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BOTTLE CAP OPENER WITH RADIOACTIVE-SHIELDING MEANS

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Fig.1

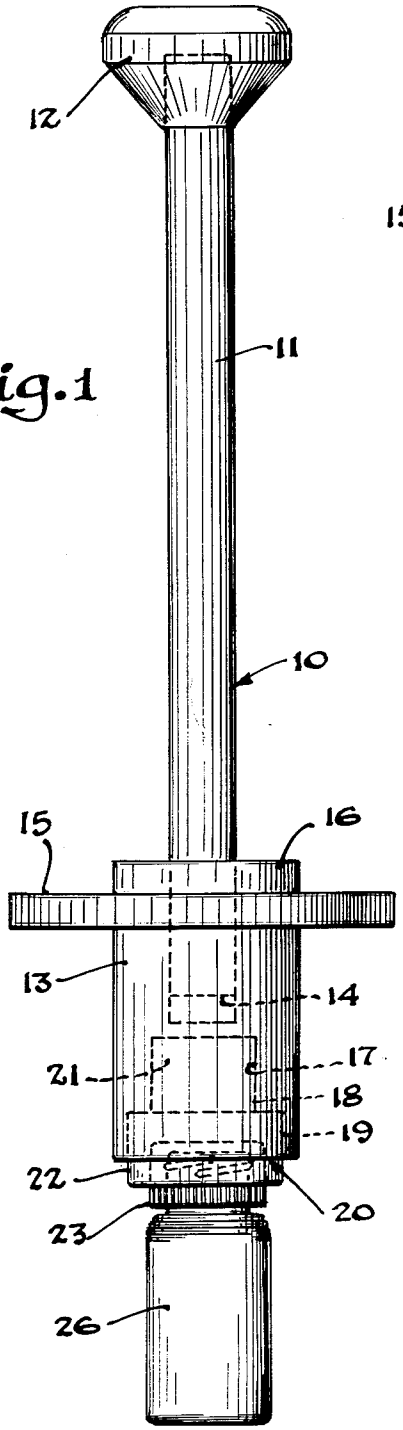


Fig.2

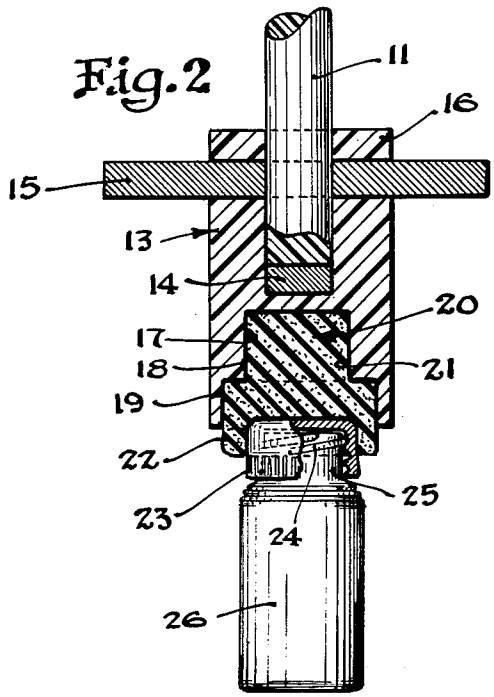
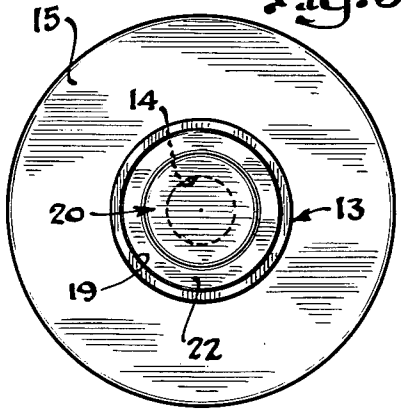


Fig.3



Inventors
William P. Grasty
James R. Dewey
By William E. Dominick
Attorney

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William P. Grasty, Zion, and James R. Dewey, Waukegan, Ill., assignors to Abbott Laboratories, North Chicago, Ill., a corporation of Illinois

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6 Claims. (Cl. 81—3.4)

This invention relates to a device for removing caps from containers and more particularly to a device for removing a closure from a container in which radioactive material is stored or shipped.

