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(54) Handling tool for the oral self-administration of a radioactive capsule

(57) The invention relates to a handling tool for the oral self-administration of a radioactive capsule, comprising a tubular body, which has a duct for passing the capsule, said duct extending from the upper end of said body to the lower end thereof, and which body is provided with a fingergrip at its outside and with a connection means for a detachable connection to a reservoir for holding said capsule at its lower end.
An intermediate portion of said duct is widened to constitute an elongated room for accommodating a cartridge of a shielding material in a longitudinally (axially) slidable manner, said room comprising a first portion coaxial with the duct, which first portion connects the two parts of the duct, viz. an upper part and an inlet part for the capsule, and is so dimensioned that it can accommodate said cartridge slidably between a first and a second abutment, and a bypass portion alongside said first portion to allow the capsule to pass the cartridge.
The invention also relates to a combination of this handling tool and a reservoir for holding a radioactive capsule.

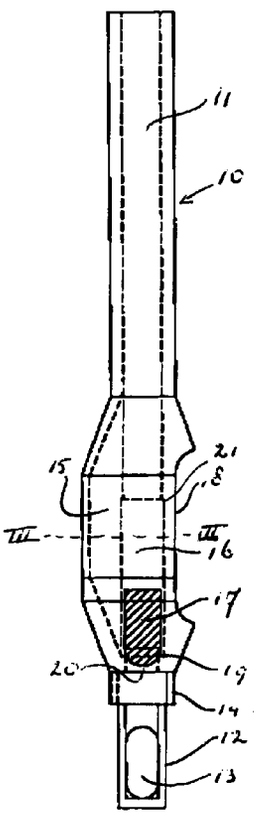

Fig. 1

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Description

The invention relates to a handling tool for the oral self-administration of a radioactive capsule.

It is often desirable to ask a patient to take a substance which is dangerous to the environment, in particular a radioactive substance, orally by him or herself. It is common practice to self-administer such a substance in the form of a capsule, in which the capsule wall, preferably manufactured from gelatin, dissolves in the stomach and releases the active substance. A well-known example of such a radioactive substance for oral self-administration is radioactive iodine, in particular I131. This radioactive iodine is administered, for example, as sodium iodide, in a suitable capsule, mostly as a therapeutic, namely to regulate the functioning of the thyroid gland or to control thyroid gland tumours.

A reservoir for holding a radioactive capsule is disclosed in the int. patent application WO 90/01279. Such a reservoir can be enclosed within a container of a shielding material, preferably manufactured from lead, has a closed bottom and can be closed at its open upper end by means of a cap, for example, a screw cap, or a cap having a bayonet catch or the like. Such a reservoir containing a radioactive capsule is placed available while enclosed in said shielding container. The idea is, that the patient opens the shielding container, unscrews the cap from the reservoir, lets the capsule slide from the reservoir into his/her mouth and finally swallows the capsule with some water. Such a self-administration is preferred to avoid frequent exposure to radioactive radiation by the personnel of a hospital or clinic.

The invention relates more in particular to a handling tool as defined above, comprising a tubular body, which has a duct for passing the capsule, said duct extending from the upper end of said body to the lower end thereof, and which body is provided with a finger-grip at its outside and with a connection means for a detachable connection to a reservoir for holding said capsule at its lower end. Such a handling tool, manufactured from glass or a suitable synthetic material, has been developed to facilitate the self-administration of the radioactive capsule from its reservoir and to reduce the risk that the patient may drop the capsule when he/she tries to take it from the reservoir.

However, this known handling tool does not contribute in any way to the protection against the radiation of the radioactive capsule during the manipulations with the capsule-containing reservoir, connected to the handling tool, in particular by the staff of the clinic or hospital.

It is the objective of the present invention to provide a handling tool as defined above, offering a considerable reduction of the radiation dose to the persons who should manipulate the capsule-containing reservoir, in particular the hospital staff.

