

(19)



(11)

EP 2 379 979 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
21.08.2013 Bulletin 2013/34

(51) Int Cl.:
F42B 33/02 (2006.01) F42D 1/10 (2006.01)

(86) International application number:
PCT/IB2009/007834

(21) Application number: **09801252.9**

(87) International publication number:
WO 2010/070442 (24.06.2010 Gazette 2010/25)

(22) Date of filing: **21.12.2009**

(54) SECURITY SYSTEM AND CORRESPONDING METHOD FOR USE WITH PUMPABLE EXPLOSIVES

SICHERHEITSVORRICHTUNG UND ENTSPRECHENDES VERFAHREN ZUR VERWENDUNG MIT PUMPBAREN SPRENGLADUNGEN

SYSTEME DE SECURITE ET METHODE ASSOCIEE DESTINEE A ETRE UTILISEE AVEC DES EXPLOSIFS POMPABLES

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL
PT RO SE SI SK SM TR**

- **BUHRMANN, Rudolph, Teodor
Centurion (ZA)**
- **BOTHA, Theuns
Pretoria (ZA)**

(30) Priority: **19.12.2008 ZA 200810719**

(74) Representative: **Stanners, David Ralph et al
Urquhart-Dykes & Lord LLP
3rd Floor
33 Glasshouse Street
London W1B 5DG (GB)**

(43) Date of publication of application:
26.10.2011 Bulletin 2011/43

(73) Proprietor: **Iptree Trust (Trust Number 503/2009)
2055 Gauteng (ZA)**

(56) References cited:
**EP-A1- 1 167 231 EP-A1- 1 221 419
DE-A1- 19 950 884 FR-A5- 2 150 112
US-A1- 2008 073 375**

(72) Inventors:
• **BUHRMANN, Rudolph
0186 Pretoria (ZA)**

EP 2 379 979 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

FIELD OF THE INVENTION

[0001] This invention relates to a system and a method for improving security in the handling and use of blasting intermediates, commonly referred to as pumpable explosives.

[0002] A security system for providing conditional access to contents of a container and the corresponding method is described in US 2008/0073375 A.

BACKGROUND TO THE INVENTION

[0003] Explosives are inherently dangerous products and security in the storage and handling of explosives has been a concern, especially as their use in mining and industry has increased since the invention of dynamite. However, in recent times a series of new situations has arisen which place ever increasing demands on users of explosives to ensure that they are securely stored, handled and accounted for. In South Africa, for example, large quantities of explosives are used in deep level mining environments as well as in open cast mining and in civil engineering projects. At the same time, the rise of a number of relatively new unlawful uses of explosives has produced a demand for tighter control on their use. For example, pirate mining of existing mines has become an increasing problem, both in South Africa and elsewhere. Pirate miners are unauthorized gangs of miners who infiltrate an existing mine, sometimes living underground for long periods, and mine areas of the mine that are not being mined by the mining company. These areas may be ore passes that are considered uneconomical to mine using the normal resources of the mine or that have been mined out or simply areas that have not yet been exploited. Further, the use of explosives in criminal activities has increased dramatically. For example, criminal gangs have taken to blowing up bank automated teller machines (ATMs) that are situated in public places to permit members of the public to draw money or conduct banking transactions. Large numbers of such ATMs are blown up every year.

[0004] For these reasons, government authorities in many countries have become increasingly concerned over the control of access to explosives and the proper control of the handling of explosives. In some countries, regulations permit the responsible governmental organization to inspect mines on a regular basis and to shut down mines that fail to meet strict rules for the control of access to and the handling and accounting for explosives used on the mine. It will be appreciated that even a temporary closure of a large mine could result in very substantial financial loss for the mine owners.

[0005] In a system where two-part explosives gels are pumped into blasting holes in the mining or other industries, mobile or semi-fixed pumping units are used. These pumping units are designed to deliver a required mass

flow ratio of the two gel components into a blasting hole. On their own, the gel components are harmless and inactive. For the two-part mixture to work as an explosive it is important that the two gel components are brought into intimate contact with each other and in the correct mass ratio. In some applications the one gel component is called the activator and the other the base emulsion/water-gel. Several different types of liquid/gel explosives are available, some of which require a delayed chemical reaction to activate after being mixed, while others are activated immediately after being brought together.

[0006] For reasons of safety, the two liquids must, however, be separately transported from an explosives gel manufacturing facility and then loaded into separate tanks in the pumping unit for mixing and placement by the user into a blast hole. Since the separate components are harmless on their own, transport and security requirements for the separate gel components have been relaxed and the security focus has moved to the pumping unit in which the two gel components are present in close proximity for the first time in the blasting cycle. This has resulted in several different methods to prevent unauthorized use and operation of the pumping unit. One solution has been to fit a conventional keyed lock to the pumping unit, which an authorized user can use to lock the pumping unit to prevent unauthorized use and operation of the pump.

[0007] An inherent problem in all currently implemented attempts to prevent unauthorized use and operation of the pump has been the fact that certain amounts of both gel components are present in the tanks of the pumping unit even when the pumping unit is in its locked state. This is a problem especially when pumps are small enough to be carried. Should a pumping unit be stolen even while it is locked, a thief could circumvent the locking mechanism and pump the gels that are present in tanks of the pumping unit, thereby producing explosive that may be used for unlawful purposes.

[0008] It would therefore be an advantage to ensure that both components of an explosives gel are not simultaneously present in a pump when the pump is in its locked state, whether because the pump is in storage, or being transported, or simply inactive between periods of use.

[0009] An additional problem present in the use of pumpable explosives is the difficulty associated with reconciling the amount of liquid explosives issued against what is actually used in blasting operations. Facilities that utilize bulk transport for the refilling of pumping units make reconciliation especially difficult because of spillage and difficulties associated with accountability and accurate measurements of the amount of liquid explosive that is transferred to the pumping unit.

[0010] Other solutions utilized in the pumpable explosives industry are to bag or bottle the liquid explosives components in known quantities, and then to reconcile the number of bags/bottles against the actual blasting operation performed. The difficulty in this system is that

accuracy is required in reconciling the issue of activator/sensitizer gel, especially considering that half-full bottles or partially filled bags must be accounted for. Since the activator/sensitizer is often used in the ratio of 35:1 with respect to the base gel, the potential loss of even a small amount of activator/sensitizer is of great concern. However, the fact that one of the components of an explosives gel is used in relatively small quantities and that the other component is relatively harmless without the first component (the activator/sensitizer) provides an opportunity for improving security in the use of such explosives.

[0011] It will be appreciated that a new generation of explosives gel charging pumps is now available for use in the mining and other industries. These pumps are capable of dispensing precise quantities of explosives gels during a predetermined pumping cycle. They are also capable of providing accurate quantities of the explosives gel components so that the masses or volumes of the two components produced in a explosives mixture can be determined with some accuracy. It is therefore possible to use these features of modern pumps in providing a solution to the above problems.

OBJECT OF THE INVENTION

[0012] It is an object of this invention to provide a system and a method for improving security in the handling and use of pumpable explosives. It is a further object of the invention to provide a system and method to inhibit unauthorized access to components of the pumpable explosives and unauthorized use of pumping equipment. It is a further object of this invention to provide a system and method to enable accurate reconciliation, of usage of components of pumpable explosives.