In the handling of radioactive material packed in conventional screw threaded containers with caps, it is necessary that precautions be taken to protect the person handling the said containers. This problem is especially acute during the operation of removing the cap from the container prior to removal of a portion or all of the radioactive material from the container. It is therefore desirable to have an opener, which in addition to opening the container rapidly and conveniently, will at the same time protect the operator from exposure to the radioactive material.

It is therefore an object of this invention to provide an improved closure removing device for a container of radioactive material, which is easy to handle.

It is also an object of this invention to provide an improved closure removing device for containers in which radioactive material is stored or shipped which will protect the operator from exposure to radiation.

It is still another object of this invention to provide a device for opening containers in which radioactive material is kept which will facilitate removal of a screw threaded closure of the container more rapidly and conveniently.

Other objects of the invention will be apparent from the detailed description and claims to follow when taken in conjunction with the accompanying drawings.

In the drawing:

Figure 1 is a side elevational view of the closure removing device engaging the closure of a container.

Figure 2 is a partial vertical sectional view of the closure removing device shown in Figure 1.

Figure 3 is a lower end view of the closure removing device of Figure 1 without the container associated therewith.

The opener shown in the drawing comprises a handle **10** comprised of an elongated cylindrical section **11** which is made of a rigid material, preferably plastic, such as methyl methacrylate. Disposed at the upper end of the cylindrical section **11** and preferably formed of the same material as section **11** is a knob **12**, which is axially bored a short distance inwardly to accommodate and seat therein the end of the section **11**. Disposed at the lower end of the cylindrical section **11** and preferably comprised of the same material is a cylindrical block **13** which is axially bored a short distance inwardly to form a recess therein to accommodate and hold securely the lower end of section **11**. Positioned immediately below the lower end of section **11** and seated in block **13** is a small lead disc **14** having a diameter equal to the diameter of the section **11**. A large diameer lead disc **15** with an axial passage extending therethrough of a diameter substantially that of the cylindrical section **11** is transversely positioned about the section **11** and is held securely against the upper surface of the block **13** by a disc **16** which has an axial

passage to accommodate section **11** and is preferably formed of the same rigid plastic material as the handle **10**. The knob **12**, block **13** and disc **16** are also preferably solvent sealed to the cylindrical section **11** to provide a secure assembly.

Extending inwardly from the lower surface of block **13** is a stepped cylindrical recessed compartment **17** formed by an inner cylindrical section **18** and an outer larger diameter cylindrical section **19**. Compartment **17** serves to accommodate a flexible closure gripping member (as best illustrated in Figure 2). The gripping member **20** is comprised preferably of a cylindrical solid flexible rubber base section **21** and an outwardly extending flexible gripping wall **22** which preferably projects slightly beyond the end of the block **13**.

The flexible closure gripping member **20** is positioned in compartment **17** by slightly moistening to lubricate the said gripping member at the time of insertion. Also, at the time of insertion, the base of the gripping member **20** is pierced through with a needle to allow for the escape of fluid pressure which forms behind the gripper at the time of insertion. By employing this procedure, the gripper **20** is held securely in compartment **17** by the friction and the resulting vacuum which is formed when any pulling force is exerted on the gripper when the opener is put into operation.

In operation, the flexible closure gripping member **20** is placed directly over and in axial alignment with the container cap **23** which threadably engages the threads **24** on the neck **25** of the container **26** the base of which is held by mechanical means against rotary movement. A downward force on the handle **10** causes the gripping member **20** to engage the container cap **23**, as best shown in Figure 2 of the drawing. The handle **10** is then turned in the direction required to back off the cap **23** from the container. To replace the cap, the cap held by the gripping member **20** is positioned over the threaded neck of the container **24** and the handle **10** turned in a direction to screw the cap **23** onto the container **26**, the handle **10** is given a slight pull in an axial direction opposite said container and the cap **23** is thereby released by the gripping member **20**. During this operation it will be noted that the operator's hand is completely protected from any possible radiation by the large diameter disc **15** and the small diameter disc **14** which together form a complete plane of protection.

It should be understood that while all of the parts of the novel opener are described as being comprised of a rigid plastic material, with the exception of the two lead discs and the rubber gripper, other rigid materials such as wood, steel, brass, aluminum and similar machineable materials can be employed.

It should also be understood that the term "rigid plastic material" as employed herein is meant to include such materials as methyl methacrylate, styrene, polyvinylchloride, nylon, lucite and similar natural and synthetic materials.

