

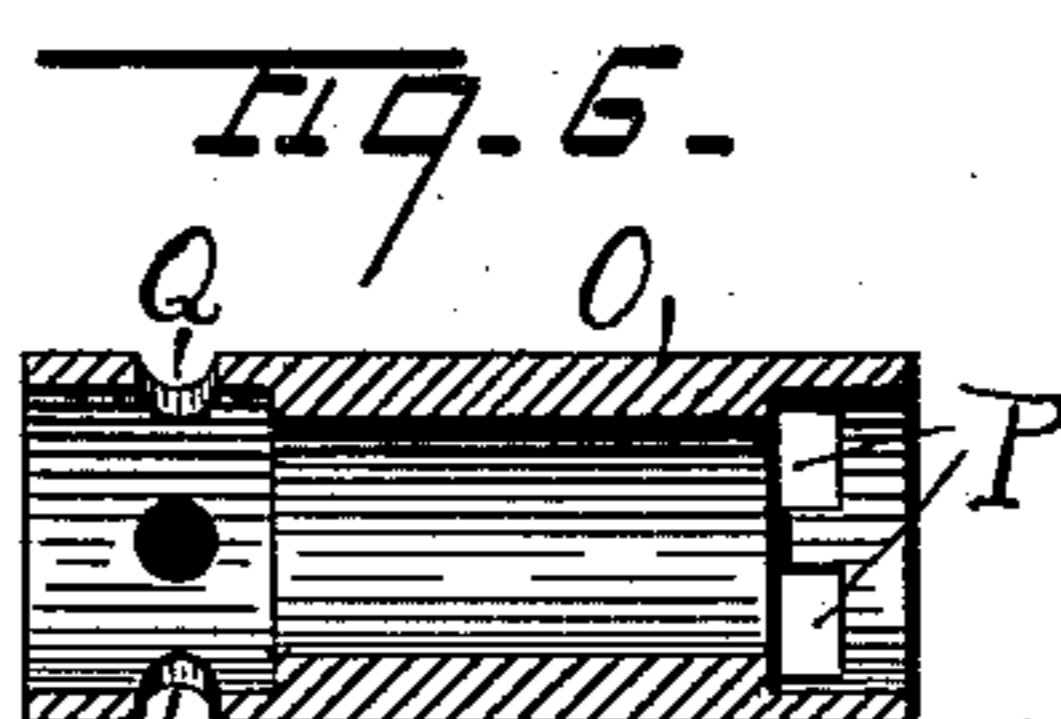
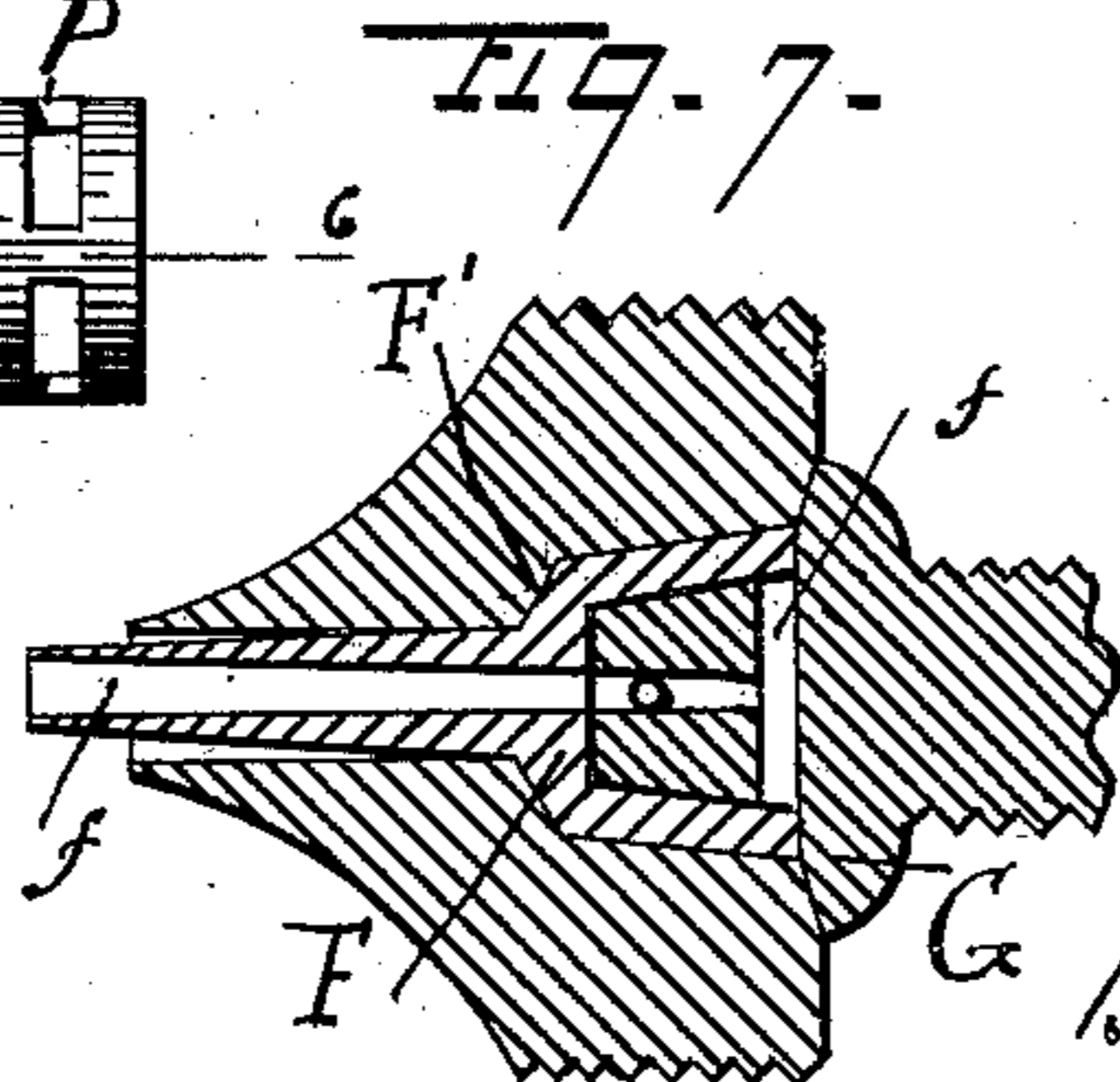
