July 4, 1933. N. KOVACS 1,916,428

MEDICAL SYRINGE

Filed Jan. 14, 1931

Fig.1.

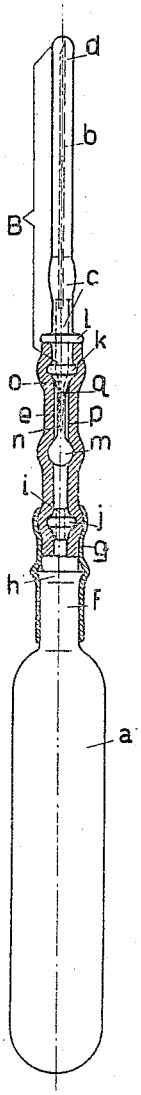


Fig.2.

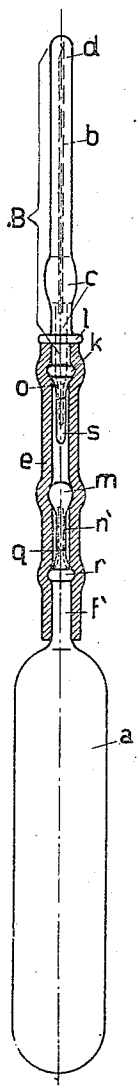
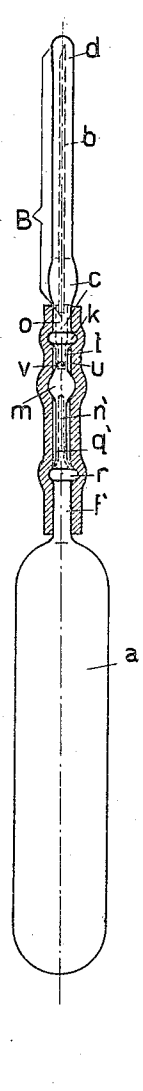


Fig.3.



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MEDICAL SYRINGE

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This invention relates to medical syringes for storing liquids or gases and for injecting them into or taking them from the human or animal body. In particular the invention relates to syringes of the type in which a container is connected with a cannula by means of an elastic connecting tube.

The purpose of my invention is to provide improved means for controlling the passage of liquids or gases through the elastic tube and at the same time to effect a simplification of the manufacture and handling of the syringe.

Referring to the drawing, in which the Figs. 1–3 show three preferred forms of the invention in part section views, *a* denotes the container or vessel for the liquid and/or the gas. The hollow metallic needle *b* is fused at its rear end into a glass body or plug *c*. A cap *d* which is made in one piece with the plug *c* and which has to be broken away before use, protects the needle *b*. The parts *b*, *c*, *d*, which may be of any other convenient form and material, will hereinafter be termed comprehensively the cannula B.

The cannula B is connected with the container *a* by means of an elastic tube *e*. As shown in Fig. 1 this tube *e* is inserted like a stopper into the neck *f* of the container. In order to provide a tight joint between the elastic tube and the container a film *g* of acetylcellulose, gelatine, or the like is spread over the tube *e* and the neck *f*. The flared edge *h* of the neck *x* prevents the film *g* from slipping off. A short tube *i*, which is provided in the middle with an enlarged portion *j*, is preferably inserted into the elastic tube which thus becomes locally distended in order to ensure an absolutely reliable adhesion of the film *g*. The glass body *c* is provided with an enlarged portion *k*, by means of which it is secured within the elastic tube, and with a collar *l* which serves as an abutment for the elastic tube.

For the purpose of controlling the passage of liquids or gases through the elastic tube there is provided a rigid element *m* of preferably spherical form, the diameter of which is greater than the internal diameter of the elastic tube, which member is connected with the plug *c* by means of a thin tubular connecting piece *n*, the duct *o* of which leads to the hollow needle *b*. The passage from the container to the hollow needle is thus interrupted firstly by the distended wall of the elastic tube which, in consequence of its elasticity, presses closely against the regulating member *m*, and secondly by the connecting piece *n* which is entirely closed, so that there is no connection from the hollow cylindrical space *p* surrounding the connecting piece *n* and the duct *o* of the latter.

As a consequence of this double interception it is impossible for liquid to ooze from the container to the needle and to rust the latter, or for the pressure of the gas in the container to diminish even if the syringe be kept stored for a very long time.

