

FIG. 1

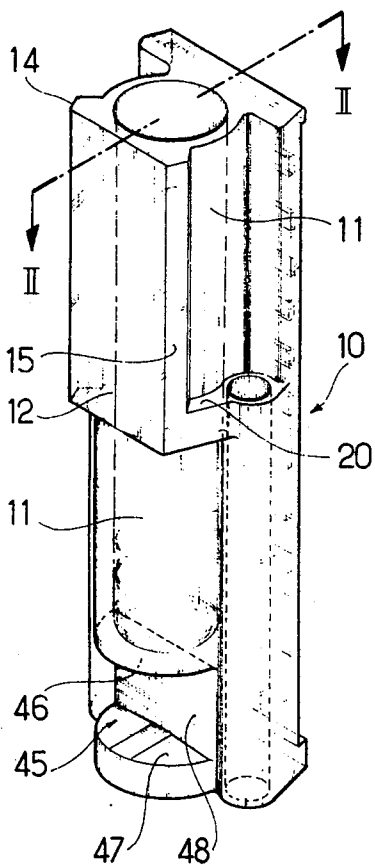


FIG. 2

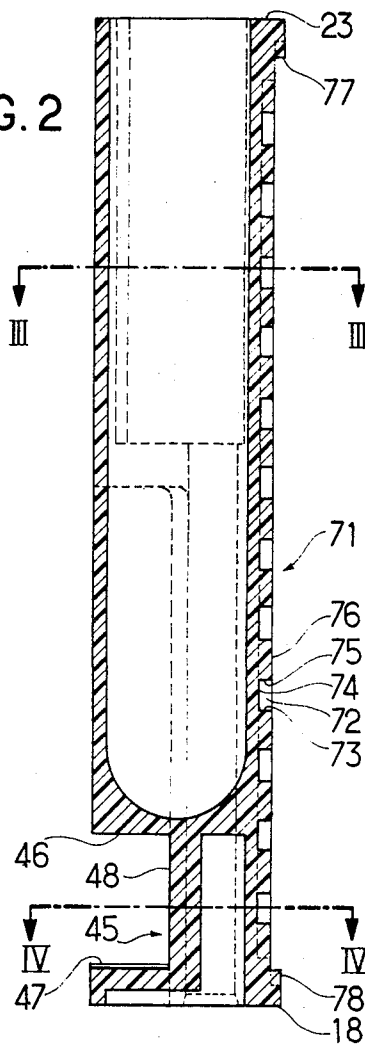


FIG. 3

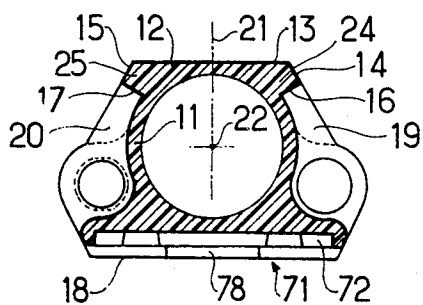
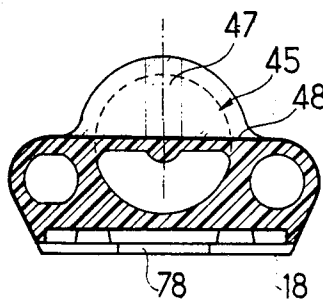


