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A. P. STORRS.  
NEEDLE VALVE.  
APPLICATION FILED FEB. 4, 1909.

Patented Sept. 6, 1910.

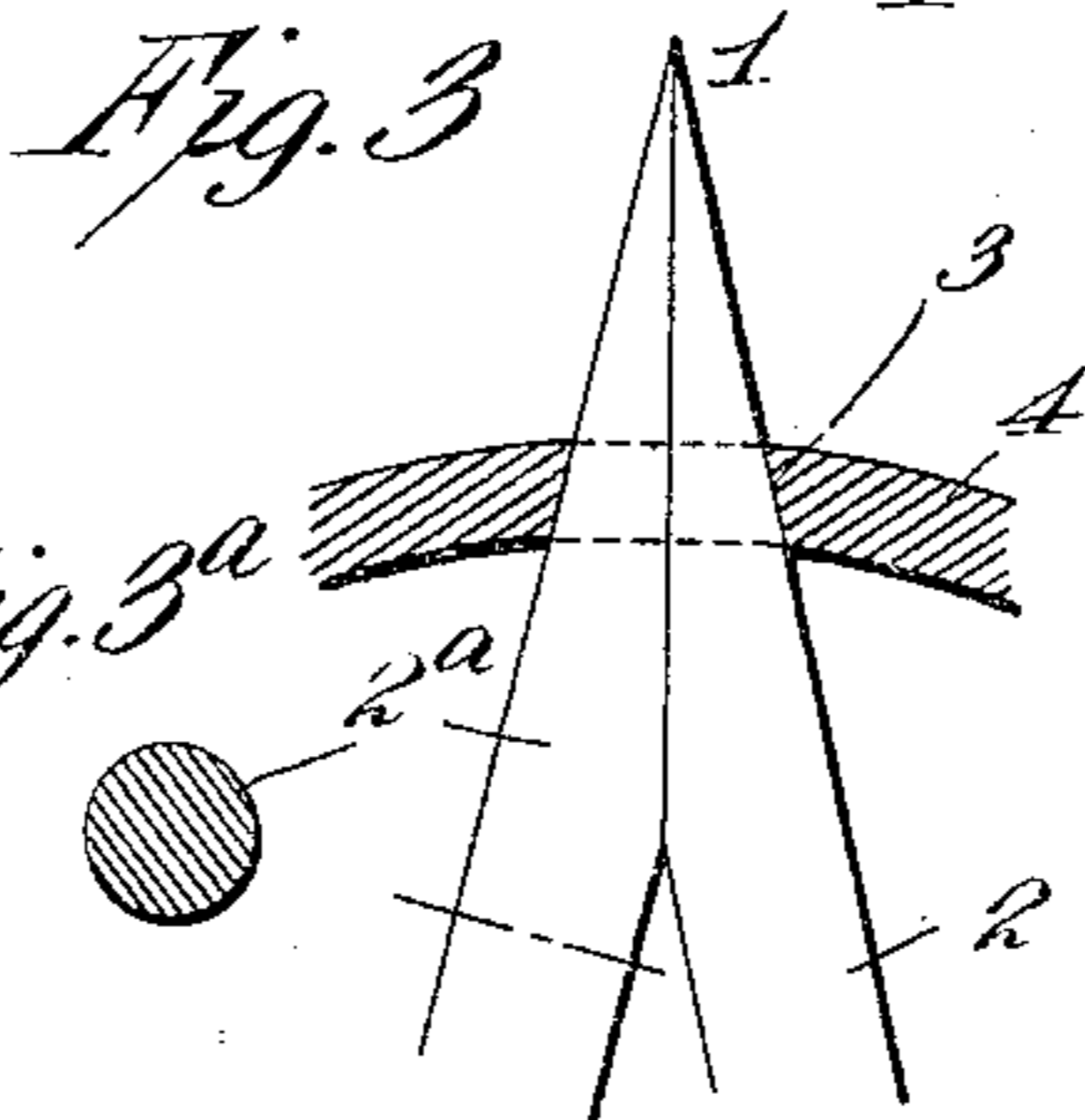
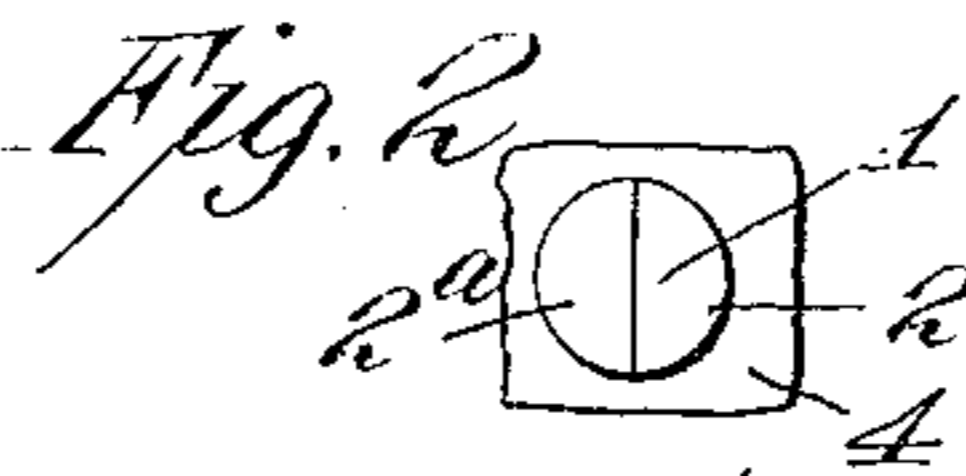
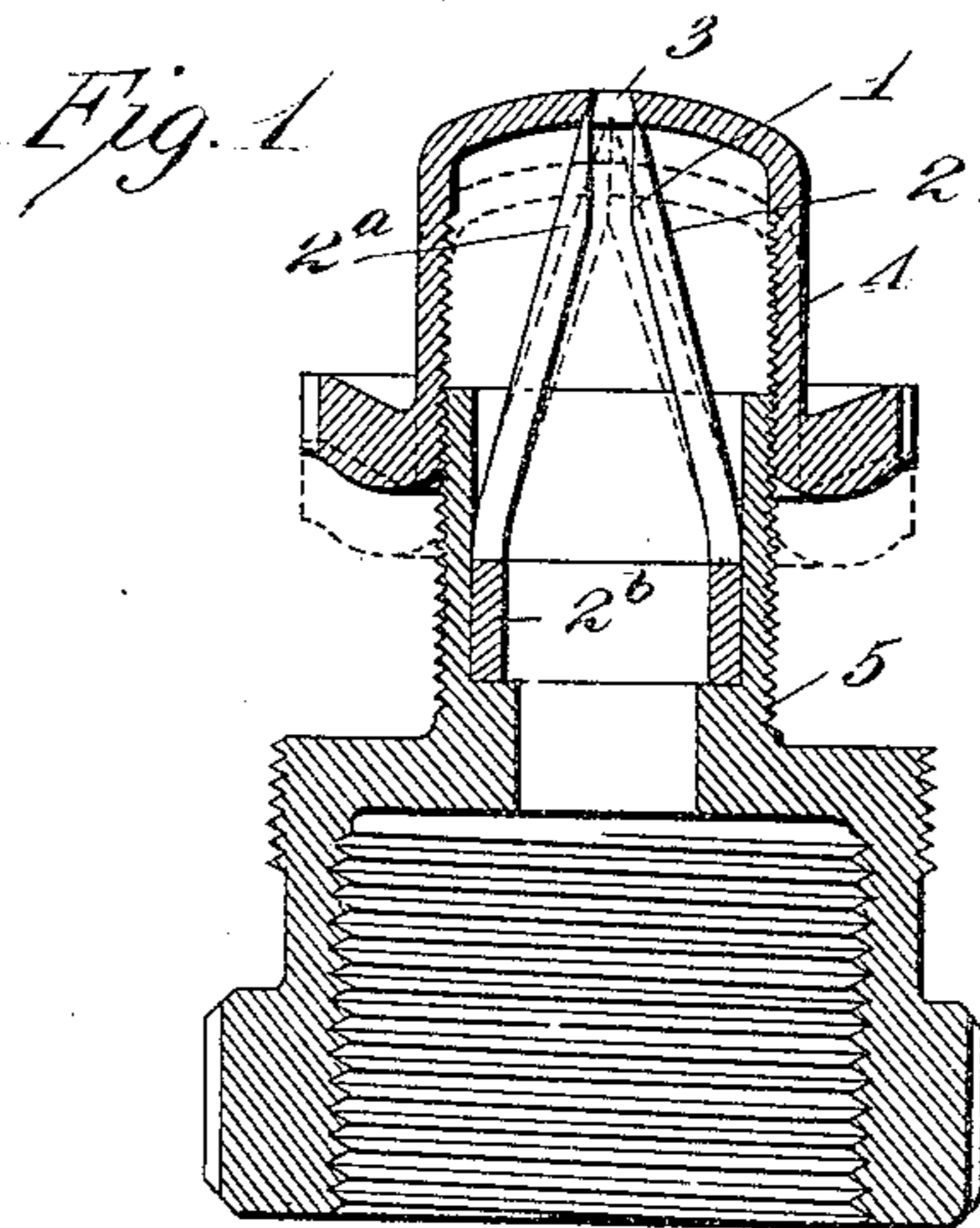