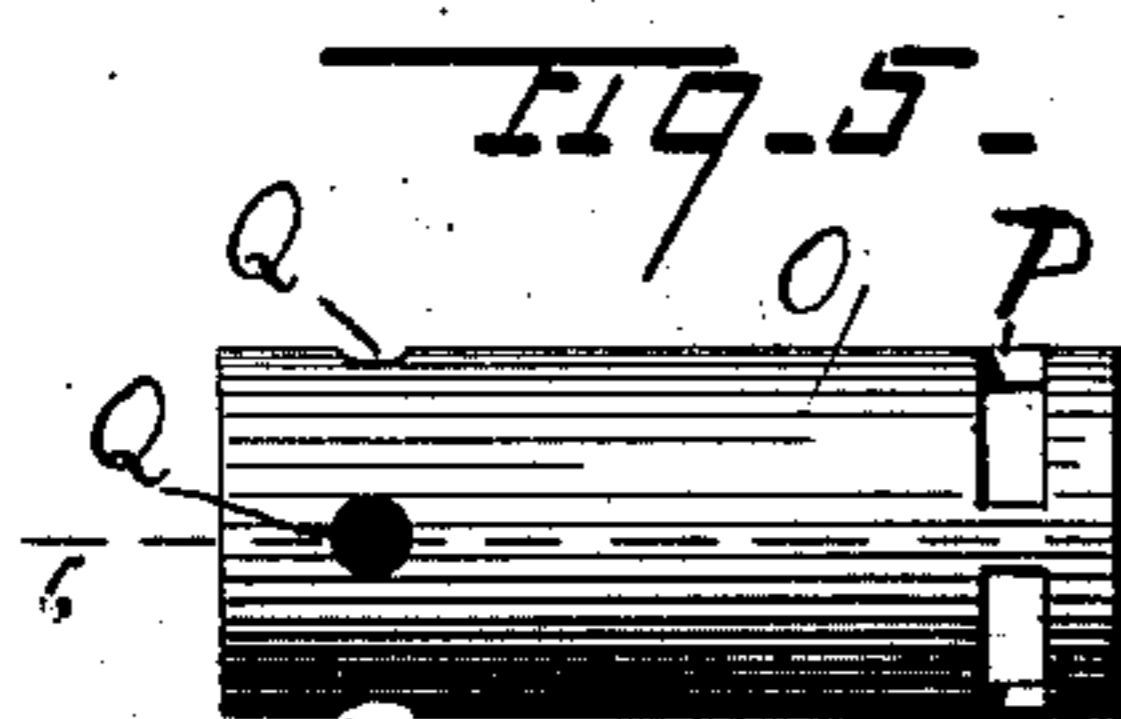
