

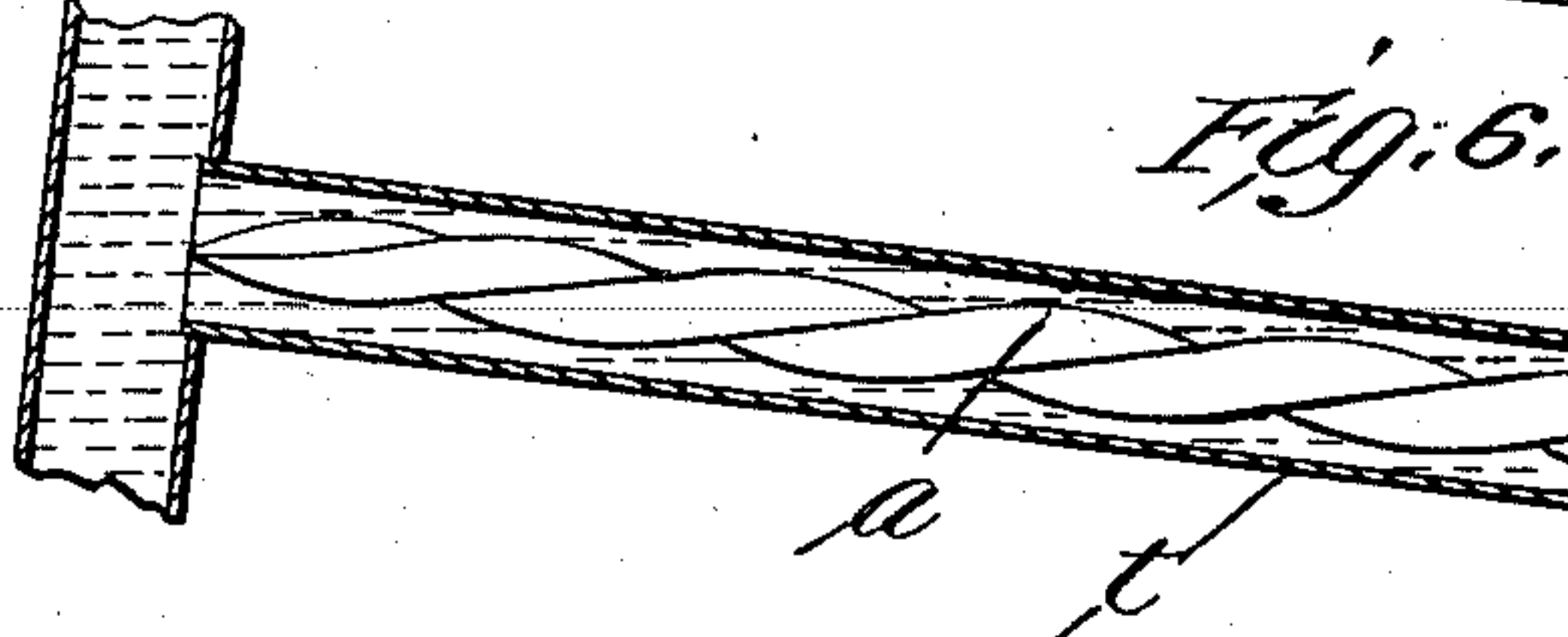
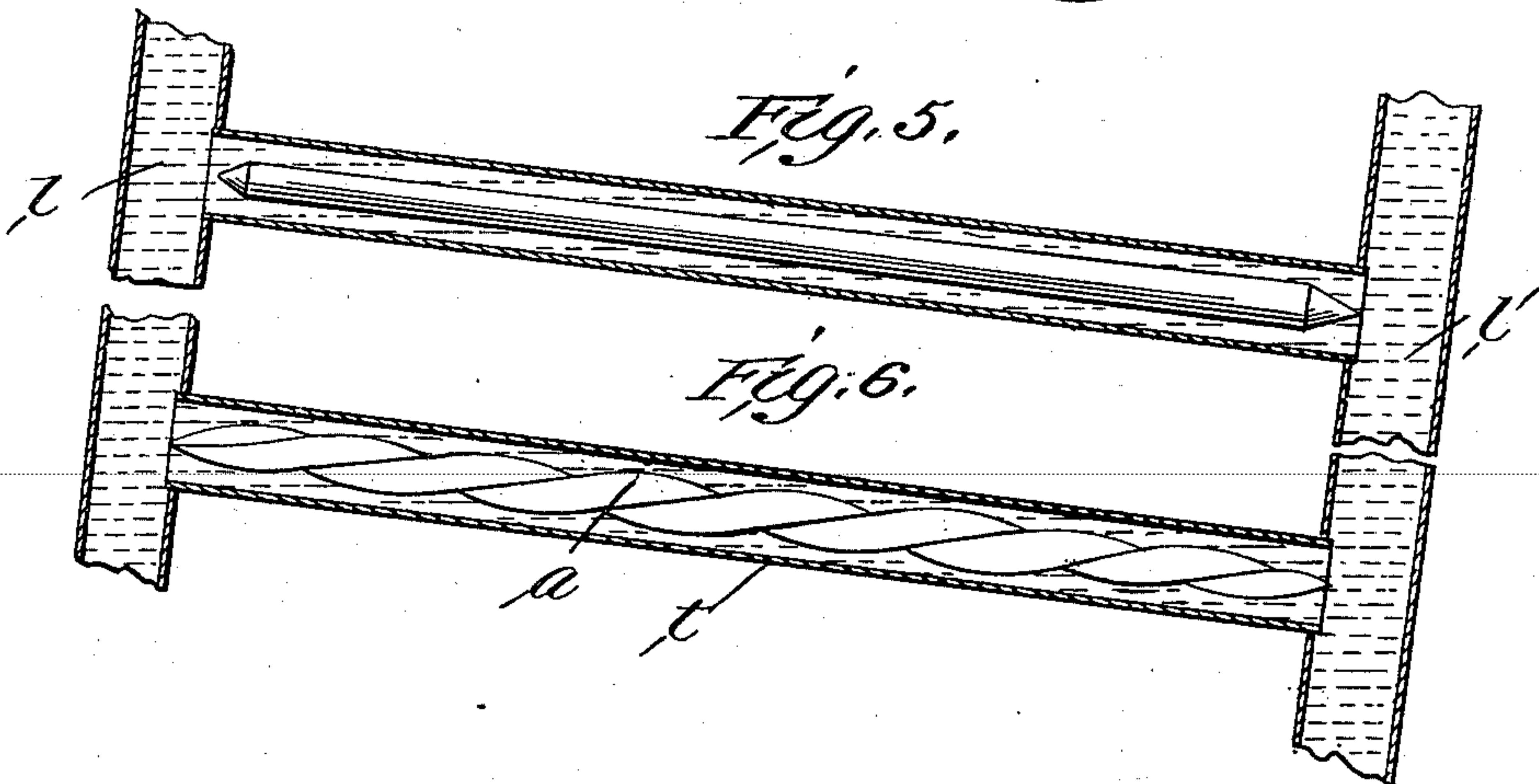