To this purpose the handling tool of the present invention is characterized in that an intermediate portion of said duct is widened to constitute an elongated room for accommodating a cartridge of a shielding material in a longitudinally (axially) slidable manner, said room comprising a first portion coaxial with the duct, which first portion connects the two parts of the duct, viz. an upper part and an inlet part for the capsule, and is so dimensioned that it can accommodate said cartridge slidably between a first and a second abutment, and a bypass portion alongside said first portion to allow the capsule to pass the cartridge,

which room is further so proportioned, that in the upright position of the tubular body the front of said cartridge bears against said first abutment, positioned where the first portion of the room is connected to the narrower inlet part of the duct, and so substantially shields the interior of the tubular body from radiation by the capsule in its reservoir, and that, upon tumbling the tubular body towards an upside down position, said cartridge shifts to said second abutment positioned in such a distance from the first one, that behind and in front of the cartridge sufficient space remains to allow the capsule to pass the cartridge through the bypass portion of the room to reach the upper duct portion.

The cartridge within the tubular body of the tool is manufactured from a suitable shielding material which should reduce the radiation dose to which the personnel is exposed considerably, such as tungsten or lead. The tool can be manipulated very easily, as can be seen in the description of a preferred embodiment hereinafter.

Advantageously said room in the tubular body of the handling tool of the present invention may conveniently comprise a plurality of longitudinal guide ribs, bordering the first portion in the room, and so contributes to a smooth slideway for the cartridge within the tubular member. Such guide ribs may be attached on the inner wall of the room e.g. by a plurality of supporting projections.

In another preferred embodiment the handling tool of the present invention is so formed, that the bypass portion of the room is formed as at least one bypass duct, having a substantially equal diameter as the duct, positioned for its greater part alongside the first portion of the room, and opening into both ends of said first portion to allow the capsule to pass through said bypass duct past the cartridge in its shifted position.

In the last preferred embodiment it is of advantage to form said bypass duct and said first portion of the room for their greater part as adjacent, if desired sidelong overlapping, longitudinal bores, recessed in the tubular member.

In case the room in the last preferred embodiment comprises a single bypass duct, preferably a flat face is situated at the outside of the tubular body opposite the bypass duct, said flat face serving as a finger grip and intended to be kept up by the user when the tubular body is tumbled to an upside down position. By gripping the flat face of the tubular member with the forefingers

and the middle fingers of both hands, and the opposite side of the tubular member with the thumbs, the handling tool is in an excellent position to be used for taking the capsule from the reservoir. This will be explained in more detail hereinafter.

Advantageously, the handling tool of the present invention comprises a separate mouthpiece which can be detachably connected to the upper end of the tubular body. In this manner only the mouthpiece will be contaminated during use of the tool and may easily be replaced after its use. Such a separate mouthpiece may serve as a disposable mouthpiece.

The present invention further relates to a combination of a handling tool for the oral self-administration of a radioactive capsule and a reservoir for holding said capsule, wherein said handling tool is detachably connected to the reservoir, for example by a screw connection, and is formed as defined above. The handling tool of the invention is excellently suitable to form a combination with each reservoir for a radioactive capsule, provided that this reservoir has a connection means fitting with the connection means of the tool.

The invention will now be described in greater detail with reference to the accompanying drawings, in which:

Figure 1 is a longitudinal sectional side view of a combination of a reservoir, containing a radioactive capsule, and a handling tool (without mouthpiece) according to a preferred embodiment of the invention;

Figure 2 is a longitudinal sectional top view of the same combination;

Figure 3 is a cross-sectional view taken at the plane III - III of the Figures 1 and 2 embodiment, viewed in the direction of the flat face (fingergrip); and

Figure 4 shows step by step the use of the handling tool of the invention, again in the preferred embodiment of Figure 1.

Figures 1 and 2 show the tubular body **10** of the handling tool, provided with a duct **11**. To the lower end of said tubular body a reservoir **12** with a radioactive (I131) capsule **13** is connected by screwing (at **14**). The duct communicates with bypass duct **15** (Figure 1), which bypass duct forms together with the widened portion **16**, coaxial with duct **11**, a room where the capsule can pass cartridge **17**. The cartridge is manufactured from solid tungsten. The handling tool is provided with a flat face **18** opposite the bypass duct, which flat face is intended for a fingergrip (Figure 1).

