

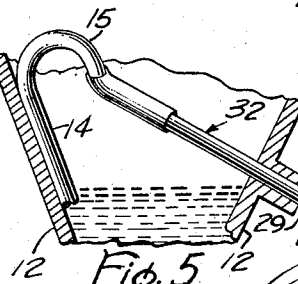
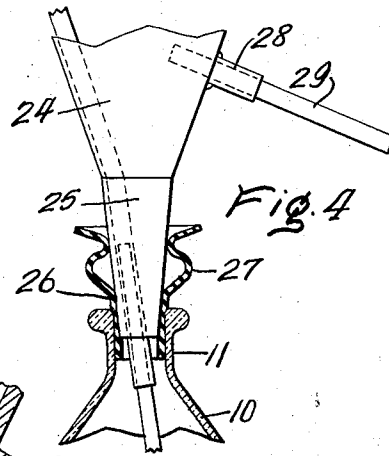
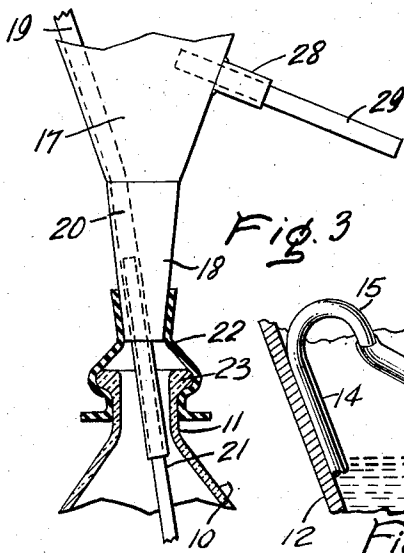
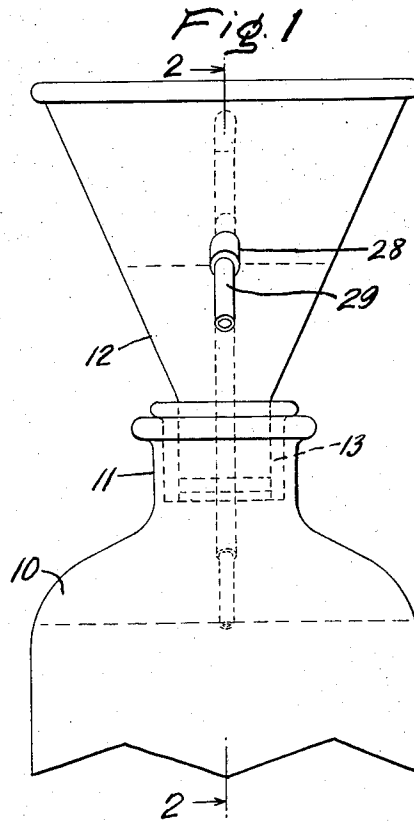
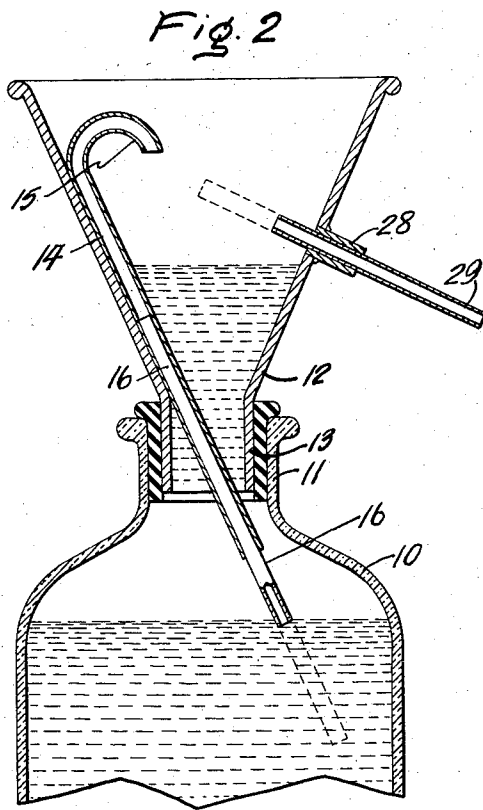
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F. X. CONNOLLY

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LIQUID SPECIMEN COLLECTING DEVICE

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Inventor:  
Frank X. Connolly,  
Andros & Smith  
Attorneys.