SUMMARY OF THE INVENTION

[0013] According to a first aspect of the invention there is provided a security system according to claim 1.

[0014] The contents of the container may be accessible only through the access port of the container, the container being otherwise sealed, and the closable access port of the container may be enabled to open only if engaged with a charging or discharging means having a security device matching that of the container.

[0015] The container may have a unique identifier associated therewith. The unique identifier may be a visible mark on the container or may be invisible to the naked eye.

[0016] Operation of the charging and/or discharging means may be enabled only if engaged with a container having a security device matching that of the charging or discharging means and may be otherwise disenabled.

[0017] The security devices of the container and the charging and/or discharging means may include complementary coupling devices on the container and the charging and/or discharging means, a first of which is located on the container at the port thereof and a second of which

is located on the charging and/or discharging means, the devices, when coupled, being operable to permit the flow of contents to between the container and the charging and/or discharging means. Then, the complementary coupling devices may comprise a spigot on the container or the charging and/or discharging means and a socket on the other of the container or the charging and/or discharging means. The coupling means may include pressure equalizing means for equalizing the pressure in the container with ambient pressure as the container is emptied or filled. The pressure equalizing means may comprise an aperture controlled by a valve to permit the flow of air but restrict the flow of liquid contents of the container. Instead, the container may be collapsible or may contain a collapsible bladder.

[0018] The security devices of the container and the charging and/or discharging means may include electronic signal communications means on the container and the charging and/or discharging means, the communications means of the container and the charging and/or discharging means being operable for signal communication therebetween.

[0019] The container and the charging and/or discharging means may include complementary signal interfaces. The signal communication between the electronic signal communications means on the container and the charging and/or discharging means may be by means of a digital signal. The signal may be communicated wirelessly. The signal may be a Radio Frequency (RF) signal.

[0020] The security device of the container may include a unique identifier in the form of a digital code that is communicated by the signal communications means whenever the container is engaged with the charging means.

[0021] The discharging device may also include a unique identifier in the form of a digital code that is communicated by the signal communications means whenever the container is engaged with the discharging means.

[0022] The container may include a data storage means and the container may be operable to save at least the following information relating to each event in which a container is engaged with the discharging means:

the date of the event;
the time of the event;
the unique identifier of the discharging device.

[0023] The following additional information is saved on the data storage means of the container in respect of each event;

the number of operating cycles of the discharging means performed while engaged with the container;
the date and time of performance of each of the operating cycles.

[0024] The discharging means may also include a data storage means and the discharging means may be operable to save at least the following information relating to each event in which the container is engaged with the discharging means:

the date of the event;
the time of the event;
the unique identifier of the container.

[0025] The following additional information is saved on the data storage means of the discharging means in respect of each event:

the number of operating cycles of the discharging means performed while engaged with the container;
the date and time of performance of each of the operating cycles.

[0026] The charging means may include a data storage means and the charging means may be operable to save at least the following information relating to each event in which the container is engaged with the charging device:

the date of the event;
the time of the event;
the unique identifier of the container; and
the amount of contents remaining in the container.

[0027] The charging means may be operable to save the following additional information relating to each event in which the container is engaged with the charging device:

the amount of contents charged into the container;
the integrity status of the container.

[0028] The charging means may be operable to download and save at least the following additional information:

the information saved on the data storage means of the container relating to previous events in which it was engaged with the discharging means.

[0029] The charging means may be operable to delete data from the data storage means of the container once that data has been downloaded to the data storage means of the charging means.

[0030] The discharging means may have a data storage means and the discharging means may be enabled only if the unique identifier of the container matches an identifier saved in the data storage means of the discharging means.

[0031] The charging means may be enabled only if the unique identifier of the container matches an identifier saved in the data storage means of the charging means.

[0032] The charging means may be operably connected to a computer data processing system, the data storage means of the charging means being accessible thereby.

[0033] The information communicated by the electronic signal communications means may be encrypted upon transmission and decrypted upon receipt.

[0034] Only a single container may have a security device that matches the security device of the charging and/or discharging means.

[0035] In a preferred embodiment of the invention, the security system comprises a system for distributing a two-part pumpable explosives gel for charging blast holes in a mine or other industry; the container comprises a container for at least one of the components of the explosives gel; the charging means comprises a filling station for filling containers with the at least one explosives gel component; and the discharging means comprises an explosives gel pump for charging blast holes with the explosives gel. The at least one component may be activator component of the explosives gel.

[0036] The filling station may be operable to test the integrity of the container and its closure when the container is engaged with the pump and to suspend filling of the container if the integrity of the container is compromised and/or to record that the integrity of the container has been compromised. The test may comprise a pressure test.

[0037] According to a second aspect of the invention there is provided a method according to claim 17.

BRIEF DESCRIPTION OF THE DRAWINGS

[0038] The invention is now described, by way of example, with reference to the accompanying diagrammatic drawings. In the drawings:

Figure 1 shows a general arrangement of an existing system for charging a blast hole with a two-part pumpable explosives gel (prior art);

Figure 2 shows a general arrangement of the system of the invention for charging a blast hole mine with a two-part pumpable explosives gel incorporating a security key;

Figure 3 shows a schematic view of a sachet for an activator for a two-part explosives gel, incorporating the security key; and

Figure 4 shows a schematic view of a filling station for filling the activator sachet.

DETAILED DESCRIPTION OF THE DRAWINGS

[0039] As shown in Figure 1, in an existing system where two-part explosives gels (9) are pumped into blasting holes in the mining or other industries, mobile or semi-

fixed pumping units (1) are used. These pumping units are designed to deliver the required mass flow ratio of the two gels into a blasting hole (2). For the two-part mixture to work as an explosive it is important that the two gel components are brought into intimate contact with each other and in the correct mass ratio. The activator component is provided in a container (6), while the emulsion is provided in a separate container (7). These containers (6,7) are conventional screw-top containers. In many cases the two gels are pumped in separate lines (3,4) and are mixed while being dispensed using a static mixer (5). In some applications the one gel is called the activator or sensitizer, and the other the base emulsion/water-gel. Several different types of liquid explosives are available some of which require a delayed chemical reaction to activate after being mixed, while others are activated immediately after being brought together. A conventional keyed lock (8) is fitted to the pumping unit (1) and an authorized user can use the key to lock the pumping unit (1) to prevent unauthorized use and operation of the pumping unit.

[0040] Figures 2 to 4 show different components comprising a security system for providing conditional access to contents of a container to prevent unauthorized use and operation of the pumping unit as well as access to the contents of the container. The system uses what may be described as a "liquid key", in the form of a removable container (12), for one of the gels components. For practical reasons, this component is preferably the activator/sensitizer. However, the removable container (12) may contain either one or both of the two gel components or two separate removable containers could be used, one for each of the respective gel components.

[0041] The container (12) has a connector (13) for connecting the container (12) to a pumping unit (15) when the container (12) is engaged with the pumping unit (15). In the embodiment described, the container (12) also has an electronic signal interface (14), which engages with a complementary interface (11) on the pumping unit (15). The pumping unit (15) is designed so that when the container (12) is removed from the pumping unit (15) the pumping unit (15) is disabled and cannot produce a material that will perform as an explosive. In effect, the container (12) may be said to perform the function of a key. The container (12) may be a rigid device having an internal collapsible bladder for its contents or the container (12) itself may be collapsible. Instead, the container may include an pressure equalization device (not shown) for equalizing the pressure in the container (12) with ambient pressure as the container (12) is emptied or filled. The pressure equalizing device may comprise an aperture controlled by a valve to permit the flow of air but restrict the flow of liquid contents of the container (12) or may be of any suitable design. The pressure equalization device may comprise a part of the connector (13) of the container (12).

