No. 609,982.

Patented Aug. 30, 1898.

B. T. WINCHESTER.

HYPODERMIC SYRINGE.

(Application filed Oct. 4, 1897.)

(No Model.)

Fig. 1.

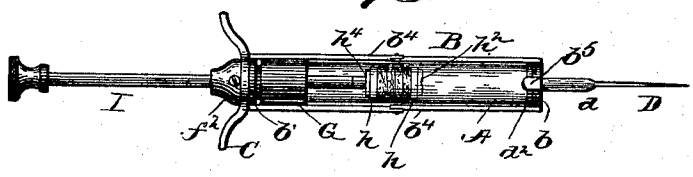


Fig. 2.

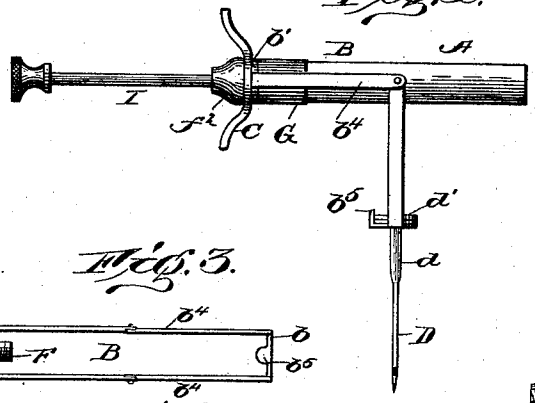


Fig. 3.

Fig. 4.



Fig. 5.

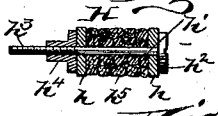


Fig. 6.



Fig. 7.

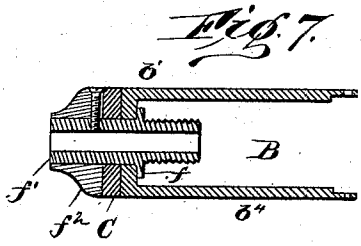
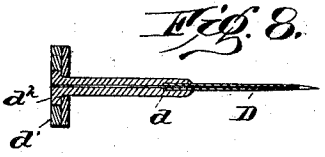


Fig. 8.



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UNITED STATES PATENT OFFICE.

BENJAMIN T. WINCHESTER, OF BALTIMORE, MARYLAND.

HYPODERMIC SYRINGE.

SPECIFICATION forming part of Letters Patent No. 609,982, dated August 30, 1898.

Application filed October 4, 1897. Serial No. 654,033. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN T. WINCHESTER, of the city of Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Hypodermic Syringes; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters of reference marked thereon.

This invention relates to improvements in that class of hypodermic syringes wherein a section of glass tubing is utilized for the cylinder or barrel in which the piston traverses, this material (glass) being preferred partly on account of cheapness, transparency, and freedom from corrosion, but more particularly because of its adaptability to antiseptic treatment, as by immersion in boiling water. Instruments of this kind as heretofore generally constructed and in common use are provided with a metallic frame or casing in which the glass cylinder or barrel is mounted between clamping heads or rings, one at each end of the cylinder. This construction necessitates the employment of an elastic packing material at one or both ends of the cylinder, both for the purpose of forming a tight joint and preventing fracture and to permit of the insertion of new cylinders in the event of breakage, which latter not infrequently occurs. The connection or head at the front end of the cylinder has an opening through it approximately equal to the internal diameter of the cylinder in order to permit the insertion of medicated tablets, and a cap is detachably secured to this head of the frame to close the orifice thus provided and afford a support for the hollow needle, which latter is in like manner detachably secured to the cap.

