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PARENTERAL FLUID DISPENSER

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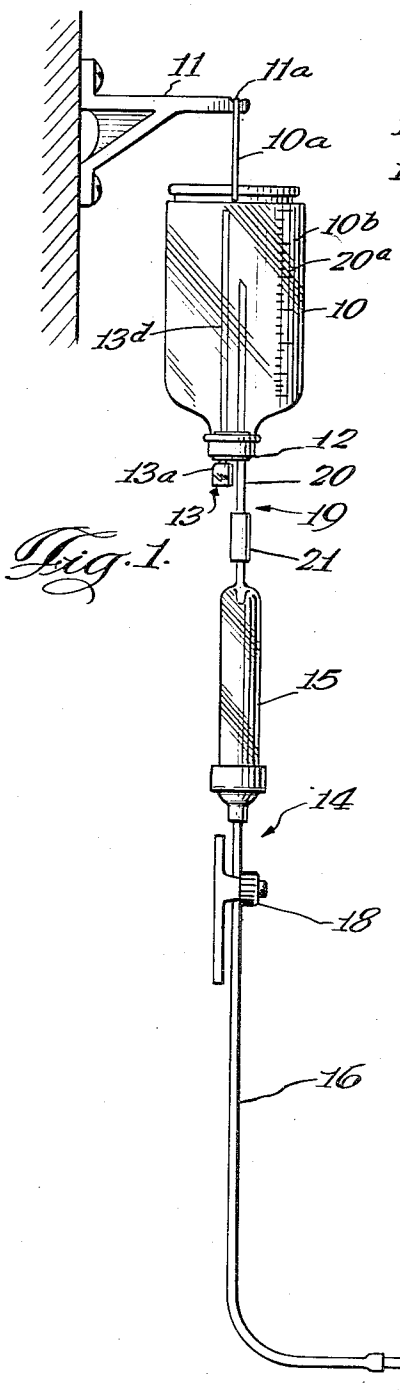


Fig. 1.

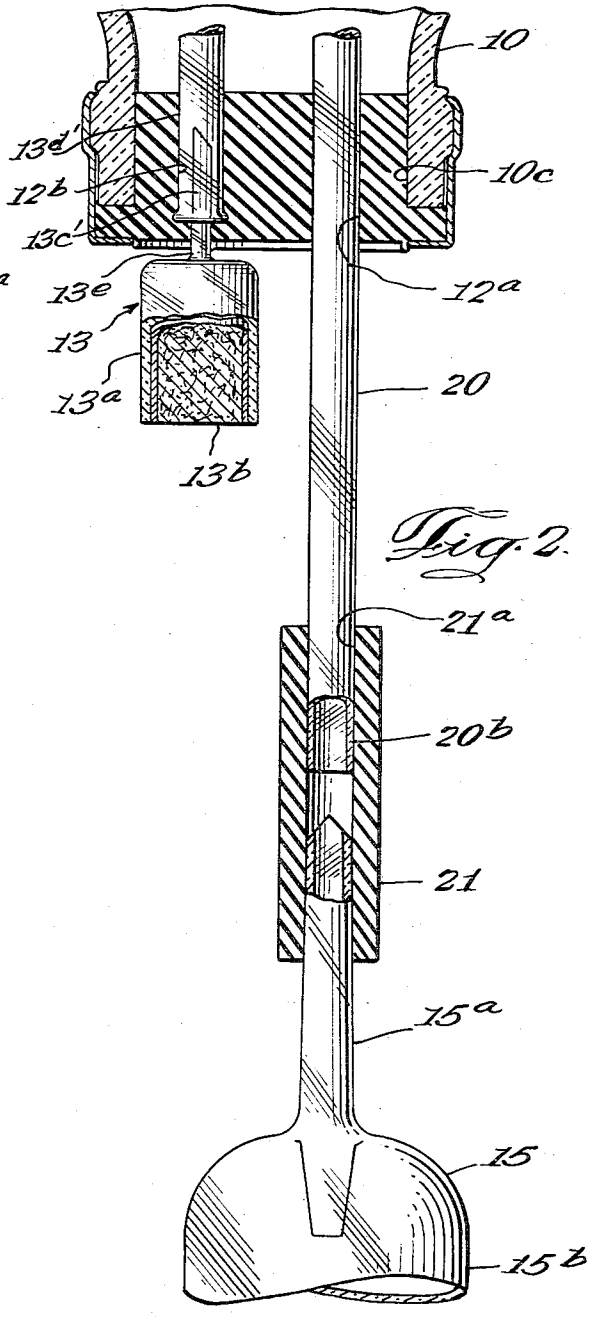


Fig. 2.

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# PARENTERAL FLUID DISPENSER

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This invention relates to a parenteral fluid dispenser and in particular to means for adjustably controlling the quantity of liquid dispensed from a parenteral fluid container.