Fig. 3<sup>a</sup>

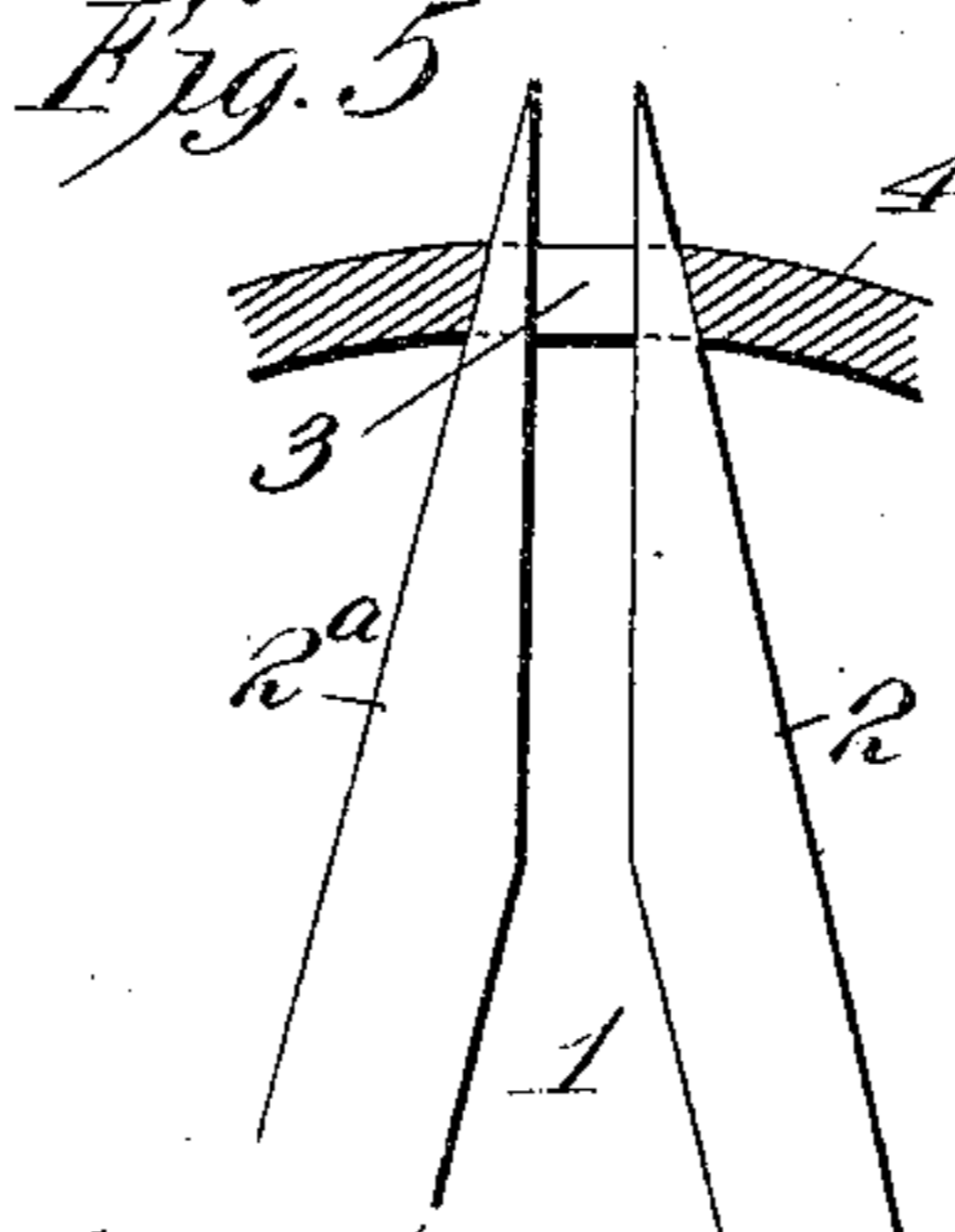
