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CLEANING AND TRANSPORTING DEVICE FOR A RADIOACTIVE SOURCE

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Fig. 2.

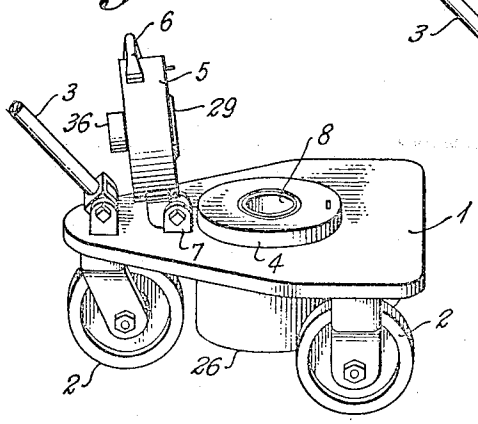


Fig. 1.

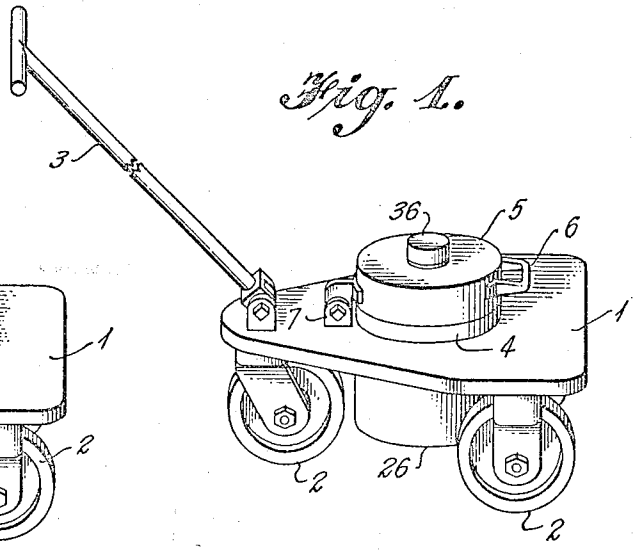
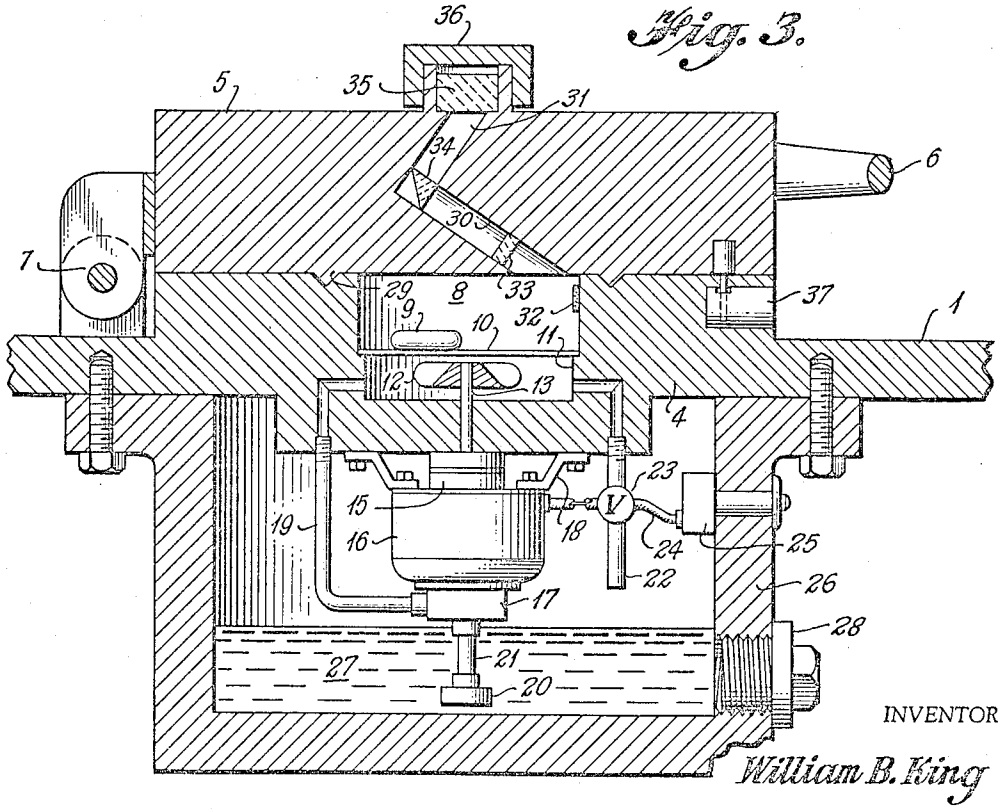


Fig. 3.



