United States Patent

[11] 3,533,400

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[54] CONTINUOUS READING VENOUS MANOMETER FOR INJECTING PARENTERAL FLUIDS
1 Claim, 2 Drawing Figs.

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[51] Int. Cl. A61b 5/02
[50] Field of Search ..... 128/2. 2.05, 213, 214, 214.2; 141/95; 137/551. 559; 73/388. 402: 222/(Inquired)

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ABSTRACT: An intravenous injection set for parenteral liquids, which includes a drip tube approximately 40 centimeters in length and has one centimeter graduations thereon. is connected at its upper end by a flexible tubing, provided with a pinch clamp to a solution bottle, and at its lower end by a flexible tubing, provided with a pinch clamp to a catheter. The pinch clamps are adjusted to provide a slow drip and the catheter is inserted into a vein of a patient. The height of the drip tube is adjusted so that a zero graduation on the drip tube is at the level of the patient's atrium. The liquid in the drip tube will then seek a level corresponding to the patient's venous pressure, which may be determined by reference to the scale on the drip tube. Thus, the venous pressure measurement is continuous and the continuous drip of fluid through the system prevents clotting, blockage, and subsequent inaccurate readings and malfunction.

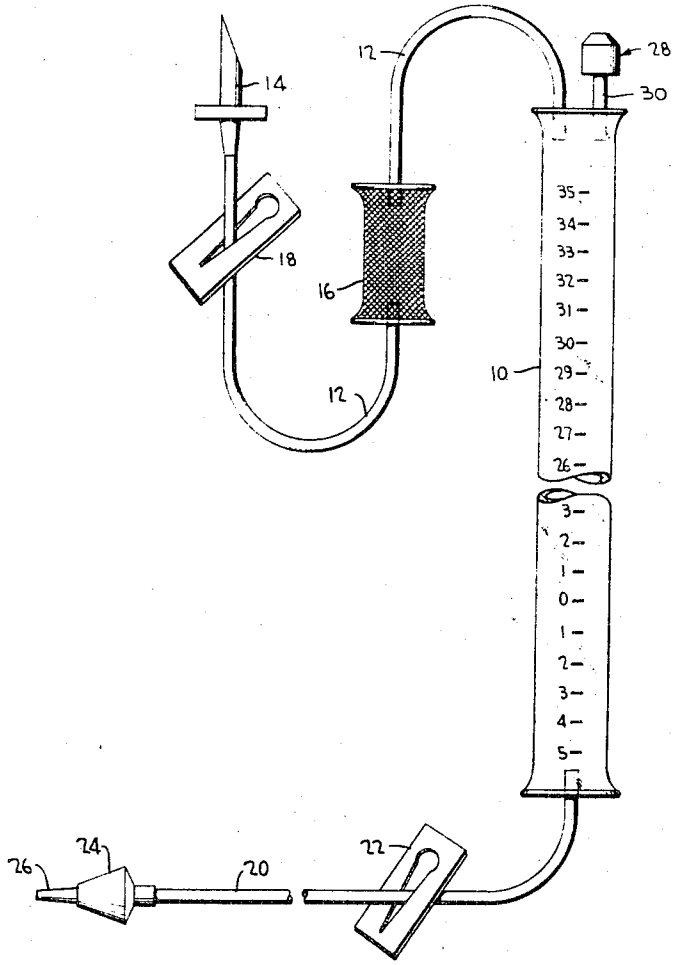

FIG. 1

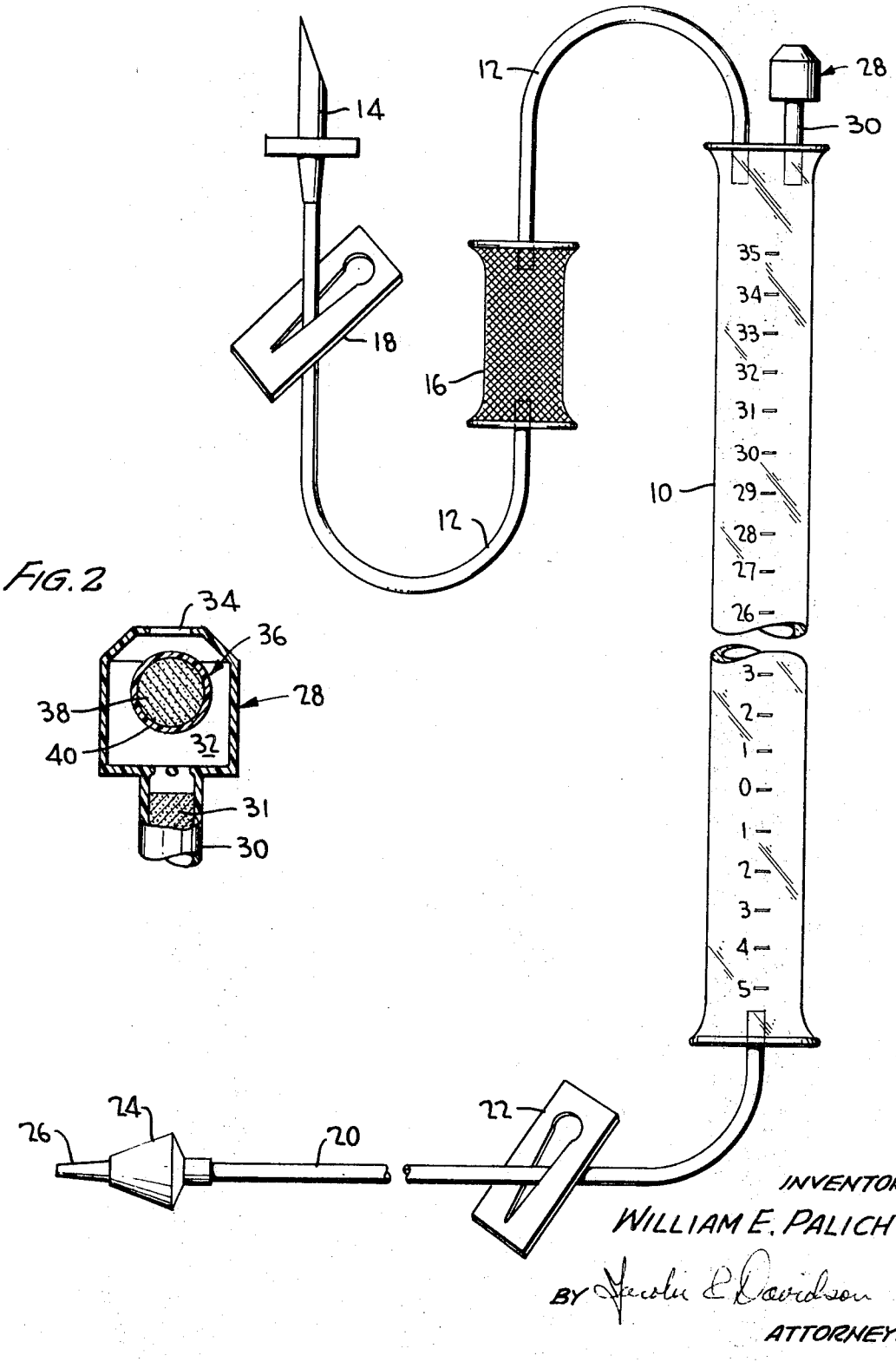

FIG. 2

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CONTINUOUS READING VENOUS MANOMETER FOR INJECTING PARENTERAL FLUIDS

BACKGROUND OF THE INVENTION

The present invention relates to an injection set for parenteral fluids and more particularly to an injection set so constructed that while administering such a parenteral fluid to a patient, it also serves as a manometer for measuring a patient's venous pressure.

The invention also relates to a method of using an intravenous injection set for continuously measuring a patient's venous pressure.

Injection sets for the administration of parenteral fluids, such as blood or other intravenous liquids, to patients have been conventionally employed by the medical profession for many years. Likewise, manometers for measuring the venous pressure of patients have also been employed with regularity by doctors. However, these did not measure continuously, were complex to operate, and prone to clotting of the venous catheter. A different piece of equipment has been required, however, for each of these separate operations. The need for different pieces of equipment involves an additional initial cost and results in there being more instruments that require transportation and storage.

