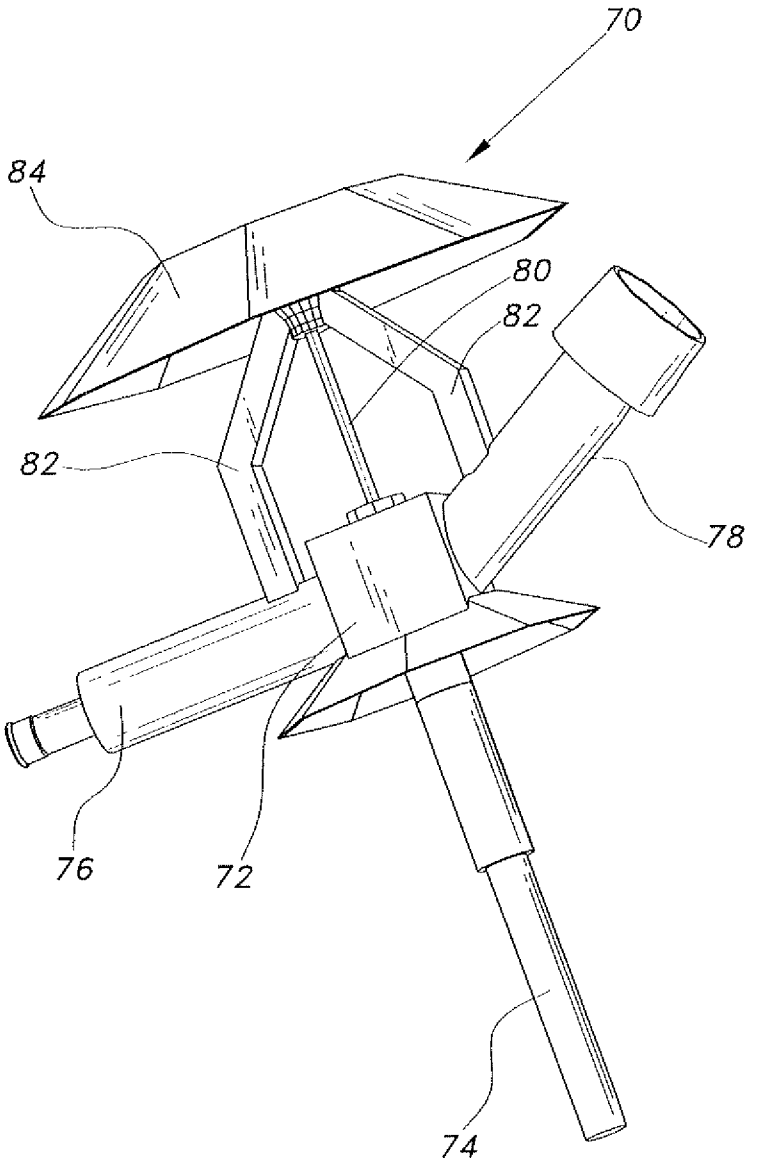


Fig. 8

FIRE EXTINGUISHING BALL

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to fire safety devices, and particularly to a fire extinguishing ball that can be safely deployed into difficult to reach areas.

2. Description of the Related Art

When one is faced with a fire emergency, one of the most difficult and dangerous aspects of combating the fire is being able to approach close enough to effectively extinguish the flames with whatever means are available. In most situations, it may be relatively safe to hose down a burning building or domicile with water or fire extinguishing chemicals from a distance. However, firefighters oftentimes must charge into the burning building in their attempts to rescue survivors. In this scenario, firefighters face many hazards, such as smoke, backdrafts and potential falling debris. Even if a survivor is reached, rescue may not be possible due to surrounding fire. The surrounding fire may be located in a place where the conventional fire hose cannot reach or so vigorous that a conventional fire extinguisher will be ill suited to handle the flames.

Similar issues can also occur in industrial sites. While most large-scale industrial fires can be relatively easy to reach, other small-scale or localized fires can occur in areas where it is difficult or even impossible to reach by conventional means, e.g., ducts for air and wires.

Many fire-fighting devices have been proposed which will help combat the fires in the above examples to a degree. Some examples include the conventional fire extinguisher mentioned above and explosive devices that contain fire-extinguishing agents. With respect to the fire extinguisher, this device is typically heavy and cumbersome requiring much physical effort to carry and operate. Moreover, they require expert periodic inspection and maintenance. With respect to the explosive devices, they can be costly and difficult to manufacture due to the materials and processes used to make them safe for normal use, e.g., the shell is usually made from materials that will not turn into shrapnel upon explosion. Oftentimes, special care must be exercised when using such devices.

In light of the above, it would be a benefit in the fire fighting arts to provide a fire-extinguishing device that can be easily and safely deployed in typically inaccessible areas. Thus, a fire extinguishing ball solving the aforementioned problems is desired.