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CLEANING AND TRANSPORTING DEVICE FOR A RADIOACTIVE SOURCE

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This invention relates to a cleaning and transporting apparatus for a radioactive source for therapeutic work.

Radioactive sources have been used in hospitals and clinics for therapeutic work and the attendants have been exposed to considerable hazard when cleaning the sources, either at the bedside or in the handling areas.

By the device of this invention, a means is provided by which the source can be taken from storage to the patient's bedside with adequate shielding and further provide means for safely cleaning the contaminated source immediately after removal from the patient, prior to returning it to storage.

It is an object of this invention, therefore, to provide a device for cleaning and transporting a radioactive source to an area to be used, in a sterile condition without radiation hazards.

It is another object of this invention to provide a means for transporting a radioactive source without unnecessary handling.

It is a further object of this invention to reduce the hazards of radiation in cleaning a radioactive source after its use in connection with the treatment of a patient.

Further and other objects of this invention will become apparent from the description of the accompanying drawings in which like numerals refer to like parts.

FIGURE 1 is a perspective view of a radioactive source handling device;

FIGURE 2 is a similar view to FIGURE 1 showing the vault uncovered;

FIGURE 3 is an enlarged cross-sectional view showing the essential features of the device.

The transportation and cleaning device generally shown in the figures consists of a chassis 1 having wheels or casters 2, having a hinged handle 3, and a shielded vault 4, having a cover 5. The cover has a handle 6 and a hinge as shown at 7. FIGURE 2 shows the device with the cover open to show the storage well 8.

The enlarged cross-sectional view shown in FIGURE 3 is a fragmentary view of the essential features of the device described above. The supporting chassis is shown at 1, having a storage vault generally indicated as 4, having a cover 5, cover handle 6 and hinge 7. A well 8 is formed in vault 4 for the transportation and washing of radioactive source 9. Vault 4 is preferably made of lead or of any other suitable shielding material. It can be cast integrally with chassis 1 or may be formed separately and secured thereto by any suitable means.

In well 8 in vault 4 is a grid or rack 10 supported by shoulders 11 to afford support throughout the cross-section of the well, on which the source 9 may be placed. In the space underneath rack 10 is mounted a washing impeller 12 driven by shaft 13, extending through the lower wall of vault 4 to a clutch, motor, and pump assembly 15, 16, and 17. The assembly is secured to the underside of vault 4 by brackets 18.

A conduit 19 extends from pump 17 to a lower portion of vault 4 for the purposes of delivering water to well 8. Strainer 20 and pipe 21 afford an inlet from the water in the lower compartment formed by housing 26 to pump 17. The outlet for water from well 8 is afforded by conduit 22 and control valve 23. A cable 24 extends between motor 16 and sequence control device 25 mounted in the side of housing 26. The control device

25 sets up the washing and rinsing cycle and controls the delivery of water to and from well 8. A quantity of water or other cleaning fluid is shown at 27. A plug 28 mounted in the side of housing 26 affords the cleaning access. Housing 26 and plug 28 must also be made of suitable thickness of lead or other adequate shielding material.

Cover 5 is formed with a re-entrant seal 29 between the cover and vault 4 to prevent any direct radiation from well 8. Seal 29 also affords a water-tight seal during the washing cycle and, if additional water sealing is required, an O-ring seal may be placed in the bottom of the groove of seal 29.

The cover is also provided with a right-angle passage consisting of bores 30 and 31. Bore 30 is aligned with a phosphor indicator 32. The water sealed lens element 33 is mounted in bore 30. A prism 34 is mounted at the juncture of bores 30 and 31 to bend any light from lens 33 toward element 35 which is a lead glass window. A lead cover 36 may be employed to cover window 35. The presence of a radioactive source 9 can always and readily be detected in well 8 of vault 4 by reason of the fact that source 9 will irradiate or luminesce phosphor 32. The light from phosphor 32 will be picked up by lens element 33 and focused along bore 30. It will then be reflected through the right-angle prism 34 and bore 31 to glass window 35. Thus, by removing the lead cover 36 and inspecting glass window 35, the presence of the phosphor in the vault will be indicated without any hazards to the viewer. Bores 30 and 31 being at right angles to one another and inclined to the top and bottom surfaces of cover 5 prevent a direct line from the source for the possible escape of radiation from well 8 in vault 4.

It can readily be seen that with the above-described device, a radioactive source 9 may be loaded into well 8 of the device in the handling area and wheeled to the patient's bedside for use. Upon removal from the patient, source 9 is again placed in well 8 and can be immediately washed by setting control 25 to the required washing cycle. A lock 37 is provided between vault 4 and cover 5. When returned to the handling area, before the technician opens the device, the presence or absence of a source of radioactivity may be detected through glass window 35 so that adequate measures for the protection of the technician may be taken prior to unlocking and opening the device.