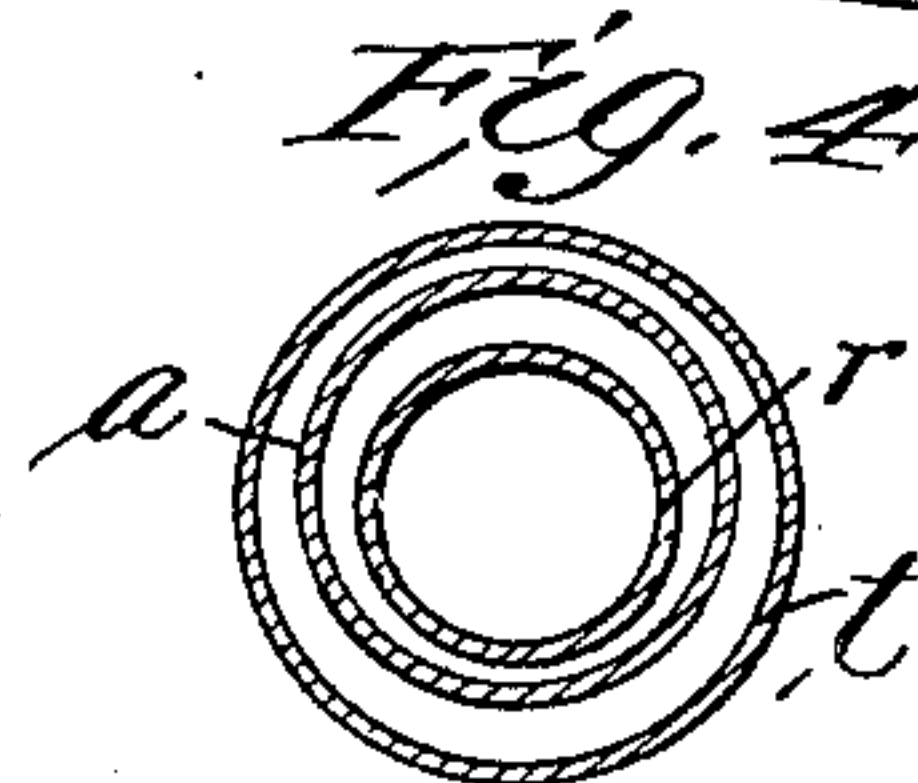
