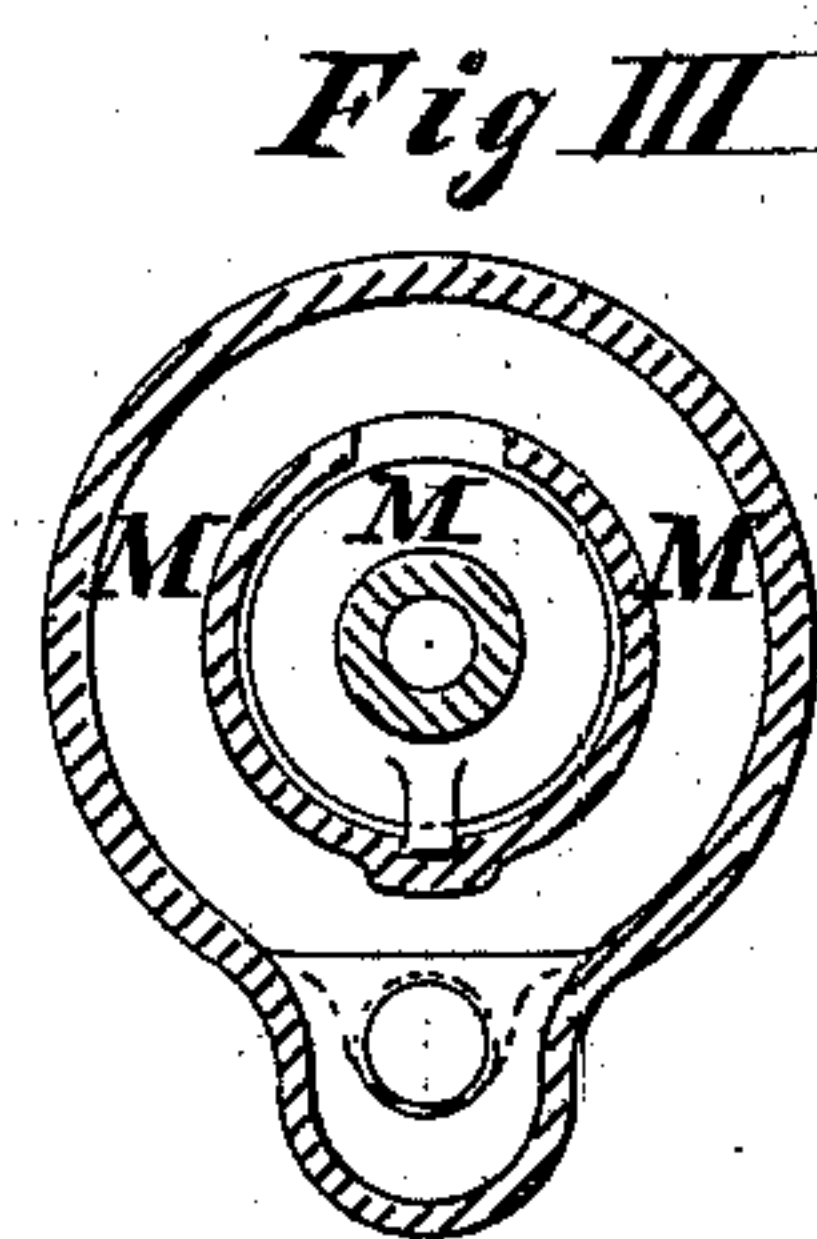