SUMMARY OF THE INVENTION

More specifically, one of the primary objects of the present invention is to provide an injection set for the administration of parenteral liquids to patients.

Another object of the invention is to provide a device for continuously measuring the venous pressure of a patient.

Still another object of the invention is to provide a device that is useful for administering parenteral liquid to a patient and also useful for measuring the venous pressure of a patient.

Yet another object of the invention is to provide a device that may remain inserted in a patient and can function to continuously measure a patient's venous pressure without clotting of the intravenous catheter.

An additional object of the invention is to provide a device which serves to feed intravenous liquids to a patient and at the same time functions as a manometer to continuously measure a patient's venous pressure.

A further additional object of the invention is to provide a combined injection set and manometer which is packaged sterile and ready for immediate use.

A still further additional object of the invention is to provide a combined injection set and manometer in which a float ball check valve in the drip chamber enables the unit to be converted into an intravenous pumping unit.

BRIEF DESCRIPTION OF THE DRAWING

The invention will be better understood, and objects other than those set forth above, will become apparent after reading the following detailed description thereof. Such description refers to the annexed drawings as presenting a preferred and illustrative embodiment of the invention.

FIG. 1 is a front elevational view of a device constructed in accordance with the present invention; and

FIG. 2 is an enlarged sectional view of the vent means which forms a part of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, it is to be noted that the device shown therein includes an elongated container or tube **10** formed of any well-known transparent material such as plastic, and may be circular, square or rectangular in cross section. Container or tube **10** should be at least 40 centimeters in length and is provided with a series of graduations spaced 1 centimeter apart. Preferably, these graduations have applied thereto a scale beginning with −5 at the lower end of the tube **10** and increasing through zero to 35.

