

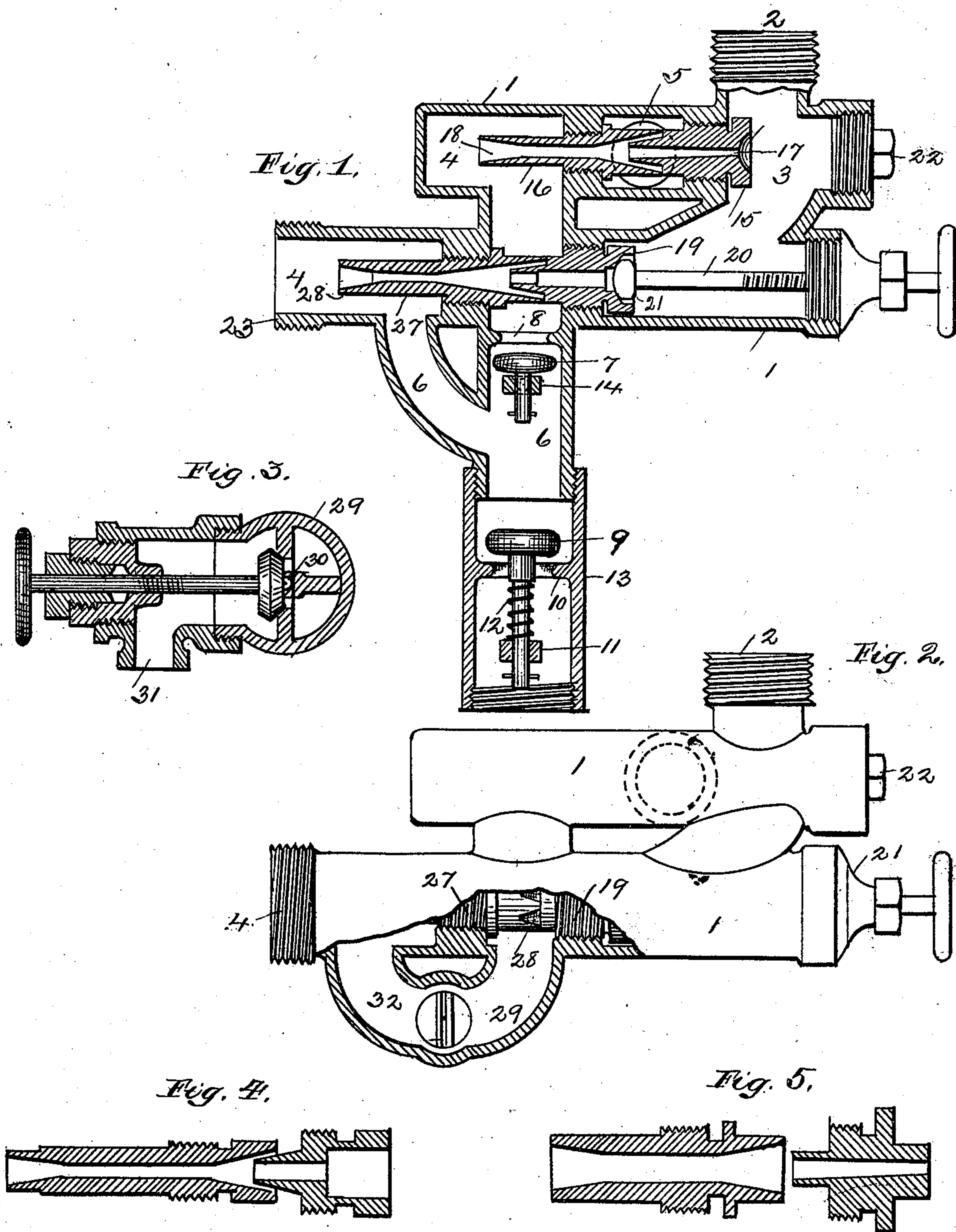
(Model.)

2 Sheets—Sheet 1.

G. W. MASON.
INJECTOR.

No. 504,068.

Patented Aug. 29, 1893.



Witnesses:
H. E. Hanson
J. A. Heron

Inventor,
G. W. Mason
Per. C. D. Lewis
Att'y.