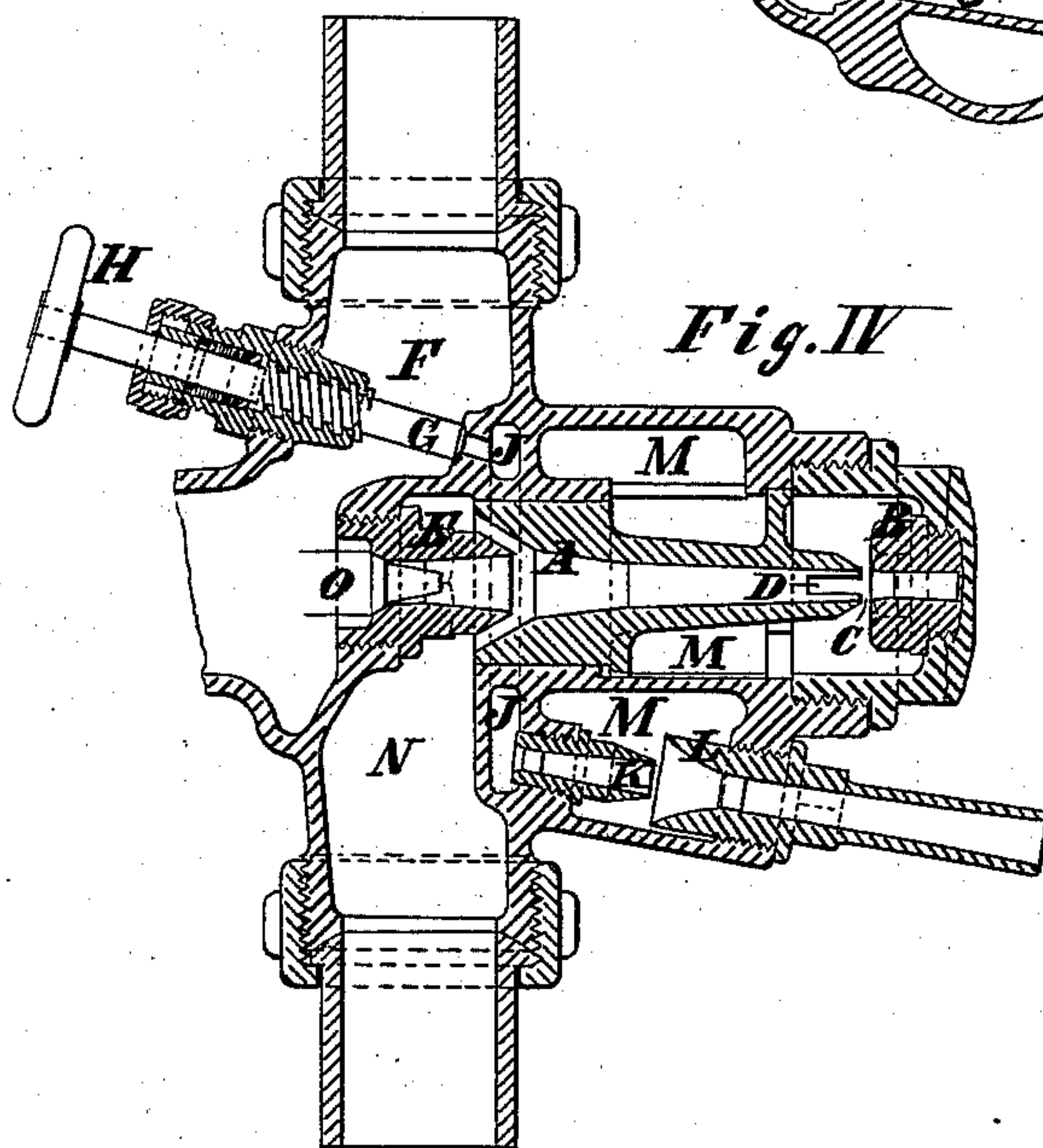
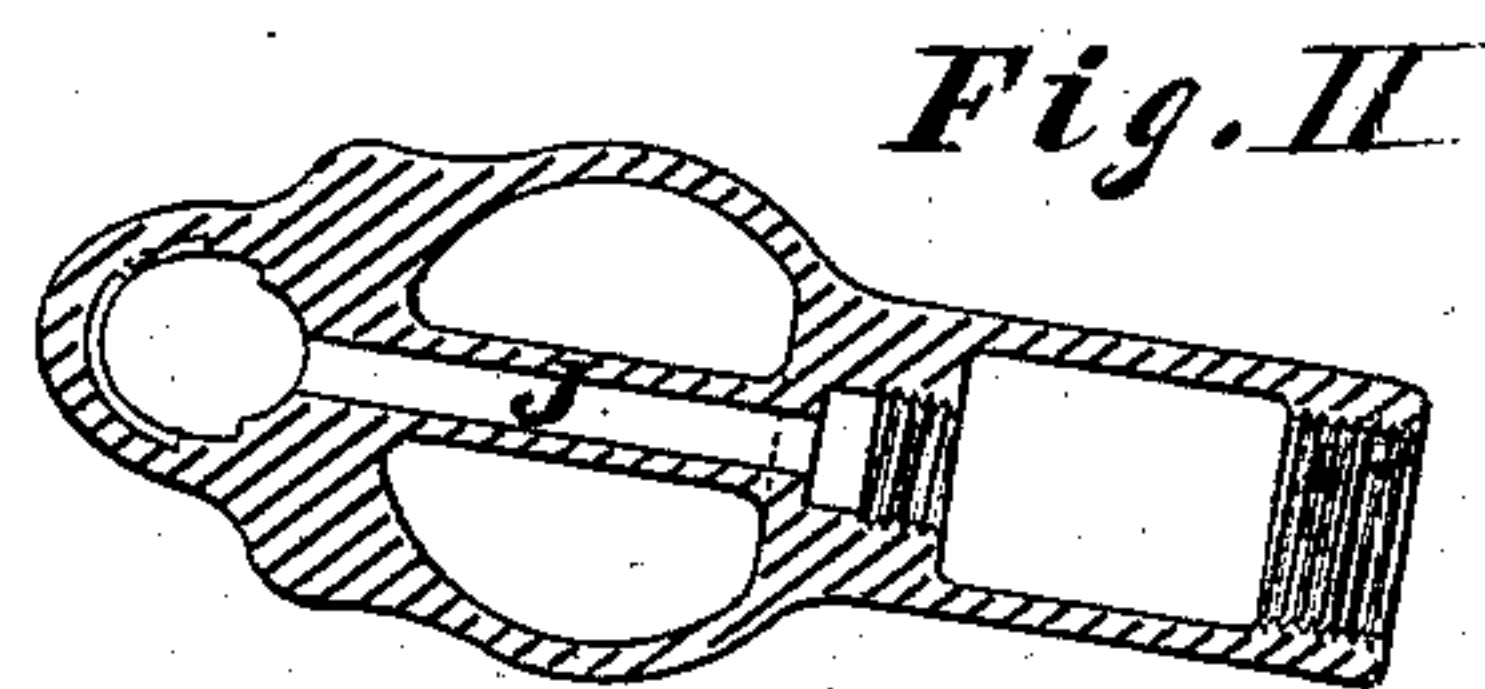
