Jan. 14, 1947. B. PAGE 2,414,240

SURGICAL APPARATUS

Filed March 15, 1944

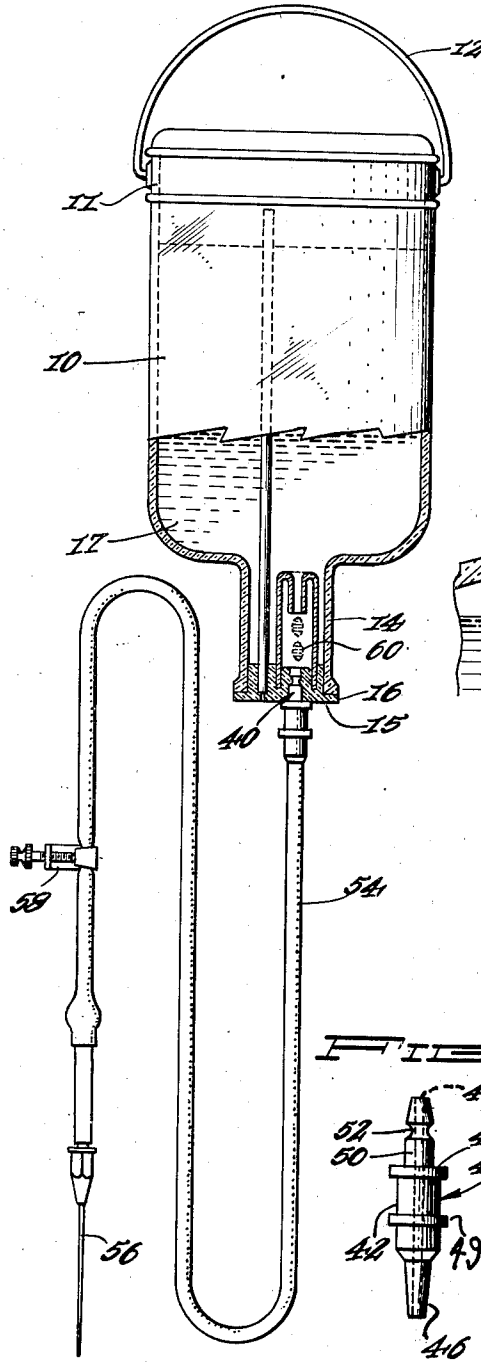


FIG. 1.

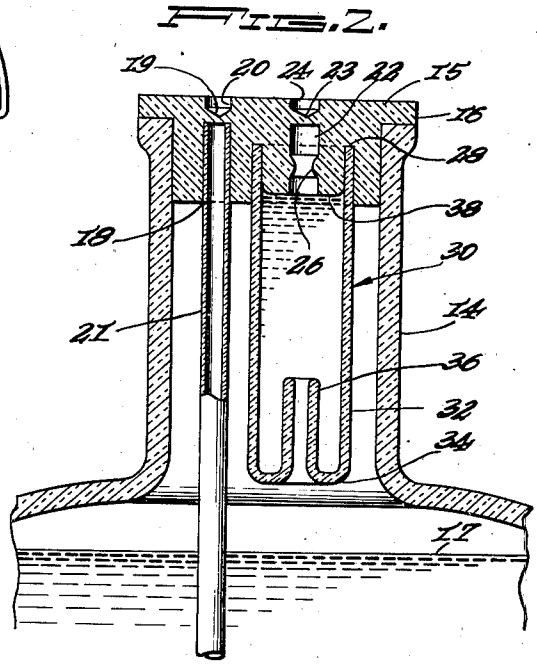


FIG. 2.

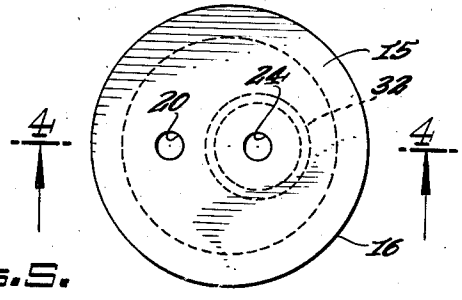


FIG. 3.

