A security system for providing conditional access to contents of a container includes a container having a closable access port for charging or discharging contents of the container; and a charging and/or discharging means for charging or discharging the contents of the container, wherein the container and the charging and/or discharging means have security devices, which are operable to enable charging and discharging of the container only if the security devices the container and the charging and/or discharging device match one another.
A LIQUID KEY FOR USE WITH PUMPABLE EXPLOSIVES

FIELD OF THE INVENTION

This invention relates to pumpable intermediates. In particular, the 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.

BACKGROUND TO THE INVENTION

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.

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.

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.

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.

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.

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.

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.

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.

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**

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**

According to a first aspect of the invention there is provided a security system for providing conditional access to contents of a container, the system including:

a container having a closable access port for charging or discharging contents of the container, and

a charging and/or discharging means for charging or discharging the contents of the container, wherein

the container and the charging and/or discharging means have security devices, which are operable to enable charging and/or discharging of the container only if the
security devices the container and the charging and/or discharging means match one another.

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.

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.

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.

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.

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.
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.

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.

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.

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.

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.

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

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

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

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

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

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

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
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.

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

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

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

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.

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.

According to a second aspect of the invention there is provided a method for providing conditional access to contents of a container, the method including:

- providing a container having a closable access port for charging or discharging contents of the container, and
- providing a charging and/or discharging means for charging or discharging the contents of the container, wherein
the container and the charging and/or discharging means have security devices, which are operable to enable charging and/or discharging of the container only if the security devices the container and the charging and/or discharging means match one another.

The container and the charging and/or discharging means may comprise a security system as hereinbefore described.

**BRIEF DESCRIPTION OF THE DRAWINGS**

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**

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.

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.

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 disenabled 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).

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.

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.

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 (12), 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

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
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 disenabled when the liquid container (12) is removed.

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).

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).

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).

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).

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.

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).

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

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 providing conditional access to contents of a container, the system including:
   - a container having a closable access port for charging or discharging contents of the container, and
   - a charging and/or discharging means for charging or discharging the contents of the container, wherein
   - the container and the charging and/or discharging means have security devices, which are operable to enable charging and/or discharging of the container only if the security devices of the container and the charging and/or discharging means match one another.

2. The security system as claimed in claim 1, in which contents of the container are accessible only through the access port of the container, the container being otherwise sealed, and in which the closable access port of the container is enabled to open only if engaged with a charging or discharging means having a security device matching that of the container.

3. The security systems as claimed in claim 1 or claim 2, in which the container has a unique identifier associated therewith.

4. The security system as claimed in any one of the preceding claims, in which operation of the charging and/or discharging means is enabled only if engaged with a container having a security device matching that of the charging or discharging means and is otherwise disenabled.

5. The security system as claimed in any one of the preceding claims, in which the security devices of the container and the charging and/or discharging means 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
The security system as claimed in claim 5, in which the complementary coupling devices 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 security system as claimed in any one of the preceding claims, in which the security devices of the container and the charging and/or discharging means 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.

The security system as claimed in claim 7, in which the container and the charging and/or discharging means include complementary signal interfaces.

The security system as claimed in claim 7 or claim 8, in which the signal communication between the electronic signal communications means on the container and the charging and/or discharging means is by means of a digital signal.

The security system as claimed in claim 9, in which the signal is communicated wirelessly.

The security system as claimed in claim 10, in which the signal is a Radio Frequency (RF) signal.

The security system as claimed in any one of claims 7 to 11, in which the security device of the container includes 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.
The security system as claimed in claim 12, in which the security device of the discharging device includes 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.

The security system as claimed in claim 13, in which the container includes a data storage means and the container is 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.

The security system as claimed in claim 14 in which the following additional information is saved 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.

The security system as claimed in any one of claims 13 to 15, in which the discharging means includes a data storage means and the discharging means is 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.

The security system as claimed in claim 16 in which the following additional information is saved 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.
18 The security system as claimed in any one of claims 12 to 17, in which the charging means includes a data storage means and the charging means is 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.

19 The security system as claimed in claim 18, in which the charging means is 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.

20 The security system as claimed in claim 18 or claim 19 as dependent on any one of claims 14 to 17, in which the charging means is 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.

21 The security system as claimed in claim 20, in which the charging means is 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.

22 The security system as claimed in claim 12, in which discharging means has a data storage means and the discharging means is enabled only if the unique identifier of the container matches an identifier saved in the data storage means of the discharging means.
23 The security system as claimed in any one of claims 18 to 21, 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.

24 The security system as claimed in any one of claims 18 to 23, in which the charging means is operably connected to a computer data processing system, the data storage means of the charging means being accessible thereby.

25 The security system as claimed in any one of claims 7 to 24, in which the information communicated by the electronic signal communications means is encrypted upon transmission and decrypted upon receipt.

26 The security system as claimed in any one of the preceding claims, in which the only a single container has a security device that matches the security device of the charging and/or discharging means.

27 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 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.

28 The security system as claimed in claim 26 or claim 27, in which the at least one component is an activator component of the explosives gel.

29 The security system as claimed in claim 27 or claim 28, in which the filling station is 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.
30. A method for providing conditional access to contents of a container, the method including
   - providing a container having a closable access port for charging or discharging contents of the container; and
   - providing a charging and/or discharging means for charging or discharging the contents of the container, wherein
     - the container and the charging and/or discharging means have security devices, which are operable to enable charging and/or discharging of the container only if the security devices the container and the charging and/or discharging means match one another.

31. The method as claimed in claim 30, in which the container and the charging and/or discharging means comprise a security system as claimed in any one of claims 1 to 29.

32. A system for providing conditional access to contents of a container, the system substantially as any one embodiment described herein with reference to the accompanying diagrammatic drawings.

33. A method for providing conditional access to contents of a container, the method substantially as any one embodiment described herein with reference to the accompanying diagrammatic drawings.
A. CLASSIFICATION OF SUBJECT MATTER

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F42B  F42D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X Further documents are listed in the continuation of Box C  X See patent family annex

* Special categories of cited documents

'A' document defining the general state of the art which is not considered to be of particular relevance

'E' earlier document but published on or after the international filing date

'I' document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

'O' document referring to an oral disclosure, use, exhibition or other means

'D' document published prior to the international filing date but later than the priority date claimed

'T' later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

'X' document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

'Y' document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

'&' document member of the same patent family

Date of the actual completion of the international search  Date of mailing of the international search report

13 April 2010  21/04/2010

Name and mailing address of the ISA/Authorized officer

European Patent Office, P B 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel (+31-70) 340-2040, Fax (+31-70) 340-3016

Menier, Renan

Form PCT/ISA/210 (second sheet) (April 2005)
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# INTERNATIONAL SEARCH REPORT

### Box No. II  Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. [ ] Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:

2. [ ] Claims Nos.: 32, 33 because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
   
   see FURTHER INFORMATION sheet PCT/ISA/210

3. [ ] Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Box No. III  Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. [ ] As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. [ ] As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. [ ] As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. [ ] No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- [ ] The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- [ ] The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- [ ] No protest accompanied the payment of additional search fees.

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Form PCT/ISA/210 (continuation of first sheet (2)) (April 2005)
Continuation of Box II.2

Claims Nos.: 32, 33

omnibus claims (Rule 6.2(a) PCT)

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.2), should the problems which led to the Article 17(2) declaration be overcome.
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