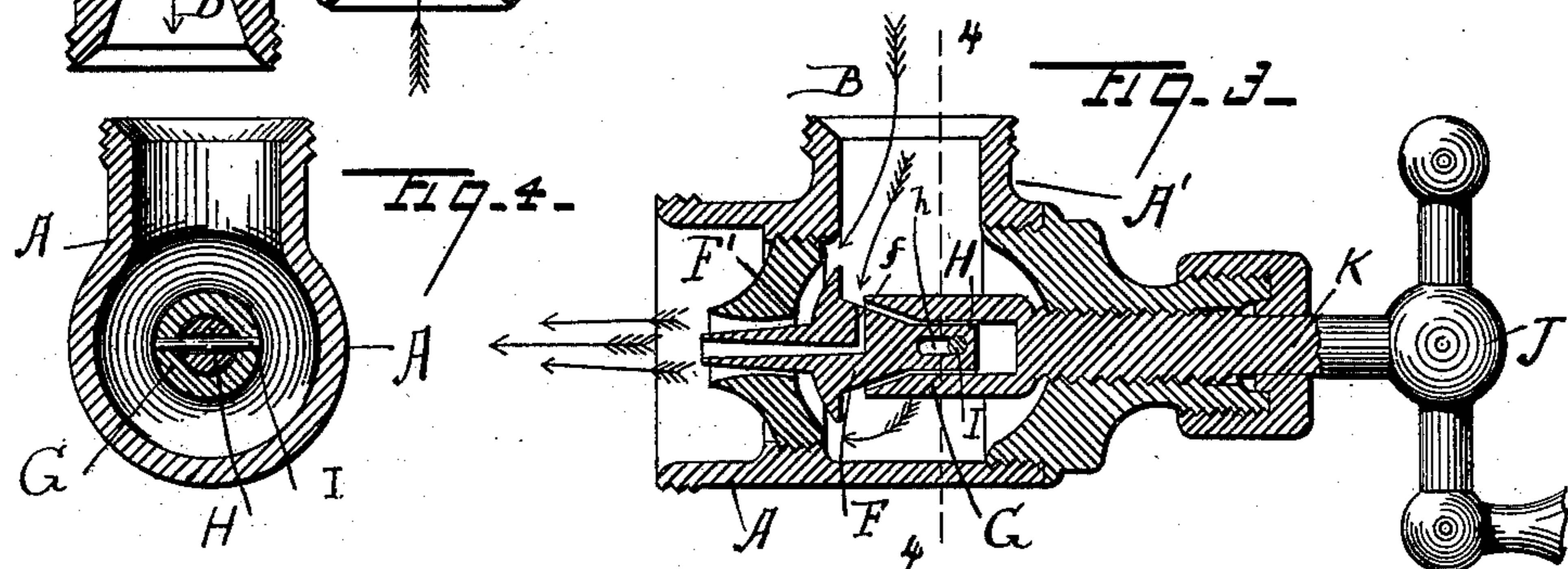
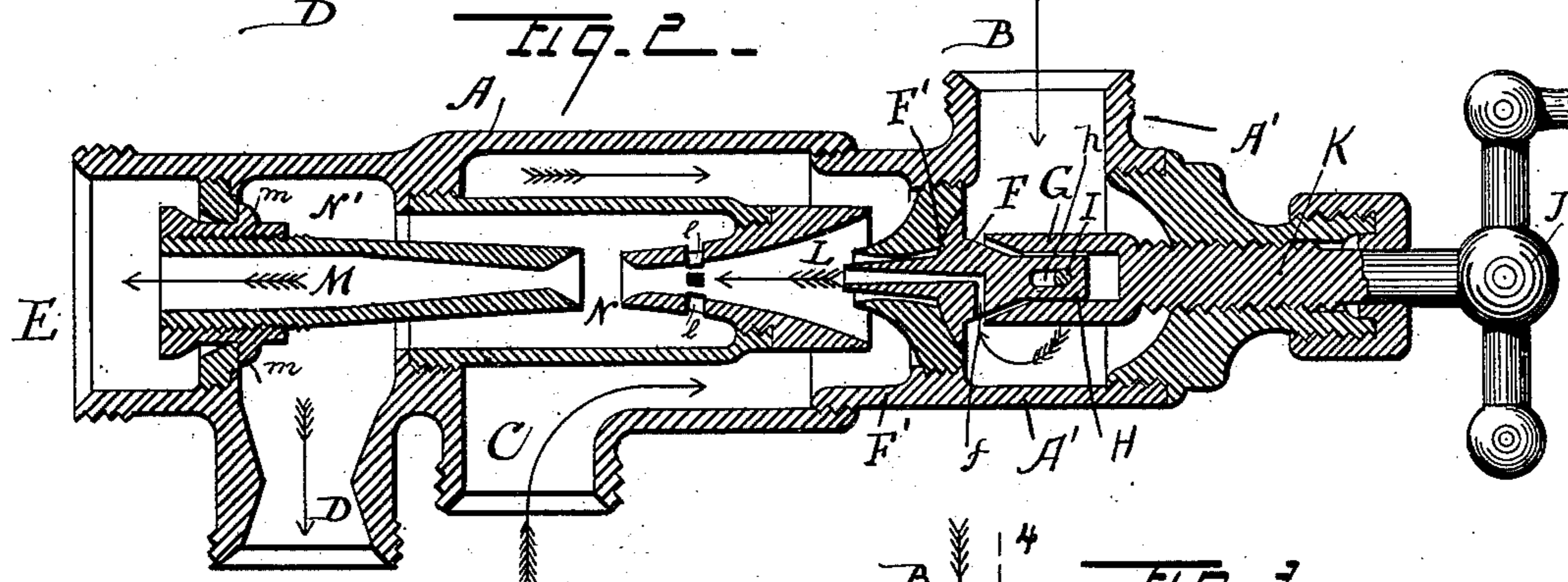