SUMMARY OF THE INVENTION

The fire extinguishing ball includes an outer ball cage, an inner ball cage freely rotatable within the outer ball cage about one axis, and an internal fire extinguishing assembly carried by the inner ball cage and freely rotatable therein about a different axis. The internal fire extinguishing assembly includes a hollow ball-shaped body containing compressed gas and fire extinguishing agents. A valve assembly attached to the top of the body permits refilling of the body and dispersion of the contents during operation. The internal fire extinguishing assembly is connected to the inner ball cage so that the valve assembly will be disposed on top when the fire extinguishing ball is at rest. The ball can be tossed or rolled towards fires in difficult to reach areas. Exposure to heat opens the valve in the valve assembly to thereby disperse the contents of the body and extinguish the flames.

These and other features of the present invention will become readily apparent upon further review of the following specification and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a fire extinguishing ball according to the present invention.

FIG. **2** is a perspective view of the outer ball cage of the fire extinguishing ball shown in FIG. **1**.

FIG. **3** is a perspective view of the inner ball cage of the fire extinguishing ball shown in FIG. **1**.

FIG. **4** is a perspective view of the internal fire extinguishing assembly of the fire extinguishing ball shown in FIG. **1**.

FIG. **5** is a perspective view of the internal fire extinguishing assembly of FIG. **4** shown mounted to the inner ball cage of FIG. **3**.

FIG. **6** is a perspective view of a joint for connecting the internal fire extinguishing assembly of FIG. **4** to the inner ball cage of FIG. **3**.

FIG. **7** is a perspective view of a ring connector for the outer ball cage of FIG. **2**.

FIG. **8** is a perspective view of the valve assembly for the internal fire extinguishing assembly of FIG. **4**.

Similar reference characters denote corresponding features consistently throughout the attached drawings.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The fire extinguishing ball, generally referred to in the drawings by reference number **10**, provides a safe means of extinguishing fires in typically inaccessible or hard to reach areas. The user rolls or tosses the fire extinguishing ball **10** into the target area from a safe distance, and the heat of the flames opens up a valve assembly to thereby release fire extinguishing agents on and around the fire extinguishing ball **10**.

As shown in FIGS. **1-4**, the fire extinguishing ball **10** includes an outer ball cage or frame **20**, an inner ball cage or frame **40** rotatable within the outer ball cage **20**, and an internal fire extinguishing assembly **60** carried by the inner ball cage **40** and rotatable therein. The outer ball cage **20** includes two spaced ring connectors **22** and a plurality of arcuate or curved wires, bars or beams **21** connected to the ring connectors **22** at their respective ends. The curved wires **21** are angularly spaced around the ring connectors **22** to form a ball or spherical shape. The wires **21** can be constructed from metal, composites or other materials that can withstand heat from a typical fire without losing its shape, at least long enough for the internal fire extinguishing assembly **60** to perform.

As shown in FIGS. **1**, **2** and **7**, each ring connector **22** can be a cylindrical disk having a top side **23**, a bottom side **25** and an outer, circumferential side surface **26**. A plurality of mounting holes or bores **24** are formed around the circumferential side surface **26** at spaced intervals, the mounting holes **24** being constructed to receive one of the ends of the curved wires **21**. A plurality of set holes or bores **28** are formed and circumferentially spaced on the top side **23**, each set hole **28** being in communication with a corresponding mounting hole **24**. The end of a curved wire **21** is inserted into one of the mounting holes **24**, and that end can be secured by a set screw through the corresponding set hole **28**. Although a circular, disk-shaped ring connector **22** has been disclosed, the ring connector **22** can be constructed in a variety of shapes that include mounting holes **24** and set holes **28**. The ring connec-

tor **22** also includes an inner bearing **30**. The inner bearing **30** facilitates rotation of the inner ball cage **40** when the inner ball cage **40** is mounted inside the outer ball cage **20**.

As shown in FIGS. **1** and **3**, the inner ball cage **40** includes an upper mounting bracket **42** and a lower mounting bracket **44**. A plurality of arcuate or curved wires, bars or beams **46** are connected to and extend between the upper and lower mounting brackets **42**, **44** to give structure and shape to the inner ball cage **40**. The curved wires **46** are preferably constructed from the same materials as the curved wires **21**. A swivel joint assembly **50** is disposed on opposite sides of the inner ball cage **40**. Each swivel joint assembly **50** is slidably mounted to a pair of the curved wires **46**. The swivel joint assembly **50** facilitates free rotation of the internal fire extinguishing assembly **60**. Each mounting bracket **42**, **44** also includes a mounting rod or bar extending outwardly therefrom for rotatably attaching the inner ball cage **40** to the outer ball cage **20**. Each mounting rod **43** passes through a through bore **32** in the respective inner bearing **30** on the ring connectors **22**, and the mounting rod **43** is secured thereon by a fastener or nut **34**. With this construction, the inner ball cage **40** is free to rotate inside and independently of the outer ball cage **20** about the axis defined by the mounting rods **43**.

