

June 29, 1954

M. B. HAWKINS ET AL

2,682,352

SHIPPING CONTAINER FOR RADIOACTIVE MATERIAL

Filed May 9, 1947

3 Sheets-Sheet 1

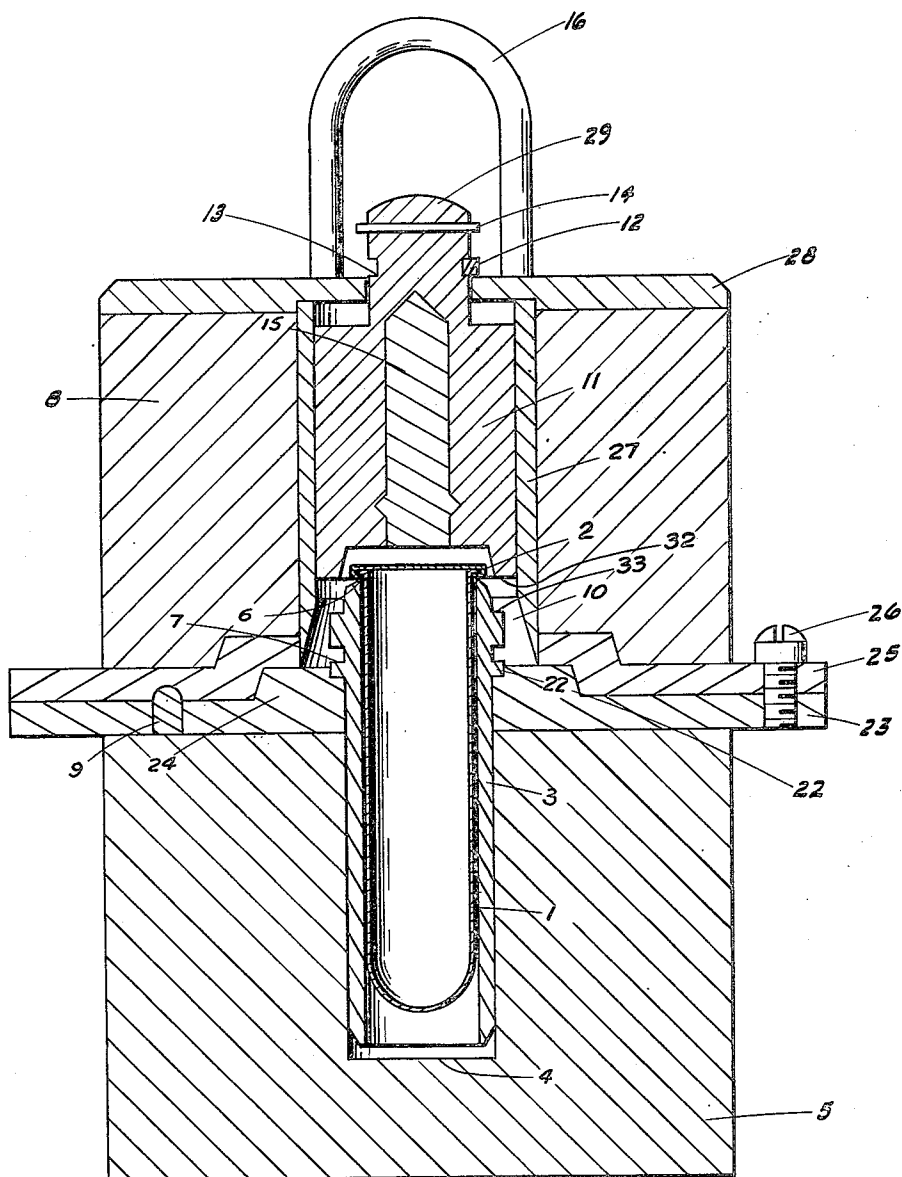


FIG. 1.