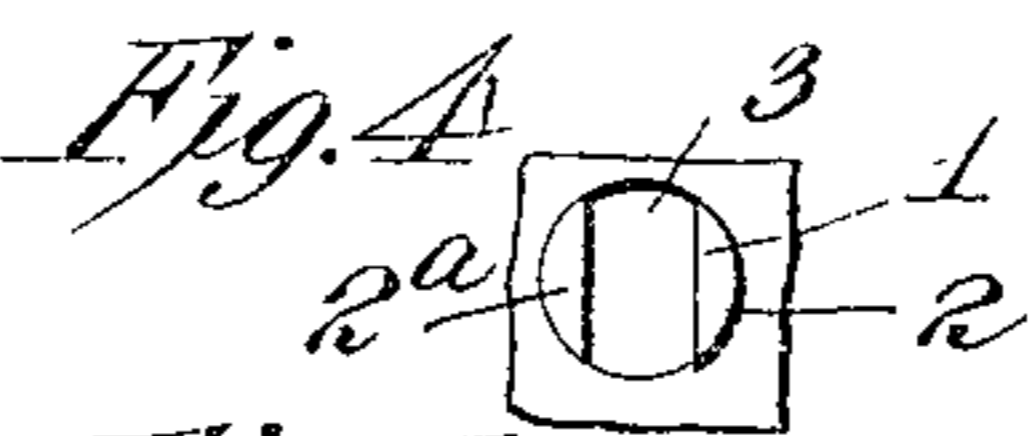


