United States Patent [19]

Knulst

[11] **3,905,482**

[45] **Sept. 16, 1975**

[54] **CASING FOR HOLDING SAMPLE TUBES**

[75] Inventor: **Benjamin Jacobus Knulst**, Wilrijk, Belgium

[73] Assignee: **ICN Tracerlab N.V.**, Mechelen, Belgium

[22] Filed: **Nov. 29, 1972**

[21] Appl. No.: **310,290**

[30] **Foreign Application Priority Data**

Dec. 14, 1971 Netherlands 7117089

[52] **U.S. Cl.** **211/74**; 23/259

[51] **Int. Cl.**[2] **A47B 73/00**; B01L 9/00

[58] **Field of Search** 211/74, 72; 206/459; 356/246; 23/253, 259

[56] **References Cited**

UNITED STATES PATENTS

2,050,608	8/1936	Hellige	356/246 X
2,341,496	2/1944	Zethmayr	211/120
2,406,334	8/1946	Keller	211/75 UX
2,741,913	4/1956	Dovas	211/74 X
2,802,391	8/1957	Maier	211/74 X
3,545,932	12/1970	Gilford	23/259 X
3,644,715	2/1972	Holderith	23/253 R X
3,713,771	1/1973	Taylor	211/74 X
3,799,744	3/1974	Jones	23/259 X

FOREIGN PATENTS OR APPLICATIONS

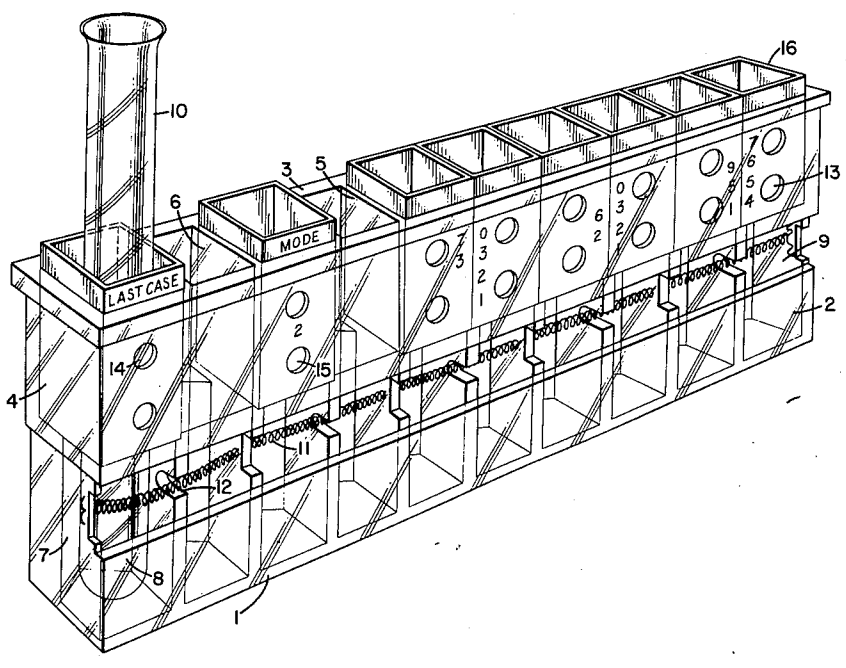
75,156	5/1949	Norway	211/74
1,205,752	9/1970	United Kingdom	211/74
920,518	11/1954	Germany	211/74

Primary Examiner—Roy D. Frazier
Assistant Examiner—Thomas J. Holko
Attorney, Agent, or Firm—Nolte and Nolte

[57] **ABSTRACT**

Apparatus for holding sample tubes comprises a casing divided into a plurality of compartments into which sample containing tubes are insertable and spring means are provided for holding the tubes within the compartments. The compartments are provided with openings in a front wall and there are coding elements insertable into the compartments which also have openings which are selectively registrable with the openings in the front wall of the compartments.