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## LIQUID SPECIMEN COLLECTING DEVICE

Frank X. Connolly, Troy, N. Y.

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6 Claims. (Cl. 141—126)

This invention relates to liquid specimen collecting devices especially where small measured quantities are desired to be collected.

It has been found in certain human diseases that the particular character of urine, upon analysis, enables the physician to properly diagnose the disease. For instance, if upon analysis the urine from a patient is found to contain a super-normal sugar content, the indication might be an infection such as diabetes. Other variations from the normal will indicate, upon analysis of the urine, other troubles and thus such an analysis will aid in the diagnosis of the disease and will often be vitally important.

In the ordinary method of collecting specimens of human urine the patient is required to urinate in a bedpan, wide-mouthed bottle, or the like receptacle and a portion of the resultant liquid is then analyzed. There is a marked difference found between the initial quantity of urine and the body of the complete urination.

One principal object of the invention is to provide a novel device for the collection of initial samples of urine with special reference to female patients.

Furthermore, it is at times desirable to collect small and measured samples of other liquids, such as oils, liquid chemicals and the like.

A second important object of the invention is to provide a novel device for this purpose which may be used either for the collection of urine samples or other liquids.

A third important object of the invention is to provide means of novel character whereby such specimens, as have been mentioned above, may be collected in a suitable bottle, the contents of which may be analyzed by a physician, engineer, or other analyst.

A fourth important object of the invention is to provide a device of this character wherein, after the sample has been collected, any excess of flowing liquid may be disposed of without contaminating the sample in the container.

A fifth important object of the invention is to provide a device which, when used in a suitable container, will limit the level to which the container can be filled with liquid.

With the above and other objects in view, as will be presently explained, the invention consists in general of a novel form of funnel adapted to be connected to a bottle or other receptacle, this funnel having certain novel details of construction and combination of parts, as will be hereinafter fully explained and illustrated.

In the accompanying drawings Fig. 1 is a side elevation of the improved device as applied to the neck of a bottle.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a view partly in elevation and partly in section of one modified form of the device.

Fig. 4 is a view partly in elevation and partly in section showing a second modification of the device.

Fig. 5 is a fragmentary portion of a modification of the same invention depicted in Fig. 2.

In the device as here disclosed there is illustrated a bottle 10 or the like having a neck 11 of reduced diameter from the body of the bottle. In the form of the invention shown in Figs. 1 and 2 the particular funnel involved has an inverted frusto-conical body 12 provided with a depending reduced neck 13. Mounted on one side of the

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body 12 is a tubular member 14 extending diagonally down through the neck 13 and having at its upper end a rebent portion 15 arranged to open downwardly of the body 12 and lying below the upper edge of said body. This tubular member 14 is provided with a sliding extension 16 which may be adjusted to project downwardly into the bottle 10. A suitable packing washer of rubber or the like is used to prevent leakage between the neck 13 and the neck 11 and to provide an air tight seal. In the form shown in Fig. 3 the frusto-conical body 17 is provided with a downwardly extending frusto-conical neck 18. In this form of the invention there is a tubular member 19 which extends along ends held by one side of the body 17 and is then bent to provide a downward extension 20 running through the frusto-conical extension 18 and having fitted within this part a slidable extension 21. In this form the neck 18 is surrounded by a flexible cap or the like, as indicated at 22 and this cap is shaped to fit over the lip 23 of the bottle neck 11.

