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DEVICE FOR PREVENTING DAMAGE TO RADIOACTIVE SOURCES IN LEAD-FILLED TRAYS OR DRAWERS

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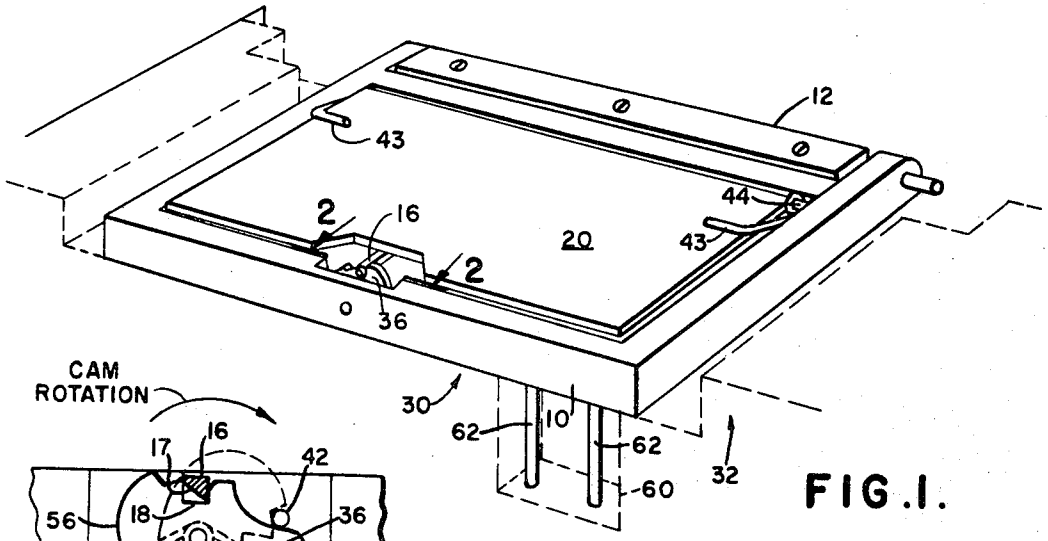


FIG. 1.

FIG. 2.

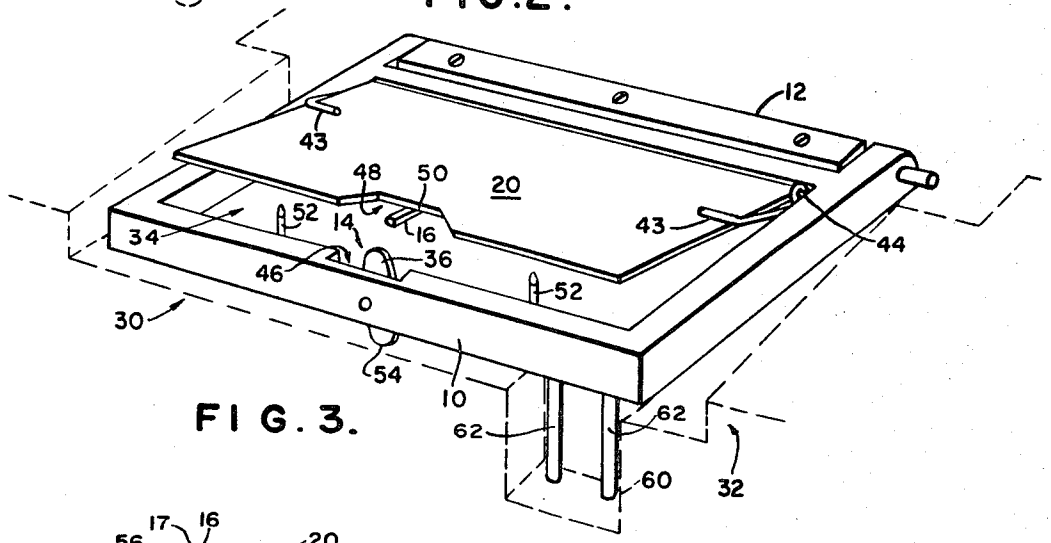


FIG. 3.

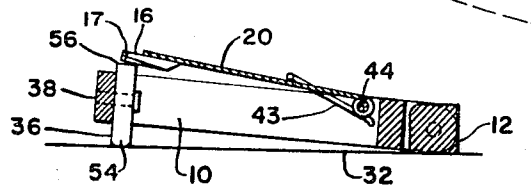


FIG. 4.

