250-507.1 SR
OR 3,787,699

United States Patent [11] 3,787,699
Menachem et al. [45] Jan. 22, 1974

[54] ROTARY DRUM FOR STORING RADIO-ACTIVE OBJECTS

[75] Inventors: **Surkes Menachem,** Rishon-Lezion; **Ivan Kis,** Tel-Aviv; **Rosental Nathan,** Givataim, all of Israel

[73] Assignee: **The State of Israel, Atomic Energy Commission,** Tel-Aviv, Israel

[22] Filed: **June 24, 1971**

[21] Appl. No.: **156,262**

[30] **Foreign Application Priority Data**

Aug. 19, 1970 Israel 35130

[52] **U.S. Cl.** ..... **250/507,** 62/381, 250/108, 250/106 S

[51] **Int. Cl.** **G21h 5/00**

[58] **Field of Search** 250/106, 108; 62/381

[56] **References Cited**

UNITED STATES PATENTS

710,173	9/1902	Aylmer	62/381
2,514,909	7/1950	Strickland	250/106 S
2,791,889	5/1957	Childers	62/381
2,858,450	10/1958	Holben	250/108 R
3,225,203	12/1965	Gombert	250/108 R

OTHER PUBLICATIONS

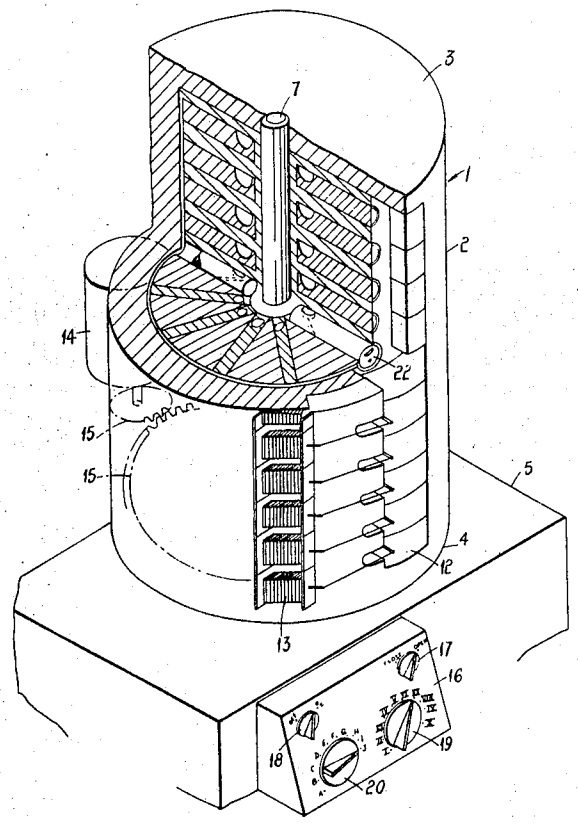
"Dial Safe Selects Hot Samples" Popular Science, May 1956, page 157.

Primary Examiner—James W. Lawrence
Assistant Examiner—Harold A. Dixon
Attorney, Agent, or Firm—Arthur B. Colvin

[57] **ABSTRACT**

Apparatus for the storage of radio-active objects, such as, for example, radio-active needles or the like, comprising a cylindrical drum mounted for rotation about its axis within a cylindrical casing, a first plurality (m) of axially spaced tiers of radially directed cavities formed in said drum so as to join a second plurality (n) of radially spaced apart columns of cavities, an elongated opening formed in the casing, means for rotatably displacing the drum so as successively to bring successive cavity columns opposite said opening and a first plurality (m) of individual closure means associated with said opening and respectively adapted to close the cavities otherwise exposed by the opening.