In the form shown in Fig. 4 the construction is much like that of Fig. 3, there being provided a funnel having, for example, a frusto-conical body 24 with a frusto-conical neck 25 and in place of the cap 22 this neck carries a washer 26 fitting within the bottle neck 11 and closely embracing the extension 25, as shown at 27.

In each of the forms of this invention there is provided on one side of the funnel a tubular extension 28 wherein is slidably fitted an overflow tube 29 which may be connected, as by flexible tubing, to any waste receptacle. It will be noted that this slidable member 29 is directed toward a point below the recurve end of the tube 15. By means of this arrangement by moving the member 29 inwardly or outwardly, the amount of urine or oil or the like received by the funnel may be controlled and thus the quantity of specimen may be graduated when desired.

In the use of this invention the patient, in those cases relating to urine, is required to urinate in the wide-mouthed end of the funnel. Naturally the liquid will rise in the funnel at the point to which it will overflow through the tube 29. Now in order that fluid may flow from the funnel into the bottle, provision must exist for the escape of air from the upper part of the bottle, and this escape of air is controlled by the tube 14, the tube 16 determining the change point in the top level of the liquid content of the bottle 10 and the escape of air will stop. The purpose of the rebent portion 15 of the draw-off tube 14 is for directing back into the funnel any liquid which may be forced up into, and out of, the tube 14 along with escaping air. Naturally, whenever the escape of air stops, no fluid will pass into the bottle from the funnel and this again provides for a measured specimen for analysis.

It should be understood that it is within the contemplation of the invention, for certain purposes, to connect the top end of the tube 14 to the inner end of the tube 29, thereby forming a continuous conduit as illustrated in Fig. 5. This can be done by a separate connection introduced between these tubes as they are shown in the drawing; or the connection can be integral so that one continuous tube is provided.

In use, liquid entering the funnel flows into the container, displacing air from the container which escapes through the draw-off or vent tube. Liquid which may be forced up through the vent along with the escaping air is directed back into the funnel by means of the rebent upper end of the vent tube. When the liquid level in the container reaches the lower end of the vent tube, a liquid seal is formed at the lower end of the vent tube, cutting off further escape of air through the tube, and stopping further rise of the liquid level in the container. Additional liquid entering the funnel builds up in the funnel between the lower end of the funnel neck and the upper

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end of the overflow tube. When the liquid level in the funnel reaches the opening in the overflow tube, additional liquid entering the funnel flows through the overflow tube to be discharged through the outer end of such tube, or extension of such tube.

When the filling operation has been completed, the air tight seal between the funnel neck and the container can be broken allowing the liquid contained in the funnel, between the lower end of the funnel neck and the upper end of the overflow tube, to pass into the container. Thus, the total amount of liquid desposited in the container will be equal to the initial amount, between the lower end of the vent and the bottom of the container, plus the additional amount which built up in the funnel between the lower end of the funnel neck and the upper end of the overflow tube. Also, knowing the volume of the funnel defined between the lower end of the funnel neck and the upper end of the overflow tube, and knowing the volume of the container between its bottom and the level in the container at which the lower end of the vent tube is to be positioned, the amount of liquid which can be deposited in the container by means of this device can be predetermined. It also readily can be seen that a container may be only partially filled to a predetermined level even though the total volume of liquid which enters the funnel is considerably in excess of the combined volumes of the container and the funnel since the excess liquid is disposed of by means of the overflow tube which extends beyond the external limits of the container so that excess liquid is disposed of without contaminating the outer surface of the container.

In use, referring to Fig. 5, with an air tight fit between the funnel neck and the neck of the container, liquid entering the funnel flows into the container, displacing air from the container which escapes through the conduit. After the liquid level in the container reaches the opening in the conduit, the liquid rises in the funnel and in the conduit until it flows out of the conduit at its opposite end. When the flow of liquid into the funnel ceases, that is to say, when the person using the device stops pouring liquid into the funnel, such as, for example, when the device is used to collect urine specimens, and the person using the same ceases urination, the flow of liquid through the conduit is continued by syphonic action until the excess liquid is entirely drained from the funnel. Thus, the container is filled to a level no higher than the inner end of the conduit. Therefore, the maximum level to which a container may be filled is predetermined by the location of the inner end of the conduit in relation to the bottom of the container.