FIG. 5.

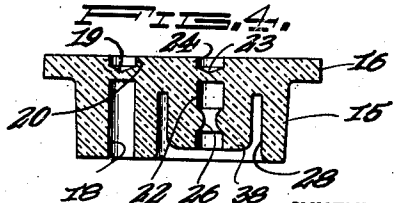


FIG. 4.

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SURGICAL APPARATUS

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Application March 15, 1944, Serial No. 526,511

2 Claims. (Cl. 128—214)

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The present invention relates to dispensing apparatus for administration of medicinals and nutrients. In the embodiment of the invention herein disclosed, the apparatus is primarily intended for parenteral administration of solutions. Such apparatus includes a device known as a drip meter or tube for visually indicating to the operator the rate of flow of the solution being injected into the patient in order that he may control the rate of flow. Such devices usually comprise a glass tube having an internal and downwardly extending nozzle which causes the solution passing therethrough to leave such nozzle in the form of drops. Heretofore these devices have been made as separate instrumentalities, being provided at their ends with integral nipples whereby they may be inserted into the flow of the fluid from the container supplying such liquid to the needle. Ordinarily such devices are inserted into the flow of the liquid at a point spaced from the container and needle by sections of rubber tubing. As this arrangement necessitates the use of many parts which are difficult to keep free from contamination and to assemble, the art devised a special form of plug or stopper for the container which enabled the drip device to be directly connected thereto. This arrangement eliminated some of the disadvantages previously encountered but was not entirely satisfactory because it still necessitated care in the handling of the drip device to keep it free from contamination. Furthermore, it was found that unless the drip device was inserted into the stopper at the proper angle and with great care, it frequently broke under the pressure required for such insertion, thereby causing injury to the fingers, the loss of medication, etc.

The principal object of the present invention is to provide apparatus of the indicated type which will be free of the disadvantages above mentioned and in which a flow indicating device is mounted within and forms part of the container for the solution to be administered.

A further object of the invention is to provide an apparatus in which the drops discharge by the flow indicator device in the use of the apparatus are magnified, thereby enabling an operator to observe the rate of flow of the fluid more readily.

A still further object of the invention is to provide simple apparatus, of very few parts which can be readily assembled and disassembled, which may be readily cleaned and maintained in a sanitary condition, which will eliminate any possibility of injury to the operator and which will

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reduce the possibility of contamination to a minimum.

A still further object of the invention is to provide an apparatus which is rugged in construction and will withstand the jarring and other shocks incidental to packaging, shipping and using such apparatus.

A still further object of the invention is to provide an apparatus which can be assembled for use rapidly and with a minimum of effort on the part of the operator.

Other objects and advantages will be apparent to those skilled in the art from the following detailed description of what is now considered the preferred embodiment of the invention.

The invention accordingly comprises the features of construction, combinations of elements, and arrangement of parts, which will be exemplified in the construction hereinafter set forth and the scope of the invention will be indicated in the claims.

The invention in general comprises a receptacle provided with a stopper which carries a flow indicating device which projects inwardly of the vessel when the stopper is in position, and means for effecting a connection between the receptacle stopper and tubing for transportation of the liquid within the receptacle to the point of introduction into the blood stream of a patient or other desired use.

For a more detailed description of the invention reference is made to the attached drawing in which:

Fig. 1 is an elevational view of the entire apparatus with some parts shown in section in order to illustrate their construction more clearly;

Fig. 2 is an enlarged vertical cross sectional view of the upper part of the container of the apparatus;

Fig. 3 is a top plan view of the stopper for the container;

Fig. 4 is a vertical sectional view of the stopper taken substantially on the plane indicated by the line 4—4 of Fig. 3 and looking in the direction of the arrows; and

Fig. 5 is an elevational view of a connector for effecting connection between the container or receptacle and the tubing for conveying the liquid to the point of use.