[0042] By removing the container (12) from the pumping unit (15), one of the two gel components, namely the

activator, is also physically removed from the pumping unit (15). The container (12) may then be securely stored away. Thus, a further advantage of using the container (12) as a key is that when one of the components required to create an explosive is removed from the pump (15), it is virtually impossible to use the pump (15) to manufacture explosives even if it were to land in the wrong hands.

[0043] The connector (13) on the container (12) is a plug or spigot-like connector and is received into a complementary socket (19) on the pumping unit (15). The spigot and socket (13,19) are of a special configuration and are designed in such a manner that it is difficult to connect a container (12) other than that containing the special spigot (13) to the pumping unit (15). Further, the spigot (13) incorporates a closure (not shown), which is only operable to open and then to close if the container (12) is engaged with a complementary socket (19). Other than for access by means of this closure, the container is sealed and tampering with the container in an attempt to access to the contents of the container will be evident or will render the container inutile. The design of the spigot (13) and socket (19) are not shown in detail and the design of such components will be within the ability of competent design engineers.

[0044] In addition, the container (12) and pumping unit (15) have engageable data interfaces (14,11) for the transmission and reception of data signals. In order to avoid possible interference with signals transmitted by wire or by means of mechanical interfaces, the signals are short range RF signals and are transmitted wirelessly. It will be appreciated that a wide variety of signal transmissions may also be used. The container (12) has a signal generator incorporated in the interface (14), which transmits an encoded signal containing a unique identifier for the container (12). Such signal generators are relatively simple and inexpensive and are used in applications such as remote control devices for household equipment. The pumping unit (15) has a receiver and decryption device incorporated in the interface (11). On receipt of an encoded signal from a container (12) interfaced with the pumping unit (15), the decryption device decrypts the encoded signal and obtains the unique identifier of the container (12). The pumping unit (12) has a data storage device (20) and only if the unique identifier matches an identifier held in a memory (20) of the pumping unit (15) will it enable discharging of the contents of the container (12) and operation of the pumping unit (15) to produce an explosive. The identification of the container (12) by the pumping unit in this manner is optional and in simplified systems, the pumping unit (15) may not have a memory device, but merely its own unique identifier, as described below. However, in some cases it may be advantageous to ensure that only certain containers (12) may be used to activate certain specific pumping units (15). This would make it possible to allocate a specific container key (12) to a pumping unit (15), and should the wrong container key be inserted into a pumping unit (15), the pumping unit (15) will not be enabled to produce

a potentially explosive material. In addition, where the pumping unit (15) has a data storage device (20), the pumping unit may be operable to save the similar information as set out below in respect of the container, in relation to each event in which the container (12) is engaged with the pumping unit (15), ie the date of the event and time of the event, which may be provided by a system clock of the processor of the container (12) or a clock on the pumping unit (15) and the unique identifier of the container (12). In addition, the number of operating cycles of the pumping unit (15) performed while engaged with the container (12) and the date and time of performance of those cycles during any event are recorded and stored.

[0045] It will also be appreciated that modern pumping units (15) that are used for the pumping of explosives gels are capable of pumping the two components of the explosives gel to good levels of accuracy, both in terms of the relative masses or volumes of the two components with respect to one another and in terms of the total amounts of the combined components pumped in any one pumping cycle. Usually, individual pumps are set to pump a predetermined mass or volume of explosive into a blast hole with each pumping cycle. For this reason, a knowledge of the identity of the pump (15) used and the number of times it has been activated will give a good idea of the actual amount of explosives gels consumed and used for blasting purposes.

[0046] When the liquid container (12) is removed from the pumping unit (15), one of the constituent components required to make an explosive mixture is also removed from the pumping unit (15). However, a certain amount of both liquids will still remain in the pipes (16, 17) and other internal components (18) of the pumping unit (15) itself. For obvious reasons, this remnant volume should be minimized by design. It would, however, be preferred if the pumping unit (15) itself were, in addition to the removal of the one constituent liquids, to be prevented from making a potentially explosive material when the liquid container key (12) is removed. Thus, removal of the container (12) may disenable operation of the pumping unit (15), by interrupting the power supply (not shown) to the pumping unit (15). Typical power supplies currently used are air pressure (compressed air), water pressure, or electrical devices and these sources of power may be interrupted. Alternatively, any other functional aspect of the pumping unit (15) that would effectively prevent the pumping unit from creating limited amounts of a potentially explosive material may be disabled when the liquid container (12) is removed.

[0047] In addition, in a preferred embodiment of the invention, the liquid container (12) is designed to discourage unauthorized access to the liquid/gel contents of the container (12), or at least to make it technically difficult to gain unauthorized access to the contents of the container (12). This is achieved by manufacturing the container (12) as a sealed unit in respect of which tampering will be evident and ensuring that it is difficult to remove the contents of the container without the container (12)

being connected to the pumping unit (15).

[0048] Preferably, each of the removable liquid containers (12) has a unique identification number indelibly imprinted thereon and which is visible to the naked eye. Other non-visible identifications may be used, such as indicia that are visible only under ultra-violet light. This number may or may not be the same as the unique identifier (RFID) embedded in the removable container (12).

[0049] The container (12) has a data storage device (22) embedded therein and operably connected to the data interface (14) and to a processor (not shown). The data storage device (22) is operable to store data relating to each event in which a container (12) is engaged with the pumping unit (15), such data including: the date of the event and time of the event, which may be provided by a system clock of the processor of the container (12) or a clock on the pumping unit (15) and the unique identifier of the pumping unit (15). In addition, the number of operating cycles of the pumping unit (15) performed while engaged with the container during any event and the date and time of performance of those cycles during any event are recorded and stored. This information is readily accessible and may be in the form of the number of times that the pumping unit (15) is activated and/or the number of pumping strokes performed by the pumping unit (15). This information will give a reliable indication of the amount of explosives actually pumped by that pumping unit (15) while coupled to the particular container (12).