3 Claims, 4 Drawing Figures



PATENTED JAN 22 1974 3,787,699

Fig. 1

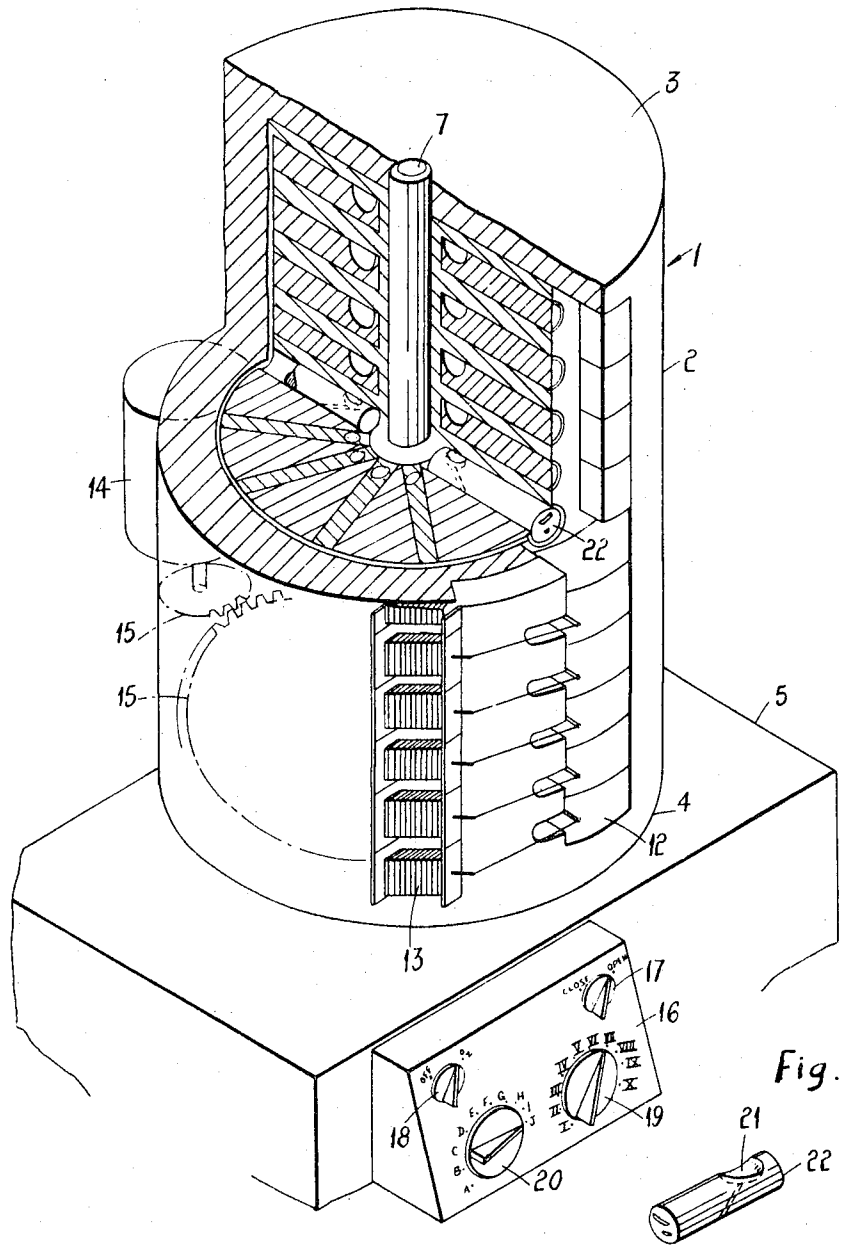


Fig. 1a

Inventors
SURKES MENACHEM
IVAN KIS
ROSENTAL NATHAN
By
Attorney

Fig. 3.

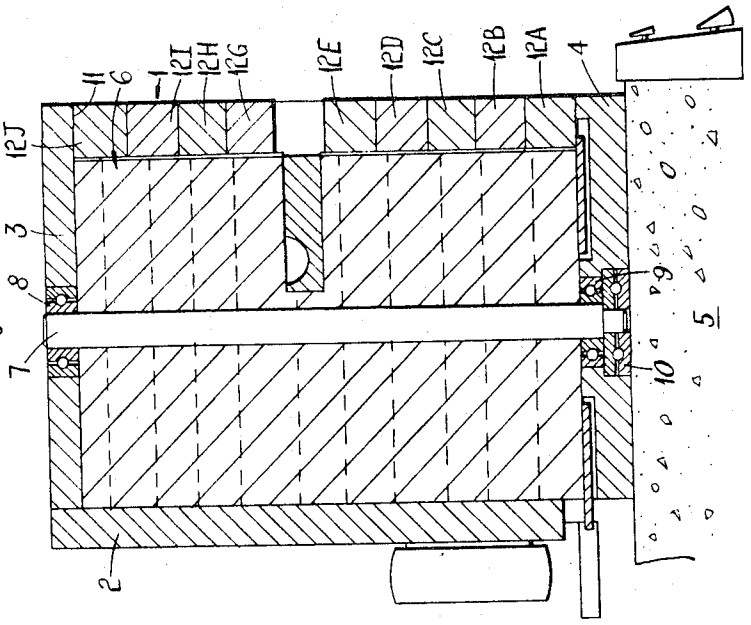
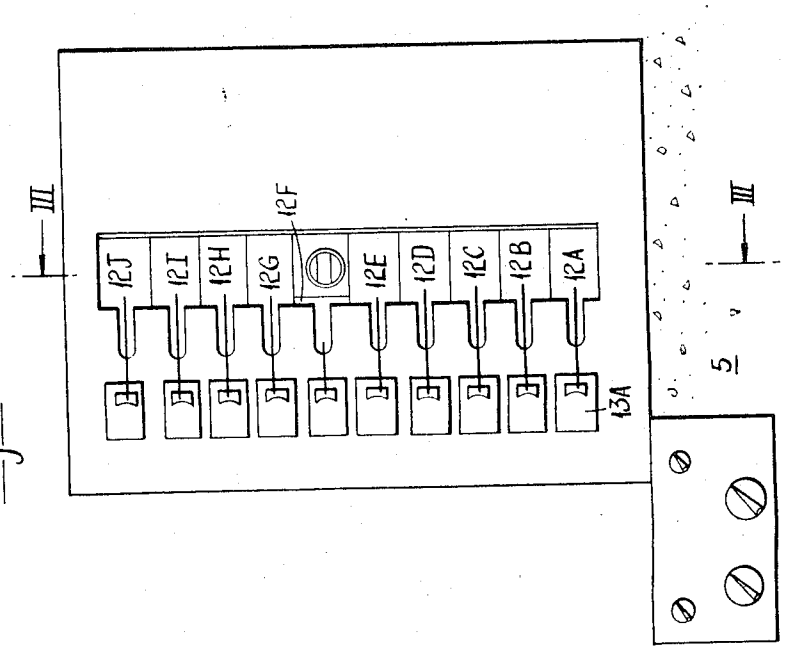