Referring to the drawing and Figs. 1 and 2 in particular, the apparatus comprises a container 10 for the liquid medicament or nutritional solution which is to be injected into the blood stream of the patient. The lower end of the container, which in the drawing for the purpose of ex-

planation is shown as a glass bottle, is provided with a metal band 11 (shown uppermost in the inverted position of the container in Fig. 1) to which is pivotally connected a wire bail 12 by which the container 10 can be mounted in inverted position upon a support which may be any suitable hook, preferably located at an elevated position relative to the patient. The container 10 is provided with a neck 14 whose open end is closed by a stopper 15 which may be made of rubber or any other suitable material. The stopper 15 includes a body portion which snugly fits in the open neck of 14 and an outwardly extending flange 16 which seats on the upper end of the neck 14 of the bottle container, the construction of the stopper with relation to the container neck being such that it hermetically seals the liquid contents 17 of the container within the container prior to use.

The stopper 15 is provided with an opening 18 which extends from the inner end of the stopper to a point near the outer surface of the stopper where it is closed by a relatively thin wall 19 which separates the opening from a depression 20 formed within the top of the stopper. A vent tube 21 is snugly seated within the opening 18 for a purpose which will be later described.

Additional blind openings of the type provided by the elements 18, 19 and 20 can be provided in the stopper as desired. As least one additional opening is frequently desired to enable the operator to insert a hypodermic needle through the thin wall of the additional opening to introduce any desired additional medicament into the container.

The stopper 15 has a second opening 22 provided therein which extends to a point below the upper surface of the stopper as viewed in Fig. 2 and is closed by a thin wall 23 which separates the opening from an indentation 24 formed in the top of the stopper. The opening 22 has a bead 26 formed therein for a purpose which will be described later.

A circular groove 28 is formed in the body of the stopper 15 substantially concentric with the opening 22 and which terminates at a point well within the body of the stopper. The circular groove 28 receives the open end of the flow indicating device 30, which in the form illustrated comprises a substantially tubular member 32 closed at one end by wall 34 which carries a nozzle 36 inverted within the tubular body 32.

During the filling of the apparatus the container 10 is first filled to some desired point with the liquid 17 after which the air is evacuated from the unfilled space of the bottle to any desired extent and the stopper 15 and the flow indicating device 30 and the vent tube 21, which have been previously assembled, are inserted into the bottle to hermetically seal the same, to concurrently prevent leakage of the liquid and the ingress of air.

The body of rubber-like material 38 formed by the groove 28 and the outer wall of the groove 28 grip the transparent tube 32 between them and prevent displacements of the flow indicating device by the jarring and other shocks incidental to handling and shipment of the apparatus.

For effecting connection between the container and the tubing which leads to the injection needle a suitable connector is employed (see Fig. 5). The connector 40 comprises a body 42 which is provided with a suitable bore 44 and is formed at one end in the shape of a boss 46 over which one end of the tubing 54 is suitably forced.

Flanges 48 and 49 extend from the body 42 and the end of the connector opposite from the boss 46 forms a stem 50 which is reduced in diameter at a point 52 by means of a suitably curved groove which will snugly fit the configuration of the bead 26 in the stopper. The flange 48 serves as a suitable stop for the connector during its insertion into the rubber stopper, as will be more fully explained hereinafter, and the flange 49 serves as a means for gripping the connector by the operator's fingers during the insertion of the connector and during withdrawal of the connector incidental to disassembly of the apparatus.