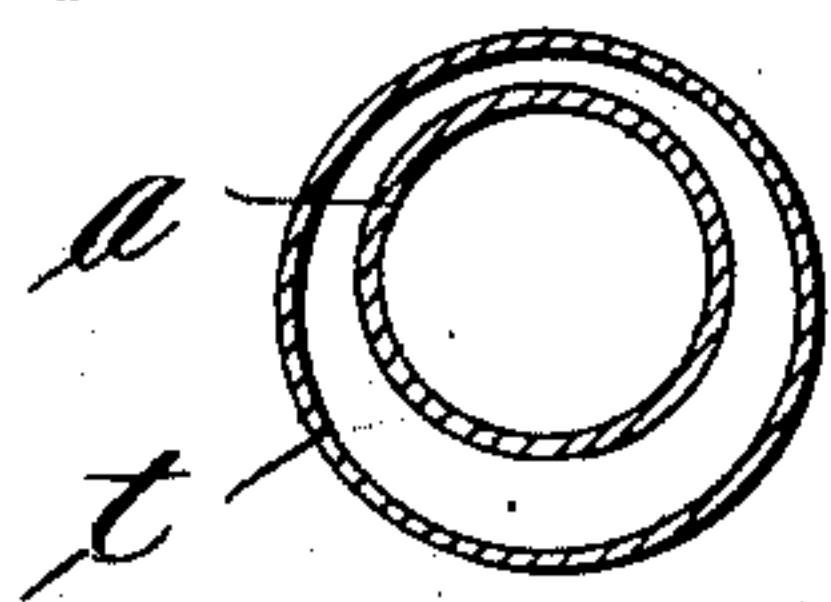
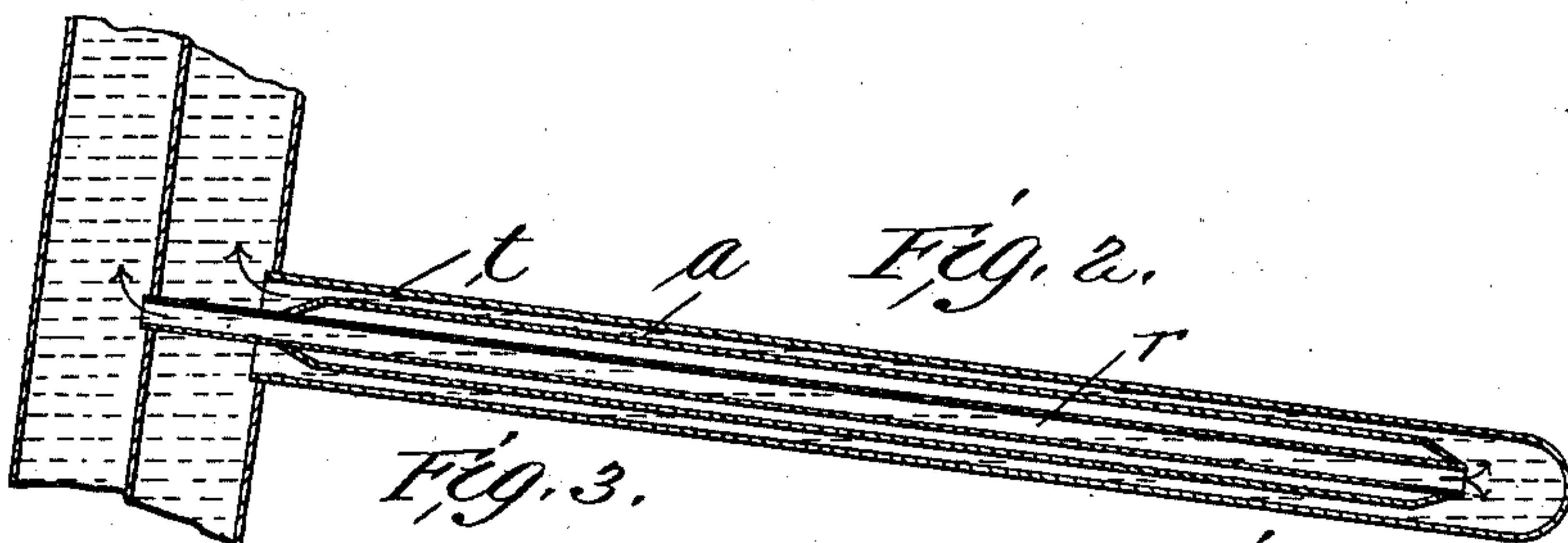