While the flexible gripping device herein described is composed of rubber, it should be understood that the gripping device can be made of other flexible materials such as polyvinylchloride and similar natural and synthetic materials.

Others may readily adapt the invention for use under various conditions of service, by employing one or more of the novel features disclosed or equivalents thereof. As at present advised with respect to the apparent scope of our invention, we desire to claim the following subject matter.

We claim:

1. A device for removing conventional screw threaded caps from containers used for storing and shipping radioactive material, said device comprising in combination;

a body section of rigid material, a handle of smaller diameter than said body section extending axially outwardly a short distance from the upper surface of the said body section, a lead disc having a diameter equal to that of the said handle positioned immediately below the said handle and disposed transversely within said body section, a large diameter lead disc having a diameter at least equal to that of said body section transversely disposed adjacent the upper surface of the body section, said disc having an axial passage of a diameter substantially equal to that of said handle to allow the handle to extend therethrough, said body section having a cylindrical compartment extending inwardly from the lower surface thereof, and a flexible gripping device secured in said compartment having frictionally engaging lips which are adapted to grip the cap of the container.

2. The device of claim 1, wherein the body section and handle are formed of a methyl methacrylate composition.

3. A device for opening conventional screw threaded caps on containers used for storing and shipping radioactive material, said device comprising in combination; a cylindrical body section of rigid material, a handle of smaller diameter than said body section extending axially outwardly a short distance from the upper surface of said body section, a lead disc having a diameter equal to that of said handle positioned immediately below said handle and disposed transversely within said body section, a large diameter lead disc having a diameter greater than that of said body section transversely disposed adjacent the upper surface of the body section, said disc having an axial passage of a diameter substantially equal to that of said handle to allow the handle to extend therethrough, said body section having a cylindrical compartment extending inwardly from the lower surface thereof, and a flexible rubber gripping device secured in said compartment having frictionally engaging lips which are adapted to grip the cap of the container.

4. A device for opening conventional screw threaded caps on containers used for storing and shipping radioactive material, said device comprising in combination; a cylindrical body section of rigid plastic material, a cylindrical handle comprised of a rigid plastic material and of a smaller diameter than said body section extending axially outwardly a short distance from the upper surface of said body section, a lead disc having a diameter equal to that of said handle positioned immediately below said handle and disposed transversely within said body section, a large diameter lead disc of a diameter larger than that of said body section transversely disposed adjacent the upper surface of said body section, said disc having an axial passage of a diameter substantially equal to that of said handle to allow the handle to extend therethrough, said body section having a stepped cylindrical recessed compartment extending inwardly from the lower surface thereof, and a cylindrical flexible rubber gripping device having a base section which is seated in said compartment and a frictionally engaging lip section which extends outwardly of said body section, said frictionally engaging lip section adapted to grip the cap of the container.

5. A device for opening conventional screw threaded caps on containers used for storing and shipping radioactive material, said device comprising in combination; a cylindrical body section of rigid plastic material, a cylindrical handle comprised of a rigid plastic material and of a smaller diameter than body section, said cylindrical handle extending axially outwardly a short distance from the upper surface of said body section, a lead disc having a diameter equal to that of said handle positioned immediately below said handle and disposed transversely within said body section, a large diameter lead disc of a diameter larger than that of said body section transversely disposed adjacent the upper surface of said body section, said disc having an axial passage of a diameter substantially equal to that of said handle to allow the handle to extend therethrough, said body section having a stepped cylindrical recessed compartment extending inwardly from the lower surface thereof comprised of an inner cylindrical section and an outer larger diameter cylindrical section, and a cylindrical flexible rubber gripping device having a base section which is seated in the said inner cylindrical section and a frictionally engaging lip section seated in said outer larger diameter cylindrical section extending outwardly of said body section, said frictionally engaging lip section adapted to grip the cap of the container.

6. A device for removing a conventional screw threaded closure cap on containers used for storing and shipping radio-active material, said device comprising in combination; a body section of rigid material, a handle extending upwardly from the upper surface of the said body section and having one end secured in said body section, said body section having a compartment extending inwardly from the lower surface of said body section, a gripping device non-rotatably mounted in said compartment having flexible means for frictionally engaging the closure cap and making non-rotating engagement therewith, and a solid lead disc forming a radio-active shield having a diameter at least equal to that of said body section, said lead disc transversely contacting said body section between said compartment and said one end of said handle, whereby the operator is protected from exposure to the radio-active material in the container.

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