In preparation of the apparatus for use the operator suitably moistens the thin walls 19 and 23 and then pushes the stem 50 of the connector 40 to which a tubing has been attached through the thin wall 23. This puncturing will produce an audible click which apprises the operator that the thin wall had been punctured. The operator then continues the insertion of the plug into the stopper and when the bead 26 snaps into position in the groove 52 there will be a second audible click which indicates to the operator that the connector is fully seated in position in the stopper, at which time the flange 48 will cooperate with the groove 52 and the bead 26 in stopping the movement of the connector into the opening 22 and will be in contact with the upper surface of the stopper to conjointly aid in sealing the connector in position.

The operator then punctures the thin wall 19 by any suitable instrumentality such as a needle so as to permit communication between the atmosphere and vent tube 21 so as to permit air to pass up through the tube 21 to the space above the liquid 17 to allow air into the space when the container is inverted to allow for the free passage of the liquid out of the container. The container is then inverted and suspended by the bail 12 at any desired position above the point of injection of the liquid into the veins of the patient to provide the proper hydrostatic head on the liquid. While in this positon the weight of the tubing 54 is readily supported by the connector 40 without unintentionally withdrawing the connector because of the coaction between the connector groove and the bead 26 of the stopper. When the time arrives, however, to withdraw the connector from the container after administration of the liquid has been completed the application of a sufficient reasonable force to withdraw the groove 52 of the adapter from within the bead 26 will permit unobstructed removal of the connector.

With the container in inverted position and after the needle 56, which is of any desired construction is inserted into the vein of the patient, the rate of passage of the liquid into the veins is controlled by any suitable clamp-valve 58. The rate of flow of the liquid is readily ascertained by counting the drops of solution falling from the tip of the nozzle 36 as illustrated at 60 in Fig. 1.

In addition to providing a self-locking seat for the connector 40, the bead 26 serves during the insertion of the connector 40 to prevent any tendency on the part of the tube flow indicating device 30 to be dislodged from the groove 28 due to flexing of the stopper under the force of the connector 40 due to the fact that the passage of the forward end 44 of the connector 40 through the opening formed by the bead 26 tends to regularly expand the body 38 and thereby grip the tube 32 and hold the same firmly in position until the

groove 52 on the connector seats over the bead 26 at which time the additional gripping action on the tubing 30 is partially relaxed but partially continued due to the expanding action of the entire stem 50 on the material forming body 38.

The connector 40 may be formed of any desired material such as glass, hard rubber, a synthetic resin or the like because the construction of the apparatus of the present invention reduces the force which is required to insert the connector into the stopper to a minimum and thereby reduces the likelihood of breakage.

The general assemblage and construction of the apparatus of the present invention makes it possible to rapidly assemble the apparatus originally, make the apparatus ready for use, disassemble and sterilize the apparatus after use and refill and thereafter resassemble the apparatus. In this manner no material is lost as is the case when relatively complicated sealing bands and breakable metallic sealing tapes and the like are employed.

The present application is in part a continuation of application Serial No. 481,225, filed March 31, 1943.

Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

The invention having been described, what is claimed is:

1. Dispensing apparatus comprising a container and deformable stopper therefor having a circular groove formed on the inner face thereof, a substantially tubular transparent drip member seated in said groove extending into the container and wholly enclosed thereby, the portion of the closure extending into the area confined by said groove having an opening therethrough to the opposite face of the stopper and a connector member extending into said opening from the opposite face of the stopper to a point adjacent the inner end of the tubular drip member compressing the portion of the closure confined by said groove against the inner end of the tubular drip member.

2. Dispensing apparatus comprising a container and deformable stopper therefor having a circular groove formed on the inner face thereof, a substantially tubular transparent drip member seated in said groove extending into the container and wholly enclosed thereby, the portion of the closure extending into the area confined by said groove having an opening therethrough to the opposite face of the stopper, a bead within the said opening from the opposite face of the stopper and a connector member extending into said opening to a point adjacent the inner end of the tubular drip member in frictional engagement with said bead compressing the portion of the closure confined by the said groove against the inner end of the tubular drip member.

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