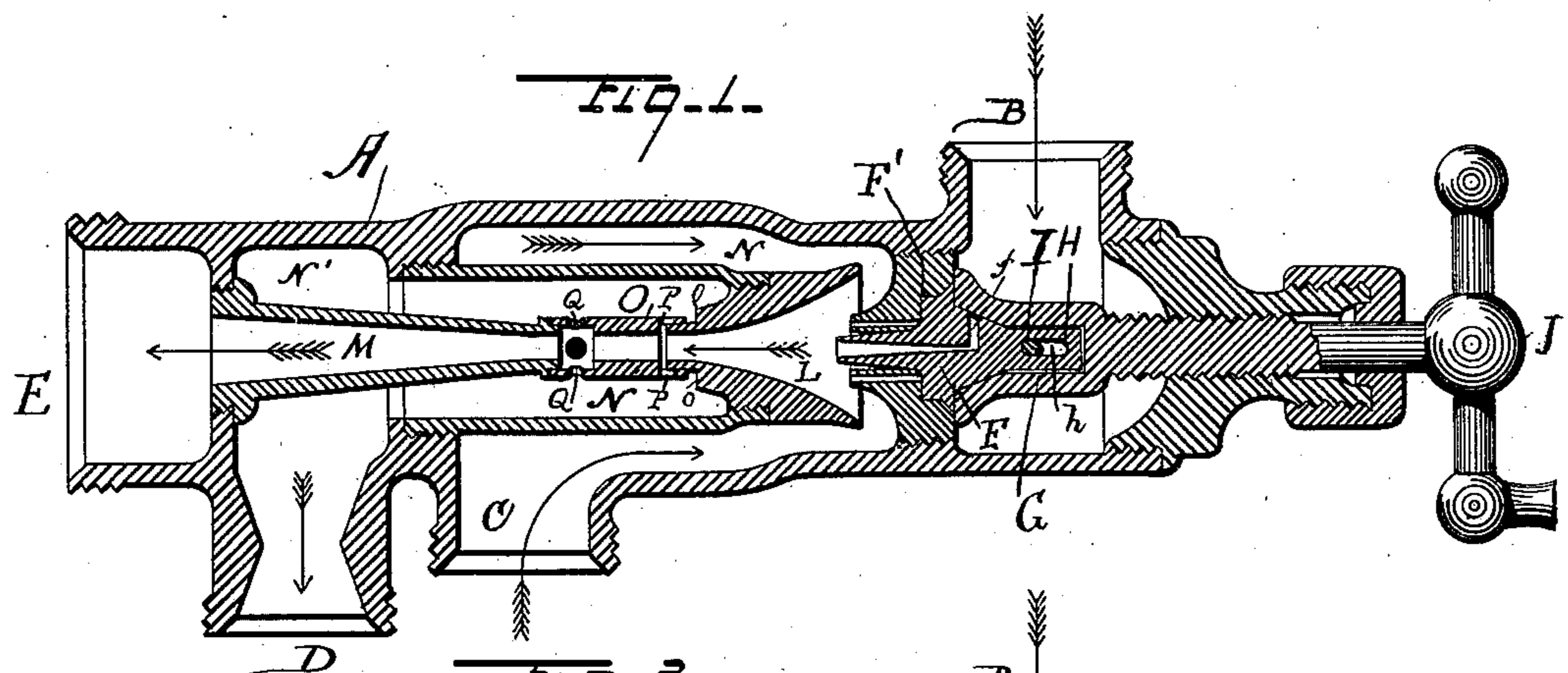
(Model.)