[0050] An additional aspect the system using the liquid container key (12) comprises means to refill the container (12), comprising a refilling machine (21). Refilling may be performed manually or automatically. However, automated refilling has certain security advantages. A refilling machine (21) is shown in Figure 4 and is operable to fill a container (12) with a preselected amount of liquid. In order to accurately audit the actual amount of liquid used, the refilling machine (21) is operable to measure the amount of liquid present in the container (12) before refilling it to achieve the preselected total amount. Alternatively, the container (12) may be filled to the predetermined total capacity required and the amount of the content needed to achieve this capacity recorded. This will allow the amount of liquid in the container (12) discharged since its last refilling to be calculated. The net amount of liquid used from the container (12) can then be reconciled against the actual amount used in explosions on the mine. The reconciliation process may be made even more robust by arranging for the refilling machine (21) to automatically detect the tank identification number by means of the RF-based identification system. Thus, the refilling machine (21) is provided with its own communications interface (26), which is operably connected to a data storage device (27) of the refilling machine (21). Under the control of a processor (not shown) the refilling machine (21) is operable to download the unique identification number of the container (12). As with the pumping unit (12), the refilling machine (21) may be disenabled from operation if the unique identification number of the

container (12) does not match an identification number stored on in the memory (27) of the refilling machine (21). The closure of the container (12) will also not operate unless the spigot (13) of the container (12) engages with a socket (19) of the refilling machine (21). Once engaged, the refilling machine is programmed to interrogate the memory (22) of the container (12) and to download information, which may include, in respect of each event on which the container (12) is engaged with the refilling machine (21), the date of the event and time of the event, which may be provide by a system clock (not shown) of the container (12) or the refilling machine (21), the unique identifier of the container, and the amount of contents remaining in the container (12) or the amount of contents required to fill the container (12) to capacity. In addition, the refilling machine (21) may download information saved on the data storage means (22) of the container (12) relating to previous events in which it was engaged with the pumping unit (15). The refilling unit may delete data from the data storage device (22) of the container (12) once that data has been downloaded to the data storage device (27) of the refilling machine (21). The processor and data storage device (27) of the refilling machine (21) may be accessed by a data management system (not shown), as indicated at (28), which may accumulate and process all of the data saved to the data storage device (27) of the refilling machine (21).

[0051] In addition, the refilling machine (21) may be operable to check the integrity of each and every liquid container (12) before it is refilled. This may be achieved by means of an automated pressure test. If implemented, a responsible person may be notified whenever the security of the liquid inside the liquid container (12) has been compromised. Typically the security of the liquid inside the container could be compromised by a hole in the container (12) or any other damage to the components of the container (12). In addition, the refilling machine (21) is inactivated if the integrity of the container (12) is compromised and it will not charge the container (12) with content.

[0052] The refilling machine (21) is designed for automated filling of containers (12) without any human intervention or human contact with the liquid that is being loaded into the liquid container key (12). A refilling machine (21) will significantly improve security and the chances of the liquid activator landing in the wrong hands. Preferably, the refilling machine (21) should be centrally located in a secure and well-controlled and audited environment, indicated at (24).

[0053] In a typical underground mining environment and other environment in which explosives are used, responsibility for each and every liquid container (12) can be allocated to an individual working with that liquid container (12). That person will be responsible for liquid activator usage and will also be held accountable for the amount of liquid activator used against the actual blasting work performed. In addition, a known amount of activator bears a known strict relationship to the amount of two-

part explosive produced. In such a system, after every shift, the container would be returned to a central and secure location for storage and refilling (24). By requiring that the liquid containers (12) are handed in after every shift or at suitable regular intervals, it will be possible to immediately take action if a liquid container (12) has not been handed in. It is also well known to estimate the amount of explosives use to achieve a certain advance in a mine and the amount of explosive required for a predetermined volume of rock blasted may be estimated with some accuracy. The anticipated usage of explosives is therefore known and may be compared with actual usage as a result of the implementation of this system. Further, in practice it is not practical to restrict the use of a single identified pumping unit to a specific individual or to a single container of activator gel. This system allows for a shift captain or responsible person to be issued with a secure container of explosives activator gel and to be permitted to use that container on any, or a specified number of identified pumping units. The use of explosives in the mining environment may, nevertheless, be accounted for and explosives use at any stope face recorded. In addition, it is known how many detonators should be required for each blast pattern and the number of detonators issued to the shift captain may be reconciled with the explosives used and the number of pumping cycles of the relevant pumping units. Since each pumping cycle corresponds to a single blast hole, the number of pumping cycles should correspond to the number of detonators used during a shift and should also correspond to the amount of explosives gels used during that shift. The theoretical usage of activator for the relevant number of pumping cycles may also be compared with the amount of activator that has actually been filled into each container to ascertain whether there has been any unauthorized use of the activator from the container.

[0054] It will be appreciated that the ability to store relevant performance data at various positions in the system will enable an interconnected management system to ascertain which pumping units and are present on the system and in use at any one time. This information could be used to provide an early warning that pumps that appear not to be in use may be missing. In addition, condition or use-based monitoring of pumps and other equipment comprising the system may be instituted, for example requiring pumps to be services and calibrated when a predetermined number of pumping cycles has been performed or the pump has been in use for a predetermined period of time.

Claims

1. A security system for improving security in the handling and use of pumpable explosives, particularly of the liquid or gel-type, the system including a container (12) having a closable access port for charging or discharging contents of the container into

- or from the container; and
 a charging and/or discharging means (21,15) for charging or discharging the contents of the container (12) wherein
 the container (12) and the charging and/or discharging means (21,15) have security devices (13,19) wherein operation of the charging and/or discharging means (21,15) is enabled only if engaged with a container (12) having a security device (13,19) matching that of the charging or discharging means (21,15) and is otherwise disabled; and
 wherein, the security devices (13,19) of the container (12) and the charging and/or discharging (21,15) means include electronic signal communications means (14,11,21) on the container (12) and the changing and/or discharging means (21,15), the communications means (14,11,21) of the container (12) and the charging and/or discharging means (21,15) being operable for signal communication therebetween.
2. The security system as claimed in claim 1, in which contents of the container (12) are accessible only through the access port of the container (12), the container (12) being otherwise sealed, and in which the closable access port of the container (12) is enabled to open only if engaged with a charging or discharging means (21,15) having a security device matching that of the container (12).
 3. The security system as claimed in claim 1 or claim 2, in which the security devices (13,19) of the container (12) and the charging and/or discharging means (21,15) include complementary coupling devices (13,19) on the container and the charging and/or discharging means, a first of which is located on the container (12) at the port thereof and a second of which is located on the charging and/or discharging means (21,15), the coupling devices (13,19), when coupled, being operable to permit the flow of contents to between the container (12) and the charging and/or discharging means (21,15), wherein the coupling device (13) of the container (12) includes pressure equalizing means for equalizing pressure in the container (12) with ambient pressure as the container (12) is emptied or filled.
 4. The security system as claimed in claim 3, wherein the pressure equalizing means comprises an aperture controlled by a valve operable to permit the flow of air but restrict the flow of liquid contents of the container (12).
 5. The security system as claimed in claim 1, wherein the container (12) is collapsible or contains a collapsible bladder.
 6. The security system as claimed in any one of claims 1 to 5, in which the security device (13) of the container (12) includes a unique identifier in the form of a digital code that is communicated by the signal communications means (14) whenever the container (12) is engaged with the charging means (21).
 7. The security system as claimed in any one of the preceding claims, in which the security device (19) of the discharging means (15) includes a unique identifier in the form of a digital code that is communicated by the signal communications means (14) whenever the container (12) is engaged with the discharging means (15).
 8. The security system as claimed in claim 7, in which the container (12) includes a data storage means (22) and the container (12) is operable to save at least one of the items of information relating to each event in which a container is engaged with the discharging means (15) selected from a list comprising:
 - the date of the event;
 - the time of the event;
 - the unique identifier of the discharging means (15);
 - the number of operating cycles of the discharging means (15) performed while engaged with the container (12); and
 - the date and time of performance of each of the operating cycles.
 9. The security system as claimed in claim 7, in which the discharging means (15) includes a data storage means (20) and the discharging means (15) is operable to save at least one of the items of information relating to each event in which the container (12) is engaged with the discharging means (15) selected from a list comprising:
 - the date of the event;
 - the time of the event;
 - the unique identifier of the container (12);
 - the number of operating cycles of the discharging means (15) performed while engaged with the container (12); and
 - the date and time of performance of each of the operating cycles.
 10. The security system as claimed in claim 6, in which the charging means (21) includes a data storage means (27) and the charging means (21) is operable to save at least one of the items of information relating to each event in which the container (12) is engaged with the charging means (21) selected from a list comprising:
 - the date of the event;
 - the time of the event;