Inasmuch as the cylinder and frame are permanently attached or united the joint between the front end of the cylinder and the head of the frame may be considered as a permanent one, while the joints between the head of the frame and cap-piece and between the latter and the base of the hollow needle may be termed "open" joints, in that in the normal use and manipulation of the instrument these parts are frequently detached and recombined. Each of the three joints requires the presence of a packing-ring, usually of leather or equivalent elastic material. Now it is well known that sepsis is the one thing most to be guarded against in the use of such instruments and that every condition tending in the slightest degree to favor or promote the retention of foreign substances constitutes a menace to the patient and is a defect in the instrument itself. Nor is this all. The construction, material, and workmanship should be of a character to not alone exclude all foreign substances or matters, but also to withstand without deterioration the usual antiseptic treatment, such as boiling in water for considerable periods of time.

It is obvious that the instrument hereinbefore referred to as typifying the kind most generally in use, while possessing points of advantage and valuable qualities, is rendered defective from a sanitary point of view by reason of the multiplicity of joints and packings necessarily employed. Each joint exposed on the interior of the instrument is a source of danger resulting from either of two causes—that is, the difficulty of forming a perfect joint, one entirely free from crevices or receptacles in which foreign materials can find lodgment, and the action of heat and moisture upon the packing material, tending to disintegrate or render it porous. The principal object of the present invention is to overcome these defects and difficulties and at the same time preserve and improve upon all the desirable qualities or features which have been instrumental in popularizing this style of instrument—such as cheapness, simplicity, convenience, and efficiency in action—and this is accomplished by so constructing and arranging the parts which go to make up the syringe that the only exposed joint will be at the junction of the cylinder and the hollow needle, said joint being what is termed an "open" joint, as distinguished from a closed or permanent one, and serving both for applying the needle to the cylinder and for opening or exposing the end of the cylinder, so that the tablet may be inserted directly therein.

In carrying out this improvement the hollow needle is applied directly to the end of the glass cylinder or barrel, a suitable packing being interposed to form a tight joint,

and the two are held firmly together by the action of clamping devices, preferably connected with the frame or casing, so that when the needle is removed the end of the glass cylinder will be entirely uncovered and free from packings or joints of any kind in which foreign substances may become lodged and retained or which can be injuriously affected by boiling water. In addition to this novel feature of construction, whereby two of the three joints and packings heretofore used are dispensed with and the needle applied directly to the end of the glass cylinder, there are other novel elements incident to the preferred form of embodiment, such as the needle, the jointing of the frame or casing so as to uncover the end of the cylinder, the means for detachably securing the needle in position and clamping it upon the cylinder, the means for supporting the cylinder in or upon the frame, and other minor features hereinafter described, and pointed out in the claims.

In the accompanying drawings, illustrating the preferred embodiment of the invention, Figure 1 is a side view of the instrument complete. Fig. 2 is a similar view with the needle and a portion of the frame swung to one side to uncover and expose the end of the cylinder or barrel. Fig. 3 is a detail view showing the frame or casing detached. Fig. 4 is a sectional view of the cylinder with cap attached. Fig. 5 is a sectional view of the piston. Fig. 6 is a detail view of the piston-rod. Fig. 7 is a sectional view of a portion of the rear end of the frame or casing. Fig. 8 is a sectional view of the hollow needle with the washer or packing in position thereon.

Like letters of reference in the several figures indicate the same parts.

The cylinder A is similar to those heretofore commonly employed—that is to say, it is composed of a single piece or section of glass tubing of the proper diameter and length and is mounted in or upon a frame or casing B, preferably metal, to which the finger-pieces C are attached. The hollow needle D is furnished or provided with an enlarged base d, of suitable shape and dimensions to form a cover for the open end of the cylinder A when applied to the latter, a suitable packing or washer d', preferably composed of hardened fiber, being interposed between the glass and metal to form a tight joint.

In order to insure a proper positioning of the packing to prevent its accidental displacement and to provide for its removal with the needle, the base d of the latter is furnished with a projection d^2, over which the washer d^3 is tightly fitted to retain it in place upon the needle and permit its removal and replacement or renewal, as required.