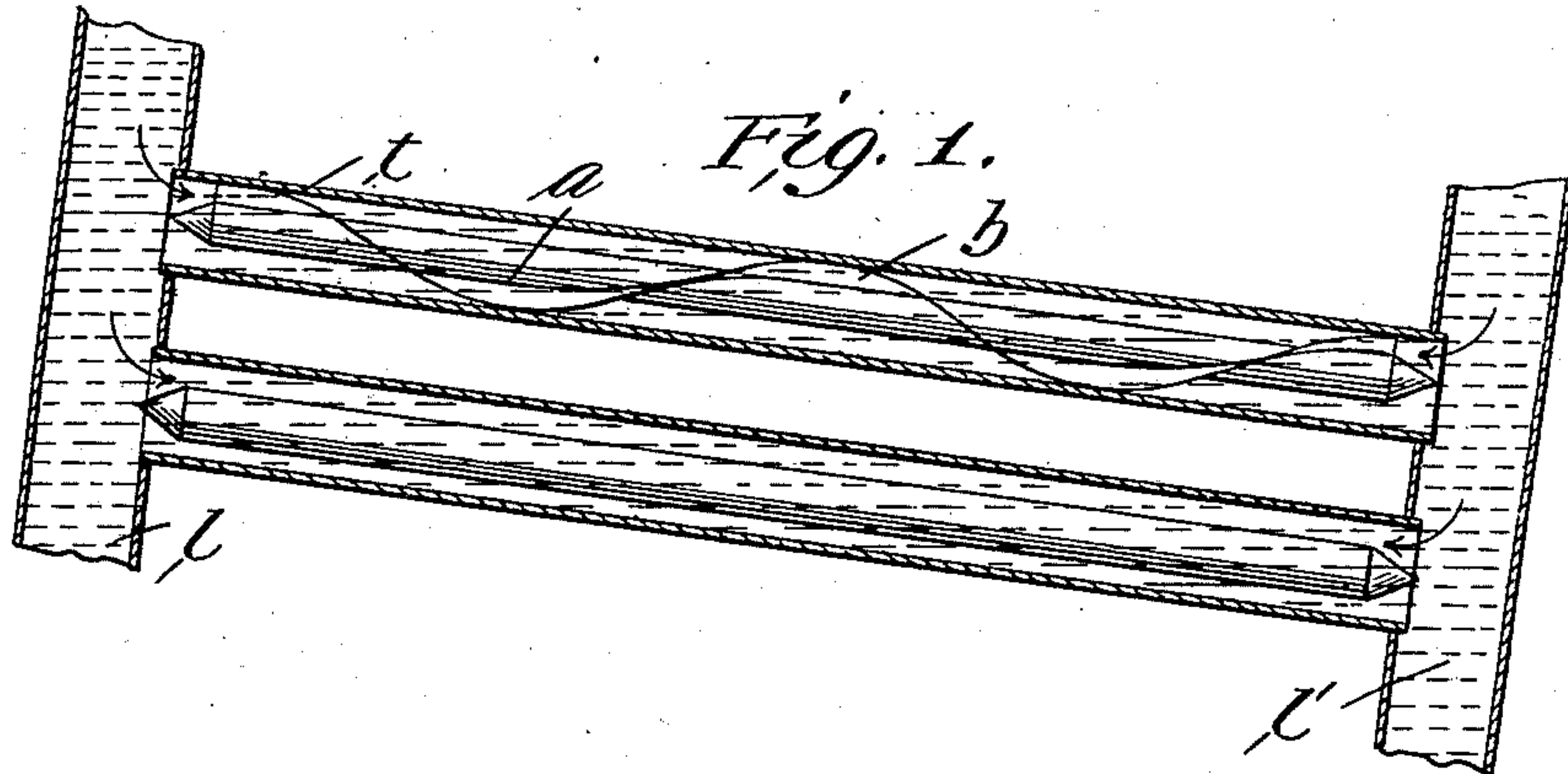
No. 665,912.