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3 Sheets-Sheet 2

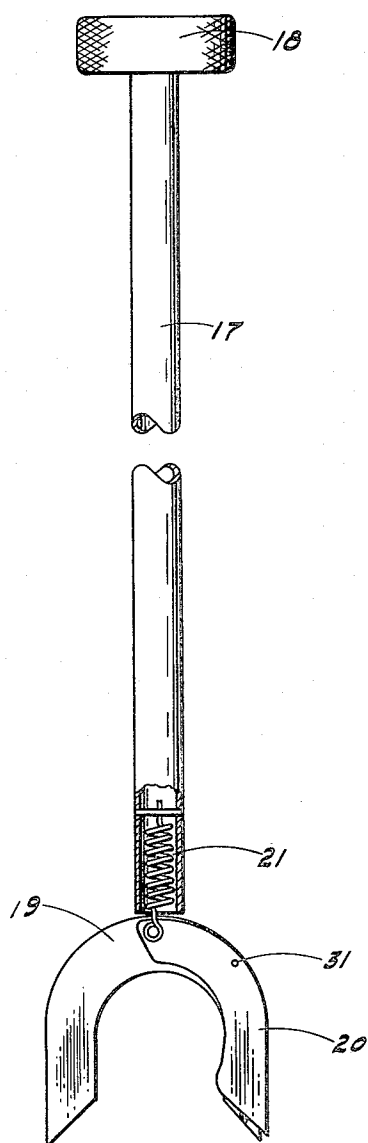


FIG. 3.

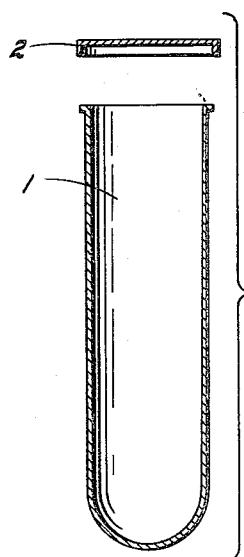


FIG. 2.

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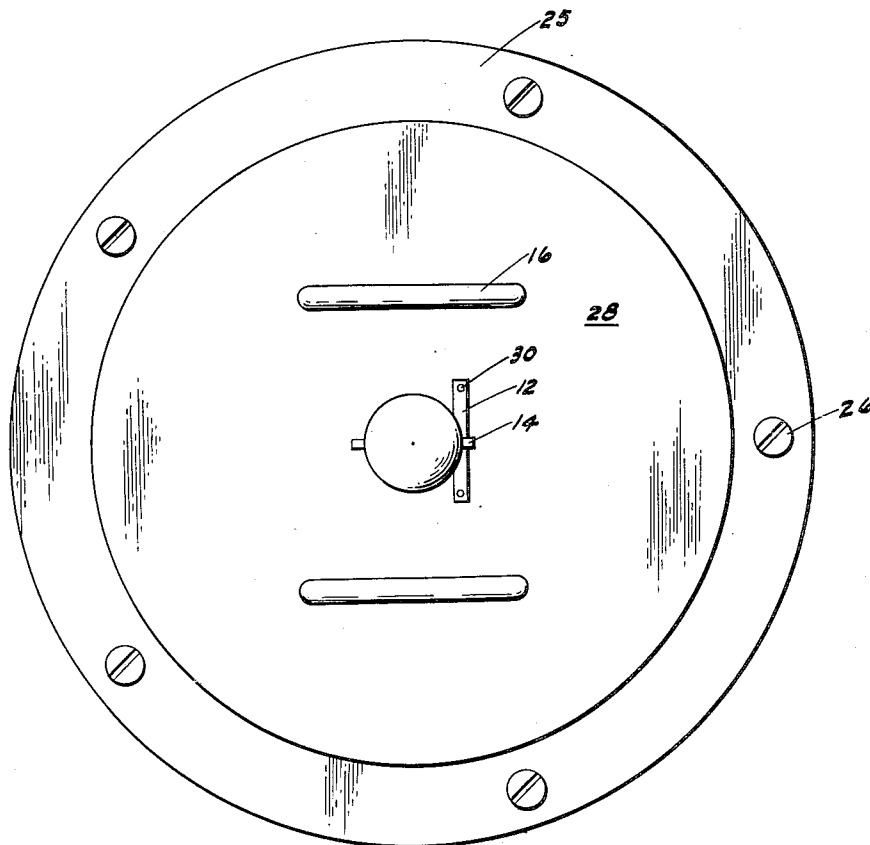


FIG. 4.

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UNITED STATES PATENT OFFICE

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SHIPPING CONTAINER FOR RADIOACTIVE MATERIAL

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Application May 9, 1947, Serial No. 747,154

3 Claims. (Cl. 220—48)

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Our invention relates to shipping containers, and shipping cans, and more particularly to a package for transporting radioactive materials.