Fig. 11

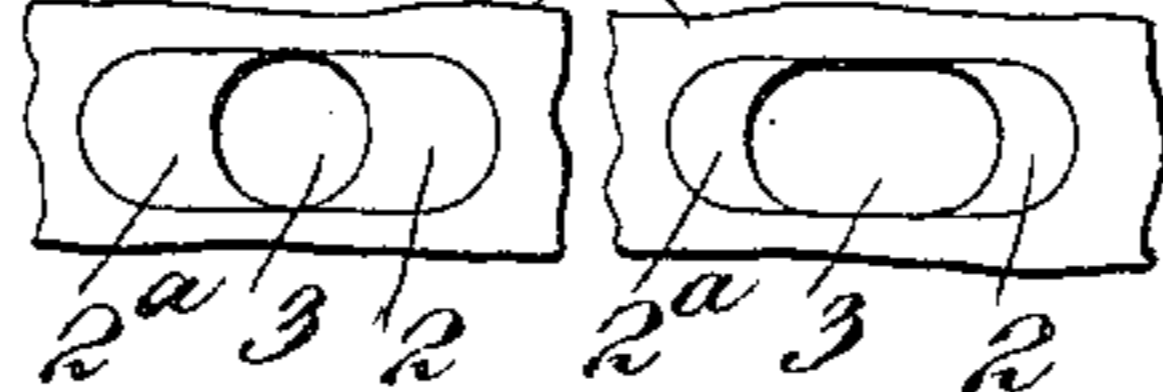


Fig. 12

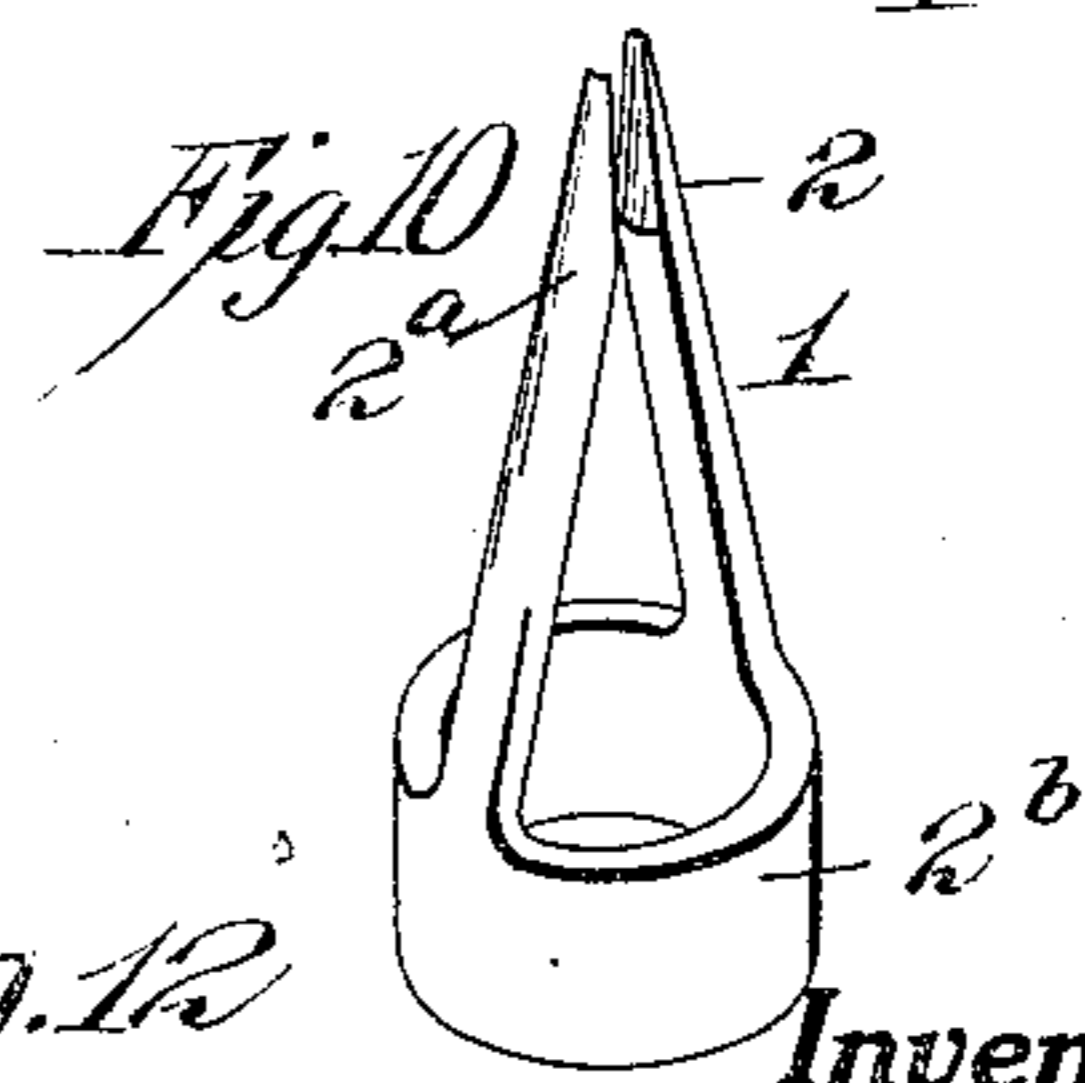