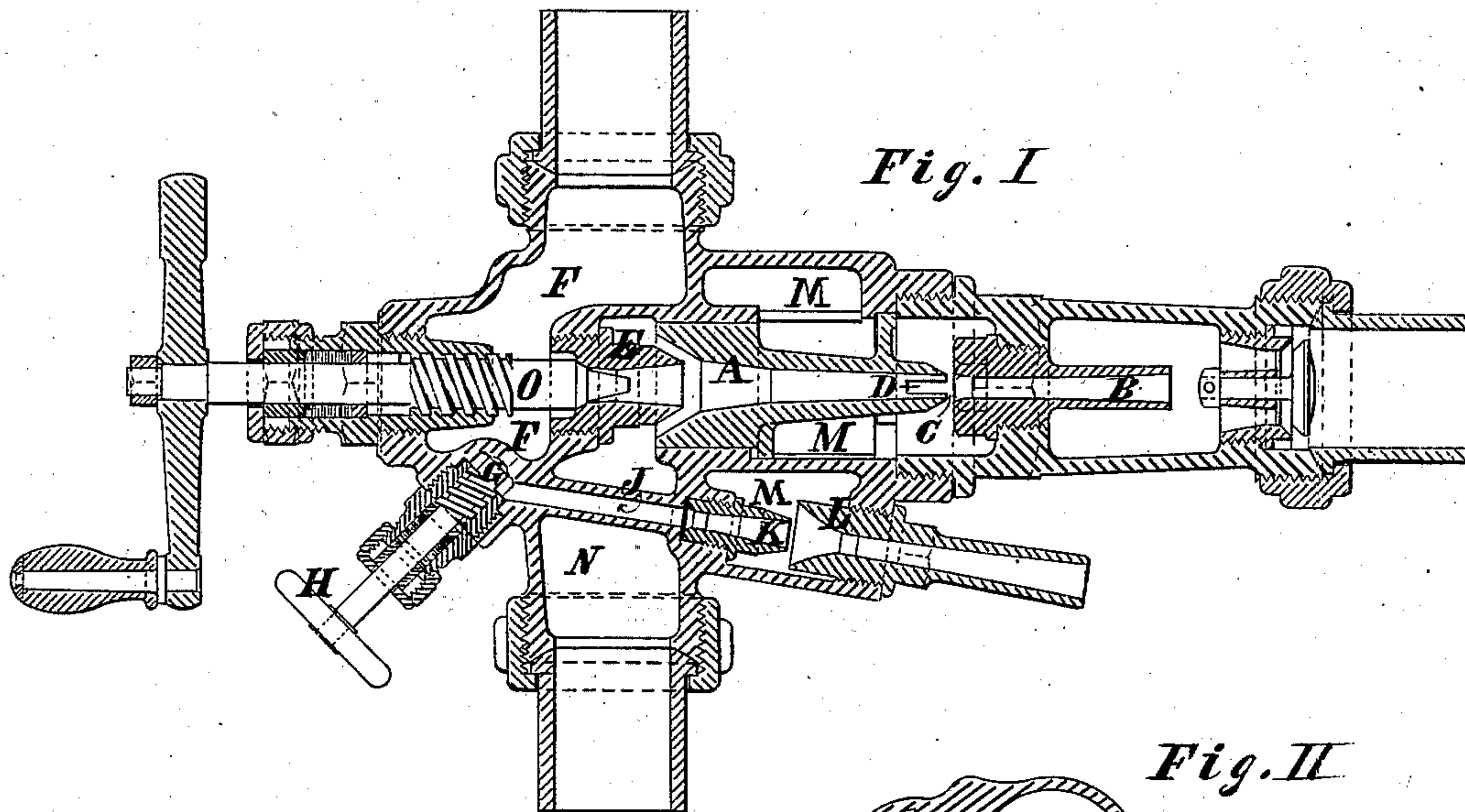


