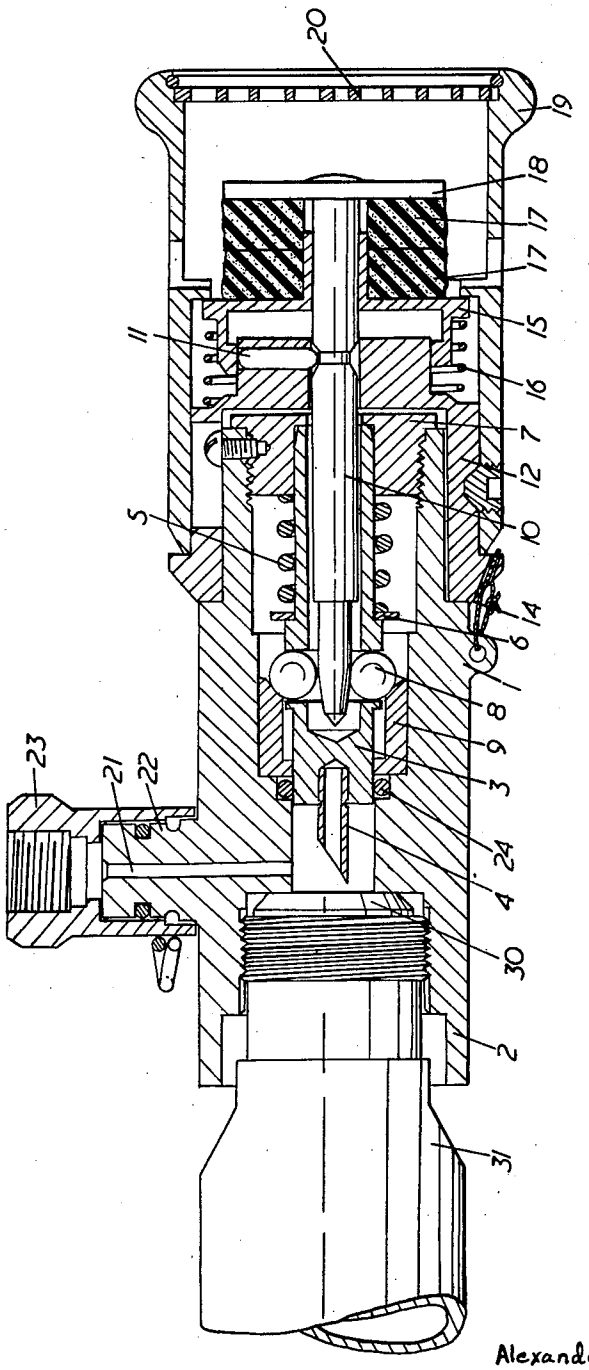
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GAS RELEASE DEVICES

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GAS RELEASE DEVICES

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The present invention relates to a device for the release of gas from a storage bottle or like container automatically on immersion in water. The purpose for which such a device is provided is to permit the automatic inflation of inflatable life jackets and dinghies.

In the specification of patent application No. 720,640 there is described and claimed an immersion-responsive actuator for gas release valves and other devices incorporating, as its critical component, a mass of porous material (such, for example, as a highly compressed cellulose or other synthetic sponge of fine pore size) which has the property of swelling strongly on absorption of free liquid thereby.

The chief object of the present invention is an improved immersion-responsive gas release device utilizing the expansive effect above-mentioned.

In the present instance reference will be made to the piercing of the seal of a sealed gas bottle by means of a spring-loaded piercer. However, in other cases the device may be employed for releasing gas from a gas bottle maintained in a closed condition by means of a check member which is displaced from its seating to release gas from a bottle. The device of the present invention would be suitable for opening both types of gas bottle with only slight structural modification.

It is a further object of the present invention to provide an over-riding manual control for the release of gas in addition to the automatic means.

According to the present invention a device for the release of gas from a closed gas container comprises a body, a container-opening plunger member slidably mounted in the body, a spring arranged between abutments on the body and the plunger member and urging said member in the container-opening direction, locking means acting on the plunger member, a release spindle longitudinally movable in relation to the plunger member and adapted to release said locking means, a body of a material, which expands on immersion in water, arranged between an abutment on the release spindle and an abutment associated with the body, the said disc being located for easy access by water on immersion of the device for the movement of the release spindle and release of the locking means.

According to a further feature of the invention, the abutment associated with the body, against which the expansible disc bears, is provided by a member which moves against resilient resistance on initial expansion of the disc until it comes into contact with a fixed abutment, this longitudinal movement sufficing to release a securing means acting on the release spindle. The securing means holds the release spindle against accidental displacement by shock.

The device may be provided with an over-riding manual control by attaching a handle, which is guided for longitudinal movement on the body, to a further movable member located around the spindle. This movable member, in fact, provides the fixed abutment for the movable abutment member, but can be withdrawn in the opposite direction to the motion of the movable abutment member so as to displace the movable abutment member and the release spindle and associated expansible disc bodily

and thus release the lock acting on the plunger member.

One construction of gas release device made in accordance with the invention is hereinafter described with reference to the accompanying drawing, which shows a longitudinal section of the device.