A common form of parenteral fluid administration system is that wherein a container or bottle containing the parenteral fluid is supported in an inverted position through a suitable handle attached to the bottle by a support positioned above the parenteral fluid recipient. Means are provided to allow a flow by gravity from the container and through a suitable injection needle into the recipient. Such means often include a flow regulator or clamp which may be operated manually to control the rate of flow of the liquid.

In the parenteral systems now found in the art where it is desired to supply only a limited quantity of liquid to the recipient, two methods of controlling the quantity are commonly employed. The first method is to utilize containers holding only the specific quantity of liquid desired. While this does allow a control over the quantity administered, it necessitates the maintaining of a considerable number of containers having different volumetric capacities and does not admit of easy adjustment where a variation of the amount to be administered is subsequently found desirable. The second method commonly utilized is to use a container having a greater quantity than is expected to be utilized and through use of the flow regulator or clamp stop the flow to the recipient when desired, or by removal of the injecting needle terminate the administration. This method has a serious disadvantage of requiring constant attention by the administrator to assure prevention of over-supplying the parenteral fluid or "flooding" the recipient. Such "flooding" may be very harmful, particularly in pediatric administrations.

The principal feature of this invention is the provision of a new and improved parenteral fluid dispensing means, suitable for pediatric administration, for adjustably limiting the quantity of fluid dispensed from a parenteral system.

Another feature of the invention is the provision of means for adjustably limiting the flow of parenteral fluid from a container having an opening adapted to be positioned at the bottom of the container, including a tube adapted to extend vertically through the opening upwardly into the container and having a length to allow the positioning of the upper end of the tube at any one of a plurality of positions between the opening and the portion of the container above the opening, and means for readily connecting the lower end of the tube in liquid conductive relationship to liquid conducting means of the parenteral system.

A further feature of the invention is to provide the above described tube with a sharpened angularly extending upper end adapted to allow ready insertion through a stopper normally provided across the opening of the container.

Other features and advantages of this invention will



be apparent from the following description taken in connection with the accompanying drawings wherein:

Figure 1 is an elevational view of a parenteral fluid dispensing system having a flow control means embodying the invention; and

Figure 2 is an enlarged fragmentary elevational view partially in section of the device of Figure 1.

In the exemplary embodiment of the invention as disclosed in the drawings, the parenteral fluid dispensing system is shown to comprise a container 10 adapted to be supported by a bracket 11 in an inverted, elevated position. Container 10 is provided with a stopper 12 through which extends an air inlet means 13. Liquid conducting or transferring means generally designated 14 are provided comprising a drip meter 15, to the lower end of which is connected one end of a tube 16. To the other end of tube 16 is connected an injection needle 17, and tube 16 is provided, intermediate its ends, with flow regulating or clamp means 18. Connected in fluid conductive relationship to the upper end of the drip meter 15 and extending upwardly through the stopper 12 into the container 10 is flow limiting means generally designated 19. Means 19 comprises a tube or pipe 20 and a connecter 21. In the administration of parenteral fluids from container 10, the fluids pass through pipe 20, into and through drip meter 15, into and through tube 16, and into and from injection needle 17 to the recipient. To permit continuation of this flow, air is admitted through air tube 13 to the interior of container 10 to replace the withdrawn fluid.

A bail 10*a* is pivotally secured to the lower portion of container 10 and is adapted to be received in a groove 11*a* provided in bracket 11 for supporting the container 10 in an inverted vertical position. Bracket 11 may be of any suitable type for positioning the container 10 in an elevated position relative to the recipient of the parenteral fluid. Container 10 is preferably provided with means for determining the position of the upper end of pipe 20 therein and to this end in the illustrative embodiment of the drawings, I show the container as transparent. Means for accurately determining the relative position of the end of the tube 20 in the container may be provided, such as graduated scale 10*b* carried on the wall of the container. Container 10 is provided with an open mouth 10*c* which, when the container is supported in the inverted position, as described above, is disposed at the lower end of the container.

Stopper 12 comprises a generally cylindrical member and is forcibly secured to container 10 across opening 10*c* to have sealing engagement therewith. Stopper 12 is preferably formed of resilient material, such as rubber. Extending at least partially through the stopper, are two longitudinal bores 12*a* and 12*b*.

Air inlet means 13 comprises an elongated tubular member 13*d* preferably formed of glass and having a length sufficient to extend from stopper 12 substantially through the interior of container 10, as best seen in Figure 1. The outer end 13*d'* of air tube 13*d* is secured in bore 12*b*. A cup-shaped filter member 13*a* is provided in which is carried suitable antiseptic filter material 13*b* which acts to purify and sterilize air passing therethrough. A hollow needle 13*c* is secured at one end to cup 13*a* to have communication with the interior of the cup, and is provided with a sharpened tip 13*c'* which is adapted to pierce stopper 12 and allow needle 13*c* to have communication with bore 12*b*. Thus, air may be drawn through filter 13*b* where it is sterilized, thence through needle 13*c*, and thence through tube 13*d* into the interior of container 10.