W. T. EWING.

INJECTOR.

No. 376,187.

Patented Jan. 10, 1888.



WINESESS

W. S. Bates

Inventor

William T. Ewing

By C. C. Linticum
—Attorney

UNITED STATES PATENT OFFICE.

WILLIAM T. EWING, OF CHICAGO, ILLINOIS.

INJECTOR.

SPECIFICATION forming part of Letters Patent No. 376,187, dated January 10, 1888.

Application filed January 26, 1887. Serial No. 225,504. (Model.)

To all whom it may concern:

Be it known that I, WILLIAM T. EWING, a citizen of the United States, residing at Chicago, Illinois, have invented certain new and useful Improvements in Injectors, of which the following is a specification.

My improvement relates to that class of injectors known as "lifting-injectors," and its object is to simplify the construction and increase the efficiency of such devices.

To this end my invention consists in certain devices and combinations of devices, as hereinafter particularly claimed.

In the accompanying drawings I have illustrated an injector containing my invention, the principal elements entering into the construction of the injector here illustrated being a casing inclosing the operating parts and provided with steam and water inlets and an overflow-opening, a condensing-chamber contained within said casing and surrounding the free ends of combining and discharge nozzles and communicating with the overflow, a main valve for regulating the supply of steam to operate the injector and having a steam aperture for admitting a small jet of steam to prime the device, an auxiliary valve for closing said steam-aperture, and a pin-and-slot connection between the main and auxiliary valves, whereby the auxiliary valve may be opened by the first movement of the operating-handle, and a further movement of the handle will open the main valve.

Figure 1 is a longitudinal section of the injector with the steam-valves closed. Fig. 2 is a similar view with the auxiliary valve open. Fig. 3 shows the steam end of the injector with the main valve open. Fig. 4 is a transverse section of the injector, taken on line 4 4 of Fig. 3. Fig. 5 is an elevation of a supplementary device for connecting the combining and discharge nozzles shown in position in Fig. 1. Fig. 6 is longitudinal section of the same, and Fig. 7 is a modified form of the steam-valves shown in the preceding figures.

A is the casing, which is provided with a steam-inlet, B, a water-inlet, C, and an overflow-opening, D. This casing is sometimes made in two parts, indicated by the letters A and A' in the drawings.

E is the outlet which leads to the boiler.

F is the main valve, F' is its seat, and *f* the steam-aperture through the main valve.

G is the auxiliary valve which closes the steam-aperture *f*, the face of the valve being conical to fit the conical surface of the main valve.