In the prior art it has been the practice to ship or transport radioactive materials in shielded containers. The shielded containers usually inclose an inner container or cartridge containing the radioactive material. In removing the radioactive material, the inner container or cartridge would usually be taken from the outer container and the top thereof unscrewed or unclamped so that the contents might be removed. The latter operation exposed the handlers to radiations from the material in the container for a considerable period of time, thus subjecting the handlers to danger of over exposure and injury from the action of the radioactive material. Cartridges of this type were formed of machined bar stock and were provided with a screw thread or snap top. The cost of manufacture thereof was consequently very great.

Applicants with a knowledge of these problems in the prior art have for an object of their invention the provision of a container for radioactive materials having radiation shielding adequate for the physiological protection of those handling the container.

Applicants have as another object of their invention the provision of a container can for radioactive materials having a dust tight sealed cap to prevent the escape of such radioactive materials from the can while permitting the flow of gases, such as those evolved during the treatment of said materials, therefrom.

Applicants have as another object of their invention the provision of a container for radioactive materials with a simple arrangement for removing the materials without the necessity for special apparatus at the delivery point for this purpose.

Applicants have as a further object of their invention the provision of a container for radioactive materials having an inner receptacle or can for housing the materials, such can being easily and cheaply constructed at only a fraction of the cost of those known to the prior art.

Applicants have as a still further object of their invention the provision of a container for radioactive materials having a relatively cheap expendable inner receptacle which may be chemically treated for the removal of any remaining radioactive materials after the dumping operation.

Applicants have as a still further object of their invention the provision of a tool in the form of

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a set of tongs for the rapid removal of the inner receptacle or can from the container at such a distance from the handlers as to offer substantial protection against the physiological effects of radiation from materials in the container.

Other objects and advantages of our invention will appear from the following specification and accompanying drawings, and the novel features thereof will be particularly pointed out in the annexed claims.

In the drawings, Fig. 1 is a sectional elevation of our improved container for radioactive materials. Fig. 2 is a sectional elevation of the inner receptacle or can with its cover separated therefrom. Fig. 3 is an elevation, partly in section, of our improved tongs for removing the inner receptacle from the container. Fig. 4 is a plan view of the container of Fig. 1.

In the preparation of the radioactive material for shipping, the neutral or stable material is packed into the can or inner receptacle, and the cover is affixed thereto by crimping the edge of the cover over the flange of the can. The can, which may be of any suitable material, such as aluminum, is inserted in and subjected to the neutron field of a pile of fissionable material. In this action neutrons bombard the material of the can either causing its transmutation into another element or the formation of a radioactive isotope of the same element, either of which may be unstable and, therefore, radioactive. The transmutation of this material of the can results in or is accompanied by the evolution of a gas or gases which must be permitted to escape from the can. Provision for the escape of these gases is accomplished by giving the cover only a dust-tight fit on the can. Under these circumstances, vapors may escape between the can and the cover. When this operation is complete, the can is removed from the pile and inserted in the container for shipment or transportation as described more in detail hereinafter.

Referring to the drawings in detail, a cylindrical cap can 1, preferably of 2-S soft aluminum, with a can cap 2 crimped in place thereon, is shown disposed in and supported by a cylindrical cutter 3 through a lip or flange at its upper end. The cutter 3, preferably of hardenable stainless steel, is supported in the cutter well 4 of the shielded base 5 through flange 22. The cutter 3 is provided at its upper end with a cutting edge 6, and an annular groove 7 is formed in the wall of the cutter to facilitate removal thereof from well 4 with tongs or a tool to be described more fully hereinafter.

The base 5 is preferably made of some shielding material, such as lead, with its upper end terminating in an annular coupling member 23 having a shouldered portion 24 for interlocking engagement with a recessed portion in a mating coupling member 25 carried by container top 8. The coupling members 23, 25 are preferably made of stainless steel and are joined together with screws or bolts 26 passing through and screw threadedly engaged with their overlapping portions. A centering pin 9 carried by coupling member 23 is provided for ease in adjusting the top to the base. The top 8 may be provided with a longitudinal plunger bore or recess 10 which is lined with a sleeve 27 joined at its upper end to plate 28 and at its lower end to coupling member 25. In the plunger recess 10 of the container top 8, the cutting plunger 11 is supported through extension 29 by latch 12 mounted on cover plate 23 by screws 30, 30 and engaged in annular groove 13 of the plunger extension 29. The plunger is provided with a vertical motion limiting pin 14 and a core 15 of shielding material, such as lead. The shielded container top 8 is provided with spaced inverted U-shaped lifting handles 16, 16.