FIG. 4



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FIG. 5

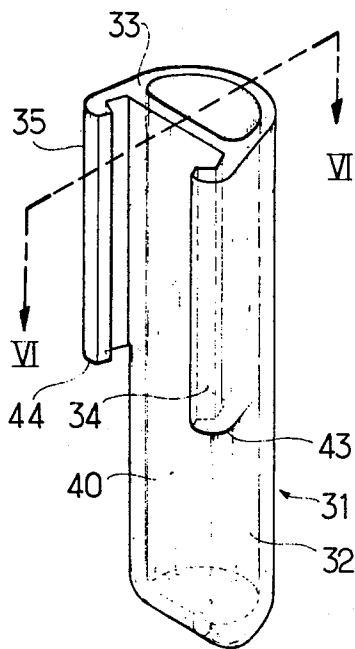


FIG. 6

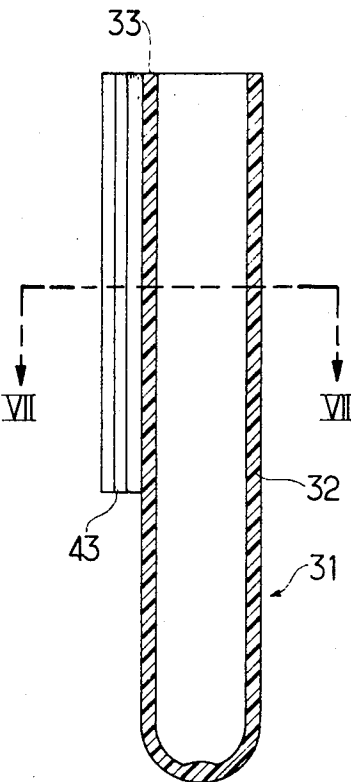
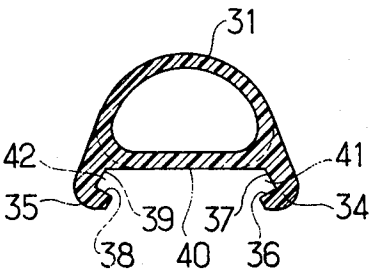


FIG. 7



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SPECIMEN TUBE DEVICE

3,684,453

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4 Sheets-Sheet 3

FIG. 8

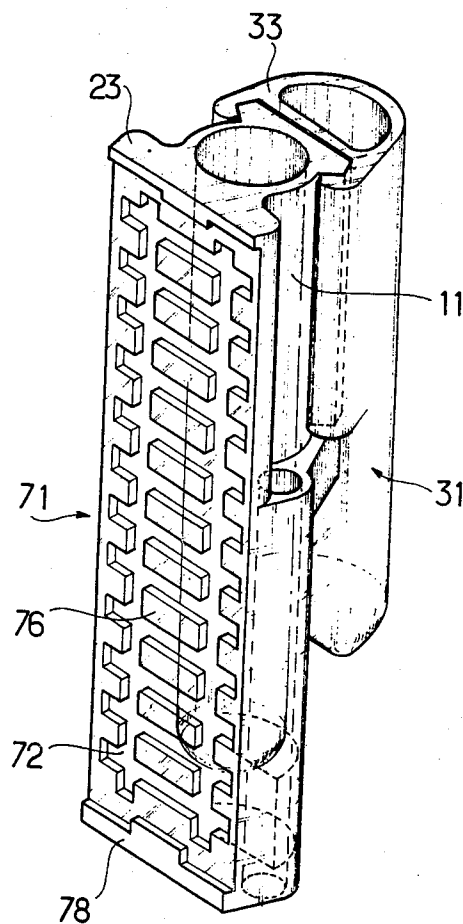


FIG. 9

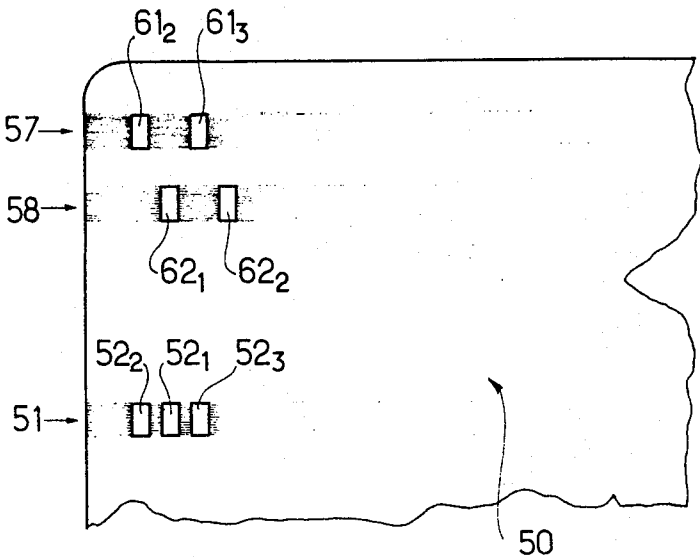
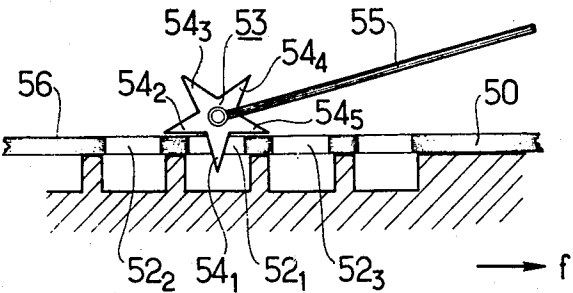


FIG. 10



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3,684,453

SPECIMEN TUBE DEVICE

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4 Claims 10

ABSTRACT OF THE DISCLOSURE

A specimen tube particularly useful for the analysis of blood samples by an automatic blood analyzing machine comprises a main tube, an auxiliary tube and an information support. A pair of flanges are provided on the auxiliary tube for engagement with grooves provided on the main tube so that the auxiliary tube can be assembled or disassembled relative to the main tube by sliding. The information support is adapted to support punched cards for identifying each specimen tube.