While the foregoing device is described as a preferred embodiment of my invention, it is to be understood that certain changes, alterations, modifications, and substitutions can be made without departing from the spirit and scope of the appended claims.

I claim:

1. A device for holding a radioactive source and adapted for manual transport comprising a shielded container, a well for receiving the radioactive source formed in and open to one side of said container, a shielded cover closing said open side of said well and movably attached to said container, said cover having an angular passage extending therethrough, said angular passage comprising at least two connecting bore portions disposed obliquely to each other, one of said bore portions ending in said outer surface of said cover above said open side of said well, the other of said bore portions extending to said well and having its longitudinal axis intersect with a lateral wall surface of said well, means mounted in said well and inherently responsive to a radioactive source to detect and visually indicate the presence of the latter when disposed in said well, said means comprising a phosphor mounted on said lateral wall surface of said well and in alignment with said other bore portion, said phosphor being caused to luminesce by the radioactive source when present in said well, means in said angular passage to transmit light from the irradiated phosphor to the outer end of said

angular passage, a transparent shielding closure means mounted on the outer end of said passage to transmit therethrough any light in said passage due to the presence of the radioactive source in said well.

2. A device for holding a radioactive source comprising a shielded container, a well for receiving the radioactive source, said well formed in and open to one side of said container, a shielded cover closing said open side of said well and movably attached to said container, said cover having an angular passage extending therethrough and comprising at least two angularly related portions connected to each other, one of said bore portions ending in said upper surface of said cover above said open side of said well, the other of said bore portions extending down obliquely to said well whereby its longitudinal axis intersects with a lateral wall surface of said well, detecting and visual indicator means mounted in said well responsive to the presence of a radioactive source therein, said detecting and indicator means comprising a phosphor mounted on said lateral wall surface of said well and in alignment with said other bore portion, said phosphor being caused to luminesce by the radioactive source when present in said well, means in said angular passage including lens means in one of said bore portions to transmit and focus light from the irradiated phosphor to the outer upper end of said angular passage, a transparent shielding means mounted on the outer end of said passage to transmit therethrough any light in said passage due to the presence of the radioactive source in said well, and a removable opaque shielding means mounted over said transparent closure means.

3. A wheeled device for transporting and storing a radioactive source for therapeutic use comprising a shielded storage vault, a well for receiving the radioactive source formed in and opening to the upper side of said vault, a shielded cover for said well mounted on said upper side of said vault, said cover and vault having means to seal said well opening when said cover is in closed position over said well, rack means in said well to support a radioactive source, means to cleanse and render sterile the radioactive source after use comprising means to cycle and agitate a cleansing fluid through said well, means in said well inherently responsive to a radioactive source to detect and visually indicate the presence of the latter in said well, said means comprising a phosphor mounted on a lateral wall of said well, said phosphor being caused to luminesce by the radioactive source when present in said well, said cover having an angular passage formed therein comprised of at least two connecting relatively angularly disposed bore portions, one of said bore portions extending obliquely down to said well with its axis aligned with said phosphor mounted on said lateral wall, the other of said bore portions ending in the upper outer side of said cover, means in said angular passage including a liquid-sealed lens to transmit and focus light from the irradiated phosphor to the upper outer end of said angular passage, a transparent shielding closure means mounted on the upper end of said angular passage to transmit therethrough any light in said passage due to the presence of the radioactive source when present in said well.

4. In a device for transporting a radioactive source, said source being particularly adapted for internal use of patients in a hospital or the like, said device comprising in combination a castered chassis, a maneuvering handle thereon, a shielded vault mounted on said chassis, said shielded vault including an upper and lower compartment, the uppermost side of said upper compartment being open, said upper compartment having a rack extending thereacross spaced above the bottom of said compartment, a radioactive substance adapted to be disposed on said rack, detecting and indicating means comprising a phosphor mounted on a lateral wall of said upper compartment and luminescently responsive to the radioactive substance when present therein, means in said lower compartment and communicating with said upper compartment beneath said rack effective to cycle and agitate a cleaning fluid up into said upper compartment to clean said radioactive substance when soiled after use, a shielded cover removably secured on said vault to close said open upper side of said upper compartment, a seal structure between said vault and cover effective to seal against the passage of cleaning fluid and rays emitted by said radioactive substance, a water sealed periscopic device formed within the confines of said cover and including at least two angularly related bore portions, the axis of one of said bore portions being aligned with said phosphor mounted on said lateral wall, the outer end of the other of said bore portions opening through said shielded cover at a point above said lateral wall, said periscopic device having mounted therein light ray transmitting means to transmit the light rays of said phosphor when luminesced by the presence of the radioactive substance in said upper compartment, said periscopic device further including a radioactive ray shielding glass cover means over the outer end of said periscopic device, and a lead cover removably mounted over said glass cover means.

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