Aug. 25, 1970 J. P. MILLER 3,525,426

DRAIN CLEANING CARTRIDGE

Filed Aug. 21, 1968

FIG. 1

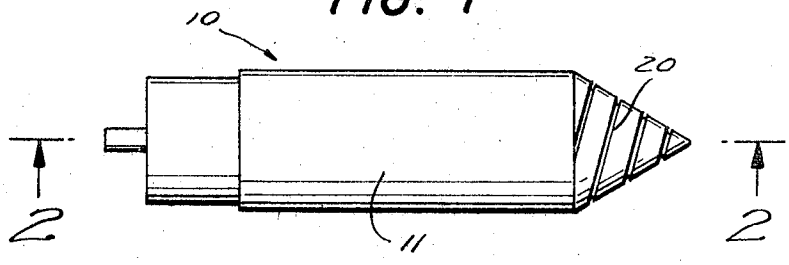


FIG. 2

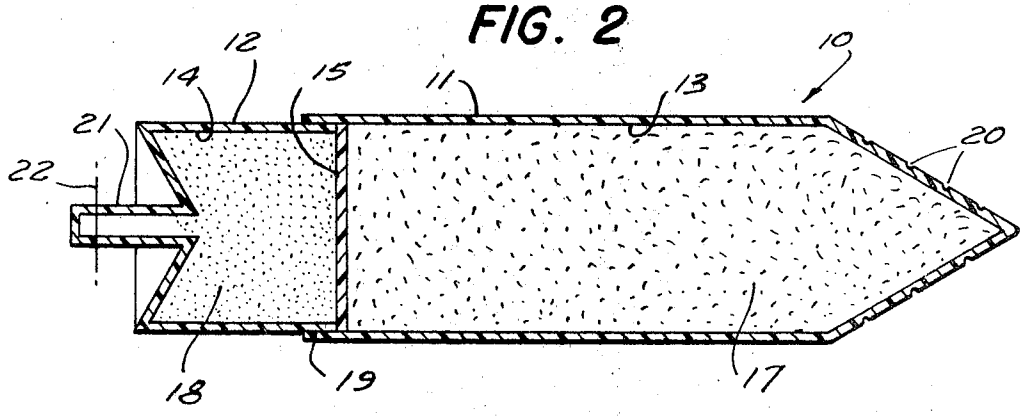
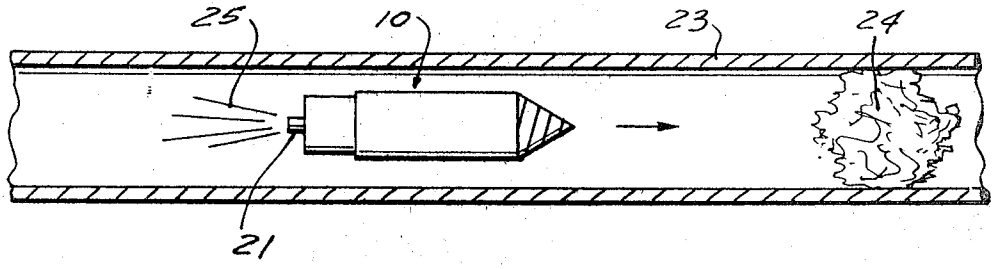


FIG. 3



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United States Patent Office 3,525,426 Patented Aug. 25, 1970

3,525,426

DRAIN CLEANING CARTRIDGE

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Filed Aug. 21, 1968, Ser. No. 754,359
Int. Cl. B65d 81/00
U.S. Cl. 206—47 7 Claims

ABSTRACT OF THE DISCLOSURE

Generally cylindrical cartridge includes front compartment containing drain-cleaning compound, e.g., lye, and rear compartment containing dry water-activatable propellant, e.g., sodium bicarbonate and an acid. Cartridge shell defined by water-soluble material e.g., gelatin.

This invention relates to drain cleaning, and more particularly to a cartridge adapted to be inserted into a clogged drain for the purpose of removing the obstruction therein.

Conventionally, drain-cleaning compounds, such as that sold under the trademark Drano, are supplied in the form of granules packaged in an openable container. When a clogged drain is to be treated, the container is opened, several spoonfuls of granules are deposited in the drain followed by a quantity of water, and the container is reclosed and stored away for future use.

