

SMART DEVICE AND METHOD FOR SAFE DISPOSAL OF INFECTIOUS MEDICAL WASTE USING UV LIGHT

DESCRIPTION OF THE INVENTION

Technical field

The present invention relates to a category of methods for the disposal of medical waste, and according to the International Classification (ICP) is classified as: B09B 3/0075, as well as to a category of devices for disinfecting or sterilizing materials or objects, and according to the International Classification (ICP) as: A61L 2202/00.

Technical problem

Infectious and potentially infectious waste makes up the most dangerous and largest part of medical waste. Such waste must be treated in a timely manner and safely disposed of in an adequate manner. Nowadays, we are witnessing a catastrophe that can be caused by the uncontrolled spread of just one virus in the environment. The fact is that the safe disposal of infectious waste requires huge amounts of money and human resources, and in most countries this process is still not under control. This is followed by the fact that, according to estimates, around 1.2 billion doses of drugs are administered by injections in the world. Improper and untimely disposal of infected needles and syringes pose a high risk of unintentional injury to an infected object during the process of sorting and collecting infectious waste among medical and technical personnel. In addition to the development of infection, improperly and untimely disposed of infected needles and syringes create the possibility of their reuse, and the danger is also posed by rodents, insects and other animals that most often become passive vectors of pathogenic microorganisms in the environment.

Prior art

The current disposal of medical waste is done in such a way that medical waste at the place of origin is collected in simple packaging that, with its characteristics, facilitates further sorting. After sorting the medical waste, the infectious waste is transported to the place of secondary storage. Infectious waste is pre-treated with various disinfection and sterilization procedures. Such devices must bring infectious waste into a state where it is sufficiently sterile so that it is not dangerous to the environment and must not be a potential source of infection. According to actual laws, the storage of infectious waste without treatment may last for a maximum of eight days. These procedures are followed by the process of crushing infectious waste, which must reduce the volume of the waste by at least 75%, and make infectious waste unrecognizable. Such hygienically harmless waste may be treated as inert municipal waste. There are already devices on the market that disinfect waste by ultraviolet radiation, but these devices are mainly used after the process of collecting and sorting large amounts of medical infectious waste, because they are not suitable for small amounts of infectious waste. In this way, a long process of collecting and storing infectious waste is not avoided. This means that infectious waste is not destroyed at the place of origin, and the consequence is a significantly increased risk of further spread of pathogenic microorganisms in the environment.

maximum control over medical infectious waste. Finally, it is important to emphasize that the medical infectious waste disposal system is an integral part of the long-term health care of humanity and the environment.

One of the key advantages of this method and the invention is that the exposure to potential infection from infection will be greatly reduced in the sense that the medical infectious waste at the place of origin will be immediately and adequately disposed of and converted into municipal inert waste. For a better understanding, we will give one example. Take, for example, a patient suffering from HIV. That patient came to the dentist to treat the tooth. He may not have intentionally or unintentionally told the doctor that he was suffering from some contagious disease. After the doctor has applied anesthesia to the patient, he is obliged to adequately dispose of the used needle and syringe in the container for infectious waste. When disposing of such waste, incidents of self-harm often occur when the protective cap is placed on the needle. This is when the infection spreads, which means that the doctor can become infected with the virus that the patient is carrying.

Furthermore, such an infected needle and syringe, before being processed, pass through the hands of many more people. According to the actual laws, such untreated waste can be stored for up to 8 days. This invention bypasses this procedure and allows the doctor to immediately insert a needle and syringe into the invention without placing a protective cap and to treat the infected needle after a short period of time, environmentally friendly, and converted into municipal inert waste.

Brief description of the drawings

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate the best mode for carrying out the method and the invention discussed so far in order to explain the essence of the invention.

Figure 1 is a spatial view of the outer part of the invention.

Figure 2 is a spatial view of the exterior and interior of the invention.