In the upright position of the tubular body, as shown in Figures 1 and 2, the tungsten cartridge bears with its front face against a first abutment **19** in the form of a circumferential edge formed by the connection of the room portion **16** to the narrower lower part (inlet part) **20** of the duct. A second equally shaped abutment for the cartridge is positioned at **21**. As can easily be seen in Figure 3, the bypass duct **15** is positioned alongside the widened room portion **16** and has a substantially equal diameter as the duct **11**. As will be clear from Figure 3, the first portion **16** of the room, slidably accommodating the cartridge, and the bypass duct **15** are for their greater parts formed as two adjacent bores, longitudinally recessed in the wall **22** of the tubular body and having a small sidelong overlap. The wall parts **23** on both sides of the mutually open connection **24** serve as a kind of guide ribs for the cartridge to contribute to its smooth sliding within the first portion **16** of the room.

The use of the handling tool of the present invention according to the preferred embodiment of Figure 1 is illustrated by Figure 4. In situation "A" the handling tool is assembled by shifting the mouthpiece **25** in a clamping connection onto the long end of the tubular body **10**. "B" visualizes the unscrewing of the cover from the lead shielding container **26**, containing the reservoir **12** with the radioactive capsule **13**. Together with the cover the cap of the reservoir will come off, as described in WO 90/01279, mentioned above. Thereupon the handling tool is screwed at its short end onto the neck **27** of the reservoir, as is illustrated in situation "C", its internal screw thread fitting with the external thread of the neck of the reservoir. The radioactivity of the capsule can now be measured by the personnel of the clinic or hospital by taking the capsule-containing reservoir out of the lead container with the aid of the handling tool and by then measuring the radioactive dose of the capsule in a dose-calibrator. This is shown schematically by "D". During these operations the manipulator is exposed to a considerably reduced radiation dose of the capsule thanks the shielding action of the tungsten cartridge within the tubular body of the handling tool. Then the patient is asked to tilt the tool upwards with the flat face up, this flat face serving as a finger grip for his/her forefingers and middle fingers, his/her thumbs being positioned at the opposite side of the tubular member. In the position shown in Figure 4-"E", the cartridge shifts backwards up to abutment **21** (see Figure 1), so that the capsule can slide through the bypass duct **15** past the cartridge and reach the mouth of the patient via the duct **11**.

Claims

1. Handling tool for the oral self-administration of a radioactive capsule, comprising a tubular body, which has a duct for passing the capsule, said duct extending from the upper end of said body to the lower end thereof, and which body is provided with a fingergrip at its outside and with a connection means for a detachable connection to a reservoir for holding said capsule at its lower end,
said handling tool being characterized in that an intermediate portion of said duct is widened to constitute an elongated room for accommodating a cartridge of a shielding material in a longitudinally (axially) slidable manner, said room comprising a

first portion coaxial with the duct, which first portion connects the two parts of the duct, viz. an upper part and an inlet part for the capsule, and is so dimensioned that it can accommodate said cartridge slidably between a first and a second abutment, and a bypass portion alongside said first portion to allow the capsule to pass the cartridge,
which room is further so proportioned, that in the upright position of the tubular body the front of said cartridge bears against said first abutment, positioned where the first portion of the room is connected to the narrower inlet part of the duct, and so substantially shields the interior of the tubular body from radiation by the capsule in its reservoir, and that, upon tumbling the tubular body towards an upside down position, said cartridge shifts to said second abutment positioned in such a distance from the first one, that behind and in front of the cartridge sufficient space remains to allow the capsule to pass the cartridge through the bypass portion of the room to reach the upper duct portion.

2. Handling tool as claimed in claim 1, characterized in that said room comprises a plurality of longitudinal guide ribs, bordering the first portion in the room, and so contributes to a smooth slideway for the cartridge within the tubular member.

