May 25, 1926. 1,585,912

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AMPULLA WITH SEPARATED COMPARTMENTS FOR LIQUIDS TO BE INJECTED

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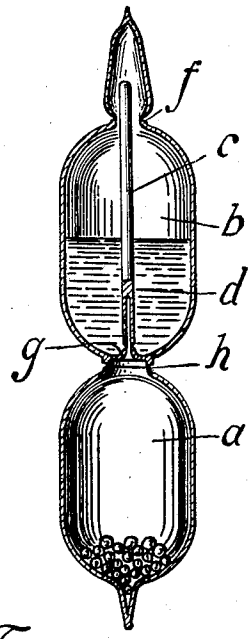

Fig. 1.

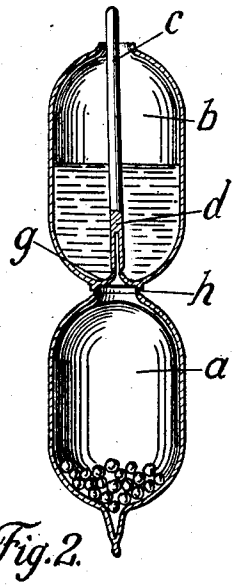

Fig. 2.

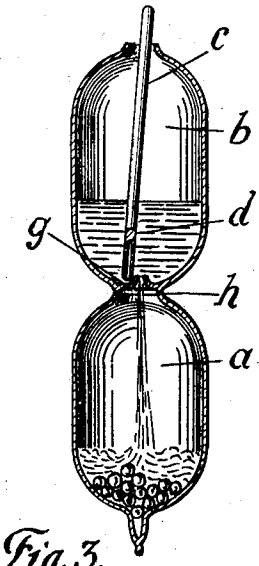

Fig. 3.

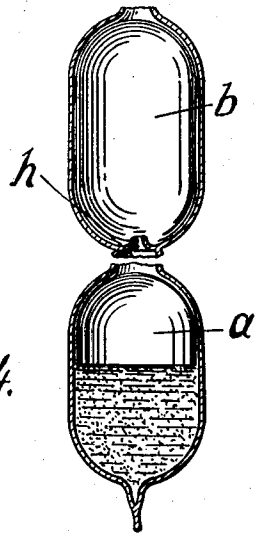

Fig. 4.

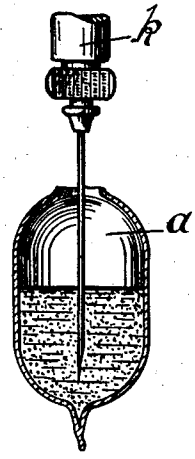

Fig. 5.

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UNITED STATES PATENT OFFICE.

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AMPULLA WITH SEPARATED COMPARTMENTS FOR LIQUIDS TO BE INJECTED.

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This ampulla relates to ampullæ for liquids to be injected comprising two compartments separated the one from the other. These compartments may both contain liquids or the one contains a liquid and the other a dry substance or in the one compartment a gas can be stored and in the other one a liquid which for any reasons have to be brought together just before the injection.

It has become known to use, for bringing the two compartments of an ampulla into communication the one with the other, a breaking lever, held in a narrowed part of the ampullæ and designed to break the vaulted partition between the two compartments.

According to the invention a pressure below the atmospheric pressure exists in the lower compartment of the ampulla, containing either a dry substance or also a liquid, the upper compartment which is always to be filled with liquid comprising the breaking lever, securely held at the point and consisting of a tube sealed by melting and forming the extension of a tulip-shaped partition between the two compartments of the ampulla, said breaking lever being adapted to be broken off easily at a point directly above said partition.