The present invention relates to a specimen or test tube device for use in chemical and biochemical analysis, in particular in the analysis of blood.

It is desirable in certain cases to be able to positively identify a particular specimen-tube amongst a large number of tubes of identical appearance. This is in fact the case with tubes containing specimens of blood before being analyzed, for example, to determine the blood type.

An object of the invention is to provide a specimen-tube device having identification means which virtually cannot be separated from the tube and information carried by the identification means being easily recorded and read.

An aspect of the invention consists in a specimen or test tube device comprising a tube per se and integral with said tube a board or the like adapted to receive an information support of the punched card type so arranged that the information support can be punched and/or brought into cooperation with a reader. Thus, all risk of error in associating a tube with a punched card are avoided.

According to one embodiment, the board integral with the tube includes parallel rectilinear grooves adapted to receive the tip of a card punch.

The portions of the surface of the board between the grooves are preferably used to secure the punched card.

According to an alternative embodiment, the information support comprises the board per se which is formed at the same time as the tube by known techniques of plastics forming, the unitary construction of the information support with the tube making the subsequent separation physically impossible.

The specimen or test tube device according to the invention is preferably used in conjunction with a machine for automatically analyzing the contents of a multiplicity of tubes, the tubes being fed into the machine which permits the results of the analysis to be recorded by automatic means while providing complete assurance as regards the correct association of the results to the specimens analyzed.

The invention also contemplates providing a specimen-tube device for carrying out a multiplicity of analysis in a machine which automatically displaces the tubes, said device comprising an auxiliary tube as well as the main tube with means for assembling and disassembling the tubes.

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In the description which follows which is made merely by way of example reference will be made to the accompanying drawings wherein:

FIG. 1 is a perspective view of a tube device according to an embodiment of the invention;

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

FIG. 3 is a cross-section taken along the line III—III of FIG. 2;

FIG. 4 is a cross-section taken along the line IV—IV of FIG. 2;

FIG. 5 is a perspective view of an auxiliary tube;

FIG. 6 is a vertical section of the auxiliary tube taken along the line VI—VI of FIG. 5;

FIG. 7 is a cross-section taken along the line VII—VII of FIG. 6;

FIG. 8 is a perspective view of a tube device providing an auxiliary tube as well as a main tube;

FIG. 9 is a fragmentary view of a punched card;

FIG. 10 is a schematic view in section of a reading device for punched cards.

Reference will first be made to FIGS. 1–4. The main tube device 10 includes a tube body 11 (FIG. 1) having a protuberance 12 formed as a flat at the back and along the upper part thereof which is delimited by a rear planar face 12 (FIG. 3), two oblique lateral planar faces extending vertically 14 and 15 and planar faces 16 and 17 joining the protuberance 12 to the tube body 11.

Horizontal shoulders 19 and 20 depend from the tube body 11 at a distance from the lower front face 18. The shoulders 19 and 20 are symmetrical relative to the plane 21 passing along the axis 22 of the tube body 11 and perpendicular to the face 13 of the protuberance or flat 12. A space 45 extending between two horizontal faces 46 and 47 and a vertical face 48 is disposed at the lower portion and to the rear of the tube device.

An auxiliary tube device 31 (FIGS. 5–7) includes a tube body 32 and two flanges 34 and 35 depending from the open end of the tube body 32 along the upper front face 33. The profile of the flanges is delimited by the faces 36, 37 and 38, 39 for mating with the external profile of the flat 12 delimited by the faces 14, 16 and 15, 17 respectively. The tube body 31 forms the inner face 40 mating with the face 13 of said flat.

In order to assemble the auxiliary tube device on the main tube device, the auxiliary tube device is brought to the rear and slightly above the main tube device so that the lower portion of the grooves 41 and 42 formed by the faces 36, 37 and 38, 39 respectively along the flanges 24 and 25 engage the faces 14, 16 and 15, 17 which delimit the flat 12. The auxiliary tube device is then slid relative to the main tube device in a direction parallel to the axis 22 until the lower front faces 43 and 44 of the flanges 34 and 35 respectively abut against the shoulders 19 and 20 which limit the sliding movement.

In this position the upper faces 23 and 33 of the main tube device and the auxiliary tube device are in alignment.

The disassembly is carried out in reverse.

The ease of assembly and disassembly of the auxiliary tube relative to the main tube enables the analysis of the auxiliary tube at several occasions during the course of analyzing of the contents of the main tube, for example by diluting the contents of the main tube.

Parallel grooves 72 extend along whole length of a board 71 on the front face of the main tube device 10 with rectangular cutouts defined by faces 73, 74 and 75. The board 71 is limited by an upper raised-edge 77 and a lower raised-edge 78.