- the unique identifier of the container (12);
 the amount of contents remaining in the container (12);
 the amount of contents charged into the container (12); and
 the integrity status of the container (12).
11. The security system as claimed in claim 10, in which the charging means (21) is operable to download and save the information saved on the data storage (22) means of the container (12) relating to previous events in which it was engaged with the discharging means (15).
12. The security system as claimed in claim 9, in which the discharging means (15) is enabled only if the unique identifier of the container (12) matches an identifier saved in the data storage means (20) of the discharging means (15).
13. The security system as claimed in claim 10, in which the charging means is enabled only if the unique identifier of the container matches an identifier saved in the data storage means of the charging means.
14. The security system as claimed in claim 11, in which the charging means (21) is operably connected to a computer data processing system, the data storage means (27) of the charging means (21) being accessible thereby.
15. The security system as claimed in any one of the preceding claims which comprises a system for distributing a two-part pumpable explosives gel for charging blast holes in a mine or other industry and in which
 the container (12) comprises a container for at least one of the components of the explosives gel;
 the charging means (21) comprises a filling station for filling containers with the at least one explosives gel component; and
 the discharging means (15) comprises an explosives gel pump for charging blast holes with the explosives gel.
16. The security system as claimed in claim 15, in which the filling station is operable to test the integrity of the container (12) and its closure when the container (12) is engaged with the charging means (21) and to suspend filling of the container (12) if the integrity of the container (12) is compromised and/or to record that the integrity of the container (12) has been compromised.
17. A method for improving security in the handling and use of pumpable explosives, particularly of the liquid or gel-type, the method including providing a container (12) having a closable access

port for charging or discharging contents of the container (12) into or from the container (12); and providing a charging and/or discharging means (21,15) for charging or
 discharging the contents of the container (12), wherein
 the container (12) and the charging and/or discharging means (21,15) have security devices (13,19) that include electronic signal communication means (14,11,21) on the container (12) and the charging and/or discharging means (21,15) operable for signal communication therebetween; the method further including
 enabling operation of the charging and/or discharging means (21,15) only if engaged with a container (12) having a security device (13) matching that of the charging and/or discharging means (19) and otherwise disabling the charging and/or discharging means (21,15); and
 if the operation of the charging and/or discharging means (21,15) is so enabled, communicating a data signal between container (12) and charging and/or discharging means (21,15).

Patentansprüche

- Ein Sicherheitssystem zur Verbesserung der Sicherheit beim Handling und Gebrauch von pumpfähigen Explosivstoffen, insbesondere vom Flüssigkeits- oder Gel-Typ, wobei das System enthält einen Container (12) mit einer verschließbaren Zugangsanschluss zum Laden und Entladen von Inhalten des Containers in oder aus dem Container; und
 Lade und/oder Entlademittel (21, 15) zum Laden oder Entladen der Inhalte des Containers (12), wobei der Container (12) und die Lade- und/oder Entlademittel (21, 15) Sicherheitseinrichtungen (13, 19) haben, wobei die Betätigung der Lade- und/oder Entlademittel (21, 15) nur möglich ist bei Verbindung mit einem Container (12), der eine Sicherheitseinrichtung (13, 19) hat, die zu der Lade- oder Entlademitteln (21, 15) passt und andernfalls nicht möglich ist; und wobei die Sicherheitseinrichtungen (13, 19) des Containers (12) und die Lade- und/oder Entlademittel (21, 15) elektronische Signalkommunikationsmittel (14, 11, 21) auf dem Container (12) und den Lade- und/oder Entlademittel (21, 15) enthalten und wobei die Kommunikationsmittel (14, 11, 21) des Containers (12) und die Lade- und/oder Entlademittel (21, 15) betriebsfähig für Signalkommunikation zwischen ihnen sind.
- Das Sicherheitssystem wie in Patentanspruch 1 beansprucht, in dem Inhalte des Containers (12) nur durch den Zugangsanschluss des Containers (12) zugänglich sind, der Container (12) anderweitig ver-

siegelt ist, und in dem der verschließbare Zugangsanschluss des Containers (12) nur geöffnet werden kann, wenn er im Eingriff mit Lade- oder Entlademitteln (21, 15) steht, die eine Sicherheitseinrichtung haben, die zu der des Containers (12) passt.

3. Das Sicherheitssystem wie beansprucht in Patentanspruch 1 oder Patentanspruch 2, in dem die Sicherheitseinrichtungen (13, 19) des Containers (12) und der Lade- und/oder Entlademittel (21, 15) komplementäre Kupplungseinrichtungen (13, 19) auf den Container und die Lade- und/oder Entlademittel einschließen, eine erste davon ist auf dem Container (12) an dessen Zugangsanschluss angeordnet und eine zweite davon ist an den Lade- und/oder Entlademitteln (21, 15) angeordnet, wobei die Kupplungseinrichtungen (13, 19), wenn gekuppelt, betätigt werden können, um den Fluss von Inhalten zwischen dem Container (12) und den Lade- und/oder Entlademitteln (21, 15) zuzulassen, wobei die Kupplungseinrichtung (13) des Containers (12) Druckausgleichsmittel enthält, um den Druck in dem Container (12) mit dem Umgebungsdruck anzugleichen, wenn der Container (12) geleert oder gefüllt wird.
4. Das Sicherheitssystem wie in Patentanspruch 3 beansprucht, wobei die Druckausgleichsmittel eine Öffnung enthalten, die von einem betätigbaren Ventil gesteuert wird, um den Durchfluss von Luft zu erlauben, aber den Durchfluss von flüssigen Inhalten des Containers (12) begrenzt.
5. Das Sicherheitssystem wie in Patentanspruch 1 beansprucht, wobei der Container (12) zusammenklappbar ist oder einen zusammenklappbaren Balg enthält.
6. Das Sicherheitssystem wie in einem der Patentansprüche 1 bis 5 beansprucht, in dem die Sicherheitseinrichtung (13) des Containers (12) ein einzigartiges Kennzeichen in Form eines digitalen Codes enthält, der von den Signalkommunikationsmitteln (14) kommuniziert wird, immer wenn der Container (12) im Eingriff mit den Lademitteln (21) steht.
7. Das Sicherheitssystem wie in einem der vorherigen Patentansprüche beansprucht, in dem die Sicherheitseinrichtung (19) der Entlademittel (15) ein einzigartiges Kennzeichen in Form eines digitalen Codes enthalten, der von den Signalkommunikationsmitteln (14) kommuniziert wird, immer wenn der Container (12) im Eingriff mit den Entlademitteln (15) steht.
8. Das Sicherheitssystem wie in Patentanspruch 7 beansprucht, in dem der Container (12) Datenspeichermittel (22) umfasst und der Container (12) betriebsfähig ist, zumindest ein Informationselement

bezogen zu jedem Ereignis, in denen ein Container im Eingriff mit den Entlademitteln (15) steht, zu speichern, das ausgewählt ist aus einer Liste, die enthält:

Das Datum des Ereignisses;
die Zeit des Ereignisses;
das einzigartige Kennzeichen der Entlademittel (15);
die Anzahl der Operationszyklen der Entlademittel (15) während sie mit dem Container (12) im Eingriff stehen;
das Datum und die Zeit der Ausführung eines jeden Betriebszyklusses.