Now, in applying the invention to the collection of a urine specimen by females for bringing the specimen to a physician's office for examination, the device is made of a convenient size and the container is a small neck prescription bottle or the like, preferably of about a 2 ounce capacity, provided with a cap or the like for sealing the container after collecting the specimen.

In the embodiment shown in Fig. 2, the tubular extension 28 and the overflow tube 29 extend beyond the funnel and the container so as to form a handle. In the embodiment shown in Fig. 5, the continuous conduit 32 extends beyond the funnel and the container so as to form a handle. By the means so provided, a female can, while seated on a toilet seat or the like, hold the device in such a position that, while urinating, the urine flows into the funnel body and the excess flows out of the overflow tube into the toilet bowl. After collecting the specimen, the collecting device can be removed from the container, the container sealed, and the specimen brought to the physician's office in the same container in which it was collected.

As applied to the collection of a small measured quantity of liquid specimen by an engineer, chemist, or other analyst, the collecting device with its specimen container may be positioned in such a manner that liquid flows into

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the funnel section of the device, the desired amount of specimen being deposited in the specimen container, while the main body of the liquid flows out of the overflow tube into a barrel, vat, pipe, or other receptacle in which it is desired to deposit the main body of liquid.

What is claimed as new is:

1. In a device of the kind described an inverted funnel having an extension at its lower end, a draw-off tube secured to the inside of said funnel and extending down through said extension, and an overflow tube extending laterally from one side of said funnel, said draw-off tube having its upper end rebent to direct back into the funnel any liquid which is forced through the draw-off tube, along with escaping air.

2. In a device of the kind described an inverted funnel having an extension at its lower end, a draw-off tube secured to the inside of said funnel and extending down through said extension, and an overflow tube extending laterally from one side of said funnel, said draw-off tube having its upper end rebent to direct back into the funnel any liquid which is forced through the draw-off tube, along with escaping air, said draw-off tube having slidably mounted in its lower end a sliding tubular extension.

3. In a device of the kind described an inverted funnel having an extension at its lower end, a draw-off tube secured to the inside of said funnel and extending down through said extension, and an overflow tube extending laterally from one side of said funnel, said draw-off tube having its upper end rebent to direct back into the funnel any liquid which is forced through the draw-off tube, along with escaping air, said lateral extension constituting an overflow and being provided with an internal slidable tube for connection to a waste device.

4. In a device of the kind described an inverted funnel having an extension at its lower end, a draw-off tube secured to the inside of said funnel and extending down through said extension, and an overflow tube extending laterally from one side of said funnel, said draw-off tube having its upper end rebent to direct back into the funnel any liquid which is forced through the draw-off tube, along with escaping air, in combination with a bottle or the like with which said draw-off tube communicates.

5. In a device of the kind described an inverted funnel having an extension at its lower end, a draw-off tube secured to the inside of said funnel and extending down through said extension, and an overflow tube extending laterally from one side of said funnel, said draw-off tube having its upper end rebent to direct back into the funnel any liquid which is forced through the draw-off tube, along with escaping air, said draw-off tube having slidably mounted in its lower end a sliding tubular extension, in combination with a bottle or the like with which said draw-off tube communicates.

6. In a device of the kind described an inverted funnel having an extension at its lower end, a draw-off tube secured to the inside of said funnel and extending down through said extension, and an overflow tube extending laterally from one side of said funnel, said draw-off tube having its upper end rebent to direct back into the funnel any liquid which is forced through the draw-off tube, along with escaping air, said lateral extension constituting an overflow and being provided with an internal slidable tube, in combination with a bottle or the like with which said draw-off tube communicates.

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