Referring to Fig. 2, the crimp cap can 1 is shown removed from the carrier with its cap 2 as yet not crimped to the can.

Fig. 3 illustrates the can lifting tongs which have a tubular handle 17 with a hand grip affixed to one end thereof. Mounted on the opposite end of the handle is a U-shaped collar 18 with a holding pawl 20 pivotally mounted on one arm of the collar at 31. The pawl 20 is engaged at one end by a tension spring 21 which serves to yieldingly urge it about the pivot and towards the opposite arm of the yolk or collar.

In utilizing the container for the shipment of radioactive materials, neutral or stable materials are ordinarily placed in the can 1 and the cover 2 is placed thereon and crimped by an appropriate tool or machine. After being subjected to the action of a pile, as heretofore described, the container may be assembled as indicated in Fig. 1. In such condition the container may be safely handled and shipped.

To empty the contained material, the latch 12 is disengaged from the annular groove 13 of the cutting plunger 11, which permits the plunger to drop and rest on the can cap 2. By driving the plunger downward with a light hammer blow, the shearing action of the plunger's base and the cutting edge 6 of the cutter 3 severs the cap from the can. Shoulder 22 of the plunger striking shoulder 33 of the cutter at the end of the cutting action prevents damage to the circular cutting edge of the cutter. The shielded container top 8 is then removed, permitting free access to the cutter 3 with its contained can 1. The collar 18, with its holding pawl 20, of the can lifting tongs is then snapped into the annular groove 7 of the cutter, and from the physiologically safe distance from the radioactive material that the tongs handle affords, the cutter and can are then lifted from the container well 5, and may be inverted, dumping the contained material. A tap on the

bottom of the emptied can removes it from the cutter.

In carrying out the shearing action of the cover 2 of can 1 by cutter 3, by the above operation the upper extremities of the can are swaged or expanded outwardly against the walls of the cutter during the cutting action, creating a frictional fit between the can and the cutter which is sufficient to support the can therein. However, such can may be simply and easily removed therefrom by inserting a tool in the lower end of the cutter and pushing the can up out of the cutter, as previously indicated.

Having thus described our invention, we claim:

1. A container for radioactive materials of the character described comprising a base having a well-defining recess therein, a cylindrical cutter disposed within the well, said cutter having an upper annular cutting edge, a can having an out turned flange on its upper extremity telescoped within the cutter and supported through the flange on the cutting edge, a top for the base, and a plunger slidably carried by the top for engagement with the can to press it against the edge of the cutter to sever the flange.

2. A container for radioactive materials of the character described comprising a base having a well-defining recess therein, a tubular cutter disposed within the recess and supported by the base, said cutter having an upper annular cutting edge, an elongated can having a shoulder adjacent its upper extremity for engagement with the cutting edge of the cutter for supporting it, a top for the base, and means carried by the top for engagement with the shoulder to press it against the cutting edge of the cutter to sever the can.

3. A container for radioactive materials of the character described comprising a container including a base having a well-defining recess therein, a tubular cutter positioned in the well, said cutter having an upper cutting edge, an elongated can telescoped within the cutter, said can having a shoulder on its upper extremity for engagement with the cutting edge of the cutter to support the can, a top for the container, and a plunger passing through the top and slidably mounted therein for engagement with the shoulder to press it against the edge of the cutter to shear the shoulder from the can.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
24,141	Shattuck	May 24, 1859
70,033	Shopbell	Oct. 22, 1867
312,643	Knox	Feb. 24, 1885
616,740	Sloan et al.	Dec. 27, 1898
1,080,636	Johnson	Dec. 9, 1913
1,270,038	Malm et al.	June 18, 1918
1,888,411	Schilling	Nov. 22, 1932
2,002,610	Nall	May 28, 1935
2,029,329	Ljungstrom	Feb. 4, 1936
2,349,128	Akers	May 16, 1944
2,594,970	Monk	Apr. 29, 1952