INVENTOR

Paul H. Bedrosian

BY Alvin Browdy

ATTORNEY

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DEVICE FOR PREVENTING DAMAGE TO RADIOACTIVE SOURCES IN LEAD-FILLED TRAYS OR DRAWERS

Paul H. Bedrosian, Montgomery, Ala., assignor to the United States of America as represented by the Secretary of the Department of Health, Education, and Welfare

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ABSTRACT OF THE DISCLOSURE

The disclosure relates to a mechanical safety device having a rectangular metal frame which is hinged to a bar along one long side thereof. On the opposite side of the frame is provided a pivoted, spring-loaded cam unit which, when held in the cocked position, lies within the open space of the frame and does not protrude above the upper plane of the frame member to which it is attached. The cam is locked by a pin which fits into a notch on the side of the cam. This pin is part of a spring-loaded cover unit which is hinged, by removable pins, to the frame at its side opposite the cam. When the cover is in locked position, it lies in the horizontal plane and is flush with the upper surface of the frame. In operation, the frame is attached by the hinged bar to a lead-filled tray or drawer in the area holding radioactive sources such as needles. When the sources lie properly within the tray or drawer, the safety device, with the cover closed against the frame, can be lowered on them and the drawer can be closed. If any of the sources protrude above the top of the drawer, the source will strike the cover from the bottom thereof causing the pin on the cover to disengage the cam which will then spring into position such that it will prevent the frame of the device from resting completely on the tray. With the frame so elevated by the sprung cam, the drawer cannot be closed thereby avoiding accidental damage to the sources.

The present invention relates to a safety device, and, more particularly, a device for preventing damage to radioactive sources in lead-filled trays or drawers.

One of the problems which has occurred in the storage of radium sources, such as radium needles, has been the accidental breakage of such needles in the conventional lead trays or drawers in which they are normally stored. For example, such needles are normally elongated and accidents have occurred in which the needles, while standing on end, were broken by being cut in the drawer upon closing thereof. The resultant contamination is dangerous and, furthermore, is of considerable nuisance.

Similar problems of an analogous nature appear wherever fragile articles are desired to be stored or maintained in a drawer, particularly where such fragile article has a dimension which exceeds the height of the drawer, and where there is relatively frequent use of the fragile articles with removal from the drawer and then subsequent replacement and closing of the drawer.

It is therefore an object of the present invention to overcome the dangers and deficiencies of the prior art, such as indicated above. It is another object of the present invention to safely store fragile articles, particularly those having at least one large dimension, in a drawer in such a manner that when the fragile article is placed in the drawer with its greater dimension projecting above the height of the drawer, it is impossible to close the drawer, therefore, breakage of the fragile article is obviated.

It is another object of the present invention to provide a safety device for insertion in a drawer which safety device will prevent closing of the drawer when an article in the drawer projects above the height thereof.

These and other objects of the nature and advantages of the instant invention will be more apparent from the following detailed description taken in conjunction with the drawing therein:

FIG. 1 is a perspective view of one embodiment of the present invention;

FIG. 2 is a section taken along line 2—2 of FIG. 1;

FIG. 3 is a perspective of the embodiment of FIG. 1 shown in a different operative position; and

FIG. 4 is a side elevational view partially in section showing the cover resting on the end of the cam.

The invention essentially relates to a safety device for inhibiting the closing of a drawer or tray when articles projecting upwardly would be sheared by the closure of the drawer or tray, and includes a metal frame having a spring-loaded pivoted cam unit mounted therein locked into cocked position by a pin which is part of a spring-loaded cover unit which is hinged to the frame; so that when the cover is in locked position it lies in a horizontal plane flush with the upper surface of the frame so that the drawer or tray can be properly closed, however, when an article protrudes above the drawer, it will strike the bottom of the cover causing the pin to disengage the cam which will then spring into position such that it will prevent the frame of the device from resting completely within the drawer thereby preventing closing of the drawer.

The figures of the drawing show an embodiment **30** of the present invention in solid lines located within a tray or drawer **32** shown in phantom. The device **30** comprises essentially a rectangular frame **10**, preferably made of metal, which is hinged to a bar **12** along its back side thereof. The bar **12**, in turn, is connected to the rear portion of the drawer or tray **32** so that, in effect, the frame **10** is hingedly connected adjacent the rear of the drawer or tray **32** so that it may be rotated about the bar **12**. It is understood that any suitable hinging means for connecting the frame **10** to the rear portion of the tray or drawer **32** would be suitable, and that the precise portion of the connection of such hinge to the tray or drawer **32** may be subject to various designs.