As shown in FIGS. **1**, **3** and **6**, the swivel joint assembly **50** includes a central swivel joint **52** having a bearing **53** therein. The bearing **53** rotatably connects the internal fire extinguishing assembly **60** to the inner ball cage **40** so that the internal fire extinguishing assembly **60** can freely rotate inside and independently of the inner ball cage **40**. An extension bar, beam or rod **54** extends from opposite sides of the central swivel joint **52**. Each extension rod **54** is threaded to facilitate adjustable connection of a mounting head **56**, as well as attachment to the central swivel joint **52**. Each mounting head **56** includes a through bore **57** for slidably mounting that end of the swivel joint assembly **50** to one of the curved wires **46**. Slight adjustments of the mounting head **56** along the extension rod **54** can be made to properly position the central swivel joint **52** for mounting the internal fire extinguishing assembly **60**. The adjustable movement can be limited by the end cap **58**.

As shown in FIGS. **1**, **4** and **5**, the internal fire extinguishing assembly **60** includes a ball-shaped body **62** and a connection rod, bar or beam **64** extending outwardly from opposite ends of the body **62**. The body **62** can be spherical, ovoid or any other ball shape. Each connection rod **64** is configured to be insertably mounted to a respective one of the central swivel joints **52** in a manner that allows free rotational movement of the internal fire extinguishing assembly **60** within the inner ball cage **40** about an axis defined by the connection rods **64**, this axis being different from the rotational axis of the inner ball cage **40**. The body **62** is hollow and constructed from copper or fiberglass, materials that are light and resist high temperature and pressure. The body **62** is filled with compressed gas and fire extinguishing agents. The top of the body **62** includes a valve assembly **70** where the body **62** can be filled with the compressed gas and fire extinguishing agents. Moreover, the valve assembly **70** facilitates dispersion of the fire extinguishing agents during operation. For effective operation of the fire extinguishing ball **10**, the connection rods **64** are preferably placed at points offset from the central axis of the body **62**, i.e., between the central axis and the valve assembly **70**. With this construction, the weight or center of mass of the internal fire extinguishing assembly **60** will be concentrated toward the ground as the assembly **60** swivels on the swivel joint assembly **50**. This allows the internal fire extinguishing assembly **60** to right itself with the valve assembly **70** at the top whenever the fire extinguishing ball **10** is at rest.

As shown in FIGS. **1**, **4**, **5** and **8**, the valve assembly **70** includes a valve housing **72** connected to first and second adjacent ports **76**, **78** extending from the valve housing **72**. The first port **76** can be configured to introduce the compressed air into the body **62** while the second port **78** can be configured to introduce the fire extinguishing agents. A flow tube **74** is connected to the valve housing and extends towards the bottom of the interior of the hollow body **62**. The flow tube **74** allows the gas and agents to flow into the interior, and to exit therefrom. The valve housing **72** includes a thermally sensitive valve, such as a mercury valve, as is known in the art. When exposed to heat, the mercury expands rapidly and opens the valve **70**. Upon opening, the contents of the body **62** escape through the flow tube **74** and funnel through a dispersion tube **80**. The dispersion tube **80** is preferably smaller in diameter than the flow tube **74** in order to increase escape pressure. The dispersion tube **80** is supported by a support bracket **82**. In order to maximize the area that can be reached by the escaping fire extinguishing agents, the valve assembly **70** includes a dispersion shroud **84**. The shroud **84** may be shaped as an umbrella. As the contents escape from dispersion tube **80**, the contents deflect off the interior surface of the shroud **84** to spread the fire extinguishing agents in a wide 360° area. The shroud **84** is also supported by the support bracket **82**.

In operation, the user tosses or rolls the fire extinguishing ball **10** towards the desired area in flames. Once in the fire, the independent rotational movements of the outer ball cage **20**, the inner ball cage **40** and the internal fire extinguishing assembly **60** allows the fire extinguishing assembly **60** to right itself with the valve assembly **70** disposed on top, this action being aided by the offset rotational axis of the internal fire extinguishing assembly **60** with respect to the inner ball cage **40**. As the body **62** heats from exposure to the flames or heat source, this causes the valve in the valve housing **72** to rapidly open and allow the compressed gas and fire extinguishing agents inside to escape. The shroud **84** helps to disperse the contents in a wide circular area to extinguish the fire.