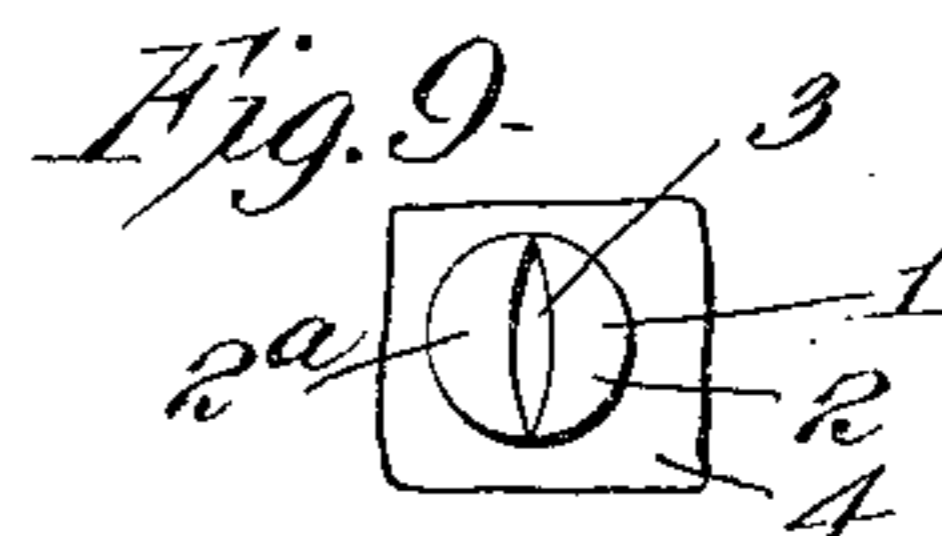
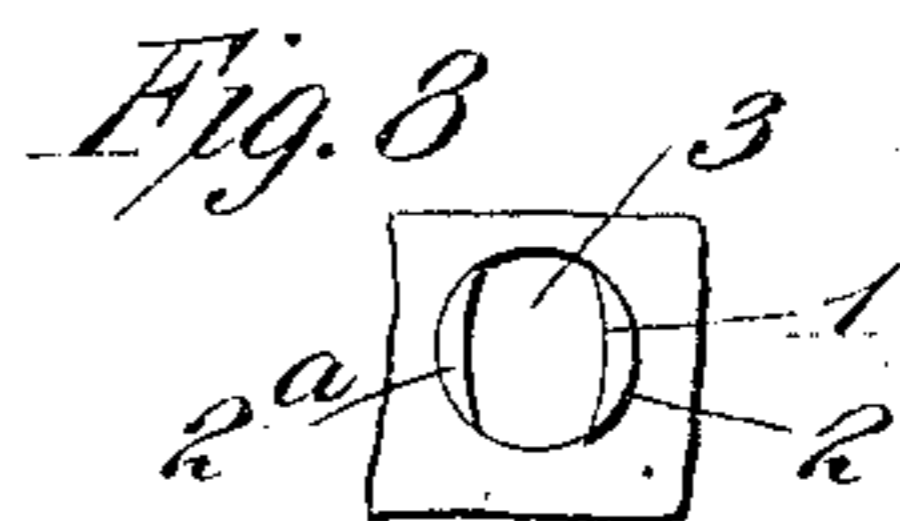