9. Das Sicherheitssystem wie in Patentanspruch 7 beansprucht, in dem die Entlademittel (15) Datenspeichermittel (22) umfassen und der Container (12) betriebsfähig ist, zumindest ein Informationselement bezogen zu jedem Ereignis, in denen ein Container im Eingriff mit den Entlademitteln (15) steht, zu speichern, das ausgewählt ist aus einer Liste, die enthält:

Das Datum des Ereignisses;
die Zeit des Ereignisses;
das einzigartige Kennzeichen der Entlademittel (15);
die Anzahl der Operationszyklen der Entlademittel (15) während sie mit dem Container (12) im Eingriff stehen;
das Datum und die Zeit der Ausführung eines jeden Betriebszyklusses.

10. Das Sicherheitssystem wie in Patentanspruch 6 beansprucht in dem die Lademittel (21) Datenspeichermittel (22) umfassen und der Container (12) betriebsfähig ist, zumindest ein Informationselement bezogen zu jedem Ereignis, in denen ein Container im Eingriff mit den Entlademitteln (15) steht, zu speichern, das ausgewählt ist aus einer Liste, die enthält:

Das Datum des Ereignisses;
die Zeit des Ereignisses;
das einzigartige Kennzeichen der Entlademittel (15);
die Menge des Inhalts, die im Container (12) verbleibt;
die Menge des Inhalts, die in den Container (12) geladen wurde; und
den Intaktheitszustand des Containers.

11. Das Sicherheitssystem wie in Patentanspruch 10 beansprucht, in dem die Lademittel (21) betriebsfähig sind, die in den Datenspeichermitteln (22) des Containers gespeicherten Informationen bezogen auf vorherige Ereignisse, in denen er mit den Entlademitteln (15) verbunden war, herunterzuladen und zu sichern.

12. Das Sicherheitssystem wie in Patentanspruch 9 beansprucht, in dem die Entlademittel (15) nur freigegeben werden, wenn das einzigartige Kennzeichen des Containers zu einem Kennzeichen passt, das in den Datenspeichermitteln (20) der Entlademittel (15) gespeichert ist. 5
13. Das Sicherheitssystem wie in Patentanspruch 10 beansprucht, in dem die Lademittel (21) nur freigegeben werden, wenn das einzigartige Kennzeichen des Containers zu einem Kennzeichen passt, das in den Datenspeichermitteln (20) der Lademittel (15) gespeichert ist. 10
14. Das Sicherheitssystem wie in Patentanspruch 11 beansprucht, in dem die Lademittel (21) betriebsfähig mit dem Datenverarbeitungssystem eines Computers verbunden sind, so dass die Datenspeichermittel (27) der Lademittel (21) zugänglich sind. 15
15. Das Sicherheitssystem wie in einem der vorhergehenden Patentansprüche beansprucht, enthaltend ein System zur Verteilung eines zweiteiligen pumpbaren Explosivgels um Sprenglöcher in einer Mine oder anderen Industrie zu laden und in dem der Container (12) einen Container für zumindest eine der Komponenten des explosiven Gels enthält; die Lademittel (21) eine Füllstation zum Füllen von Containern mit zumindest einer Komponente des Explosivgels enthalten; und 25
die Entlademittel (15) eine Pumpe für Explosivgel enthält, um Sprenglöcher mit dem Explosivgel zu laden. 30
16. Das Sicherheitssystem wie in Patentanspruch 15 beansprucht, in dem die Füllstation betriebsfähig ist, die Intaktheit des Containers (12) und seines Verschlusses zu prüfen, während der Container (12) mit den Lademitteln (21) verbunden ist, und um die Füllung des Containers (12) auszusetzen, falls die Intaktheit des Containers (12) gefährdet ist/oder zu berichten, dass die Intaktheit des Containers (12) gefährdet war. 35
40
17. Ein Verfahren zur Verbesserung der Sicherheit des Endlings und Gebrauchs von pumpfähigen Explosivstoffen, insbesondere vom Flüssigkeits- oder Geltyp, wobei das Verfahren enthält 45
Bereitstellung eines Containers (12), der einen verschließbaren Zugangsanschluß zum Laden und Entladen von Inhalten des Containers (12) in oder aus dem Container (12); und 50
Bereitstellung von Lade- und/oder Entlademitteln (21, 15) zum Laden oder Entladen der Inhalte des Containers (12), wobei 55
der Container (12) und die Lade- und/oder Entlademittel (21, 15) Sicherheitseinrichtungen (13, 19) haben, die elektronische Signalkommunikationsmittel

(14, 11, 21) auf den Container (12) und den Lade- und/oder Entlademitteln (21, 15) enthalten, die betriebsfähig für eine Signalkommunikation zwischen ihnen sind; das Verfahren ferner enthaltend das Ermöglichen eines Betriebs der Lade- und/oder Entlademittel (21, 15) nur, wenn diese im Eingriff mit einem Container (12) sind, der eine Sicherheitseinrichtung (13) hat, die zu der an den Lade- und/oder Entlademitteln (19) paßt und anderenfalls die Lade- und/oder Entlademittel (21, 15) deaktiviert; und falls der Betrieb der Lade- und/oder Entlademittel (21, 15) so aktiviert ist, wird ein Datensignal zwischen Container (12) und Lade- und/oder Entlademittel (21, 15) ausgetauscht.

Revendications

1. Système de sécurité destiné à améliorer la sécurité de la manutention et de l'utilisation d'explosifs pouvant être pompés, en particulier de type liquide ou sous forme de gel, le système incluant un récipient (12) ayant un orifice d'accès fermable pour charger ou décharger le contenu du récipient dans ou depuis le récipient ; et un moyen de chargement et/ou de déchargement (21, 15) pour charger ou décharger le contenu du récipient (12), dans lequel le récipient (12) et le moyen de chargement et/ou de déchargement (21, 15) comportent des dispositifs de sécurité (13, 19), où le fonctionnement du moyen de chargement et/ou de déchargement (21, 15) n'est activé que s'il est en prise avec un récipient (12) ayant un dispositif de sécurité (13, 19) correspondant à celui du moyen de chargement ou de déchargement (21, 15) et est désactivé dans le cas contraire ; et dans lequel les dispositifs de sécurité (13, 19) du récipient (12) et du moyen de chargement et/ou de déchargement (21, 15) comportent un moyen de communication de signal électronique (14, 11, 21) sur le récipient (12) et le moyen de chargement et/ou de déchargement (21, 15), les moyens de communication (16, 11, 21) du récipient (12) et du moyen de chargement et/ou de déchargement (21, 15) pouvant être actionnés pour la communication de signaux entre eux.
2. Système de sécurité selon la revendication 1, dans lequel le contenu du récipient (12) n'est accessible que par l'intermédiaire de l'orifice d'accès du récipient (12), le récipient (12) étant hermétiquement fermé dans le cas contraire et dans lequel, l'orifice d'accès fermable du récipient (12) n'est activé pour s'ouvrir que s'il est en prise avec un moyen de chargement ou de déchargement (21, 15) ayant un dispositif de sécurité correspondant à celui du récipient (12).