This known technique presents a number of disadvantages, the most important of which arises when the obstruction in the drain is spaced relatively far from the drain opening into which the cleaning compound is placed. Since the drain will either be filled with water up to the point of the obstruction, or it will be filled with water while "washing" the cleaning compound down to the obstruction, the compound becomes extremely diluted before reaching the obstruction, and hence its drain-cleaning effect is greatly minimized.

Another disadvantage involves the danger in handling drain-cleaning compounds, such as lye. This material is harmful if swallowed, or even if it remains on the skin too long, and therefore extreme care must be employed in manipulating a conventional container of such a compound and in spooning out its contents.

It is an object of the present invention to overcome these problems by providing a device capable of delivering undiluted drain-cleaning compound to a drain obstruction regardless of the location of the obstruction with respect to the drain opening.

It is another object to provide such a device in which the drain-cleaning compound is never exposed to the user, and hence even if handled with a minimum of care no danger to the user is present.

To achieve these objectives, the invention provides a cartridge having front and rear compartments completely closed to the atmosphere. At least the front compartment, but preferably both, is defined by a shell formed of water-soluble material. A drain-cleaning compound is stored within the front compartment, and a water-activatable propellant fills the rear compartment. When the cartridge is to be used, the rear compartment is provided with a small opening and the cartridge is deposited into the drain, front compartment first. The propellant is activated by water in the drain, and drives the cartridge to the obstruction. Thereafter, the shell melts and releases the cleaning compound, full strength, against the obstruction.

Additional features and advantages of the invention will be apparent from the following detailed description in which reference is made to the accompanying drawings.

In the drawings:

FIG. 1 is a side elevational view of a drain-cleaning cartridge according to the present invention;

FIG. 2 is a longitudinal cross-sectional view, on an enlarged scale, taken along line 2—2 of FIG. 1; and

FIG. 3 is a longitudinal cross-sectional view through an obstructed drain pipe showing the cartridge in use.

The cartridge **10** chosen to illustrate this invention includes a generally cylindrical shell, which may be formed of two interfitting parts **11** and **12**. The interior of the shell is divided by a partition **15** into a front compartment **13** and rear compartment **14**. The shell **11, 12** is formed, preferably in its entirety, of a self-sustaining water-soluble material, such as gelatin. As is well known, pharmaceutical capsules have been molded of gelatin, and then provided with an exterior coating of phenyl salicylate to retard the absorption of water by the gelatin. The shell **11, 12** of the present cartridge may be produced by the same technique, or any other suitable technique. The partition **15** is also preferably formed of a water soluble material.

Housed within the front compartment **13** is a drain-cleaning compound **17**, which may be lye, also known as sodium hydroxide (NaOH), or any other material suitable for the purpose. Located within the rear compartment **14** is a propellant **18**, preferably in a dry powdered form. Suitable propellants are mixtures of baking soda, also known as sodium bicarbonate ($NaHCO_3$), and a dry acid, e.g., citric acid, tartaric acid, potassium acid tartrate, and lactic acid. A ratio of 35 grams of baking soda to 40 grams of the dry acid has been found satisfactory. When such a mixture is combined with water, a large volume of gas is produced.

Initially, the shell parts **11** and **12** are separate. The cartridge may be assembled by filling the front shell part **11** with the cleaning compound **17**, filling the rear shell part **12** with the propellant **18**, placing the partition **15** into the open end of shell part **11**, and engaging the shell parts as shown, the annular seam **19** between these being sealed by any suitable means.

The front end of the front shell part **11** tapers forwardly, as shown, and is formed in its exterior surface with a helical groove **20**. The groove **20** causes the cartridge to rotate about its longitudinal axis as it moves through a water-filled drain pipe, and this rotation together with the tapered front end aids the forward motion of the cartridge and minimizes wobble. In addition, the cartridge is made to be considerably longer than the internal diameter of the pipe in which it is used, and this factor, together with the tapered nose and groove mentioned above, greatly reduce the chance of the cartridge becoming lodged in the pipe before it reaches the obstruction.

