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PACKAGED SERUM TREATER

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Fig. 1

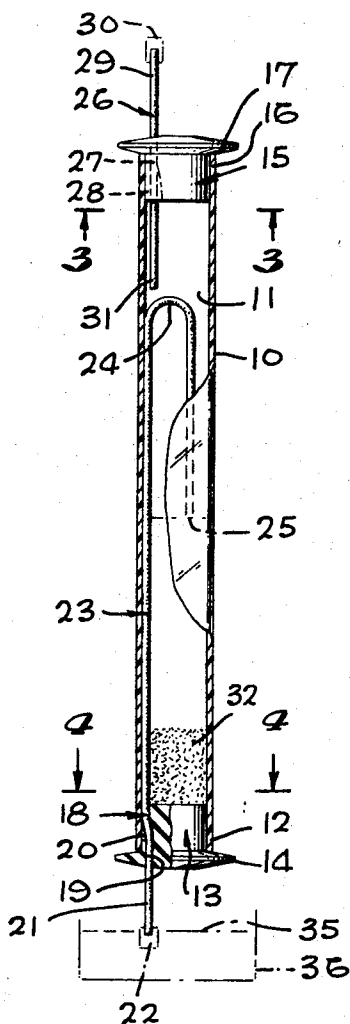


Fig. 2

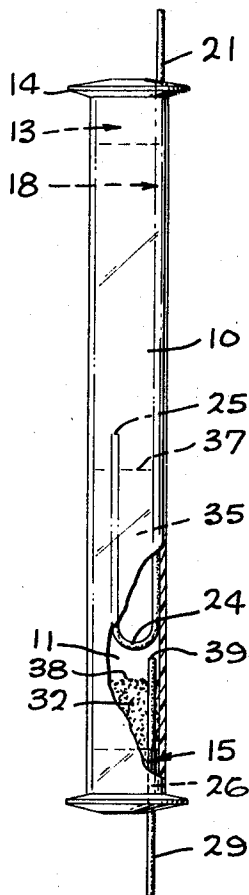


Fig. 3

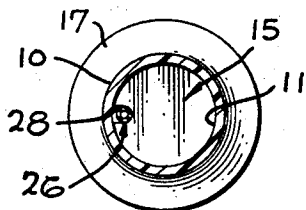
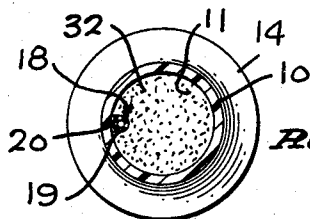


Fig. 4



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**PACKAGED SERUM TREATER**  
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## ABSTRACT OF THE DISCLOSURE

A laboratory apparatus for the treatment of blood serum. During analyses a tube of preferably clear resilient plastic material is employed, closed at both ends by plugs or stoppers, wherein an initially measured amount of ion exchange particles has been placed in sealed condition. There is an inflow tube through one of the plugs and an outflow tube through the other of the plugs, each of which is initially capped to insure against contamination of the measured amount of particles in the tube. When the tube is to be put to use, the caps are removed, untreated serum is drawn into the tube in an amount gauged in proportion to the measured amount of particles, and the particles then entrain unwanted solids which are in the serum. The tube is then inverted, the outflow tube then acting as a stand pipe extends above the level of the particles and clear treated serum is ejected outwardly.

This general type of laboratory equipment has heretofore been in common use, but those items of equipment heretofore available have been handicapped by certain time-consuming limitations. In view of the fact that thousands of examinations of this type are conducted daily in many clinical laboratories, thousands of hours are therefore spent for this operation. Heretofore the common practice has been for each technician to separately and independently measure into an open tube the needed amount of ion exchange particles, then temporarily close both ends of the tube while the treatment is taking place, then open one end of the tube and decanter the treated clear serum, leaving behind a quantity of the serum containing the particles. A particular disadvantage in this individual treating operation resides in the fact that the most advantageous and desirable ion exchange material consists of resin particles which are initially rather moist, causing them to stick together and making them very difficult to handle. Hence, it is a time-consuming operation to accurately measure the quantity of particles to be employed in a treating tube and, also, to place the desired quantity of particles in the tube without spilling. This handling operation also is prone to result frequently in contamination of the particles before the laboratory operation is commenced. As a consequence, thousands of hours are wasted which could be otherwise put to productive use and there is a constant troublesome likelihood of contamination of the resulting treated serum and lack of dependability.