Noting FIG. 3, it may be seen that the frame **10** is essentially annular defining a storage space **34** in the interior thereof. Also, while such annular frame **10** is shown to be rectangular, it is understood that it may in general be of any shape, although it is usually most desirable that it correspond to the general interior dimensions of the tray or drawer **32** in which it is placed. It should be understood, however, that it is within the scope of the present invention to provide a plurality of such frames within a single tray or drawer or to provide such a frame **10** within a drawer **32** wherein the frame **10** covers only a portion of the tray or drawer **32**.

Along the side of the annular frame **10** opposite the bar **12** or other suitable hinge is located a cam unit **14** which preferably comprises a generally flat or planar cam plate **36**, which is shown in detail in FIG. 2. The cam unit **14** also includes a pivot **38** to which the cam plate **36** is attached to the frame **10**, and a coil spring **40** which, as illustrated in FIG. 2, urges the plate **36** about the pivot **38** in a counterclockwise direction. A stop **42** is provided to limit the rotation of the cam plate **36** about the pivot **38**.

Noting particularly FIG. 2, it is seen that the width of the cam plate **36** should be no greater than the height of the frame **10** so that in the position illustrated in FIG. 2 (corresponding to the closed position illustrated in FIG. 1) the cam plate **36** is maintained within the

vertical dimensions of the frame **10**. On the contrary, and as shown in phantom in FIG. 2, the length of the cam plate **36** should be greater than the height of the frame **10**, for reasons explained below, Thus, the pivoted, spring-loaded cam plate **36** lies within the open space of the frame **10** and does not protrude beyond the frame **10** to which it is attached when the cam unit **14** is in the cocked position as shown in FIGS. 1 and 2.

The cam plate **36** is provided with a notch **18** along one of its sides thereof so that such cam plate may interlock with a pin **16** which fits into such notch **18** as shown in FIGS. 1 and 2. The pin **16**, which may be generally rectangular as shown in FIG. 3, preferably has a beveled portion **17**.

The frame **10** is provided with a cover **20** which is preferably constructed to cover only the storage space **34** and, in closed position, to lie coplanar with the top surface of the frame **10**. The cover is hinged, preferably by removable pins **44**, to the frame **10** at its side opposite from the cam unit **14**. The pin **16** extends from the cover **20**, and is preferably generally coplanar therewith. When the cover **20** is in the closed and cocked position over the space **34** of the frame **10**, it lies in a horizontal plane and is flush with the upper surface of the frame **10**. T spring **43**, associated with the cover hinge **44**, is adapted to urge the cover downwardly and into intimate contact with the frame **10**.

In the embodiment shown, the cam unit is located within a recess **46** along the inner periphery of the front side of the frame **10**. Similarly, the cover **20** is also provided with a recess **48** into which the pin **16** projects from that portion **50** of the cover adjacent the recess **48**. It is of course understood that the recesses **46** and **48** are not essential and/or that the cam unit **14** may be attached to the outer, rather than inner, periphery of the annular frame **10**.

A recess **60** may be provided in the drawer **32** to facilitate opening the device. A pair of prongs **62**, connected to the underside of the frame **10**, project into the recess **60** when the device is closed. A suitable instrument (not shown) such as a rod or the finger of the user may be inserted between the prongs **62** to lift up the frame **10**.

In operation, the frame **10** is attached by the hinge bar **12** to a lead-filled tray or drawer in the area holding radioactive sources, such as the needles **52**. As indicated above, the width and length of the device **30** should be governed by the width and length of the source area of the tray and this is often two inches by three to six inches. When the sources lie properly within the tray or drawer **32**, the device **30**, in cocked position shown in FIG. 1, can be rotated downwardly about the hinge **12** and lowered over such sources and the drawer can be closed. However, if any of the sources protrude above the top of the drawer **32**, such as shown in FIG. 3 (note the upwardly extending needles **52**), as the device **30** is rotated downwardly, the needles will contact the under surface of the cover **20**. This will cause the interlocking pin **16** and notch **18** of the cam plate **36** to disengage, since such engagement is merely frictional as can be seen in FIG. 2.

As soon as the pin **16** and the cam plate **36** disengage, the spring **40**, previously urging the cam plate **36** into engagement with the pin **16**, will effect a further rotation of the cam plate **36** about the pivot **38** to first effect engagement of the cam plate **36** with the beveled face **17** of the pin **16** to thereby force the cover **20** upwardly against the action of the spring **44**. The rotation of the cam **36** continues until the cam engages the stop **42** and is at or slightly past its vertical position, shown in FIG. 3 and also in FIG. 2 in phantom. At this point, depending on the design of the device **30**, the ends **54** and **56** of the cam plate **36** may provide either one, or both, of two functions. Thus, the bottom end **54**, by forcing against the bottom of the tray **32**, will lift the frame **10** upwardly about its hinge **12**. With the frame **10** so elevated by the sprung cam unit **14**, the drawer **32** cannot be closed avoiding, thereby, accidental damage to the sources **52**.