When the device is to be used, the connecting piece *n* is first broken at a weakened place *q* provided for instance by a file stroke. For this purpose the elastic tube is grasped at its outer end and at the enlargement caused by the ball *m*. In order to open the passage through the elastic tube entirely the wall of the tube has to be drawn away from the glass-bead *m*. By partly or entirely releasing the wall of the tube the injection of liquid may be throttled by degrees or instantly arrested as required. The control device is operated by two fingers only whereby no displacement of the cannula or of the container is required nor is the pressure applied to the tube transmitted to the hypodermic needle. The handling of the syringe is thus extremely safe and convenient.

In the form shown in Fig. 2 the glass-bead *m* is connected by a thin tubular connecting piece *n'* to the neck *f'* of the container. Since in this case the elastic tube has to be pulled over the neck, this latter is made comparatively thin and is provided with an enlarged portion *r*. This modification is preferably employed in blood taking devices, which must have an evacuated container with a fused seal. The arrangement of the regulating member *m* thereby renders it possible to take a certain quantity of blood in small amounts from different parts of the body. This is for instance necessary if the patient

is suffering from deficiencies of the veins. In order to prevent that the vacuum in the container gets diminished by the porosity of the elastic tube after the connecting piece n' has been broken, the tube is preferably provided with a coating of shellac. The rear end of the glass plug c may be closed up by melting to a point s which also has to be broken before use. Thus it becomes possible to connect a cannula with a vessel immediately before use, since these parts remain aseptically sealed up to this moment.

In the form shown in Fig. 3 the container a forms one piece with the regulating member m and the cannula B. The connecting piece n' between the glass-bead m and the container a is identical with that shown in Fig. 2. The connecting piece between the regulating-member m and the plug c is also of smaller diameter than the internal diameter of the connecting tube e. Into the cylindrical space u thus formed the duct o leading to the hollow needle opens at the small aperture v. Before use the connecting piece n' has to be broken at q'.

The manufacturing costs of a syringe according to the invention are very low. Thus for instance the assembling of the device consists merely in the inserting of two glass parts into an india rubber tube; and further the work of the glass blower is much simplified by the fact, that the container, the regulating member, and the cannula consist of but one or two parts.

What I claim is:

1. A syringe comprising a container, a cannula, an elastic tube connecting the container with the cannula, means for securing the elastic tube to the cannula and the container, and a rigid member, the diameter of which is greater than the internal diameter of the tube, inserted in the tube, and a rigid tube, of less diameter than the elastic tube, disposed within the tube and connected with the rigid member at one of its ends and with the cannula at its other end, and adapted to be opened by breaking, the wall of the tube being adapted to be drawn away from the rigid member to allow a passage.

2. A syringe comprising two rigid bodies, one of the said bodies being adapted as a container and the other of the said bodies as a cannula, an elastic tube connecting said bodies, means for securing the elastic tube to said bodies, a rigid member, the diameter of which is greater than the internal diameter of the tube, inserted in the tube, and a rigid tube, of less diameter than the elastic tube, disposed within the tube and connected with one of the said rigid bodies at one of its ends and with the rigid member at its other end, and adapted to be opened by breaking, the wall of the elastic tube being adapted to be drawn away from the rigid member to allow a passage.

3. A syringe comprising a container, a cannula, an elastic tube adapted to connect the said container with the said cannula, a rigid member, the diameter of which is greater than the internal diameter of the said connecting tube, inserted into the said tube, tubular connecting pieces rigidly connecting the said member with the ends of the container and the cannula lying within the said connecting tube, said connecting pieces being of smaller diameter than the internal diameter of the said connecting tube, so as to form hollow spaces within the said tube, and a duct leading to the container and to the cannula respectively provided in each connecting piece, one of the said connecting pieces being entirely closed so as to cut off the said duct from the one hollow space and adapted to be broken in order to clear the passage from the one hollow space into the said duct, the duct within the other of the said connecting pieces opening into the other hollow space.

4. A syringe comprising a container, a cannula, an elastic tube connecting the container with the cannula, means for securing the elastic tube to the cannula and the container, and a rigid member, the diameter of which is greater than the internal diameter of the tube, inserted in the tube, and a rigid tube, of less diameter than the elastic tube, disposed within the tube and connected with the rigid member at one of its ends and with the container at its other end, and adapted to be opened by breaking, the wall of the tube being adapted to be drawn away from the rigid member to allow a passage.

In testimony whereof I have signed my name to this specification.

NIKOLAUS KOVACS.