Drip meter 15 may be of any suitable form, preferably having a relatively small diameter inlet cannula 15*a*. In

such drip meters, typically, the inner end of the cannula extends interiorly of the body 15*b* of the drip meter so that drops of the parenteral fluid may be counted as they pass through the drip meter.

Pipe or tube 20 comprises an elongated tubular member preferably having a length sufficient to extend from stopper 12 through the interior of container 10 to adjacent the upper end thereof when the container is supported in the inverted position of Figure 1. Pipe 20 may be provided with a sharpened, angularly extending inner end 20*a* which is adapted more readily to penetrate through bore 12*a* of stopper 12 for insertion of tube 20 into container 10. To simplify such insertion, needle 13*c* of air inlet recess 13 may be used originally to pierce stopper 12 axially of bore 12*a*. Pipe 20 is provided with an external diameter somewhat greater than the diameter of bore 12 to allow a frictional gripping and sealing engagement between pipe 20 and stopper 12. This engagement is such as to allow ready longitudinal movement of pipe 20 through bore 12*a* so that inner end 20*a* of the pipe may be readily positioned in any one of a plurality of positions between stopper 12 and the opposite or upper end of container 10. I have found that where pipe 20 is formed of glass and stopper 12 is formed of rubber, an excellent coaction is had therebetween allowing ready adjustment while maintaining a yieldable gripping and sealing engagement therebetween.

Connector 21 comprises a tubular sleeve preferably formed of a resilient material such as rubber and provided with a bore 21*a* extending longitudinally therethrough having a diameter slightly less than the diameter of pipe 20. Connector 21 is secured over the outer end 20*b* of pipe 20 and over the end of the drip meter cannula 15*a* to connect pipe 20 and drip meter 15 in fluid conductive relationship.

In using flow limiting means 19, stopper 12 is perforated axially of bore 12*a* preferably by inserting end 13*c'* of air filter 13*a*. The interior of the parenteral fluid container 10 is commonly under a vacuum pressure so that air is drawn through filter 13*a* to relieve the vacuum. Filter 13*a* is then withdrawn from bore 12*a* and its end 13*c'* inserted into bore 12*b* for admitting filtered air through tube 13*d* during subsequent withdrawal of fluid from the container. Connector 21 is secured over the end of drip meter cannula 15*a* with tube 20 projecting outwardly oppositely from the connector. End 20*a* of pipe 20 is then forcibly urged through the bore 12*a*. To prevent contamination, tube 20 may be wrapped in a suitable flexible packaging (not shown) which may be withdrawn as the tube passes into bore 12*a*. With the container in the inverted position of Figure 1, the height of end 20*a* in the container is adjusted to the desired position which may be gauged by use of scale 10*b*. The administration of the parenteral fluid may then be conducted in the normal manner. When, however, the level of fluid in the container 10 has been lowered below the end 20*a* of tube 20, the dispensing of the fluid is automatically terminated, thereby preventing "flooding" of the patient without the necessity of continuous personal supervision. If it is desired at this point to continue the administration of the fluid, pipe 20 may be withdrawn outwardly from the container 10 thereby lowering end 20*a* so that fluid may again flow from the container 10. It should be noted that flow limiting means 19 does not affect the rate of flow, so that clamp 18 may function in the normal manner as by restricting the tubing 16 the desired extent to permit only the desired rate of flow; flow limiting means 19 limits the total quantity which may flow from the container with any given longitudinal positioning of the pipe 20.

While I have shown and described certain embodiments of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. Parenteral administration apparatus of the character described, comprising: a parenteral solution dispensing container having an opening in the bottom; a resilient stopper in the opening; an outlet tube extending through and adjustably carried by said stopper to be positioned at various heights in said container, said outlet tube being of sufficient length to extend substantially to the top of the container when fully inserted; a graduated scale operably associated with said container and outlet tube to indicate the quantity of parenteral solution to be dispensed with a particular setting of the outlet tube; and infusion equipment connected to said outlet tube.

2. Parenteral administration apparatus of the character described, comprising: a dispensing container having an opening in the bottom; a resilient stopper in the opening; an outlet tube extending through and adjustably carried by said stopper to be positioned at various heights in said container, said outlet tube being of sufficient length to extend substantially to the top of the container when fully inserted; a flexible connector on the outer end of said outlet tube; and infusion equipment including a drip meter having a cannula connected with said flexible connector.

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