E. N. BLISS & J. DAVOL.

Syringe.

No. 208,062. Patented Sept. 17, 1878.

Fig. 1.

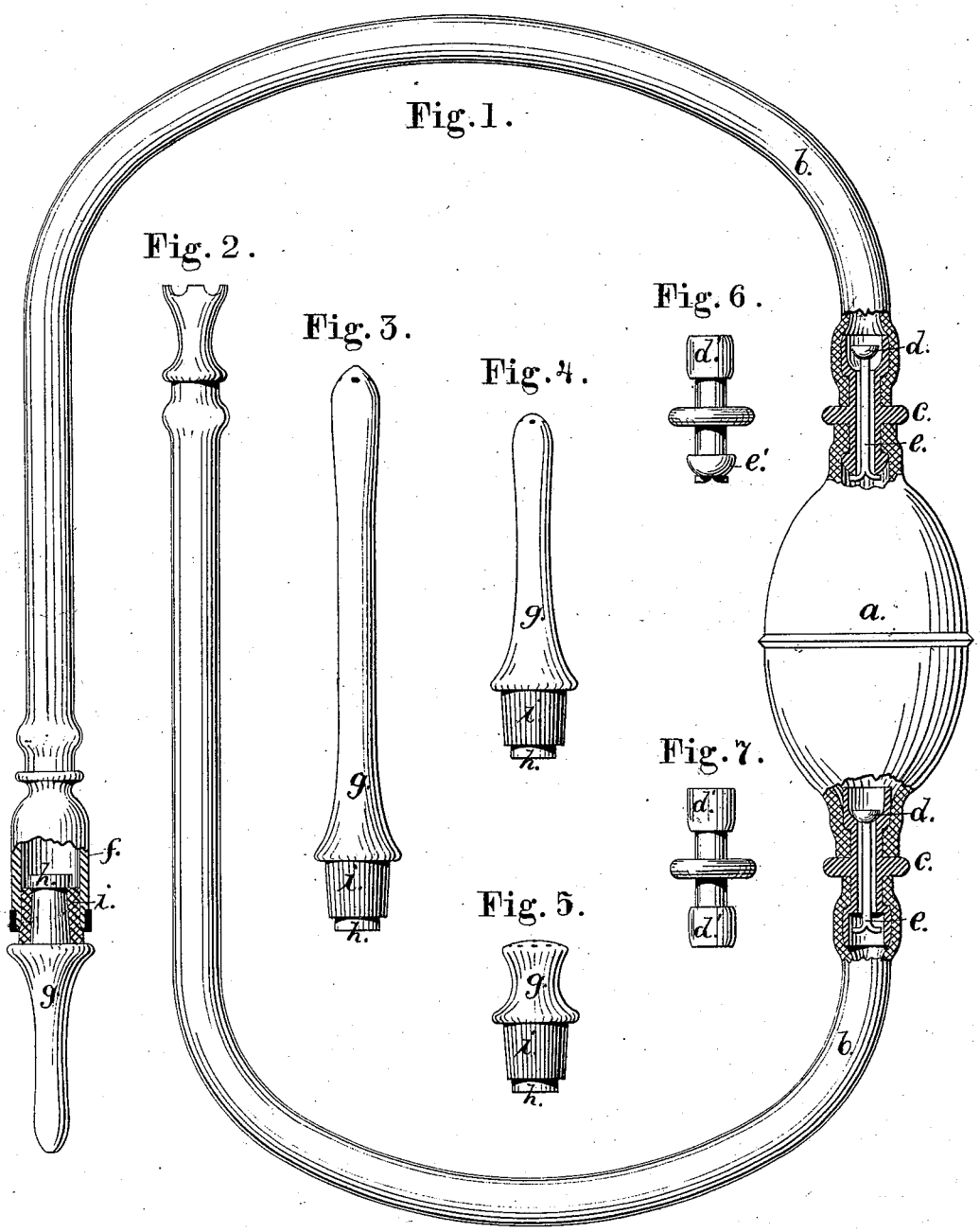

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

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IMPROVEMENT IN SYRINGES.

Specification forming part of Letters Patent No. **208,062**, dated September 17, 1878; application filed July 10, 1878.