The outer face 76 of the board 71 is planar and adapted to support a punched card or the like to be fixed

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thereto by a layer of adhesive disposed between the face 76 and the back of the card or by other means.

According to the present device, the grooves 72 have the spacing of the successive rows of the punched card. The board 71 can thus be used as a support for the punched card in the course of reading the punched holes therein so that it is not necessary to separate the punched card from the tube device in order to read the information provided by the punched holes in the card.

The card can be formed of pasteboard or the like as is common practice. The card could, however, be formed of plastics material.

The card can be manufactured with the tube and the punching then taking place afterwards.

The information support can be provided by a pre-formed card adapted to be punched out, i.e., comprising perforated cutouts which can be punched out by the tip of a punch in order to provide a card with the desired punched holes. Such a pre-formed card, applied on board 71 and fixed thereto can be punched without being separated from the board, the punch going into the grooves 72 which allow the escape of the punched pieces of card-board or the like.

Further such a pre-formed card of pasteboard or the like can be used as a template for simultaneously preparing a multiplicity of pre-formed cards, i.e., having pre-perforated cutouts. These pre-formed cards are piled one on top of one another and are topped by the punched card of pasteboard or the like which is preferably of a different colour than the pre-formed cards. The punch is passed through the punched holes of the punched card thereby punching all the pre-formed cards thereunder. It is therefore certain that all of said cards will have the same punched holes. A multiplicity of tubes or tube devices adapted to contain the same liquid can be equipped with these identically punched cards, for example blood samples from the same container of blood.

FIG. 9 is related to the formation of a punched card which may be of the type with pre-formed cutouts for use in conjunction with the specimen-tube device but is also adapted for other uses.

The punched card 50 comprises rows, as is customary along which punched holes 52 can be provided. The card is read, as is known, for example by a star wheel 53 with prongs 54 disposed at the end of the shaft 55 of the reader (FIG. 10).

As shown in FIG. 9, when two punched holes 52₁ and 52₂ are provided side by side, the engagement of the prong 54 in the punched hole 52₁ is immediately followed by the engagement of prong 54₂ in the punched hole 52₂ when the card 50 is displaced in the direction indicated by the arrow *f*, without lifting of the shaft 55 by support of the star wheel 53 on the upper face 56 of the card 50 between the two engagements. There results a reading difficulty or ambiguity.

Accordingly, the punched card of the present invention includes two rows 57 and 58 designed to overcome this difficulty. The row 57 includes a first punched hole 61₂ vertically aligned with the punched hole 52₂. The row 58 includes a punched hole 62₁ vertically aligned with the punched hole 52₁. The second punched hole 61₃ in the row 57 is in line with the third possible position indicated at 52₃ for the row 52 etc.

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By reading the punched holes 61 and 62 with reading members analogous to the ones used for the reading of rows 51 and comparing the reading of the rows 57 and 58 with that of rows 51, ambiguity resulting from the presence of punched holes in successive positions along the same row is avoided, in a simple manner which does not require a modification in the reading apparatus.

We claim:

1. Specimen tube device which can be employed for purposes of chemical or biochemical analysis, and particularly for blood analysis, comprising an elongated tube open at its top and a board which is directed along the axis of said tube and integral therewith for receiving and providing backing to a data punch card, said board having spaced apart grooves in its face, the spacing of said grooves corresponding to the spacing of successive rows of punched openings on a data punch card, the portion of the board between and around said grooves providing means for supporting and maintaining the data punch card, so that the data punch card may be machine read and punched while the card is attached to the specimen tube device whereby a permanent record of information is formed on said specimen tube device.

2. Specimen tube device according to claim 1 wherein the grooves are rectilinear, parallel grooves.

3. Specimen tube device which can be employed for purposes of chemical or biochemical analysis, and particularly for blood analysis, comprising an elongated tube open at its top and a board which is directed along the axis of said tube and integral therewith for receiving and providing backing to a data punch card, said board having spaced apart grooves in its face, the spacing of said grooves corresponding to the spacing of successive rows of punched openings on a data punch card, the portion of the board between and around said grooves providing means for supporting and maintaining the data punch card, so that the data punch card may be machine read and punched while the card is attached to the specimen tube device whereby a permanent record of information is formed on said specimen tube device, a second elongated tube open at its top, slide means on the portion of the said first tube opposite that bearing the board, and mating slide means on the said second tube for the removable assembling of the said first and second tubes.

4. Specimen tube device according to claim 3, in which the slide means on the first tube consist of ribs and the slide means on the second tube consist of flanges of a shape corresponding to said ribs, and furthermore comprising stop means carried by said first tube for limiting the sliding of the flange means on the rib means.

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U.S. Cl. X.R.

23-259, 292; 235-151.35