Thus, it can be seen that the fire extinguishing ball **10** can be an economical, lightweight solution for extinguishing fires in typically inaccessible or hard to reach places. The ball cage construction minimizes the weight of the fire extinguishing ball **10** while providing high mobility for placing the same in the desired area.

It is to be understood that the fire extinguishing ball. **10** encompasses a variety of alternatives. For example, the fire extinguishing ball **10** can be constructed in a variety of sizes, depending on the needs of the user. Moreover, the body **62** can contain specific fire extinguishing agents for specific types of fires.

It is to be understood that the present invention is not limited to the embodiments described above, but encompasses any and all embodiments within the scope of the following claims.

I claim:

1. A fire extinguishing ball, comprising:

an outer ball cage adapted to be rolled or tossed towards a source of fire;

an inner ball cage rotatably mounted inside the outer ball cage, the inner ball cage being freely rotatable about a first axis; and

an internal fire extinguishing assembly rotatably mounted inside the inner ball cage, the internal fire extinguishing

assembly being freely rotatable about a second axis different from the first axis, the internal fire extinguishing assembly having fire extinguishing agents under pressure and a heat-activated valve assembly, the valve assembly selectively introducing and dispersing fire extinguishing agents into and out of the internal fire extinguishing assembly;

wherein exposure to heat from the source of fire causes the valve assembly to open and disperse the fire extinguishing agents in a wide area and thereby extinguish the fire.

2. The fire extinguishing ball according to claim **1**, wherein the outer ball cage comprises two vertically spaced ring connectors and a plurality of angularly spaced, curved wires attached to the ring connectors at their respective ends, the curved wires forming a ball shape.

3. The fire extinguishing ball according to claim **2**, wherein each said ring connector comprises:

a body having a top side, a bottom side, and an outer side surface, the outer side surface having a plurality of mounting holes formed therein, the mounting holes being disposed at spaced intervals, each of the mounting holes being configured for receiving an end of one of said curved wires, the top side having a plurality of set holes formed therein, each of the set holes being in communication with a corresponding one of the mounting holes

set screws disposed in the set holes and selectively bearing against the ends of said curved wires inside the corresponding mounting hole to secure said curved wires; and

an inner bearing mounted in the body of said ring connector, the inner bearing facilitating free rotation of said inner ball cage when said inner ball cage is mounted inside said outer ball cage.

4. The fire extinguishing ball according to claim **1**, wherein said inner ball cage comprises:

an upper mounting bracket;

a lower mounting bracket spaced away from the upper mounting bracket;

a plurality of curved wires connected to and extending between the upper and lower mounting brackets, the curved wires providing structure and shape to the inner ball cage;

a swivel joint assembly disposed on opposite sides of the inner ball cage, each of the swivel joint assemblies being slidably mounted to a pair of the curved wires, the swivel joint assembly facilitating free rotation of said internal fire extinguishing assembly about said second axis; and

a mounting rod extending outward from each of the mounting brackets, each of the mounting rods mounting the respective mounting bracket to said outer ball cage.

5. The fire extinguishing ball according to claim **4**, wherein said swivel joint assembly comprises:

a central swivel joint having a bearing, the bearing being for rotatably connecting said internal fire extinguishing assembly to the inner ball cage;

an extension bar connected to opposite sides of the central swivel joint; and

a mounting head adjustably mounted to a distal end of each of the extension bars, the mounting head having a through bore slidably mounting the mounting head to one of said pair of curved wires.

6. The fire extinguishing ball according to claim **1**, wherein said internal fire extinguishing assembly comprises:

a hollow, ball-shaped body, the body having an interior for holding compressed gas and fire extinguishing agents, the body having a central axis;

a connection rod attached to opposite ends of the body and defining the second axis, the connection rods being offset from the central axis, the connection rods being adapted for rotatably mounting the body to said inner ball cage about the second axis, the second axis being offset from the central axis, said valve assembly being disposed on top of the body;

wherein the offset second axis permits self righting of body with said valve assembly on top when the fire extinguishing ball is at rest.

7. The fire extinguishing ball according to claim **6**, wherein said valve assembly comprises:

a valve housing attached to said body;

a first port and a second port extending from the valve housing, each of the ports being selectively used to fill said body with compressed air and fire extinguishing agents;

a flow tube connected to the valve housing, the flow tube having a first diameter and extending towards the bottom of said body, the flow tube permitting inflow and outflow of compressed air and fire extinguishing agents;

a dispersion tube attached to the valve housing, the dispersion tube having a diameter smaller than the diameter of the flow tube in order to increase exit pressure of the compressed air and fire extinguishing agents;

a support bracket stably supporting the dispersion tube; and

a shroud attached to the support bracket, the shroud having an interior surface for deflecting the exiting compressed gas and fire extinguishing agents to thereby disperse the same in a wide circular area.

* * * * *