(Model.)

2 Sheets—Sheet 2.

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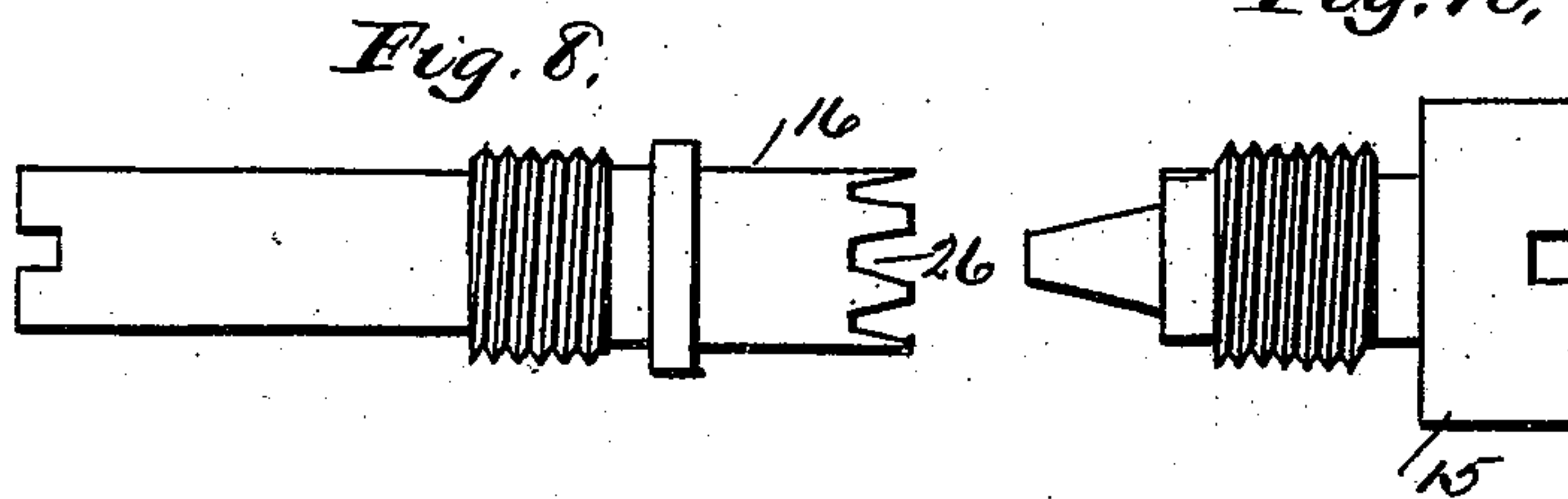
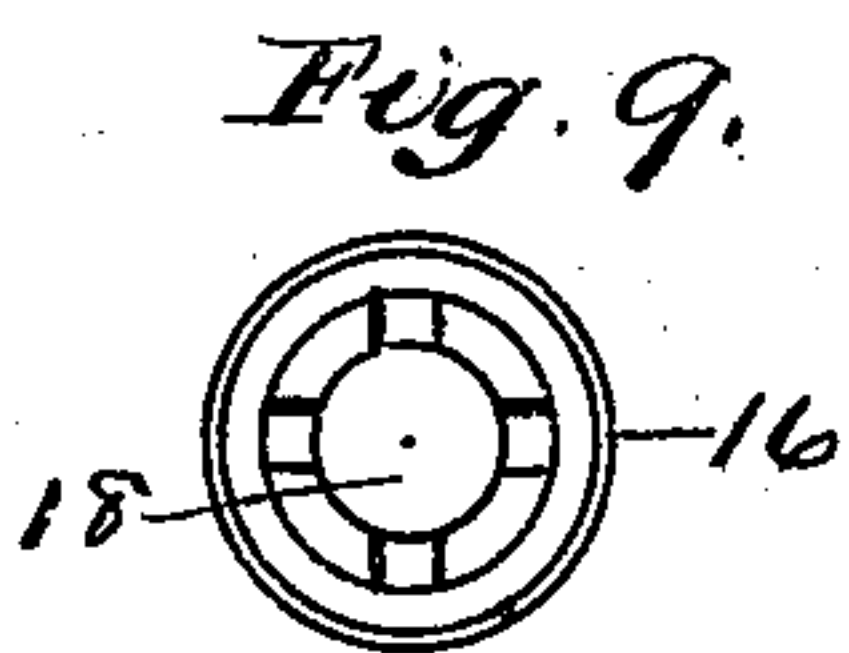