List of used labels:

- 1 - switch for opening of the lid
- 2 - cover
- 3 - LCD display
- 4 - final waste container
- 5 - inlet pipe
- 6 - metal chamber

- 7 - inlet pipe opening
- 8 - first disinfection chamber
- 9 - opening of the first disinfection chamber
- 10 - chamber in which the grinding / crushing system is located
- 11 - grinding / crushing machine
- 12 - second disinfection chamber
- 13 - opening of the second disinfection chamber
- 14 - UV lamps
- 15 - vacuum device

Detailed description of at least one of the embodiments of the invention

Figure 1 shows an external view of the invention. It includes the following parts: lid opening switch (1), lid (2), LCD display (3) and waste bin (4). The lid opening switch (1) is there to facilitate access to the disposal of medical infectious waste in the invention. Its purpose lies in the fact that the lid (2) of the invention must be closed at all times for safety reasons except at the time of insertion of the medical infectious waste. That is, the cover (2) must be closed at all times except when the lid opening switch (1) is pressed. In this way, a physical barrier is provided by means of a lid (2) from the inlet pipe (5) in which the medical infectious waste will be located. This is necessary to control the medical infectious waste itself. If any obstruction is found in the space between the open lid (2) and the infectious medical waste container (4) by means of the sensor, the lid (2) will be opened or the closing will be suspended until the space is free for total closure.

The necessity of the LCD display (3) is because it will be a indicator of the following items: volume of medical infectious waste in the first disinfection chamber (8), percentage of battery of the invention, volume of municipal inert waste, possible errors and other technical specifications.

The necessity of the final waste container (4) is reflected in that this container will contain fully treated medical infectious waste, i.e. municipal - inert waste. When the container is filled to the maximum volume of municipal inert waste, the sensor will signal this and the LCD display (3) will show that the municipal inert waste is ready for further disposal.

Figure 2 shows the interior of the invention as well as the arrangement of the associated elements in the smart device. The inner part of the invention includes the following parts: inlet pipe (5), metal chamber (6), inlet pipe opening (7), first disinfection chamber (8), opening of the first disinfection chamber (9), chamber in which the grinding / shredding / crushing system is located (10), grinding / shredding /

crushing machine (11), second disinfection chamber (12), opening of second disinfection chamber (13), UV lamps (14) and vacuum device (15).

The inlet tube (5) is the place of disposal of infectious medical waste. Pressing the lid opening switch (1) automatically opens the cover (2) on the smart device.

Infectious medical waste is inserted into the inlet pipe (5) of the device which falls on the lid that fills the opening of the inlet pipe (7) located on the upper part of the first disinfection chamber (8). After a certain time, the cover on the smart device (2) closes automatically. After closing the lid (2) on the smart device, a few seconds later, the lid opens which fills the opening of the inlet tube (7) which allows the inserted infectious medical waste to slide into the first disinfection chamber (8). A few seconds later, the cover that fills the opening of the inlet pipe (7) closes automatically, which means that the inlet pipe (5) is emptied. This prevents any secondary contact of people with medical infectious waste, as well as the accumulation of medical infectious waste in the inlet pipe (5).

The necessity of a metal chamber (6) is manifested in the fact that it represents the main form of protection against UV light for people who may be in the vicinity of the invention. The metal chamber (6) will prevent the passage of UV rays into the environment. In this way, the use of the invention will be maximally safe for humans. The metal chamber (6) will also allow the creation of the necessary optimal conditions (e.g., optimal temperature, humidity, air composition, etc.) to achieve the most efficient action of UV rays within the invention.

The cover that fills the opening of the inlet pipe (7) has the role of preventing any secondary contact of people with medical infectious waste. The cover that fills the opening of the inlet pipe (7) opens or closes automatically at the set time.

The first disinfection chamber (8) has the role of collecting medical infectious waste up to a certain amount or volume. After closing the cover that fills the opening of the inlet pipe (7), a few seconds later, all UV lamps (14) are automatically turned on and the first phase of disinfection begins. The UV lamps (14) are lit for a certain period of time and then turn off automatically. This procedure is repeated until a sufficient amount or volume of infectious waste is collected. When a sufficient amount or volume of infectious waste is collected, the lid that fills the opening of the first disinfection chamber (9) is automatically opened, and at the same time a grinding / shredding / crushing machine (11) is put into operation (one of these methods is used depending on the type of infectious waste). Infectious medical waste gradually falls into the grinding / shredding / crushing chamber (10) where the infectious waste is shredded/grounded or crushed to the optimum intended size.