8 Claims, 3 Drawing Figures



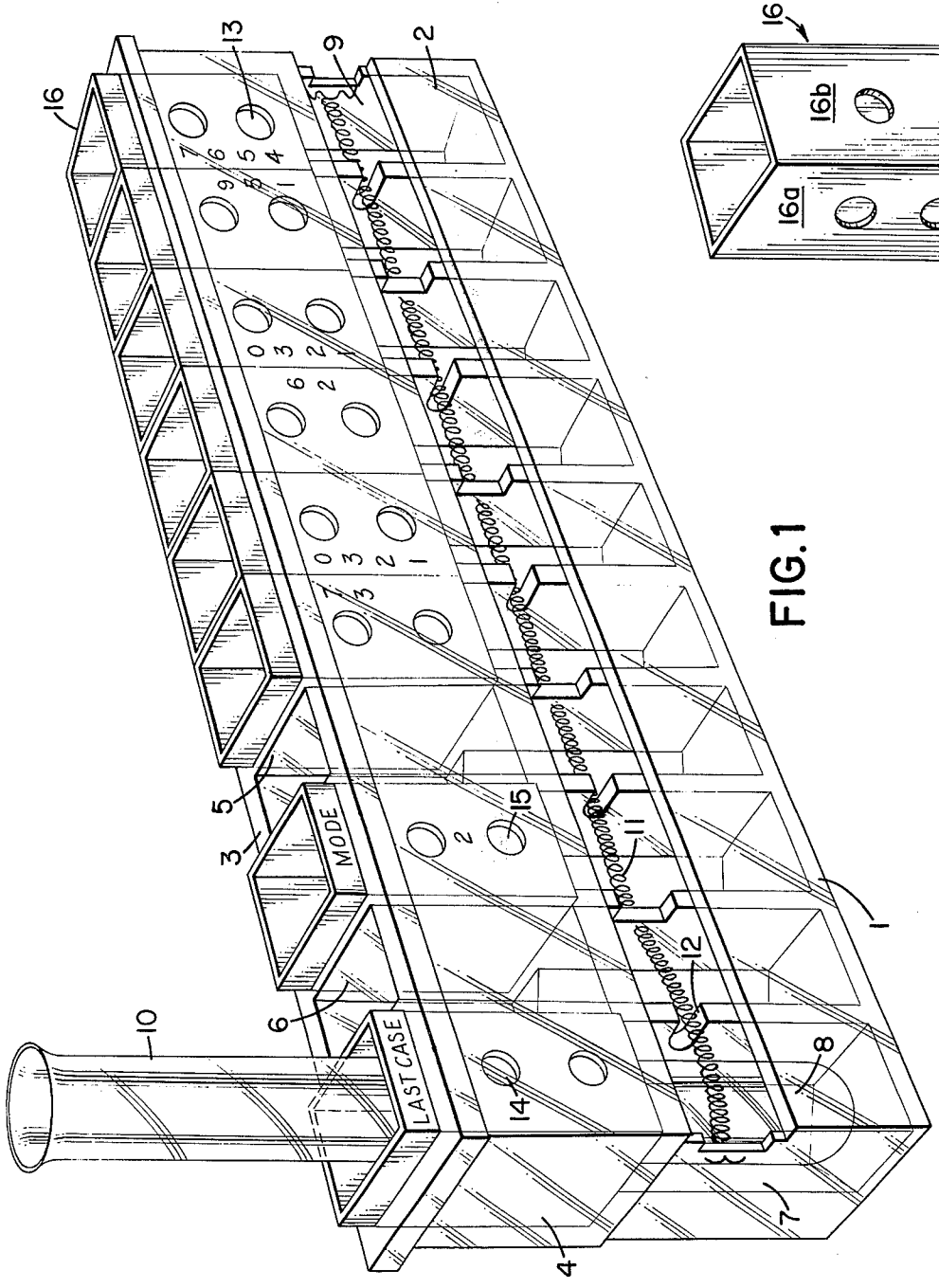


FIG. 1

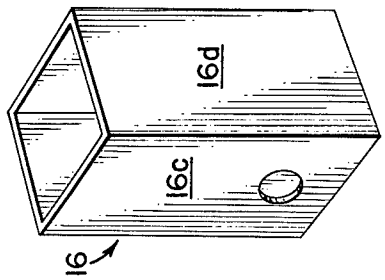


FIG. 3

FIG. 2

CASING FOR HOLDING SAMPLE TUBES

The invention relates to a casing for holding sample tubes, particularly, but not exclusively, intended for use in systems for the automatic check of the contents of the sample tubes, for example, in gamma counting systems.

In known systems of this kind each sample tube is placed in a separate holder, the holders being subsequently joined to form a transport chain. The position of the sample tube in the transport chain serves to identify the sample contained in the tube concerned. The chain conveys the sample tubes in succession towards a pick-up station, from whence the sample tube is moved towards a measuring station.