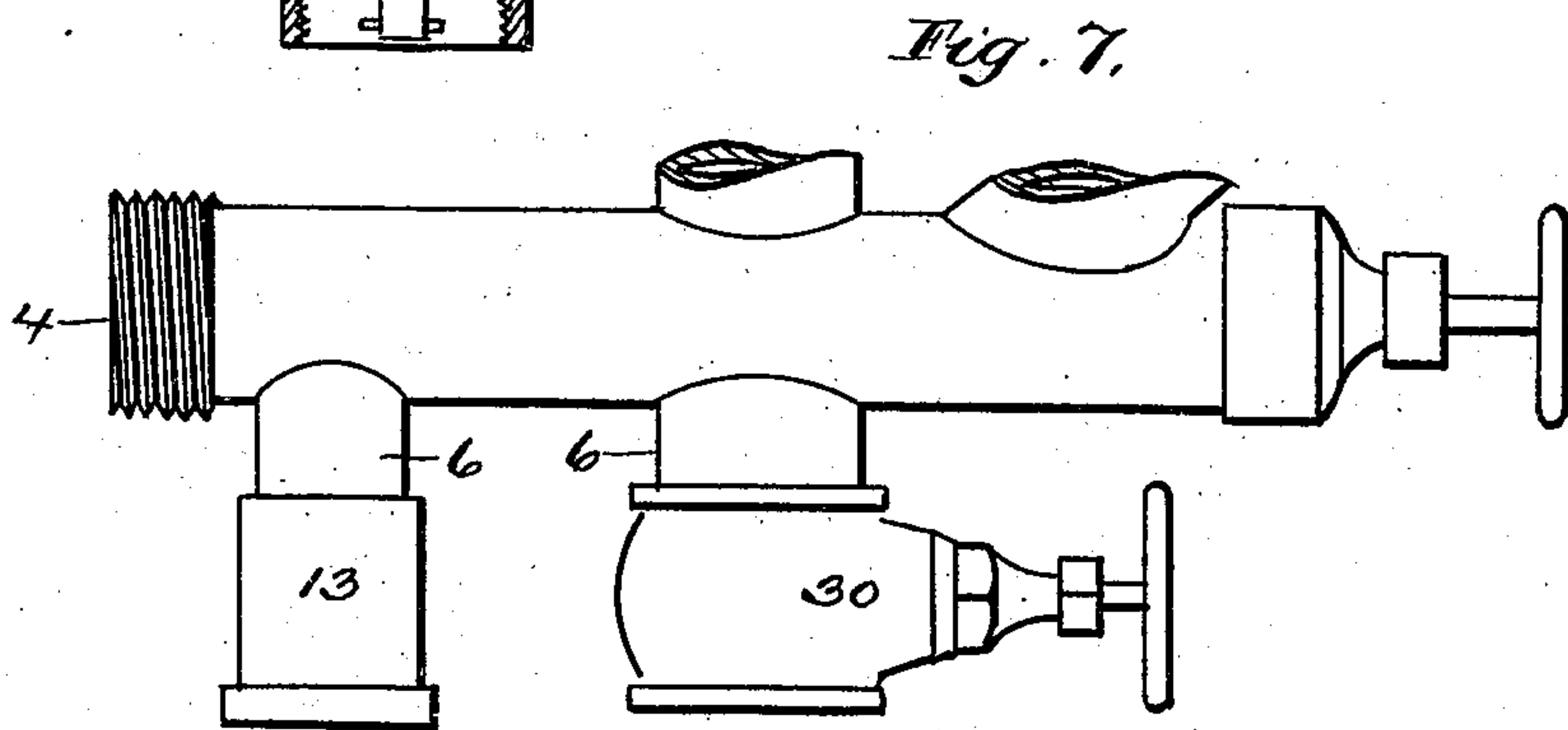
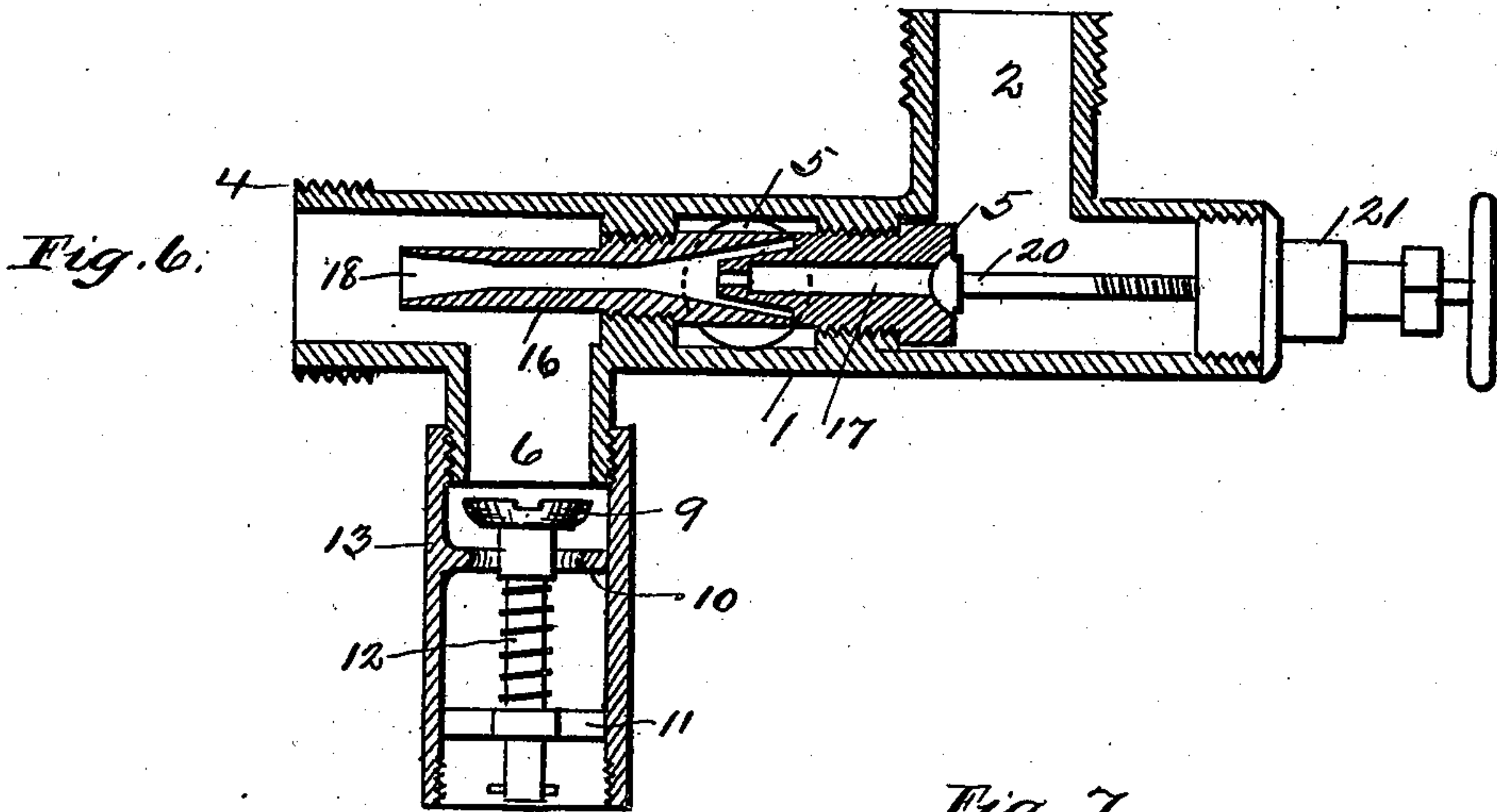


