

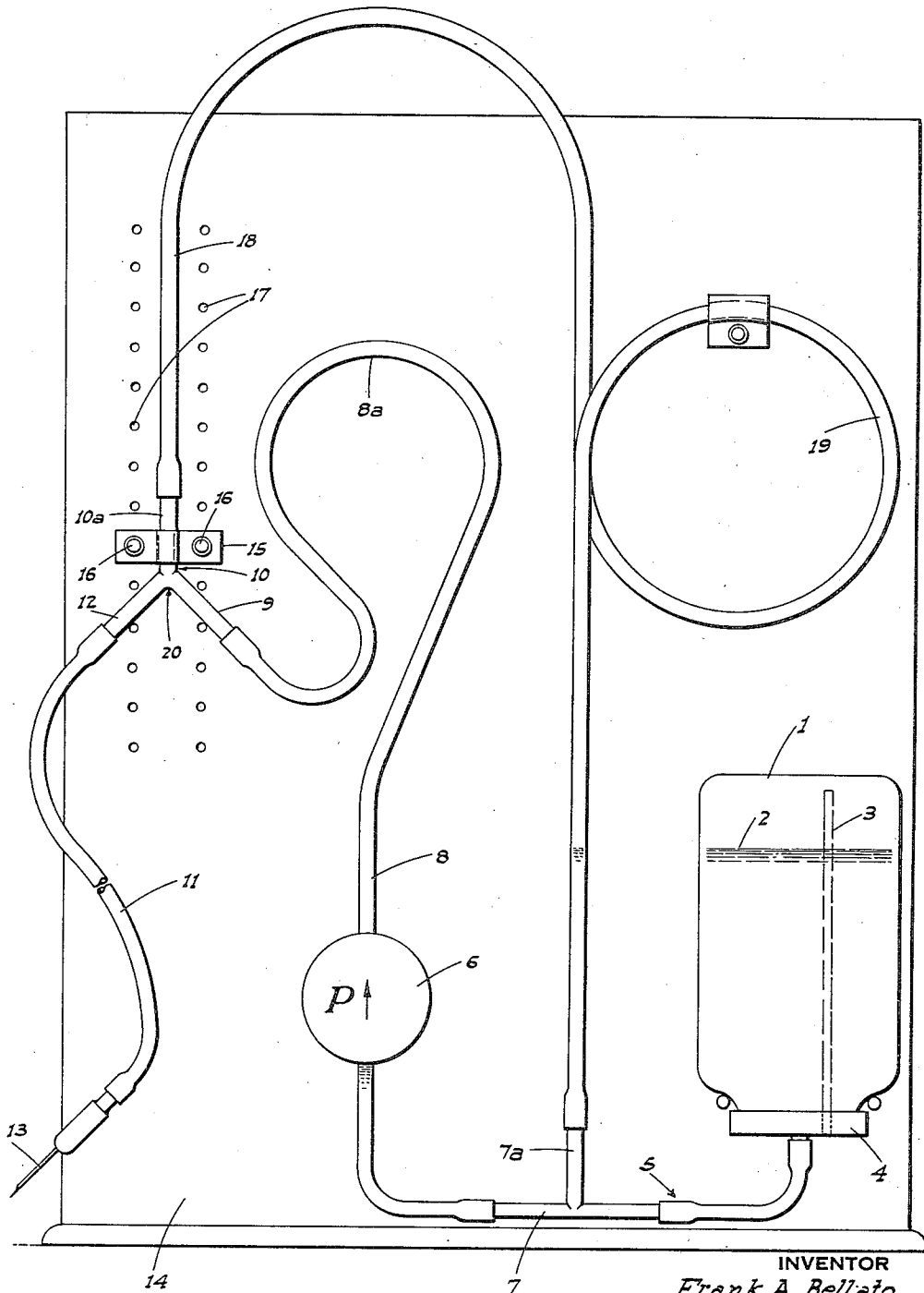
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FEED CIRCUIT FOR SURGICAL PUMPS

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FEED CIRCUIT FOR SURGICAL PUMPS

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4 Claims. (Cl. 128—214)

This invention relates to medical apparatus, and particularly to apparatus by means of which medicinal liquids of one kind or another are injected into a patient intravenously.

Heretofore, the use of apparatus of this general type has been clouded by the fact that at times—even though infrequently—air bubbles have passed into the veins of the patient along with the desired liquid. Such an occurrence has had—if not actually fatal—results.

It is therefore the main object of my invention to provide an apparatus or system for injecting a medicinal liquid into the veins of a patient in such a manner that air bubbles, even though initially mingled with the fluid, will be separated and escape of themselves from the flowing liquid before the latter reaches the injection needle.

Another object is to provide a system for the purpose, which while utilizing a constant-delivery pump to circulate the liquid from the source of supply toward the needles, relies on gravity to actually deliver the liquid into the veins, regardless of the pressure generated by the pump.

A further object of the invention is to arrange a portion of the liquid feeding conduit of the system so that the head of the gravity flow may be altered to suit the viscosity of the liquid being administered, and without altering or affecting the operation of the pump.

A still further object of the invention is to arrange the conduiting of the system so that if a stoppage or restriction at the needle should occur, and the desired gravity flow of the liquid into the veins is not effected, the liquid—under the action of the pump—will be bypassed back to the source of supply and will not be forced into the veins.