Fig. 6

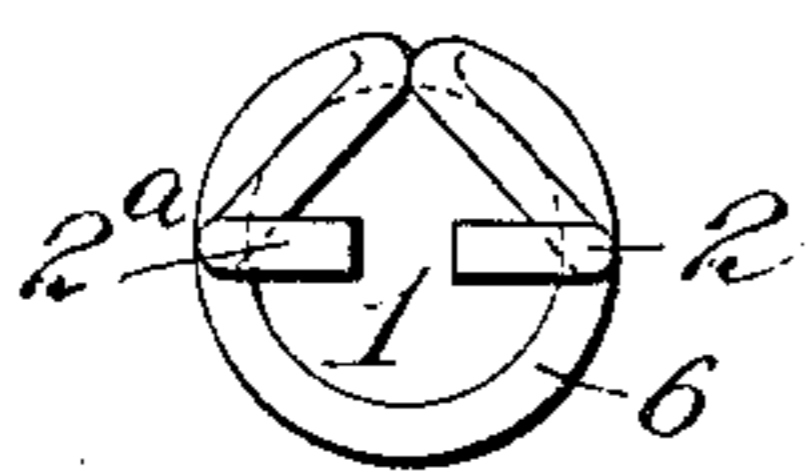
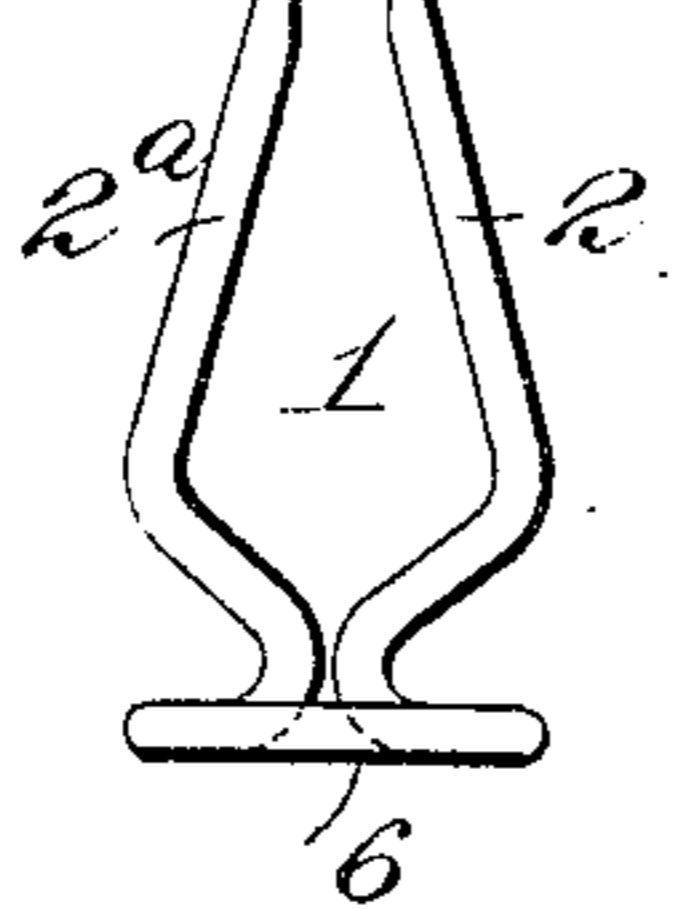


Fig. 7



Witnesses:

Geo. F. Coleman  
John Bokch.

Inventor

Aaron P. Storrs,  
By Dyer & Dyer

Attorneys.

# UNITED STATES PATENT OFFICE.

AARON P. STORRS, OF OWEGO, NEW YORK.

## NEEDLE-VALVE.

969,573.

Specification of Letters Patent.

Patented Sept. 6, 1910.

Application filed February 4, 1909. Serial No. 475,950.

*To all whom it may concern:*

Be it known that I, AARON P. STORRS, a citizen of the United States, residing at Owego, Tioga county, State of New York, have invented a new and useful Needle-Valve, of which the following is a specification.

The object I have in view is the production of a valve of the needle type, in which the jet of fluid or liquid issuing from the orifice will be solid and compact under all conditions of opening or closure of the valve.

Needle valves, so far as I am aware, which employ a single solid needle, when partly closed produce a jet which is tubular or hollow. This is objectionable for certain purposes,—particularly for use in a Bunsen gas burner. It is also objectionable in other situations, as in directing nozzles for water and other liquids and fluids.

By my invention, I seek to produce a valve in which the issuing jet will not be hollow or tube-like, and which will not be broken up, but, on the contrary, will be solid and compact. These and further advantages will appear from the following specification and accompanying drawings, considered together or separately.