It is therefore among the objects of the invention to provide a new and improved packaged serum treater tube wherein a precisely measured amount of ion exchange particles is placed in the tube under carefully controlled conditions, and then sealed in the tube until the tube is ready for use.

Another object of the invention is to provide a new and improved packaged serum treater tube which is so constructed and adjusted that the technician can quickly and easily gauge the precise amount of untreated serum taken into the tube, corresponding to a previously measured amount of ion exchange particles, thereby to be capable of quickly performing an accurate treatment step, after which resulting clear treated serum can be

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readily discharged, unaccompanied by any undesired untreated liquid.

Still another object of the invention is to provide a new and improved packaged serum treater tube wherein the ingredients needed for treatment can be quickly and inexpensively premeasured and prepacked in sealed uncontaminated condition and in quantity, the tube being of such character that it can be used without change or readjustment for the step of treating the liquid and subsequently discharging the treated liquid, thereby to minimize the amount of time spent for each use.

With these and other objects in view, the invention consists in the construction, arrangement, and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims and illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a longitudinal sectional view of the packaged serum treater tube shown in the position employed when drawing blood serum into the tube for treatment.

FIGURE 2 is a longitudinal sectional view showing the packaged serum treater tube in the inverted position employed for discharging treated serum.

FIGURE 3 is a cross-sectional view on the line 3—3 of FIGURE 1.

FIGURE 4 is a cross-sectional view on the line 4—4 of FIGURE 1.

In an embodiment of the invention chosen for the purpose of illustration there is shown an elongated, preferably transparent tubular body 10 which, in the embodiment shown, may be assumed to be constructed of a resilient synthetic plastic resin material, and within which is a chamber 11. At an inflow end 12 is an inflow plug 13 provided with a flange 14 which overlies the inflow end 12 and determines the location of the plug when inserted into the tube. A somewhat similar outflow plug 15 is applied to an outflow end 16 of the tube, the outflow plug likewise being provided with a flange 17 serving the same purpose as the flange 14. Both plugs may be constructed of rubber-like or soft plastic material permitting them to be inserted into the tube as a cork or plug to seal the respective end of the tube, but being readily removable for cleaning and reuse.

The inflow plug 13 has extending through it an inflow tube 18, there being provided in the inflow plug 13 a hole 19, communicating with a slot 20 to accommodate the inflow tube. A snug fit is provided between the hole and the tube so that there is a sealing relationship between them. An outside portion 21 of the inflow tube 18 is initially provided with a removable sealing cap 22.

An inside portion 23 of the inflow tube 18, in the chosen embodiment, is slightly longer than the tubular body 10 and is doubled upon itself providing a bend 24 so that the inside end 25 points toward the inflow plug 13 and is at a predetermined or calibrated location with respect to the inflow plug 13.

In the outflow plug 15 is an outflow tube 26 which likewise extends through a hole 27 and slot 28 in the outflow plug 15 in sealed relationship to the plug. An outside portion 29 is initially provided with a protecting cap 30. An inside portion 31 extends into the chamber 11 to a location coinciding more or less with the location of the bend 24. Within the chamber 11 is a measured amount of ion exchange particles 32 of an appropriate material such as one of the approved resins.

In use, the body 10 is initially loaded with a carefully measured amount of particles 32 which is gauged in accordance with the anticipated laboratory operation after one of the plugs has been inserted in its respective end of the body 10. The other plug is then applied, thereby to effectively seal the chamber 11 and its contents, inasmuch

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as caps 20 and 30 are applied at the same time. Substantial quantities of packaged units can be prepared in advance inasmuch as the materials are relatively inexpensive and much time can be saved by the repetitive step of prepackaging the ion exchange material in advance of the measured amounts referred to.