3. Handling tool as claimed in claim 1, characterized in that the bypass portion of the room is formed as at least one bypass duct, having a substantially equal diameter as the duct, positioned for its greater part alongside the first portion of the room, and opening into both ends of said first portion to allow the capsule to pass through said bypass duct past the cartridge in its shifted position.

4. Handling tool as claimed in claim 3, characterized in that said bypass duct and said first portion of the room are for their greater part formed as adjacent, if desired sidelong overlapping, longitudinal bores, recessed in the tubular member.

5. Handling tool as claimed in claim 3 or 4, characterized in that the room comprises a single bypass duct, and that a flat face is situated at the outside of the tubular body opposite the bypass duct, said flat face serving as a finger grip and intended to be kept up by the user when the tubular body is tumbled to an upside down position.

6. Handling tool as claimed in any of the preceding claims, characterized in that the tool comprises a separate mouthpiece which can be detachably connected to the upper end of the tubular body.

7. Combination of a handling tool for the oral self-administration of a radioactive capsule and a reservoir for holding said capsule, wherein said handling tool is detachably connected to the reservoir, for example by a screw connection, characterized in that the handling tool is a tool as claimed in any of the preceding claims.

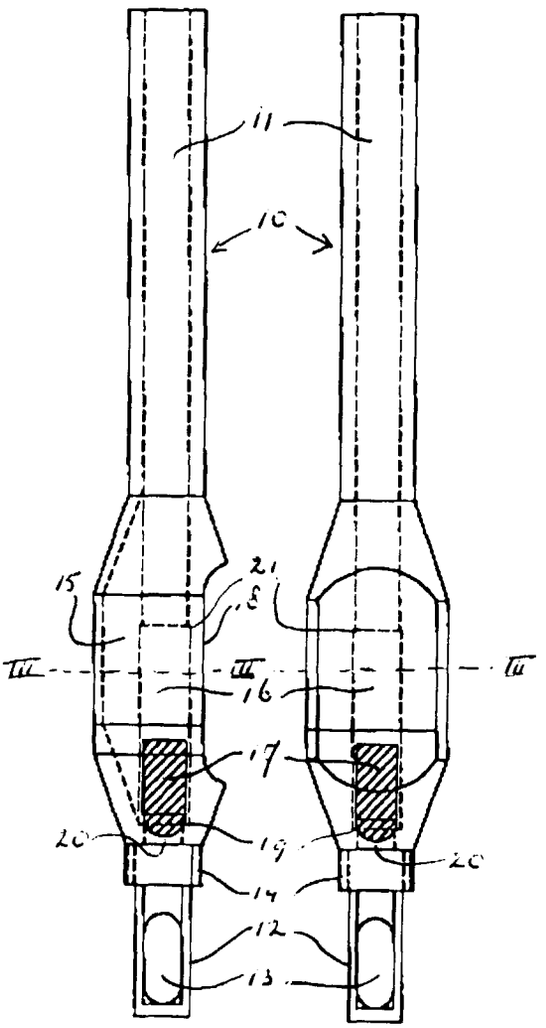


Fig. 1

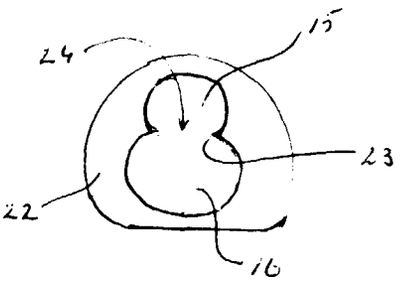
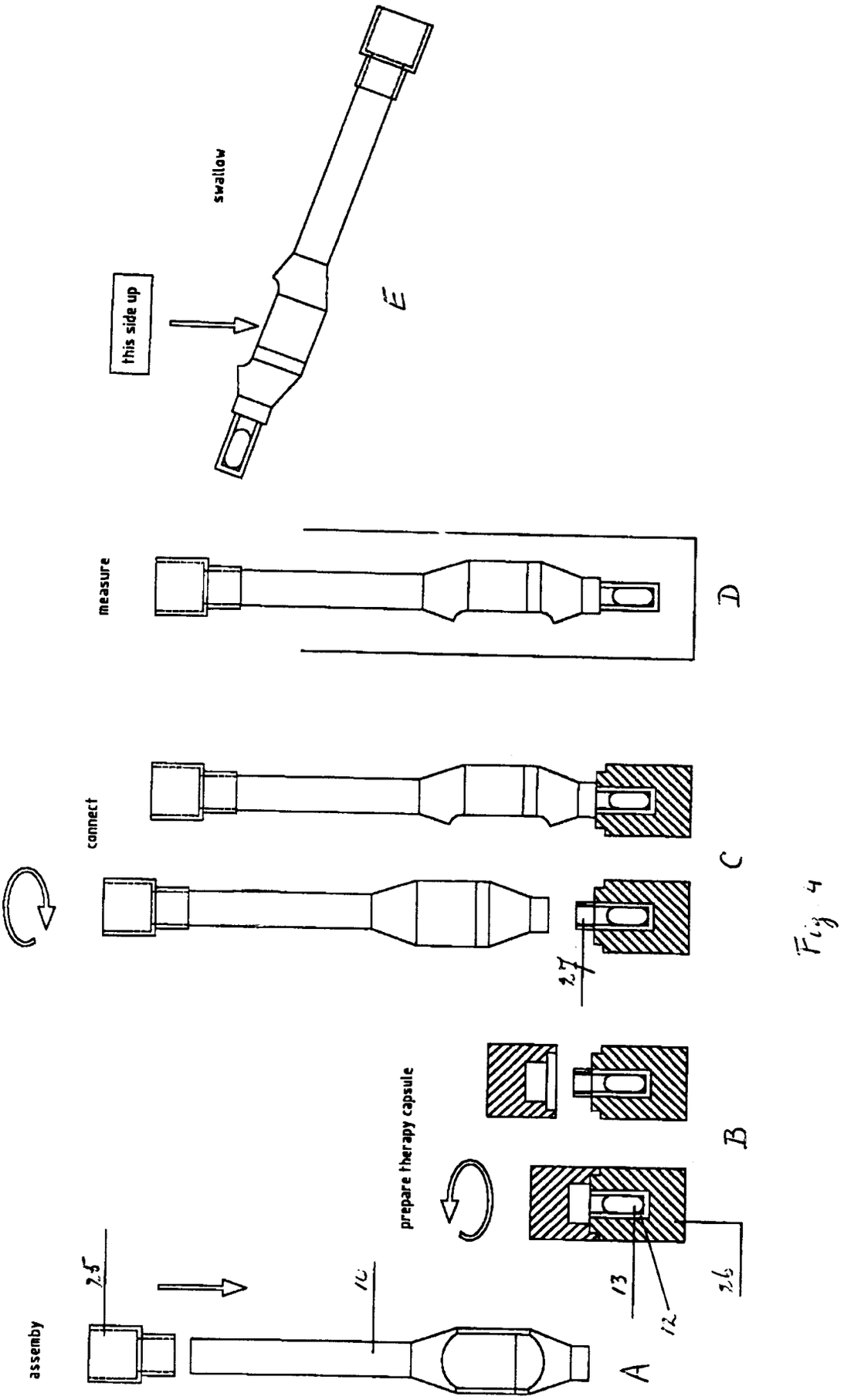


Fig. 3

Fig. 2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prepare therapy capsule
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Fig 4

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EUROPEAN SEARCH REPORT

Application Number
EP 97 20 0280

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A,D	WO 90 01279 A (MALLINCKRODT) * the whole document * ---	1	A61J7/00
A	US 5 292 307 A (DOLZINE) * the whole document * -----	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

A61J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20 June 1997	Baert, F

CATEGORY OF CITED DOCUMENTS

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