Patented Jan. 15, 1901.

E. JOLICARD.
BOILER.

(Application filed Jan. 3, 1900.)

(No Model.)



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UNITED STATES PATENT OFFICE.

EMILE JOLICARD, OF LYONS, FRANCE.

BOILER.

SPECIFICATION forming part of Letters Patent No. 665,912, dated January 15, 1901.

Application filed January 3, 1900. Serial No. 260. (No model.)

To all whom it may concern:

Be it known that I, EMILE JOLICARD, a citizen of France, residing at Lyons, France, have invented certain new and useful Improvements in Water-Tube Boilers, of which the following is a full, clear, and exact description, and for which I have made application for patent in France, dated December 13, 1899.

The invention is applicable to straight-tube water-tube boilers. In these boilers it is of the greatest importance that in all the tubes forming the group, including the lower tubes exposed to the radiation of the furnace, as well as the upper ones, which are less heated, the ascending current of water and of steam should have sufficient speed to obviate the tartarous deposits and the overheating of the tubes. It is also desirable that this speed be as nearly as possible uniform in all the tubes in order that each of them may deliver into the collector a mixture of water and steam having about the same proportions. To realize this condition of a nearly-uniform speed of the upward current in all the tubes, I place in the interior of each tube a cylindrical obstructor of variable diameter, limiting the section of passage for the current proportionately to the evaporating power of this tube. Thus the tubes of the lower row exposed to the furnace will receive obstructors of small diameter or none at all, according to the greater or less intense heating conditions of the boiler. The tubes of the upper rows will receive gradually larger obstructors in proportion as they are less heated. These obstructors will be preferably formed of tubes. The accompanying drawings show the arrangement adopted for the two most frequently used forms of water-tube boilers.

In boilers having two separate sheets of water *l l'*, Figure 1, the obstructor-tube *a* is closed at both ends, but not hermetically. It only serves to limit the section of passage for the upward current. In order to fix this tube in the center of the main tube *t*, an elongated helical web *b* may be fixed around its exterior surface, which will at the same time have the effect of giving to the rising current a gyratory motion very favorable for evaporation.

In boilers having two juxtaposed sheets of water *l l'*, Fig. 2, the section of the ascending current may be limited by varying the diameter of the water-return tubes *r*; but it is pref-

erable to keep them the diameter which has been assigned to them and to cover them with a sheath *a*, closed at both ends, without being hermetic, and the diameter of which varies according to the section to be given to the ascending current. The sheath *a* can, like the tube *a* of Fig. 1, be furnished on the exterior with a helical web. In both cases provision may be made for the difference of evaporation existing between the lower and upper parts of the boiler-tube by excentering the obstructor-tube—that is to say, by leaving more space below than above to the current of steam, as shown by the sections, Figs. 3 and 4. Provision may also be made for the steam formed in the length of the boiler-tube by making the obstructor-tube conical—that is to say, by progressively increasing the section of the ascending current, as shown at Fig. 5. Finally the obstructor can without ceasing to fulfil its function have a section of any suitable shape—plain or grooved, constant or decreasing, straight or twisted helically—as shown at Fig. 6.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In water-tube boilers, the combination with the tubes of obstructors of variable section and form, which limit the section of the ascending current of water and steam, proportionately to the evaporating power of each tube, substantially as set forth.

2. In combination in a water-tube boiler, of obstructions in the tubes thereof, said obstructions varying in size corresponding to the relation of the tubes to the source of heat.

3. The combination with a water-tube boiler comprising a series of tubes, a collector at both ends of said tubes into which said tubes discharge, of means placed in said tubes to regulate the passage of water through the same, said means bearing such a relation to the distance of said tubes from the fire-box of the furnace that the tubes will all discharge a uniform body of water into the collectors.

In testimony whereof I affix my signature in presence of two witnesses.

EMILE JOLICARD.

Witnesses:

GASTON JEAUNIAU,
THOS. N. BROWNE.