In this manner it is possible to transfer the liquid from the upper compartment entirely into the lower compartment of the ampulla. At the same time a capillary opening is produced in the partition at the breaking of the lever so that the liquid can be sucked in a skin-jet from the upper compartment into the lower compartment owing to the vacuum which, as is known, exists in the lower compartment of the ampulla. The capillary opening serves to prevent that when the mixture in the lower compartment is being shaken some of the liquid gets lost. When the injection solution has been prepared the upper part of the ampulla can be broken off owing to the narrowing between the two parts and the liquid can be withdrawn by a syringe without having been transferred into another vessel.

An embodiment of the invention is shown by way of example on the accompanying drawing, in which:

Fig. 1 shows in section an ampulla having two compartments.

Fig. 2 illustrates how the breaking lever is liberated.

Fig. 3 illustrates the breaking of the lever.

Fig. 4 illustrates the breaking of the upper part of the ampulla and

Fig. 5 illustrates how the lower part of the ampulla is used for filling a syringe for injection with the liquid.

On the drawings *a* designates the lower, and *b* the upper part of the ampulla. The lower part *b* is filled with a gas, a dry substance or with a liquid, but the upper part *a* is always filled with a liquid. *c* is the breaking lever by means of which communication can be established between the two parts *a* and *b* of the ampulla. This lever *c* consists not of a glass rod as is usually the case but of a glass tube. The upper end of the tube *c* is closed by melting and it is filled with glass at *d* somewhat above its lower end whereby a greater resistance moment is given to the breaking lever at this point. By making the breaking lever *c* tubular the mass is reduced so that this tubular lever does not break off during transportation, even if the upper narrowed end of the part *b* of the ampulla should not suffice to protect the lever. By making the breaking lever *c* tubular it is further possible to give to the lower end *g* of the same a tulip shape. The edge of this tulip-shaped lower end *g* of the breaking lever is fixed by melting in the narrowed part *h* of the ampulla between the two parts *a* and *b* so that it forms a partition which is only slightly vaulted or quite plane so that after the breaking of the lever *c*, as shown in Fig. 3, the entire quantity of liquid can flow from the upper part *b* of the ampulla into the lower part *a* of the same. The cross section of the tubular breaking lever can be easily selected so that by the breaking of the lever only a comparatively narrow opening is produced through which the liquid from the upper part *b* of the ampulla is sucked in a thin jet into the lower part *a* of the ampulla when a vacuum exists in this lower part. Owing to the flow of the liquid in a thin jet from part *b* into part *a* of the ampulla the dissolving of the dry substance by the liquid or the mixing of the gas with the liquid or of one liquid with the other is considerably facilitated. The narrowness of the opening presents the further advantage that the admixed media in the lower part *a* of the ampulla can be strongly shaken and that at this occasion nothing of the liquid is spilled or lost. This

is rather important as the loss of even a tiny quantity of the liquid could cause errors about the dosing of the injection. When the solution in the part *a* of the ampulla is ready for use the upper part *b* of the ampulla is broken off below the partition *h*, as shown in Fig. 4, this part of the ampulla body being narrowed for this purpose. In this manner an open vessel is produced as shown in Fig. 5 from which the liquid to be injected can be easily withdrawn by means of a syringe *k*.

I claim:—

An ampulla for liquids to be injected comprising in combination a body separated by a narrowed part into an upper part designed to contain a liquid and a lower part designed to contain a dry substance, gas or liquid, a space of reduced pressure existing in said lower part, a breaking lever in said upper part consisting of a glass tube closed at the upper end by melting, a tulip-shaped lower end of said tubular breaking lever connected by melting with the wall of the narrowed part of the ampulla body to form a partition separating the two parts of the ampulla, a filling of glass in said tubular breaking lever above the lower end of the same, a circular incision being made in the other surface of the tubular breaking lever below said thickened part so that said breaking lever can be easily broken at this incision to form a narrow opening in the partition through which the liquid from the upper compartment is sucked in a thin jet into the lower compartment the mixture in this lower compartment being then strongly shaken to be sucked out by means of a syringe after the upper part of the ampella has broken off below said partition.

In testimony whereof I affix my signature.

WILHELM OSKAR HEUBLEIN.