H is a short stem on the main valve, which enters the hollow of the auxiliary valve in the construction shown in Figs. 1, 2, and 3, and has in it a slot, *h*, as shown. A pin, I, passes through the substance of the auxiliary valve and through the slot *h*.

J is the operating-handle secured upon the end of the stem K of the auxiliary valve.

L is a combining-nozzle, which, as shown in Fig. 2, is provided with perforations *l*, and M is the condensing or discharge nozzle.

N is the condensing-chamber which surrounds the free ends of the nozzles L and M, and N' the portion of said chamber above the overflow.

As shown in the drawings, the chamber N is so arranged with reference to the water-inlet that the feed-water surrounds the same on its way to the suction-nozzle. In some cases I have found it expedient to so arrange the nozzle M that it shall be adjustable endwise, as shown in Fig. 2. In other cases I have found it expedient to have both nozzles fixed in their position and to use an intermediate coupling, O, (shown particularly in Figs. 5 and 6,) which is made to ride upon the nozzles L and M, and is provided with perforations P and Q, communicating with the chamber N.

To put the injector in operation handle J is turned, thereby drawing out the auxiliary valve G and opening the aperture *f*, admitting a small jet of steam to prime the injector, the main valve F being held upon its seat by the pressure of the steam upon its extended face until the pin I has traversed the length of the slot, when the further turning of the handle in the same direction will open the main valve and sufficient steam be admitted to force water to the boiler.

The above particular description is intended to explain the construction of the injector illustrated in the drawings. In the practical operation of such an injector it will be found exceedingly simple. The working parts are all arranged in an axial line, which arrangement

is of itself an element of utility. The construction and arrangement of valves herein set forth enables even a novice to operate the injector; but my object has been to secure the most thorough condensation of steam with the least expenditure of power, and at the same time render the operative parts as simple as consistent with this object, and therefore I have provided the condensing-chamber as a means to this better condensation of steam. I prefer to place the feed-water opening so that the water will flow around the condensing-chamber N, whose walls are made thin, so as to be readily cooled by the contact. The steam not condensed in the combining-nozzle will pass through the first vent, as the perforations P or L, and, striking the walls of the chamber N, will be cooled and condensed and taken up by the condensing or discharge nozzle. Of course this condensing chamber is applicable to non-lifting injectors.

It will be observed that this condensing-nozzle enters the condensing-chamber N for a considerable portion of its length, so that it may be surrounded by the cool feed-water. I prefer to make the overflow with constricted sides, as shown, and it may be provided with an ordinary vertical check-valve opening outward, in which case said valve will act as a cushion against any back-pressure from the boiler, and the overflow being closed the steam not condensed may also fill the space above the overflow—that is, the chamber N'—from whence it will be drawn by the jet of water entering the discharge-nozzle. The nozzle M may be made adjustable, as shown in Fig. 2, or stationary, and the coupling O may be used, if desired, or the suction-nozzle may be provided with perforations, as shown, and this coupling dispensed with. As shown, the coupling O is ar-

ranged to be self-adjusting by the action of the steam; but it may also be made stationary, the limit of its play, when made adjustable, being from the position shown in Fig. 1 up against the shoulders o o. For use with muddy waters or those containing incrustating material, I prefer to make the injector with the suction-nozzle, (shown in Fig. 2,) omitting the coupling O and making the nozzle M stationary, as shown in Fig. 1; but I do not desire to confine my invention to the use of any particular form or adjustment of nozzles so long as said nozzles communicate with the condensing-chamber herein shown.

I do not here claim the valve construction above described, as I intend to make this feature the subject of a separate application.

I claim—

1. In an injector, the combination of a condensing-chamber located in the feed-water passage, but closed thereto and communicating with the overflow, a suction or combining nozzle communicating with said chamber, and a discharge or condensing nozzle also communicating with said chamber, substantially as set forth.

2. In an injector, the combination of a condensing-chamber located in the feed-water passage, but closed thereto and communicating with the overflow, a suction or combining nozzle opening into said chamber and also communicating with it by apertures near the point where it enters said chamber, and a condensing or discharge nozzle opening out of said chamber, substantially as set forth.

WILLIAM T. EWING.

Witnesses:

JAMES T. HAIR,
C. C. LINTHICUM.