It will be observed that the cylinder and needle when associated together complete the receptacle and channel to which the fluid to be injected is exposed and that but a single joint and packing is employed, so that when the needle is detached and removed the end of the cylinder is exposed and the tablet can be inserted directly therein, and there is nothing to be injured by antiseptic treatment, such as boiling, with the possible exception of the washer or packing, and this source of possible injury is avoided by employing for the purpose hardened fiber such as is commonly used for hot-water and steam valves and packings. It only remains to provide suitable means for detachably holding the needle in position upon the end of the cylinder, and for this purpose the frame or casing B can conveniently be utilized.

According to the preferred plan or arrangement the frame B is constructed to receive the cylinder and needle between its ends or heads b b', the front plate or head b being notched or perforated for the passage of the stem of the needle and so arranged as to engage the outer face of the flange at the base of the needle. The two parts being thus restrained from endwise movement beyond the ends or heads of the frame, it is only required to supply adequate means for diminishing the space occupied by the cylinder and flanged base of the needle or for diminishing the space between the heads b b' of the frame in order to firmly clamp and hold the cylinder and needle together. In the illustration given the first plan has been adopted, and to this end the rear head d' of the frame is furnished with an inwardly-projecting screw F, while upon the rear end of the cylinder A is cemented or otherwise secured a cap G, centrally perforated and threaded to receive the screw F. This screw F is arranged to turn freely in the rear head of the frame, for which purpose it is formed with a collar f and a stem f', the latter passing through a central opening in head b' and held from longitudinal movement by a sleeve f^2 and finger-piece C, detachably applied thereto in rear of head b'.

The cylinder A is mounted and held normally in position in the frame by means of screw F, the latter engaging cap G and being turned until the cylinder is drawn against head b' of the frame. After the needle has been passed through the front head b of the frame the screw F is revolved so as to advance the cylinder, thus tending to diminish the space or interval previously existing between the rear end of the cylinder and the front face of the flange of the needle and clamping the two parts firmly together. As according to this plan the front head b of the frame—that serving to confine the needle—would normally occupy a position in front of the open end of the cylinder, thus interfering with the convenient placing of the tablets in the cylinder, it is desirable that means be provided for permitting lateral movement of one or both of these parts in order that the end of the cylinder may be uncovered and the needle removed or replaced in position. This can conveniently be accomplished by employing either separable connections or

pivots, and the latter plan is preferred, as it reduces the liability of accidental loss or displacement. With this end in view the side bars b^4 of the frame are formed in sections united by pivots, so that the front head b of the frame can be swung to one side, thereby uncovering the end of the cylinder, as indicated in Fig. 2. This movement of the frame and needle can only take place when the cylinder is retracted, as by turning screw F, so as to draw the cylinder toward the rear head b' of the frame. A lip b^5, formed on one side of head b, serves to position the front section of the frame when swung into position in front of the cylinder, as shown in Fig. 1, and when said lip is brought into contact with the cylinder and screw F is turned to force the cylinder into close contact with the base of the needle, previously inserted in head b of the pivoted section, the parts will be locked and held rigidly in position, but when the screw is turned to retract the cylinder the front section of the frame, together with the needle carried thereby, can readily be swung to one side, thus uncovering the cylinder and permitting the removal of the needle.

The clamping-screw F is provided with a longitudinal perforation for the passage of the piston-rod I, said screw serving as a bearing or guide for said rod.

The piston is another source of annoyance and danger in instruments of this kind owing to the difficulties encountered in producing an efficient packing which shall be flexible enough to accommodate slight irregularities in the bore of the cylinder, capable of adjustment, and unaffected by boiling. Attempts have been made to utilize asbestos for the packing; but it was found that in use small particles would become detached and become lodged in the bore of the needle or injected with the fluid beneath the skin of the patient. Hence its use for this purpose was abandoned. It has been discovered, however, that by first twisting the asbestos fibers slightly to form a thread or strand and then wrapping this strand about the piston-head between confining walls the shedding of the fibers could be prevented and a serviceable packing be produced.