W. SELLERS & J. S. BANCROFT.
Injector for Feeding Boilers.

No. 224,798.

Patented Feb. 24, 1880.



Witnesses:
W. B. Schrock
Dan B. Ely

Inventors:
Wm. Sellers
J. Sellers Bancroft

UNITED STATES PATENT OFFICE.

WILLIAM SELLERS AND J. SELLERS BANCROFT, OF PHILADELPHIA, PENN-
SYLVANIA; SAID BANCROFT ASSIGNOR TO SAID SELLERS.

INJECTOR FOR FEEDING BOILERS.

SPECIFICATION forming part of Letters Patent No. 224,798, dated February 24, 1880.

Application filed December 2, 1879.

To all whom it may concern:

Be it known that we, WILLIAM SELLERS and J. SELLERS BANCROFT, of the city and county of Philadelphia, and State of Pennsylv-
5 vania, have invented certain new and useful Improvements in Injectors for Feeding Boil-
ers; and we hereby declare the following to be a full and exact description thereof, refer-
ence being had to the accompanying drawings,
10 which form part of this specification.

An object of our present invention is to pro-
vide a supplemental lifting jet or ejector apart
from the ordinary lifting and forcing nozzles
of the injector, but which shall be combined
15 with the outer casing of the injector, and so
arranged as to draw its steam-supply within
this casing and its water-supply through the
combining-tube and overflow-chamber of the
injector with which it is placed.

20 A further object of our invention is to im-
prove the means of escape for the overflow be-
tween the combining and discharging tubes
to facilitate the starting of the injector.

The nozzles of the injector, when properly
25 proportioned for forcing water into a boiler,
are not well adapted for lifting the supply-
water to the injector. This latter has been
improved in two ways—first, by a supplemental
jet, which draws its supply through the com-
30 bining-tube of the injector, as shown and de-
scribed in the patent granted James Gresham,
August 7, 1866; second, by forming a steam-
nozzle in the spindle, which regulates the sup-
ply of steam to the injector, as shown and de-
35 scribed in the patent granted Wm. Sellers,
March 3, 1868, and the lifting-jet of our present
invention is an improvement upon the former.
All such supplemental lifting jets or ejectors
having the nozzles separate and apart from
40 the injector-nozzles have heretofore required
extra pipes and fittings outside the injector-
case, involving much additional expense and
increasing the number of joints to be kept
tight, as well as requiring more space than
45 was necessary for the injector alone; and our
improvement consists in providing a conduit
within the injector-case, from the steam-cham-
ber to the ejector, in connection with the over-
flow-chamber, and providing said conduit with
50 an inlet-valve.