Fig. 2.



Inventors
SURKES MENACHEM
IVAN KIS
ROSENTAL NATHAN
By
Attorney

ROTARY DRUM FOR STORING RADIO-ACTIVE OBJECTS

This invention relates to apparatus for the storage of radio active objects such as, for example, radio active needles or the like.

It is a desideratum in the storage of radio active objects to achieve a maximum degree of shielding with respect to the radio active objects stored together with a maximum degree of accessibility to the objects. This desideratum can generally be achieved only by using very bulky, space consuming equipment with complicated control mechanisms.

This in connection with the storage of radio active needles, for example, in hospitals, it is often desired to store a substantial quantity of differing types of needles the total radiation of which is very considerable and highly lethal. Hitherto the only method for effectively storing such needles whilst providing effective shielding involved the provisions of very bulky storage equipment the space for which is not always readily available in hospitals. It must furthermore be borne in mind that the operator must have ready access to any individual needle and when selecting a needle for withdrawal from storage he should not be exposed to radiation emanating from needles not to be selected.

It is an object of the present invention to provide apparatus for the storage of radio active objects in which the above referred to desideratum is economically and readily achieved.

According to the present invention there is provided apparatus for the storage of radio active objects comprising a cylindrical drum mounted for rotation about its axis within a cylindrical casing, a first plurality (m) of axially spaced tiers of radially directed cavities formed in said drum so as to join a second plurality (n) of radially spaced apart columns of cavities, an elongated opening formed in the casing, means for rotatably displacing the drum so as successively to bring successive cavity columns opposite said opening and a first plurality (m) of individual closure means associated with said opening and respectively adapted to close the cavities otherwise exposed by the opening.

Such apparatus, having m.n cavities, is capable of containing a substantial number of radio active objects. On the other hand the overwhelming bulk of these cavities are always completely shielded by the cylindrical casing and so no danger arises from any radiation emerging from the objects contained therein. At any particular instant only m cavities are exposed by the opening in the casing and even these, so-called exposed cavities, are individually shielded by the separate closure means.

Each cavity and in consequence each object located in a particular cavity is identified by the particular tier and particular column where it is located. In order therefore to have access to the object located in a particular cavity the drum is rotated so that the required column is located opposite the opening whereupon the closure means associated with the particular opening is opened and the object can be withdrawn or replaced as required.

Thus at any particular time the operator is, at the most, exposed only to the radiation emerging from the particular cavity uncovered by the associated closure means. On the other hand, the apparatus is very economical in terms of space and in terms of the effort to

be expended by the operator in achieving access to the particular cavity seeing that the operator can always remain opposite the fixed opening all displacement being effected by the drum.

In accordance with a preferred embodiment of the present invention a displacement of the drum is effected by means of an electrically operated motor, suitable selector means being provided which when set with respect to a particular cavity will cause the drum to rotate so that the column in which the cavity is located will be located opposite the opening whereupon the closure means closing the cavity will be opened.

Alternatively, rotation of the drum can be effected manually as can the opening of each individual closure means.

For a better understanding of the present invention and to show how the same may be carried out in practice, reference will now be made to the accompanying drawings in which:

FIG. 1 is a partially sectioned perspective view of a storage apparatus in accordance with the invention,

FIG. 1*a* is a perspective view of a needle holder for use in the apparatus shown in FIG. 1,

FIG. 2 is a side elevation of the apparatus shown in FIG. 1,

FIG. 3 is a longitudinally sectioned view of the apparatus shown in FIG. 2 taken along the lines III—III.