By reference to Fig. 5 it will be seen that the improved piston H is made up of two hard-fiber washers h h of a diameter closely approximating the internal diameter of the cylinder A, said washers being mounted upon a rod h', provided with a head h^2 at one end and a screw-shank h^3 and thimble h^4 at the opposite end. Between the washers h is wound a strand or strands h^5 of the twisted asbestos fiber, the latter lying circumferentially of the piston and transversely of the direction of its motion in the cylinder.

The piston-rod I has its end bored out and threaded to fit the screw-shank h^3 of the piston, and when screwed up its end abutting against thimble h^4 forces the latter toward head h^2, thereby compressing and expanding the packing lying between the washers h.

Having thus described my invention, what I claim as new is—

1. In a syringe such as described the combination with the open-ended cylinder and a needle whose base is applied directly to the end of the cylinder, of a supporting-frame formed of sections pivotally connected, the rear section furnished with means for sustaining the cylinder and adjusting the same, while the front section supporting the needle being articulated is capable of being swung laterally to bring the needle in line with the open end of the cylinder or to uncover the latter; substantially as described.

2. In a hypodermic syringe, such as described, the combination of the open-ended cylinder provided with a threaded collar at one end, a needle-base adapted to contact with the front end of said cylinder; and a supporting-frame comprising front and rear sections articulated together, the rear section carrying a hollow screw for engaging the collar on the cylinder to support and adjust the latter and form a bearing for the piston-rod, while the front section of the frame is provided with a bearing to receive the needle-base; substantially as described.

3. In a syringe such as described, the combination with the open-ended cylinder and a removable needle base or support, of the supporting-frame composed of front and rear sections hinged together, the rear section provided with means for detachably securing the cylinder to the frame and adjusting said cylinder longitudinally, and the front section furnished with a head or cross-piece provided with an opening or bearing for the reception of the detachable needle-base arranged to swing transversely in front of the open end of the cylinder; substantially as described.

4. In a syringe such as described, the combination with the open-ended cylinder provided with a screw-collar at its rear end, the detachable needle-support and the piston and piston-rod; of the supporting-frame comprising front and rear heads connected by diametrically opposite side bars formed in sections and hinged together, the finger-piece and adjusting-screw applied to the rear head of the frame and the bearing for the needle-support formed in the front head of said frame; substantially as described.

5. In a hypodermic syringe such as described the combination of a sectional pivoted frame, a cylinder supported at its rear end in one of said sections, a hollow needle supported in the opposite section and adapted to close the open end of the cylinder and means for advancing and retracting the cylinder; substantially as described.

6. In a hypodermic syringe such as described, the combination of the open-end cylinder; a frame supporting said cylinder and provided with a head or abutment adapted to be swung into alinement with and beyond the

open end of the cylinder; a hollow needle detachably mounted in said swinging head and adapted for direct application to the end of the cylinder; and means, such as a screw for advancing and retracting the cylinder; substantially as described.

7. In a hypodermic syringe such as described the combination with the open-end cylinder and the hollow needle fitted to close the end of the cylinder, of the frame provided with a screw engaging a cap on the rear end of the cylinder, pivotally-connected side bars and a cross-piece or head perforated for the reception of the hollow needle; substantially as described.

8. In a hypodermic syringe such as described, the combination with the cylinder and hollow needle, the latter adapted to engage and close the end of the cylinder, of a frame provided with two heads or abutments connected by hinged or pivoted side bars one of said heads being provided with a hollow screw forming a bearing for the piston-rod and an adjustable attachment for the cylinder, while the opposite head is perforated for the reception of the flanged hollow needle; substantially as described.

9. The hereinbefore-described improved hypodermic syringe, the same comprising a frame formed in sections pivoted together and adapted to be swung into and out of alinement; a cylinder adjustably connected by its rear end to one section of the frame; and a hollow needle detachably connected to the other section of the frame to permit it to be moved into and out of alinement with the front end of the cylinder; substantially as described.

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