A flexible tubing **12** of any well-known material, such as polyethylene, polypropylene, or "Teflon" is attached at one end to, and communicates with, the upper end of the tube **10**. An adapter **14** is secured to the terminal end of tubing **12**. The adapter is of the bayonet type and adapted to be inserted through the stopper of a liquid storage bottle (not shown) containing an intravenous liquid, such as, blood, glucose solution, saline solution, and the like.

A filter device **16** containing any well-known filtering material, such as "Nylon" mesh, is inserted within tubing **12**. The tubing **12** is also provided with a pinch clamp **18** of any conventional construction. Pinch clamp **18** makes it possible to minutely control the flow from the liquid storage bottle to the tube or container **10** or to completely shut off flow from the bottle to the tube.

A flexible tubing **20** of any well-known material, such as polyethylene, polypropylene, or "Teflon" is attached at the lower end of tube **10** and is in communication with the interior thereof. Tubing **20** is provided with a pinch clamp **22**, the same as, or similar to, pinch clamp **18**. The terminal end of tubing **20** is secured to one end of a latex bulb **24** that at its other end is provided with an adapter **26** having a standard Luer taper to which an intravenous catheter (not illustrated) may be connected. Bulb **24** serves as a means to inject medicaments into a patient's veins.

A vent device indicated generally by the numeral **28** is connected to and communicates with the upper end of the container or tube **10**. This vent device **28** is illustrated on an enlarged scale in FIG. **2** and comprises a nipple **30** secured to and extending into the upper end of the container or tube **10**. It also includes a chamber **32** secured to the upper end of nipple **30**. Chamber **32** is provided with an opening **34** at its upper end in communication with the surrounding atmosphere. A ball shaped float valve generally indicated by the numeral **36** is located within chamber **32**. The ball float valve **32** coacts with the wall of the chamber **32** surrounding opening **34** to seal off the opening to the flow of liquid therethrough as liquid rises in chamber **32** and air is expelled therefrom.

Ball float valve **36** may be formed of any suitable lightweight material that will float in the parenteral liquids intended to be used in the device. However, a ball valve **36** having its body portion **38** formed of a foamed plastic coated with a layer **40** of silicone rubber or a soft plastic material has been found to be commercially satisfactory and desirable.

Although a specific vent device has been illustrated, venting may be achieved by terminating tube **30** without vent device **28** if the injection set is to be used as a passive drip set and not to actively pump fluids into the recipient. A cotton plug **31** in tube **30** would preserve sterility.

In the operation of the embodiment of the invention illustrated, a bottle (not shown) containing blood, glucose solution, saline solution or similar liquid is suspended in an elevated position from a conventional standard, such as employed in hospitals. The complete unit illustrated in FIG. **1** is packaged in sterile condition, ready for immediate use, without requiring assembly. After removal from its package, the user first makes sure that pinch clamps **18** and **22** shut off flow through tubings **12** and **20**. The bayonet adapter is then inserted through the bottle closure (not shown). Pinch clamp **18** is then opened to admit liquid into the tube **10** until it reaches the level of the 10 centimeter graduation.

Pinch clamp **18** is then closed and pinch clamp **22** slightly opened to slowly fill tubing **20** and free it of the air contained therein. Adapter **26** is then inserted into the female end of the catheter (not shown) that has previously been inserted into the patient's venous system, and pinch clamp **22** fully opened. Pinch clamp **18** is now adjusted to provide a slow drip. The zero marking on the tube **10** is then adjusted to the level of the patient's atrium. Liquid will then slowly rise in the tube **10** and will become stabilized at a height where the liquid head marking corresponds to the venous pressure of the patient. As the patient's venous pressure varies, the height of the column of

liquid in tube **10** will likewise vary. Thus, while parenteral liquid is being administered to a patient, an observation of the level of the liquid in tube **10** will provide a continuous indication of the patient's venous pressure.

After reading the foregoing detailed description it will be apparent that the objects set forth initially have been successfully achieved.

I claim:

1. An injection set for parenteral liquids, such as blood, glucose solutions, saline solutions, and the like, comprising an elongated drip tube having a zero marking thereon and graduations thereon spaced 1 centimeter apart and extending in opposite directions from said zero marking, a first flexible tubing, having a shutoff means associated therewith, attached and communicating at one of its ends with one end of said drip tube and at its other end with a bayonet adapter adapted for insertion through the stopper of a gravity bottle; a second flexible tubing, having a shutoff means associated therewith, attached and communicating at one of its ends with the other end of said drip tube and at its other end with a Luer taper adapter for connection with a catheter; whereby when said bayonet adapter is placed in communication with a gravity bottle, said catheter is inserted in a patient's vein and the zero graduation of the drip tube is placed at the level of said patient's atrium the height of the parenteral liquid in said drip tube will constitute a measure of the patient's venous pressure; and wherein said shutoff means comprises pinch clamps, said drip tube constitutes a cylinder of clear plastic material at least 40 centimeters in length, a filter of nylon mesh is included in one of said tubings, the one end of said drip tube is provided with a liquid discriminating vent means having a ball of foam plastic coated with silicone and said second tubing is provided with a latex bulb.