Coincident thereto, or as an alternative thereto, if a shorter cam plate **36** is provided or the cam plate is pivoted to the frame **10** at a higher elevation than shown in FIG. 2, the upper end **56** of the cam plate **36** will engage with the underside of the pin **16** thereby preventing the cover **20** from being closed upon an attempt to close the drawer **32**.

After the protruding needles have been properly arranged in the drawer, the cam unit **14** may be readily cocked by turning it to its flush position and the spring (**43**) loaded cover **20** may then be depressed so that the pin **16** and the notch **18** of the cam plate **36** are once more in interlocking engagement. The device **30** may then be pivoted downwardly to the fully closed position shown in FIG. 1 so that the drawer may be closed.

Without the device **30**, the protruding sources **52** would be sheared by the closing action of the drawer and the radium salts contained therein would be released to contaminate the area.

It will be obvious to those skilled in the art that various changes may be made without departing from the scope of the invention. The device **30** may be formed of any suitable materials, such as various metals, woods or plastics. The type of inter-frictional engagement between two friction elements may be varied, as well as the structural details. Therefore, the invention is not to be considered limited to what is shown in the drawings and described in the specification.

What is claimed is:

1. A safety device for inhibiting the inadvertent shearing of frangible articles projecting upwardly from a tray or drawer, said device comprising

an annular frame having an outer size and shape for fitting within the tray or drawer in which said safety device is to be used;

means for hingedly connecting said frame to the tray or drawer in which said device is to be used;

means for covering the opening within said annular frame, said covering means being hinged to said frame along that portion of said frame carrying said means for hingedly connecting said frame to the tray or drawer;

a first friction member extending outwardly from said covering means;

a cooperative friction element pivotally connected to said frame along that portion of said frame opposite that portion of said frame carrying said hinge means and frictionally engaging said first friction member when said covering means is in tight engagement over the opening of said frame, said cooperative friction element having means thereon to hold a portion of said device out of its normal horizontal plane in the drawer when said friction member and element are not engaged so that the drawer cannot be closed; and

spring means for urging said cooperative friction element about its pivot so that said spring exerts a force tending first to engage said cooperative friction element with said first friction member while maintaining said holding means on said friction element in its inoperative position, and second to move said cooperative friction element beyond its engagement position with said friction member to the operative position of said holding means when the frictional contact between said friction element and friction member has been broken, whereby said holding means moves to the operative position when said covering means is displaced upwardly relatively to said frame by a projecting article in the drawer thereby preventing closure of said drawer.

2. A device in accordance with claim **1** wherein said annular frame and said covering means are of generally rectangular configuration and said covering means is gen-

erally coplanar with the top surface of said frame; said device further comprising a second spring means urging said cover downwardly; said first friction member comprising a pin lying generally in the plane of said cover, said cooperative friction element comprising an elongated cam plate having its pivot at the approximate center thereof, the width of said cam plate being no greater than the thickness of said annular frame and the length of said cam plate being substantially greater than the thickness of said annular frame, said cam plate being aligned essentially perpendicularly to the plane of said cover and said pin, said cam plate having a pin-engaging notch along one side thereof which engages said pin thereby effecting said frictional engagement when said covering means is in tight engagement over the opening of said frame, an end of said cam plate holding a portion of said device out of its normal plane in the drawer when said pin is not engaged in said notch.

3. A device in accordance with claim 2 wherein said covering means has a recess into which said pin extends from that portion of the cover adjacent said recess.

4. A device in accordance with claim 2 wherein said pivotal connection of said cam plate to said frame is along the inner periphery of said frame.

5. A device in accordance with claim 2 wherein said frame has a recess in which lie said cam plate and said pivotal connection of said cam plate to said frame.

6. A device in accordance with claim 2 wherein said cam plate is planar.

7. A device in accordance with claim 1 wherein said hinge connection of said cover to said frame is removable.

8. A device in accordance with claim 1 wherein said means to hold a portion of said device out of its normal plane in the drawer comprises means to displace said frame at its free unhinged end away from contact with the drawer in which said device is contained.

9. A device in accordance with claim 2 wherein said end of said cam plate which comprises means to hold a portion of said device out of its normal plane in the drawer serves to engage with said pin to hold said covering means in open position above said frame.

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JAMES T. McCALL, *Primary Examiner.*

U.S. Cl. X.R.

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