In the drawings: Figure 1 is a cross-section of one form of valve embodying my invention. Fig. 2 is a plan view of the orifice when entirely closed. Fig. 3 is a detail view showing the needle completely closing the orifice. Fig. 3<sup>a</sup> is a view showing the sectional construction of the body of each member of the needle. Fig. 4 is similar to Fig. 2 but with the orifice partly closed. Fig. 5 is a view similar to Fig. 3, with the orifice closed to the extent illustrated in Fig. 4. Fig. 6 is a plan view; and Fig. 7 is an elevation of one form of needle for use with the valve. Fig. 8 is a detail view showing a needle which will not entirely close the orifice, the members being in partly open position. Fig. 9 is a similar view, showing the parts in a completely closed position; Fig. 10 is a detail view of a modified form of needle; and Figs. 11 and 12 represent a modification, showing the orifice contracted and extended.

In carrying out my invention, I provide a needle which I designate a split needle. This needle is so arranged that its parts will separate to expose the orifice, and will reduce the cross section of the orifice in one dimension,—the other dimension of the orifice remaining constant.

Referring to Fig. 3, the needle 1 is shown as formed of two parts, 2 and 2<sup>a</sup>. In the embodiment illustrated, these parts are formed of wire of circular cross section, as shown in Fig. 3<sup>a</sup>. The two parts of the needle lie within an orifice 3 formed in the member 4. As shown in Figs. 2 and 4, the orifice is of circular cross section. In the embodiment illustrated the cross section of each of the parts of the needle and the orifice is the same. The ends of the parts are beveled, as shown in Fig. 3, and are arranged to lie at such an angle to one another that the beveled faces may be brought into engagement. When in this position, and lying within the orifice 3, they will completely close the latter. As the valve is opened by withdrawing the needle from the orifice, the two parts of the needle will separate (as shown in Figs. 1 and 5), producing an opening which, as shown in Fig. 4, will be a four sided figure, having two opposed straight sides and two opposed outwardly curved sides,—the straight sides being formed by the inner beveled faces of the needle parts, and the curved sides by the wall of the orifice. The members of the needle are made to separate as the needle is withdrawn from the orifice. One way of securing this is by making them of elastic material and holding them under tension. It will be apparent that, the cross section of the unbeveled portion of each part being the same shape and size as the orifice, as the valve is opened and the outside of each part is forced against the inner walls of the orifice, a close joint will be made between some portion of the wall of the orifice and the part,—thus closing the orifice at every point except between the two opposing parts. The jet, therefore, issuing between the parts of the needle, will be of solid cross section and will not be hollow or tube like, as is the case where the needle is of a single part.

Instead of making the opposing walls of the two needle parts with plane surfaces, as shown in Fig. 4, they may be made with concave surfaces (Figs. 8, 9 and 10). In this case the valve, when opened, will leave an opening which is not formed with two opposed straight sides, but, on the contrary will have two opposed curved sides and two other opposed curved sides as before.

Fig. 1 shows one way of practically carrying out my invention. The needle 1,

as shown, is made of stamped metal and consists of the two needle parts 2 and 2<sup>a</sup> and an integral, cylindrical base 2<sup>b</sup>, and, as illustrated, it lies within the member 5. The member 4, which contains the orifice 3, is screwed upon the member 5. By changing the position to that shown in dotted lines (Fig. 1), the member 4 may be forced down upon the needle, drawing the two parts of the needle together and thereby closing the orifice.

Figs. 6 and 7 show a form of needle made of wire. The two parts 2 and 2<sup>a</sup> are formed of the same piece of wire which is bent to circular form at 6. This forms a base for the needle, by means of which it may be supported in position. The shape of the orifice and the jet is immaterial. Fig. 11 shows a jet of circular cross-section when the orifice is contracted, and Fig. 12 shows the same orifice expanded.

In accordance with the provisions of the patent statutes, I have described the principle of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the appa-

ratus shown is merely illustrative and that the invention can be carried out in other ways.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A needle valve having an element with an orifice, and a needle with two parts which cooperate to produce a solid, compact and non-tubular jet.

2. A valve having an element with an orifice, with a two-part needle working within the orifice to produce a compact and solid jet.

3. A valve having an element with an orifice, a two-part needle engaging within the orifice, and means to relatively move the two to create an opening which will produce a solid and compact jet at all positions of the orifice and needle.

This specification signed and witnessed this 28th day of January, 1909.

AARON P. STORRS.

Witnesses:

CHAS. P. STORRS,  
R. L. WILTSE.