This known method has several disadvantages. For example, each sample tube has to be inserted separately into a holder and subsequently into the transport chain, it being removed from the chain and from the holder after a measurement has been made. This method is labour-consuming and time-consuming. It further has the disadvantage that the identification of a given sample is dependent upon its place in the chain, so that after the samples have been inserted into the chain and the chain has been inserted into the measurement system, an intermediate exchange of samples in order to permit a test immediately after the sample has been taken is not practically possible.

In making measurements in a gamma counting system in accordance with a given programme, a selection of a measuring spectrum has to be made. An alteration of the measuring spectrum can be made by inserting a code stop into the chain between the sample tubes, the stop causing the measuring spectrum to be modified at the correct instances. However, the insertion of such code stops into the chain reduces the sample tube capacity of the chain. The sample tube capacity of the chain is already comparatively low, whereas there is a need for high-capacity systems.

According to the invention there is provided a casing for holding sample tubes wherein the casing comprises a plurality of compartments, each of which is formed with two wall portions arranged at an angle to each other, and a biasing member opposite the wall portions.

At least one wall of a plurality of the compartments can be provided with openings and removable coding members can be arranged in at least some of the compartments, the coding members having openings corresponding to selected openings in the compartment walls.

An embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawing, in which the

FIG. 1 is a perspective view of the embodiment;

FIG. 2 is a perspective view of a coding member of the embodiment of FIG. 1; and

FIG. 3 is a view similar to FIG. 2 but turned through approximately 180°.

The casing of transparent synthetic resin shown in the drawing comprises a bottom plate **1**, a front wall **2**, a rear wall **3** and side walls **4**.

By means of partitions **5**, the elongated casing is subdivided into ten compartments **6**, in each of which a sample tube **10** can be received. In use the casing is moved step-wise by a suitable drive means to a pick-up station.

Adjacent the rear wall **3** the lower part of each compartment is provided with two rear wall portions **7** and **8** arranged at an angle to each other to define a V-shaped recess.

At the level of these wall portions **7, 8,** an elongated slot **9** is provided in the front wall **2** and extends throughout the length of the front wall **2.** The lower parts of sample tubes **10** inserted into the compartments **6** can be observed through the slot **9.** At a given distance in front of the wall portions **7** and **8,** biasing members in the form of springs **11** are arranged. The ends of each spring **11** are embedded in the material of a side wall **4** or a partition **5,** each spring being of a length such that it extends across two adjacent compartments. The partition **5** separating the compartments concerned is provided with an elongated slot **12** for receiving the spring **11.** The sample tubes **10** in the compartments **6** are urged by the springs **11** against the wall portions **7, 8,** so that the sample tubes will always occupy a fixed position in a compartment relative to the casing. Thus the sample tubes can be lifted out of the casings without difficulty with the aid of a suitable pick-up mechanism, because the correct location of a sample tube relative to the pick-up mechanism is assured.

The front walls of the six right-hand compartments have two circular-section holes **13** lying one above the other. The extreme left-hand compartment has two similar holes **14,** one lying above the other and the third compartment viewed from the left has two similar holes **15,** lying one above the other.

Each compartment is adapted to receive a square coding can **16,** which extends over approximately half the height of the compartment, as is shown in the Figure. Each can **16** as shown in FIGS. **1** and **2,** is constructed with one wall **16*a*** having two holes lying one above the other such that, when the can is inserted into a compartment with this wall engaging the front wall of a compartment, these holes are in line with the two holes in the front wall of the compartment. A second wall **16*b*** of the can **16** has a hole which is positioned to be at the level of the upper row of holes provided in the front walls of the compartments, when the can is inserted in a compartment. A third wall **16*c*** of the can **16** has a hole which is positioned to be at the level of the lower row of holes provided in the front walls of the compartments when the can **16** is inserted in a compartment and the fourth wall **16*d*** has no registering opening.

When such a casing is inserted into the measuring system it can be determined by means of a scanning device whether the holes **13, 14** and **15** in the front walls of the casing are or are not in register with the holes in the cans **16.** In accordance with a registration or a non-registration of the holes **13, 14** and **15** with holes in the cans **16,** the system will be automatically adjusted by an electronic means to provide the measurement required. For example, the holes in the six right-hand compartments may be employed for encoding the sample, e.g., for indicating the practitioner concerned and/or the patient from whom the sample is taken, etc. The holes in the third compartment from the left, may be used for adjusting the system to the required measurement. It will be apparent that in this way one of four different measurements can be selected in dependence on whether there is no hole in the can **16** found opposite the hole **15,** a hole in the can **16** found opposite only

the upper hole **15**, a hole in the can **16** found opposite only the lower hole or two holes in the can **16** found opposite the two holes **15**.