In use, untreated blood serum 35 is made available in a container 36. The tubular body 10 is then turned so that the inflow end is down, the sealing cap 22 is removed and the outside portion 21 of the inflow tube 18 inserted into the blood serum. On those occasions when the body is constructed of flexible resilient material, the body can then be squeezed expelling some of the air in the chamber 11, and then released to draw blood serum 35 through the inflow tube 18 into the chamber 11. The serum is drawn into the chamber in such quantity as will fill the chamber 11 to about the level of the downwardly facing end 25 of the inflow tube. The ion exchange particles then mix with the untreated blood serum and entrain the solid particles which are to be separated from the untreated serum. After this exchange has taken place, the body 10 is then inverted to the position shown in FIGURE 2. When this occurs the particles 32 will fall to a location which is now adjacent the outflow plug 15. Blood serum 35 will fill the chamber 11 to about a level 37 which is below the location of the end 25 of the inflow tube 18. The cap 30 is then removed and the treated blood serum which now is cleared by action of the ion exchange particles is discharged outwardly through the outflow tube 26. It should be noted that an upper level 38 of the particles is slightly lower than the inside end 39 of the outflow tube 26 so that the presence of particles does not impair the free outflow of clear treated serum through the outflow tube, and also in order that only clear treated serum will be discharged inasmuch as residual serum which wets and is surrounded by the particles 32 is at a level below the level of the end 39.

After this discharge takes place, the unit can then be discarded, and, if preferred, returned to the original packaging operation for cleaning and repackaging.

Although not shown, on those occasions where it becomes desirable to filter the treated serum the outflow tube 26 may be replaced by a corresponding outflow tube of larger diameter, sufficiently large to accommodate a plug of filter cotton (not shown). Since the body 10, particularly when made of flexible resilient material, can be squeezed, by recapping the inflow tube 18 treated serum from within the chamber 11 can thus be forcibly discharged through a filter plug in the outflow tube.

While the invention has herein been shown and described in what is conceived to be a practical and effective embodiment, it is recognized that departures may be

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made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices.

Having described the invention, what is claimed as new in support of Letters Patent is:

1. A self-contained serum treating package comprising an elongated transparent tubular body having a chamber therein with inflow and outflow ends, an inflow plug forming a removable seal substantially closing said inflow end and an outflow plug forming a removable seal substantially closing said outflow end, a supply tube extending in sealed relationship through the inflow plug, an outside portion of said supply tube extending outwardly beyond said plug and an inside portion of said supply tube being doubled upon itself forming a bend located in the chamber and spaced inwardly from the outflow plug, the free end of said inside portion being located intermediate opposite ends of said chamber and opening in a direction facing said inflow end, a discharge tube extending in sealed relationship through the plug at said outflow end, said discharge tube having an outside portion extending beyond said plug at the outside end and an inside portion in the chamber, the end of said last identified inside portion facing said inflow end, and a mass of ion exchange particles in said body adapted to mass above said outflow plug when said body is inverted for discharge of liquid contents whereby treated serum will flow outwardly through said discharge tube.

2. A self-contained serum treating package as defined in claim 1 wherein said tubular body is of resilient construction whereby to draw untreated serum into the tubular body and expell treated serum from said body.

3. A self-contained serum treating package as in claim 1 wherein said inside portion of the supply tube has a length exceeding the length of said chamber and the free end of said inside portion is located at a distance spaced from said inflow plug corresponding to the amount of ion exchange particles in the tube whereby to gauge the amount of untreated serum taken into said tube for treatment.

4. A self-contained serum treating package as in claim 1 wherein said mass of ion exchange particles are of resin material having a depth when accumulated at one end of the body less than the length of the inside portion of said outflow tube whereby to clear the inside end thereof when said body is inverted for discharge of treated serum.

No references cited.

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