To all whom it may concern:

Be it known that we, EDWARD N. BLISS and JOSEPH DAVOL, both of the city and county of Providence, and State of Rhode Island, have invented certain new and useful Improvements in Syringes; and we hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention has reference to that class of syringes in which a rubber bulb or hollow globe is provided with an inlet and outlet tube, and in which the expansion of the bulb, by decreasing the pressure on the liquid, draws the same into the bulb, whence it is discharged by the compression of the bulb.

The invention consists in an improvement of the inlet and outlet valves, in the construction and arrangement of the injection-tubes and the means for connecting the same, and in the improved construction of fittings for rubber syringes, as will be more fully set forth hereinafter, and pointed out in the claims.

In the drawings, Figure 1 is a view of our improved rubber-bulb syringe, parts of which are shown in section. Fig. 2 is the suction-end piece of the syringe, shown as connected with the flexible tube. Figs. 3, 4, and 5 are views of the several styles of ejection-tubes. Figs. 6 and 7 are views of the valve-couplings.

Similar letters of reference indicate corresponding parts.

a is the rubber bulb. *b b* are the flexible tubes, connected with the bulb by the valve-couplings *c c*. These valve-couplings have heretofore been made of metal and usually in two parts, each part secured, respectively, to the bulb and flexible tube, and the two parts united together by a male and female screw, which joints being liable to leak, some elastic packing-ring was always required to produce a tight joint.

By making a valve in one piece, so as to form a union-piece for connecting the bulb to the flexible tube, a simpler, cheaper, and better article is produced. The valve-stem is split at the end *e*, and bent out so that while the valve proper *d* will have sufficient play to rise off its seat and allow the fluid to pass, it will be held within the coupling by the forked end *e*. This split and bent end of the valve-stem enables us to secure the valve quickly and cheaply in the cup *d'*. When, as in Fig. 7, such a cup is used, these cups *d'* serve the double purpose of protecting the valve and valve-stem, and to firmly hold the elastic and flexible tubes or the rubber bulb by stretching the same over the cups and allowing the ends to contract around the contracted neck of the coupling. The valve-coupling may be provided with two cups, *d' d'*; or a holding-button, *e'*, may be placed on the end of the discharge-valve, as shown in Fig. 6.

To avoid the use of screws in the construction of these syringes, screws being very objectionable for general use, as they are liable to cross thread and thus get injured and destroy the use of the syringes frequently at the most critical time, and also because screw-joints must be packed with some elastic material, which is liable to get lost, and, the joint being loose, the injection-liquid is forced through the joints and the efficiency of the syringe is destroyed, we therefore provide the discharge end of the flexible tube *b* with a cylindrical cup-shaped socket, *f*, and provide the different injection-tubes with the elastic ring *i*, and secure the same by the flange *h*, over which the ring *i* is forced and by which it is permanently retained. When, then, any one of the different injection or the spray tubes are to be used the same are slightly forced into the socket *f*, and are firmly and tightly held by the elastic band *i*.

The valve-couplings, injection-tubes, and all the fittings on these syringes are made of wood, and are covered inside and outside with a water and acid proof enamel, by which the fiber of the wood is strengthened, a smooth polished interior and exterior surface is produced, and the fittings are not liable to corrode, as is the case with metal fittings. These fittings are lighter, smoother, and cheaper than metal fittings, and when used for internal injections are more agreeable in use, as they, being poor conductors of heat, do not affect injured parts as painfully as metal or glass tubes will. They

are not affected by tannic acid or other compounds that may be used for injections, and they produce no injurious compounds by decomposition, as metal fittings are liable to do, and which are liable to be injected with the injection-liquids.

These fittings are superior to fittings made either of metal or vulcanized rubber; they are stronger, and, not being affected by any acid or liquid, will not corrode or become foul, as is the case with vulcanized-rubber fittings.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. In a syringe, the combination, with the valve *d*, of the coupling *c*, provided with the cups *d'*, arranged to protect the valve and form projections or bulbs to retain the elastic tube, substantially as described.

2. The combination, in a rubber syringe, with the flexible tube *b*, of the socket-piece *f*, the injection-tube *g*, and the elastic band *i*, secured by the flange *h*, substantially as and for the purpose set forth.

3. The combination, with the elastic tube, of the coupling *c*, provided with one or two cups, *d'*, a central disk against which the tubes abut, and the valve *d*, provided with the stem *e*, forked at its end and arranged to retain the valve, substantially as and for the purpose described.

4. The combination, with the injection or spraying tubes of a syringe, of the rubber ring *i* and the flange *h*, substantially as and for the purpose set forth.

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