The device shown in the drawing consists of a body **1** having an end socket part **2** which can be connected to a gas bottle. The socket **2** is shaped in accordance with the requirements of the gas bottle or other container with which the device is to be employed. A plunger **3**, carrying a piercer pin **4**, is arranged for longitudinal movement in the body **1**. A spring **5** is arranged between an abutment thrust washer **6** on the plunger **3** and an abutment formed by a retainer member **7** screw-threaded into the body, so as to urge the plunger **3** in the direction required for the pin **4** to pierce a seal **30** in the top of a gas bottle **31**. The plunger **3** is, however, held against movement by balls **8** located in apertures in the plunger member **3** and bearing against a chamfered seating ring **9** held in the body. The balls **8** are held against movement radially inwardly of the plunger by means of the tapered leading end of a release spindle **10**. The spindle **10** is itself guided in the plunger member **3** and when it is withdrawn from between the balls **8** the plunger member **3** is thereby released to open the gas bottle under the force produced by the compressed spring **5**. The release spindle **10** is itself held against longitudinal movement by the engagement of a locking pin **11** slidably mounted in a release spindle guide member **12** in a waist in the release spindle. The guide member **12** is itself guided for longitudinal movement on the exterior surface of the body **1**, but is held against the end of the body in the position shown by means of a break cord **14**, the purpose of which will appear hereafter. A movable abutment member or locking ring **15** is guided on the external surface of the guide member **12** and holds the locking pin **11** in position. A light spring **16** is arranged between the guide member **12** and the locking ring **15**. It will be observed that the movement of the locking ring **15** towards the guide member **12** will release the locking pin **11** for outward movement and only a short movement of the locking ring **15** is possible until it comes up solid against the guide member **12**.

A pair of actuating discs **17** are located between the locking ring **15** and an end plate **18** carried by the release spindle **10**. A handle member **19** is secured to the guide member **12** and is provided with a perforated end cover plate **20** which permits easy access of water to the discs **17** on immersion of the device in water. The discs **17** are made of a compressed cellulose sponge material of small pore size which is found to expand considerably when fully immersed in water and to provide sufficient force during such expansion for the full withdrawal of the release spindle **10** from between the balls **8**.

In operation, since the release spindle **10** is itself locked by the pin **11** against longitudinal movement, the initial movement produced by the expansion of the discs **17** moves the locking ring **15** to compress the light spring **16** and at the same time to free the pin **11** so that it may move radially outwards. The movement of the locking ring **15** is limited by the guide member **12**, which acts as a fixed abutment or stop to prevent further movement of the locking ring **15**. When the locking pin **11** has been freed, further expansion of the discs **17** causes the withdrawal of the release spindle **10** from between the balls **8**. The plunger **3** is thus freed to move in the actuating direction, the pin **4** rupturing the seal **30**.

The function of the apparatus as described so far permits of the automatic release of gas from a container to a life jacket or the like and thus ensures that in the event of an injured or panicky wearer of the life jacket being immersed in water, the life jacket will automatically in-

flate after the short delay necessary for the expansion of the discs **17**.

The over-riding manual control of the device is provided by the handle **19** which, on being pulled outwardly, will first break the cord **14**. Thereafter the release spindle guide member **12** will come up against the end of the locking ring **15** which will then move bodily with the handle **19** together with the discs **17** and the release spindle **10**.

The gas released is led out through a passage **21** in a boss **22** on which a coupling nut **23** is captive. The escape of gas through the body is prevented by O-ring **24**.

We claim:

1. A device for the release of gas from a closed gas container secured thereto, comprising a body, a hollow plunger member for opening such container on longitudinal movement thereof in one direction, said body having a bore in which said plunger member is slidably mounted, abutments on said body and said plunger member, a first spring means arranged between said abutments, said first spring means urging said member in said one direction, a release spindle coaxially and slidably mounted within said plunger member, locking means for holding said plunger member in a cocked position, said locking means comprising detent means, said plunger having a radial aperture in the wall thereof, said detent means being held in said radial apertures in said wall in a projecting and blocking position in relation to said plunger member in the cocked position of said plunger member, a shoulder in said bore or said body with which said detent means is engageable, a mass of material capable of substantially increasing its volume without change of state when immersed in water, an abutment on the release spindle, and a slidable member slidable relative to said body, said mass of material being between said abutment on said spindle and said slidable member, a second spring means arranged between said slidable member and the body of said device to resist movement of said slidable member away from said abutment on the release spindle, and further locking means holding said release spindle against movement in relation to said body and releasable by said slidable member when said slidable member moves against the action of said second spring means, initial expansion of said expansible material on immersion in water being effective to release said spindle locking means by movement of said slidable member against the spring resistance of said second spring means, further expansion of said expansible material causing movement of said release spindle to a position where it frees said slidable member for movement inwardly of said plunger and thus releases said plunger member for endwise movement under the force of said first spring means.

2. A device as claimed in claim 1, wherein said detent means comprise a pair of balls, said spindle having a tapered end, said plunger member having a pair of diametrically oppositely arranged apertures in the wall thereof, said balls being, in the cocked position of said plunger member, held in an outwardly projecting position by contact with the tapered end of said release spindle, said shoulder in the bore in the body of said device being chamfered and engaged by said balls.

3. A device for the release of gas from a closed gas container secured thereto, comprising a body having a bore therein, a plunger member for opening the container on longitudinal movement thereof in one direction, said plunger member being slidably mounted in the bore in said body, said body having an abutment thereon, spring means arranged between said abutment on said body and said plunger member, said spring means urging said member in said one direction, locking means for holding said plunger member in a cocked position and against movement in said one direction, a release spindle longitudinally moveable in relation to the plunger member for releasing said locking means on movement in one direction, a body of material capable of substantially increasing its volume without change of state on immersion in water for controlling the position of said release spindle, an abutment on said release spindle, a securing member axially movable in said body of said device, said body of expansible material being arranged between said abutment on said release spindle and said securing member, said securing member being spring biased against movement in said body in the direction opposite to the releasing direction of said release spindle, further locking means acting on said release spindle in the cocked position to prevent endwise movement of said spindle, said release spindle locking means being released to permit movement of said spindle in said plunger member releasing direction on movement of said securing member in said opposite direction on expansion of said body of expansible material.

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