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A SYRINGE CAPABLE OF BEING USED FOR MULTIPLE PURPOSES.

BY LIEUTENANT J. P. McGOWAN,
Royal Army Medical Corps.

The syringe consists of a barrel with lateral openings, a plunger with a longitudinal groove and a mechanism for the interaction of these parts.

In fig. 1, A, B, C, D, E, F, is the barrel closed at the end, C, D, and open at the end A, F, with lateral openings, to serve as inlets or outlets, surmounted by comparatively long studs at several points on one circumference, such as B, G, and E. These lateral openings should not be too numerous and should probably be restricted, in the case of a cylinder of the diameter used in ordinary syringes, to four at a quadrant's distance from one another.

![Fig. 1](image-url)

In fig. 2, H, J, K, is the piston of which H represents the head, J is the stem, square in section, and K the handle or button head. L, M, is a longitudinal groove cut into the solid piston head, while the part M, N, of the piston head is solid, and may or may not have a piston ring on it. The piston is accurately ground into the barrel.
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O, P, Q (fig. 2), is the screw-on cover of the syringe, which is fitted on to the barrel at A, E, and fixed in one definite position by means of the fixation screw B. This screw cover has a circular hole in its centre through which passes a cylindrical projection U from a circular plate S, T. This cylindrical projection has a flange V, on its inner surface, which holds the plate S, T and the cover together, though allowing a circular movement of the plate S, T. The square piston stem J passes through a square opening in the cylindrical projection U, and is a fairly tight fit allowing of easy longitudinal movement but of no circular movement.

On the projecting rim of the cover X are cut shallow notches to correspond exactly with the various lateral openings in the barrel. Further, at a point on the rim of the plate S, T, corresponding exactly with the situation of the longitudinal groove L, M, in the piston head is fixed, in a line with the axis of the syringe, a stout straight spring with a wedge-shaped head Y. The function of the notches on the cover rim and this spring on the plate S, T, is to ensure that the groove on the piston head is in accurate communication for the time being with any lateral opening desired.

In the working of the syringe, suppose that the piston is pushed fully in and that its groove is opposite an inlet. On pulling out the piston in this position, fluid comes in at the inlet along the groove and fills the barrel. The other lateral openings in the barrel are shut off meantime by the convexity of the piston head. When the syringe is filled the piston is turned round until the groove is opposite the outlet desired, while the inlet is at the same time automatically shut off. The piston is now pushed home and the fluid flows from the syringe along the groove and out by the outlet. After this, the piston is rotated back so that the groove is again opposite the inlet when the process described can be repeated indefinitely.

The outlets and inlets are connected up to the needles and reservoirs respectively by means of rubber tubing. A special case, however, deserves mention, namely, where the fluid to be injected, such as antitoxic serum, is contained in a capsule. Here it is desirable that the capsule should be of a special shape as shown in fig. 3, where a, b, c is a bulb drawn out at both ends into narrow tubes with depressions and file marks at two points d and e.

On the inlet stub of the syringe is fitted a short length (about one inch) of very thick walled narrow bored rubber tubing. The fluid in the capsule is now shaken down to one end and the capsule held in a vertical position. The narrow tube at the upper end of the capsule is now broken at the file mark and the end sterilized.
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by the means of a flame. The conical end left by the breaking off at the middle of the depression renders easy the fitting of this end into the rubber receptacle, just mentioned, on the syringe. For this purpose the syringe is held with the rubber fitting downwards and this latter is then squeezed on to the broken-off end of capsule. When this is accomplished the syringe is turned bodily round so that the capsule is now inverted when its other end is broken off at the file mark and the pumping of its contents can be commenced.

The syringe can be made entirely of metal, or better, of glass, or silica ware, with metal fittings. In the case of an all-metal syringe the graduations would be on the stem whilst in one with a glass barrel they would be on the barrel. The size of the syringe need not be large, depending entirely on the amount that it is desired to deliver with one stroke of the piston. Speaking generally, it need not be larger than a five cubic centimetres or ten cubic centimetres record syringe. The holes in the studs as well as the groove in the piston should be fairly large, especially in consideration of the use of the apparatus as an aspirator. On the end C, D (fig. 1), of the barrel may be fitted an additional nozzle controlled by a tap or there may be placed here a fitting for the reception of a suitable handle to manipulate the apparatus while it is being used.

Some of the uses to which the syringe can be put may be indicated. Thus it may be used as an aspirator, to remove collections of fluid from various parts of the body, for the intravenous injection of salvarsan, as an infusion or transfusion appliance, as also for the administration of successive measured doses of drugs to a series of men as in the administration of morphia or of typhoid vaccine. It may also be used for the measuring out of successive measured doses of medicinal substances into ampoules, more especially when this has to be accomplished in an aseptic manner. It can also be used as a simple syringe if it be fitted with the nozzle controlled with a tap at the end C, D, as mentioned above. The drawings illustrating this description are by Serjt. James Read, R.A.M.C., T.F., to whom I wish to express my thanks.

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AN APPARATUS FOR WITHDRAWING BLOOD, ETC., FOR CULTURES, WASSERMANN REACTION, ETC.

BY LIEUTENANT J. P. McGOWAN.

Royal Army Medical Corps.

This apparatus is constructed from a test-tube of suitable size, a cork to fit it, a piece of small-bored glass tubing, a piece of Carrel tubing, a large sized record needle, a piece of bandage and some cotton-wool and thread. A cork (e.g., a medicine bottle cork) to fit the test-tube selected has a narrow longitudinal groove cut in its circumference to allow of the escape of air from the interior of the test-tube. Through a hole bored in the centre of the cork is passed a piece of glass tubing about 1⁄2 inch diameter and about three inches long. Round the edge of this glass tubing which is to project into the test-tube is wrapped cotton-wool of sufficient quantity to form a plug for the test-tube when the cork is withdrawn.