3. Système de sécurité selon la revendication 1 ou la revendication 2, dans lequel les dispositifs de sécurité (13, 19) du récipient (12) et du moyen de chargement et/ou de déchargement (21, 15) comportent des dispositifs de couplage complémentaires (13, 19) sur le récipient et le moyen de chargement et/ou de déchargement, dont un premier est situé sur le récipient (12) au niveau de son orifice et dont un second est situé sur le moyen de chargement et/ou de déchargement (21, 15), les dispositifs de couplage (13, 19), lorsqu'ils sont couplés, pouvant être actionnés pour permettre l'écoulement d'un contenu entre le récipient (12) et le moyen de chargement et/ou de déchargement (21, 15), dans lequel le dispositif de couplage (13) du récipient (12) comporte un moyen d'égalisation de pression pour égaliser la pression dans le récipient (12) avec la pression ambiante lorsque le récipient (12) est vidé ou rempli.
4. Système de sécurité selon la revendication 2, dans lequel le moyen d'égalisation de pression comprend une ouverture commandée par une soupape pouvant être actionnée pour permettre l'écoulement d'air mais limiter l'écoulement du contenu liquide du récipient (12).
5. Système de sécurité selon la revendication 1, dans lequel le récipient (12) est pliable ou contient une vessie pliable.
6. Système de sécurité selon l'une quelconque des revendications 1 à 5, dans lequel le dispositif de sécurité (13) du récipient (12) comporte un identifiant unique sous forme d'un code numérique communiqué par le moyen de communication de signal (14) à chaque fois que le récipient (12) vient en prise avec le moyen de chargement (21).
7. Système de sécurité selon l'une quelconque des revendications précédentes, dans lequel le dispositif de sécurité (19) du moyen de déchargement (15) comporte un identifiant unique sous forme d'un code numérique communiqué par le moyen de communication de signal (14) à chaque fois que le récipient (12) vient en prise avec le moyen de déchargement (15).
8. Système de sécurité selon la revendication 7, dans lequel le récipient (12) comporte un moyen de mémorisation de données (22) et le récipient (12) peut être actionné pour sauvegarder au moins l'une des informations concernant chaque événement pendant lequel un récipient est en prise avec le moyen de déchargement (15), choisies dans une liste comprenant :
- la date de l'événement ;
- l'heure de événement ;
- l'identifiant unique du moyen de déchargement (15) ;
- le nombre de cycles de fonctionnement du moyen de déchargement (15) exécutés lorsqu'il est en prise avec le récipient (12) ; et
- la date et l'heure d'exécution de chacun des cycles de fonctionnement.
9. Système de sécurité selon la revendication 7, dans lequel le moyen de déchargement (15) comporte un moyen de mémorisation de données (20) et le moyen de déchargement (15) peut être actionné pour sauvegarder au moins l'une des informations concernant chaque événement pendant lequel le récipient (12) est en prise avec le moyen de déchargement (15), choisies dans une liste comprenant :
- la date de événement ;
- l'heure de l'événement ;
- l'identifiant unique du récipient (12) ;
- le nombre de cycles de fonctionnement du moyen de déchargement (15) exécutés lorsqu'il est en prise avec le récipient (12) ; et
- la date et l'heure d'exécution de chacun des cycles de fonctionnement.
10. Système de sécurité selon la revendication 6, dans lequel le moyen de chargement (21) comporte un moyen de mémorisation de données (27) et le moyen de chargement (21) peut être actionné pour sauvegarder au moins l'une des informations concernant chaque événement pendant lequel le récipient (12) est en prise avec le moyen de chargement (21), choisies dans une liste comprenant :
- la date de événement ;
- l'heure de événement ;
- l'identifiant unique du récipient (12) ;
- l'importance du contenu restant dans le récipient (12) ;
- l'importance du contenu chargé dans le récipient (12) ; et
- l'état d'intégrité du récipient (12).
11. Système de sécurité selon la revendication 10, dans lequel le moyen de chargement (21) peut être actionné pour télécharger et sauvegarder les informations sauvegardées dans le moyen de mémorisation de données (22) du récipient (12) concernant les événements antérieurs pendant lesquels il était en prise avec le moyen de déchargement (15).
12. Système de sécurité selon la revendication 9, dans lequel le moyen de déchargement (15) n'est activé que si l'identifiant unique du récipient (12) correspond à un identifiant sauvegardé dans le moyen de mémorisation de données (20) du moyen de déchar-

gement (15).

13. Système de sécurité selon la revendication 10, dans lequel le moyen de chargement n'est activé que si l'identifiant unique du récipient correspond à un identifiant sauvegardé dans le moyen de mémorisation de données du moyen de chargement. 5
14. Système de sécurité selon la revendication 11, dans lequel le moyen de chargement (21) est relié fonctionnellement à un système informatique de traitement de données, le moyen de mémorisation de données (27) du moyen de chargement (21) étant accessible par celui-ci. 10
15. Système de sécurité selon l'une quelconque des revendications précédentes, comprenant un système pour distribuer un gel explosif pouvant être pompé en deux parties pour charger des trous de mine dans l'industrie minière ou d'autre industries et dans lequel 15

le récipient (12) comprend un récipient pour au moins l'un des constituants du gel explosif ;

le moyen de chargement (21) comprend un poste de remplissage pour remplir les récipients avec au moins un constituant du gel explosif ; et 25