The holes **14** in the front wall of the extreme left-hand compartment are preferably used for indicating the presence or absence of further casings following the casing scanned so that, when the can **16** inserted into the left-hand compartment is arranged in a position indicating that this is the last casing the measurement system is automatically stopped after the samples in the tubes of this last casing have been measured.

At least the portion of the front wall **2** formed with the holes **13, 14** and **15** is frosted with the exception of a clear, transparent portion between the holes **15** and clear, transparent strips at the junction between pairs of adjacent compartments. A digital code may thus be provided on the cans **16** so that the operator inserting the sample tubes into the casing can readily check whether he has placed the cans **16** in the correct positions for the correct coding of the samples. The code is formed by a given number allotted, for example, to a practitioner, a department or a hospital or the like. The two left-hand compartments of the six right-hand compartments correspond to the contenary digits, the contenary digits of the code concerned being the digit which is repeated on the two adjacent cans, that is to say in the embodiment shown the digit **3** which is repeated. In the embodiment shown the digit **2** indicates the decades and the digit **5** indicates the units.

The upper portions of the rear wall and of the side walls are frosted. The user of the casing can thus make his own marks or notes on these portions.

The four different modes of measurement are designated by the digits **1** to **4** and in order to ensure performance of the correct measurement it is only needed for the desired digit corresponding to the measurement required to be visible between the holes **15** by the correct adjustment of the can **16.**

The adjustment of the cans **16** is performed in a particularly simple manner, since they can be drawn upwardly out of the casing, even when the sample tubes have been inserted into the compartments; subsequently they can be turned around their longitudinal axes and reinserted into the casing in the required position.

Obviously by using more than two holes in the front wall of each compartment and by providing or not providing various holes in the side walls of the cans **16.** a large number of different selectable measurements can be obtained, whilst the code can be readily scanned and processed electronically in computers and the like.

The results of the measurements can be printed by electronic means with an indication of the code scanned by the system. It will be obvious that, when this system is employed, a casing already arranged in the system can be readily exchanged with another casing so that it is always possible to modify the measuring process in order to give priority to certain samples over other samples. Furthermore, the casing can be employed as a stand for the sample tubes so that sample tubes can be directly inserted into a casing at the location where the samples are taken, after which the casings with the sample tubes can be moved to the measurement system.

What we claim is:

1. Apparatus for holding sample tubes comprising a casing defining a plurality of compartments for the reception of sample tubes, means for holding tubes in said compartments, each compartment having a front wall, each said front wall having two openings formed therein said openings lying one above the other, and removable coding members insertable into said compartments, said coding members having in one face, two openings registrable with the two openings in said front walls of the compartments, in another face, an opening registrable with the lower opening in said front wall, in a further face, an opening registrable with the upper opening in said front wall and in a fourth face, no opening.

2. Apparatus as claimed in claim **1** wherein a rear wall portion of a compartment is formed by two relatively inclined parts and biasing means is arranged adjacent a front portion of said compartment for urging a sample to its place into that compartment towards said rear wall.

3. Apparatus as claimed in claim **2** wherein said biasing means is constituted by a spring.

4. Apparatus as claimed in claim **2** wherein said biasing means is formed by a helical spring which extends across the front of said compartments and is spaced from said rear wall of said compartments.

5. Apparatus as claimed in claim **4** wherein each spring extends across the fronts of two compartments, an elongated hole for receiving the spring being formed in a wall separating said two compartments.

6. Apparatus as claimed in claim **5** wherein the ends of the spring are embedded in wall portions of the casing which are made of a synthetic resin.

7. Apparatus as claimed in claim **1,** wherein said front walls of the compartments are opaque at least for a major part thereof, transparent, vertical strips are provided in the front walls of six adjacent compartments of the casing at the level of the junction between two adjacent compartments, and the coding members insertable therein are provided with digits which are visible through said transparent strips.

8. Apparatus as claimed in claim **7,** wherein the front wall of one compartment of the plurality of compartments has a transparent portion between said two openings lying one above the other, the coding member arranged in said compartment having a digital marking which is visible through said transparent portion.

* * * * *