As seen in the drawings, the cylindrical casing 1 formed of lead with a stainless steel outer coating has a cylindrical wall portion 2 and upper and lower circular planar portions 3 and 4. The lower planar portion 4 is securely mounted on a concrete base 5.

Located within the casing 1 and rotatable with respect thereto is a cylindrical drum 6 which is also formed of lead. Passing through the drum 6 and integral therewith is an elongated axle 7 which is rotatably journalled with respect to the upper and lower portions 3 and 4 of the cylindrical casing 1 by means of ball bearings 8 and 9, the latter being rotatably journalled with respect to the base 5 by means of a ball bearing 10.

Formed in the drum 6 are ten superimposed tiers A, B, C, D, E, F, G, H, I and J of radially directed cylindrical cavities each tier containing ten equiangularly spaced cavities numbered (i) to (x). There are thus formed 10 columns of cavities each column containing 10 individual cavities. Each cavity can therefore be identified by the column and tier in which it is located thus cavity (IV)(E) is the cavity located in column (IV) and tier E.

Formed in the cylindrical wall 2 of the casing 1 is an elongated aperture 11 which extends in an axial direction along the length of the casing and is so dimensioned as to be capable of exposing successive columns of cavity apertures as the drum is rotated with respect to the casing. Mounted on the cylindrical wall 2 of the casing 1 is a column of ten, superimposed shielding doors 12A, 12B, 12C to 12J respectively associated with electromagnetic displacing means 13A to 13J the arrangement being that the column of doors 12 fills the elongated aperture 11 and thereby seals the exposed cavity column.

An electric drive motor 14 is coupled via drive gears 15 to the base of the drum 6 so as to rotate the drum with respect to the casing 2.

A control panel 16 is mounted on the base 5 and is provided with an actuating switch 17 which controls

the flow of actuating current to the drive motor **14** and a second actuating switch **18** which controls the flow of actuating current to the electro-magnetic means **13.** A first selector dial **19** can be set to any one of the ten columns of cavities and when so set and when the switch **17** is turned on the motor rotates the drum so that the particular column selected is disposed opposite the elongated aperture **11.** A second selector switch **20** can be set to any of the cavity tiers A to J and when so set and when the switch **18** is turned on after the required cavity column has been located in front of the elongated aperture the appropriate door closing the selected cavity swings open.

As seen in detail in FIG. 1*a* of the drawings the radio active needle to be stored (not shown) is located in a recess **21** formed in a cylindrical lead slug **22** the slug as a whole being inserted in the appropriate cavity in the drum with the recess **21** located in an innermost position.

In use the radio active needles located in the differing cavities can be identified by the particular identification of the cavity. Thus a list can be provided whereby an operator can readily identify any particular radio active needle as being located in a cavity identified by a particular tier and column identification symbol. Thus if it is desired to have access to a particular needle all that is required is that its cavity identification symbols be determined whereupon the selector dials **19** and **20** are appropriately set, the switches **17** and **18** are turned on and the drum is automatically rotated by the drive motor so that the appropriate column is located opposite the elongated aperture **11** and the appropriate door **12** swings open. The required needle is then removed together with its slug and the opened door is then manually closed whereupon it can be arranged that the drum returns to an initial position.

It will be realised that with apparatus of the kind just described, a considerable number of radio objects, in the present case radio active needles, can be stored in a compact space and that ready access can be had at all times to any particular object. Furthermore, the operator is at no time exposed to radiation other than possibly a certain minimal amount of radiation which may excape through the opened cavity from which the object is to be withdrawn.

Whilst the arrangements specifically described above automatic selection means have been described for displacing the drum and the closure means so as to provide immediate access to the required cavity and the radio active object lodged therein it will be readily appreciated that both the rotation of the drum and the opening and closing of the closure means can be effected manually.

We claim:

1. Apparatus for storing radioactive objects comprising:

a. a cylindrical lead drum coaxially mounted inside a cylindrical casing for rotation about the common axis of the drum and casing;

b. the casing having an axially directed slot exposing the drum;

c. the drum containing $m \times n$ radially directed cylindrical cavities arranged in m axially spaced tiers and n radially spaced-apart columns;

d. means for rotating the drum to selected angular positions for bringing respective ones of the cavities into alignment with the slot in the casing; and

e. a plurality of axially spaced individual closure members on the casing adjacent the slot aligned with the m axially spaced tiers for closing the slot, but individually openable to provide an access to the drum aligned with a selected one of the tiers.

2. Apparatus according to claim **1** including settable selector means for identifying the cavity of interest, and a drive motor responsive to the setting of the selector means for rotating the drum until the cavity of interest is aligned with the slot.

3. Apparatus according to claim **2** including a further settable selector means for specifying the closure to be opened, and an electromagnetic closure operator associated with each closure and responsive to the setting of the further selector means for opening the specified closure.

* * * * *