The rear compartment **14** must be opened before the cartridge is placed in a drain, and this could be accomplished simply by piercing the rear shell part **12** with a sharp instrument. However, since the opening should be on the longitudinal axis of the cartridge, for the reason mentioned below, it is preferable to form the rear shell part **12** with a hollow stem **21** arranged along the cartridge axis. The interior of the stem communicates with the interior of the rear compartment **14**, but the free end of the stem is closed. At the time of use, the stem **21** is severed at some point along its length, such as along the line **22**, to open the compartment **14** to the atmosphere.

After opening of the rear compartment **14**, as just described, the cartridge is inserted, tapered end first, into a drain pipe **23** clogged by an obstruction **24**. If necessary, water is then allowed to flow into the pipe **23**. Water enters the rear compartment **14**, via the stem **21**, and saturates the propellant **18**. The latter reacts with the water generating a gas **25**, which jets out through the stem **21**,

causing the cartridge to move forwardly through the pipe **23**. Since the jet **25** extends along the longitudinal axis of the cartridge, the reaction force moves the cartridge, forward along a straight line path. If the opening from the compartment **14** were not axial, an eccentric force would be applied to the cartridge tending to rotate it end-over-end, a type of motion likely to result in the cartridge becoming wedged in the pipe.

When the cartridge **10** reaches the obstruction **24**, its forward motion is arrested, although the jet **25** will continue until all the propellant has reacted with the water. The shell **11, 12** is made thick enough so that it does not lose its self-sustaining character in water for at least several minutes. Consequently, the cleaning compound **17** does not contact the water prior to the time the cartridge reaches the obstruction **24**. Ultimately, while the cartridge engages the obstruction, the shell part **11** dissolves releasing the undiluted compound **17** precisely at the point of obstruction in the drain, whereupon the obstruction **24** disintegrates and is washed through to the drain outlet.

It will be appreciated that since the shell **11, 12**, and the partition **15**, as well as the cleaner **17** and propellant **18**, are water-soluble, the cartridge leaves no residue whatsoever in the drain. However, it may be possible to accomplish the objectives of this invention with a cartridge whose shell is water-soluble only in part. Thus, it is essential only that at least a portion of the shell part **11** be soluble so that the cleaner **17** is freed after the cartridge has been in the drain for a certain period. Furthermore, it will be observed that the cartridge as furnished to the consumer is completely closed and hence may be stored for long periods without adverse effect, and that the cleaning compound **17** is never handled directly by the user since it remains enclosed within the shell until well after the cartridge enters the drain.

The invention has been shown and described in preferred form only, and by way of example, and many variations may be made in the invention which will still be comprised within its spirit. It is understood, therefore, that the invention is not limited to any specific form or embodiment except insofar as such limitations are included in the appended claims.

What is claimed is:

1. A drain-cleaning cartridge comprising front and rear compartments, the interiors of said compartments being closed to the atmosphere, at least said front compartment being defined by a generally cylindrical shell formed at least in part of self-sustaining water-soluble material, a water-activatable drain-cleaning compound within said shell, and a water-activatable propellant within said rear compartment, said rear compartment being openable when the cartridge is to be used, whereby when the cartridge with opened rear compartment is inserted into a clogged drain, water entering said rear compartment activates said propellant causing the cartridge to move through the drain until it abuts the obstruction clogging the drain so that when said shell dissolves, said drain-cleaning compound is released in the immediate vicinity of the obstruction.

2. A drain-cleaning cartridge as defined in claim **1** wherein said shell extends around both of said compartments, and including a partition within said shell separating said compartments.

3. A drain-cleaning cartridge as defined in claim **1** wherein the front end of said shell tapers forwardly, and including a spiral groove formed in the outer surface of said tapered end.

4. A drain-cleaning cartridge as defined in claim **1** including a stem projecting from said rear compartment along the longitudinal axis of the cartridge, at least one end of said stem communicating with the interior of said rear compartment but the free end of said stem being closed, whereby severing said stem at some point along its length serves to open said rear compartment to the atmosphere.

5. A drain-cleaning cartridge as defined in claim **1** wherein the material forming said shell is gelatin.

6. A drain-cleaning cartridge as defined in claim **1** wherein said drain cleaning compound is composed essentially of lye.

7. A drain-cleaning cartridge as defined in claim **1** wherein said propellant is a mixture of sodium bicarbonate and an acid.

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U.C. Cl. X.R.

4—255; 15—104.3; 134—22; 206—0.5, 84