The overflow-space between the combining
and delivery tubes of injectors as heretofore
constructed usually consists of an annular open-
ing of sufficient width to permit the necessary
escape of water in starting the instrument. 55
With such an arrangement of overflow, and
with a water-supply regulated by hand, either
by adjusting the relative position of the tubes
or by throttling the water-supply passage, if too
much water is admitted to the instrument in 60
starting, the combined jet of steam and water
will all escape through the overflow-space with-
out attaining sufficient velocity to enter the
boiler through the delivery-tube. If the water-
supply is then reduced, this escape or overflow 65
water will gradually diminish, and finally cease
when the jet is established and the injector is
at work feeding into the boiler; but, however
slowly the water-supply may have been re-
duced, it will be found, after the injector is at 70
work, that more feed-water may be admitted
without causing an overflow, and in many
cases the point where all the water is taken
up without waste at the overflow is so close
to the minimum supply with which the in- 75
jector will work that frequently the jet is en-
tirely broken by the endeavor to stop the waste,
and the operation of starting must be repeated.

To remedy this defect, which is probably
due to the action of the atmosphere upon the 80
exposed surface of the jet, the nature of our
improvement consists in contracting materi-
ally the width of the annular overflow-space
and providing one or more openings or slots
(preferably two) in the lower end of the com- 85
bining-tube and parallel to the axis thereof,
which slots connect with the annular overflow-
space.

The accompanying drawings, which form
part of this specification, represent an injector 90
embodying our present improvements.

Figure I is a longitudinal section, showing
all the parts in position. Fig. II is a section
of the water-passage N in the line of the steam-
passage J. Fig. III is a cross-section through 95
the overflow-chamber M. Fig. IV shows a
modification of the steam-conduit.

Similar letters denote similar parts.

B, Fig. I, is a delivery-tube, and A is a com-
bining-tube, having a narrow annular opening, 100

C, between them. The lower end of A has a slot or slots, D, extending from a short distance above the end into the annular opening C. The function of these slots is to permit
 5 a free escape of the water sidewise from the jet, while the walls of the tube between the slots serve to guide the jet and maintain its form, so that it reaches the delivery-tube with much greater velocity than is possible when
 10 the annular opening C is the only overflow; and hence the jet will have sufficient force to enter the boiler long before the waste from the overflow ceases.

F, Figs. I and IV, is the steam-chamber of
 15 the injector, from which steam is admitted, through the steam-nozzle E, to the combining-tube of the injector, and also by the valve G, operated by the hand-wheel H, to the ejector through the conduit J. The discharge-nozzle
 20 K, at the end of the conduit J, discharges a solid steam-jet into the mouth of the draft-tube L, the receiving end of which is in communication with the overflow-chamber M, and the discharging end opens into the air.

25 The operation is as follows: The valve G is opened, and the steam escaping from the discharging-nozzle K into the draft-tube L forms a vacuum in the overflow-chamber M, which communicates, through the combining-tube,
 30 with the water-supply passage N, thus raising the water, which finally escapes by the tube L. As soon as this occurs the spindle O is lifted from its seat on the nozzle E, and the injector begins to work, forcing water into the boiler.
 35 The valve G is then closed and the ejector ceases to operate.

We do not limit our invention to the particular arrangement of lifting jet or ejector hereinabove described, for the conduit J may
 40 be arranged within the flange which separates the water-supply and overflow-chambers, as shown in Fig. IV, in which the steam is carried from the upper part of the steam-chambers F around the bearing for the combining-tube.

It will be seen that the steam-supply and 45 conduits for the ejector are entirely within the body of the injector, and do not in any way interfere with the ordinary arrangements of the instrument for steam, water, or delivery.

We are aware that combining-tubes of in- 50 jectors have been provided with lateral circular holes near their discharging ends, in addition to an annular opening between the combining and delivery tubes, to facilitate the escape of water in starting the injector; but such holes, 55 at their edges opposite to the direction of the jet, present an obstruction to the column of water passing them and create a drip, which is not the case with a slot extending from the end of the combining-tube, such as we have shown 60 and described.

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

1. A solid steam-jet ejector, in combination 65 with an injector, when the steam-conduit from the steam-valve of the ejector passes from the steam-chamber in the injector through the water-supply chamber of the injector, substantially as shown and described. 70

2. A solid steam-jet ejector, in combination with an injector arranged to discharge into the open air when the steam-conduit from the ejector-valve to the ejector is contained entirely within the body or casing of the injector, 75 as and for the purposes set forth.

3. In an injector, a combining-tube provided with a slot at its discharging end, substantially as described, in combination with a delivery-tube, when these combining and delivery tubes are so arranged as to form an annular space between their adjacent ends, as and for the purposes set forth. 80

WM. SELLERS.

J. SELLERS BANCROFT.

Witnesses:

JNO. H. SCHWACKE,

DANL. B. ELY.