An additional object of the invention is to provide a practical and reliable feed circuit for surgical pumps, and one which will be exceedingly effective for the purpose for which it is designed.

These objects are accomplished by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

The figure on the drawing is a mainly diagrammatic view of the improved feed circuit for surgical pumps.

Referring now more particularly to the drawing, and to the characters of reference marked thereon, the improved feed circuit or system comprises a suitable container 1 for the liquid 2 to be injected; the container being preferably a capped jar mounted in an inverted position and having an air tube 3 mounted in the jar cap 4 and projecting into the jar so as to terminate above the level of the liquid therein.

A conduit unit 5 extends from cap 4 to a constant delivery pump 6; unit 5 including an inverted T-fitting 7 intermediate its ends.

Extending upwardly from the discharge side of the pump is a conduit 8 in the form of a flexible tube, which tube at its upper end is connected to one leg 9 of an inverted Y-fitting 10. Another flexible tube 11 is con-

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nected to and depends from the other leg 12 of fitting 10, and at its lower end mounts an injection needle 13 of conventional form. Fitting 10 is mounted in connection with a supporting panel 14 at a level above that of the jar 1 by means of a clamping strap 15 embracing the stem 10a of said fitting and having thumb screws 16 therethrough to the sides of the fitting, and each engaging in any one at a time of a row of tapped holes 17 in the panel.

The flexible tube 8 includes a loop portion 8a so as to allow for any desired vertical adjustment of the fitting 10 relative to the fixed pump without restraint.

Another flexible air-trap tube 18, which includes a full-circle loop 19 to increase its capacity, is connected to and extends between the upwardly projecting stem 10a of fitting 10 and the upwardly projecting stem 7a of fitting 7.

When the circuit or system is set up for operation the liquid will initially drain from the jar of itself into conduit 5 as far as the intake of the pump (which is in a plane adjacent the lower end of the jar) and into the air tube 18 to a level the same as that of the liquid in the jar 1, as indicated. When the pump 6 is operated, the liquid is forced upwardly in the tube 8 to the top of the leg 9 of fitting 10, or to the point or apex 20 where said leg 9 joins the opposed leg 12 of said fitting. It may be here stated that the pump is controlled, by means not here shown, so as to feed a metered amount of the liquid into the fitting 10 to said apex 20 thereof.

The liquid as being pumped and reaching apex 20 then flows downwardly through leg 12 and tube 11 and into the needle 13 by gravity and any air which may have been mingled with the liquid as pumped escapes from the liquid through the fitting stem 10 and into tube 18, so that the liquid flowing down through tube 11 is free of air. Such air as enters the tube 18 cannot pass into the liquid being drawn to the pump, since the column of liquid automatically maintained in the lower portion of tube 18, as previously described, forms a seal against the flow of air into the pumping line.

Should the needle become clogged so that the liquid will not drain by gravity through the tube 11, the pump—if still operating—will merely force the liquid up and into the air-trap tube 18, and ultimately back into the jar 1, without forcing the liquid into the patient. Any air which may be in the tube 18 and forced by the bypassed liquid back into the jar 1, can of course escape therefrom through the relief tube 3 in said jar.

The vertical adjustability of the fitting 10 on the supporting panel 14 enables the head of the gravity-flowing liquid to be altered according to the viscosity of the liquid being administered. In any case, the apex 20 of the fitting 10 must always be above the liquid in the jar 1 in order to avoid the possibility of a siphoning action taking place.

The loop 19, in the air-trap tube 18, provides ample air space in the tube in a compact form, so as to avoid any back pressure being set up in the tube by the accumulation of air therein.

Although the system, as described above, is especially adapted for use in connection with the giving of intravenous injections, it may also be highly useful to feed various liquids for other medicinal or similar purposes.

From the foregoing description it will be readily seen that there has been provided such a system as will substantially fulfill the objects of the invention, as set forth herein.

While this specification sets forth in detail the present and preferred construction of the system, still in practice such deviations therefrom may be resorted to as do not form a departure from the spirit of the invention, as set forth herein.

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Having thus described the invention, the following is claimed as new and useful and upon which Letters Patent are desired:

1. A liquid-injection system comprising a container for a supply of liquid, a constant-delivery pump, a conduit extending from the bottom of the container to the intake of the pump, an inverted Y-fitting secured in a fixed position at a relatively high level, said fitting having downwardly facing legs disposed in diverging relation and an upstanding stem above the legs, a conduit from the discharge of the pump to one leg of the fitting, a flexible conduit connected to and depending from the other leg and mounting an injection needle at its lower end for gravity feeding of the liquid from the Y-fitting to the needle, and an air-trap conduit connected at one end to the upstanding stem and at the other end to the first named conduit; the air-trap conduit including a portion

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upstanding from said first named conduit to a height not less than that of the container.

2. A system, as in claim 1, with a support on which the container, pump, and Y-fitting are mounted as a unit, said Y-fitting being disposed at a level above the top level of the liquid in the container.

3. A system, as in claim 1, with a support on which the container, pump, and Y-fitting are mounted as a unit, and means mounting the Y-fitting on the support for vertical adjustment thereon.

4. A system, as in claim 1, in which the air trap conduit is formed intermediate its ends with a coiled portion to increase the air holding capacity of said conduit.

References Cited in the file of this patent

Surgery, vol. 36, No. 3, September 1954, page 560.
(Copy in Scientific Library.)