The opening of the first disinfection chamber (9) has the role of keeping in the closed position the intended amount or volume of infectious medical waste that would be sufficient to activate the grinding / shredding / crushing machine (11). The opening of the first disinfection chamber (9) is opened by means of sensors located inside the first disinfection chamber (8). When a certain volume of infectious medical waste is filled in the first disinfection chamber (8), the sensors report that the condition for starting the grinding / shredding / crushing machine (11) is met, and at the same time the UV lamps (14) light up and the lid opens automatically which is contained in the opening of the first disinfection

chamber (9). Through the opening of the first disinfection chamber (9), the infectious waste falls into the space of the grinding / shredding / crushing chamber (10). Infectious waste gradually enters the grinding / shredding / crushing machine (11) where it is prepared for final UV treatment. After switching off the grinding / shredding / crushing machine (11), the opening of the first disinfection chamber (9) closes automatically.

The grinding / crushing / crushing chamber (10) has the role of gradually accepting the infectious medical waste from the first disinfection chamber (8) and to prevent the grinding / crushing / crushing machine (11) from being backfilled.

The grinding / shredding / crushing machine (11) has the role of grinding, shredding or crushing infectious waste, depending on the type of infectious waste. The original intention was to apply one of these methods of treating infectious medical waste, but it could also be a combination of several systems that would encompass all three operations. There are such machines on the market that meet the requirements of the present invention, both in power and size.

The second disinfection chamber (12) has the task of bringing the infectious medical waste into a state of municipal internal waste ready for further disposal. Thus, shredded infectious medical waste gradually falls into the second disinfection chamber (12). After activating the grinding / shredding / crushing machine (11), the UV lamps (14) are lit. The grinding / shredding / crushing machine (11) switches off automatically (after the load has stopped) and the UV lamps (14) remain on until the infectious medical waste becomes a harmless municipal inert waste. The duration of action of UV lamps (14), according to expert research, should last approximately 30 minutes. At the same time, systems for humidity, temperature and air quality are activated, in order to enable the most efficient action of UV radiation in the process.

The lid that fills the opening of the second disinfection chamber (13) is located at the very bottom of the second disinfection chamber (12), and its purpose is to keep the shredded infectious medical waste in the second disinfection chamber (12) for a certain period of time to disinfect medical infectious waste, sterilizes. After the expiration of this time period, the lid that fills the opening of the second disinfection chamber (13) is automatically opened, and the crushed internal municipal waste passes through the opening and enters the vacuum-plastic bag. When all the shredded internal municipal waste from the second disinfection chamber (12) enters the plastic vacuum bag, the lid that fills the opening of the second disinfection chamber (13) is automatically closed and the internal municipal waste is ready for vacuum packaging.

UV lamps (14) are located inside the smart device, and are attached to the metal chamber (6), and properly arranged in a way that allows the most efficient action of UV rays. The efficient action of UV rays means that pathogenic microorganisms will not have any possibility of survival, which aims at this smart device, which is to bring infectious medical waste into a state that is harmless to humans and the environment, or acceptable inert municipal waste. In the present invention, UV lamps (14) emitting ultraviolet radiation at 254 nm wavelength (UVC lamps) and lamps emitting ultraviolet radiation at 185 nm wavelength (VUV lamps) will be used.

The vacuum device (15) has the function of vacuuming the internal municipal waste so that the internal municipal waste is suitable for further disposal. The vacuuming procedure is as follows: Upon completion of the UV disinfection procedure, the lid that fills the opening of the second disinfection chamber (13) is automatically opened and the inert waste enters the vacuum bag. After the vacuum bags are filled to the maximum, the inert medical waste vacuum device (15) is activated. The vacuum bag is disposed of in the final waste container (4) and a new empty vacuum bag is automatically placed in its place. When the final waste container (4) is completely filled with vacuum bags, the LCD display (3) signals that the final waste container (4) needs to be emptied and that the inert waste is ready for further disposal.

The present invention will be powered by electricity and it is important to emphasize that all additional electrical parts already invented, which represent necessary parts of the present invention. Also, the dimensions of the device will be adjusted to the needs of the market or end users. This means that for users who produce smaller quantities of medical infectious waste per day, smaller devices will be constructed with dimensions and capacity for receiving quantities of infectious waste, and that for users who produce larger quantities of medical infectious waste per day, larger devices can be constructed and manufactured.

In the manner described above, the invention provides a practical, safe, useful and durable device comprising significant improvements and advances over existing inventions to date. It will be apparent to those skilled in the prior art that a number of changes may be made to the present methods and packaging for the safe disposal of medical infectious waste according to the present invention and method, without departing from the scope and spirit of the present invention and method.