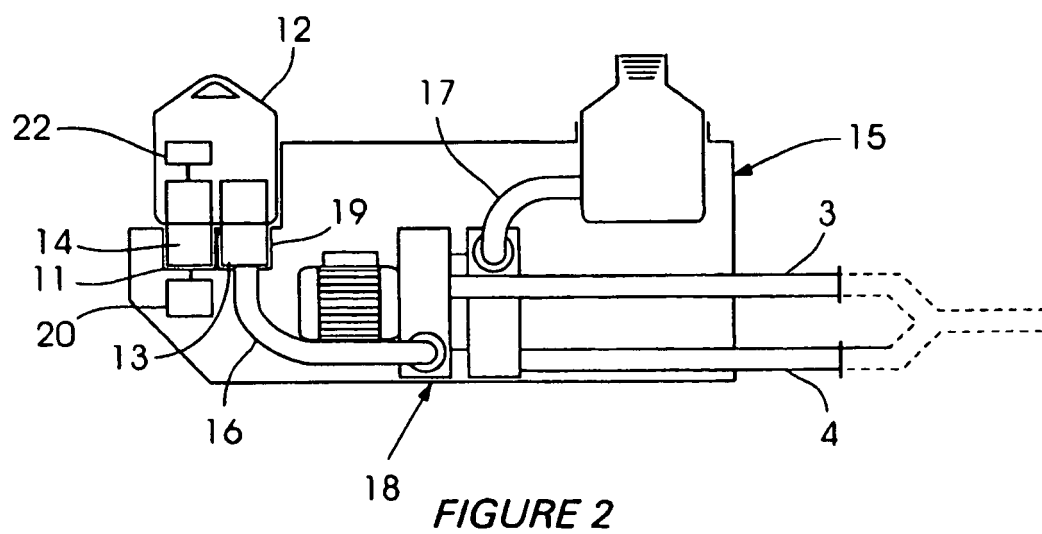
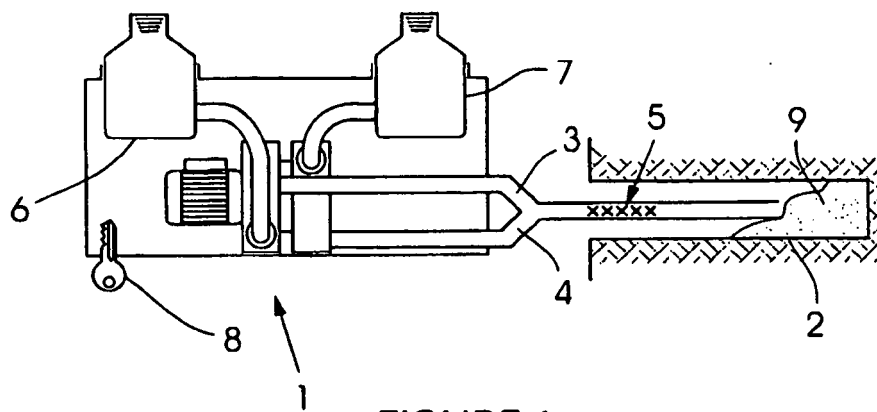
le moyen de déchargement (15) comprend une pompe de gel explosif pour charger les trous de mine avec le gel explosif. 30
16. Système de sécurité selon la revendication 15, dans lequel le poste de remplissage peut être actionné pour vérifier l'intégrité du récipient (12) et sa fermeture lorsque le récipient (12) est en prise avec le moyen de chargement (21) et pour interrompre le remplissage du récipient (12) si l'intégrité du récipient (12) est compromise et/ou pour enregistrer le fait que l'intégrité du récipient (12) a été compromise. 35
17. Procédé permettant d'améliorer la sécurité de la maintenance et de l'utilisation d'explosifs pouvant être pompés, en particulier de type liquide ou sous forme de gel, le procédé incluant 40

la fourniture d'un récipient (12) ayant un orifice d'accès fermable pour charger ou décharger le contenu du récipient (12) dans ou depuis le récipient (12) ; et 45

la fourniture d'un moyen de chargement et/ou de déchargement (21, 15) pour charger ou décharger le contenu du récipient (12), dans lequel le récipient (12) et le moyen de chargement et/ou de déchargement (21, 15) comportent des dispositifs de sécurité (13, 19) incluant un moyen de communication de signal électronique (14, 11, 21) sur le récipient (12) et le moyen de chargement et/ou de déchargement (21, 15), pouvant être actionnés pour la communication de signaux entre eux ; le procédé comportant en outre 50

l'activation du fonctionnement du moyen de charge- 55

ment et/ou de déchargement (21, 15) uniquement s'il est en prise avec un récipient (12) ayant un dispositif de sécurité (13) correspondant à celui du moyen de chargement ou de déchargement (19) et la désactivation du moyen de chargement et/ou de déchargement (21, 15) dans le cas contraire ; et si le fonctionnement du moyen de chargement et/ou de déchargement (21, 15) est ainsi activé, la communication d'un signal de données entre le récipient (12) et le moyen de chargement et/ou de déchargement (21, 15).



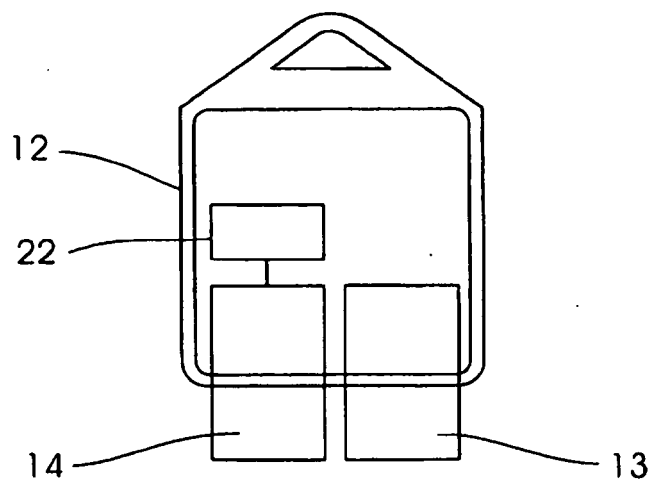


FIGURE 3

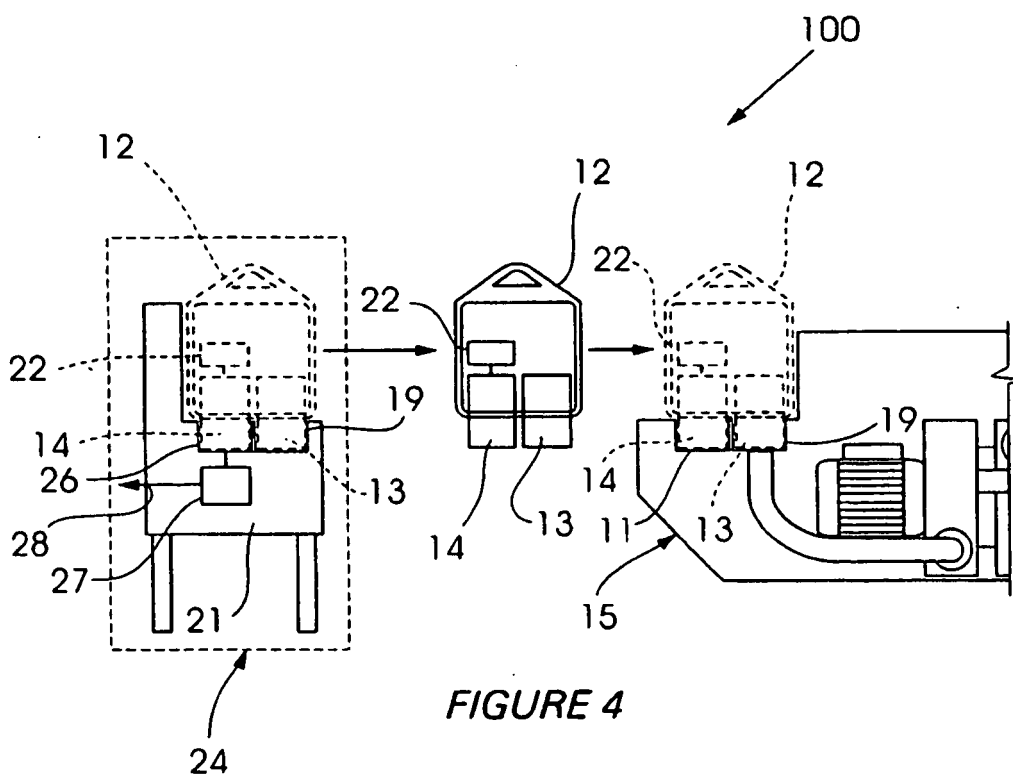


FIGURE 4

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 20080073375 A [0002]