Fig. 10.



Fig. 11.

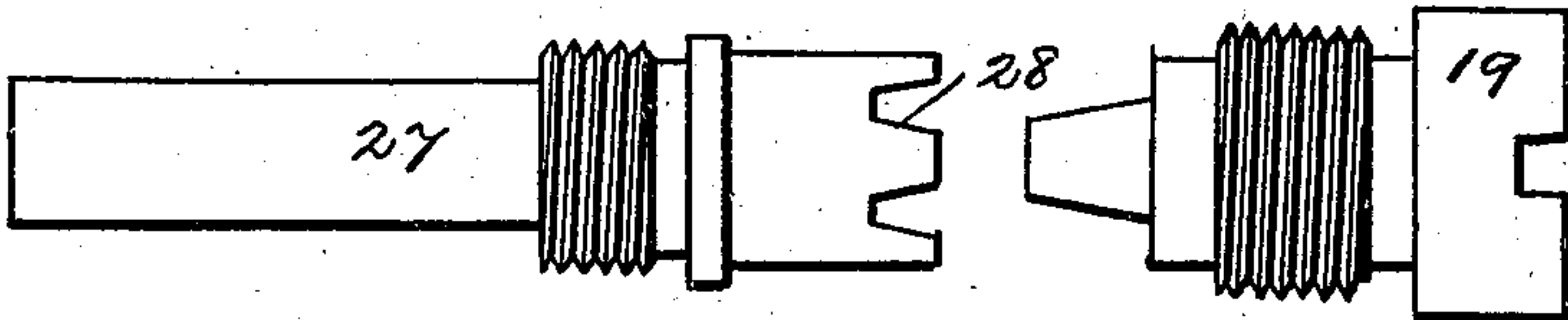
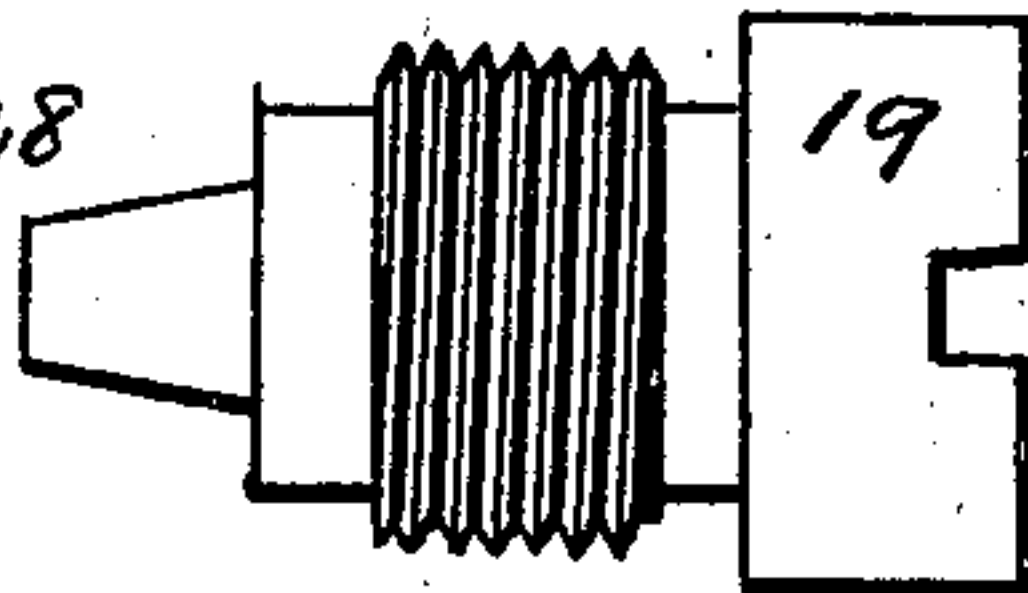


Fig. 12.



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Inventor,
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Att'y.

UNITED STATES PATENT OFFICE.

GEORGE W. MASON, OF SHARON, PENNSYLVANIA.

INJECTOR.

SPECIFICATION forming part of Letters Patent No. 504,068, dated August 29, 1893.

Application filed August 30, 1892. Serial No. 444,541. (Model.)

To all whom it may concern:

Be it known that I, GEORGE W. MASON, a citizen of the United States, residing at Sharon, in the county of Mercer and State of Pennsylvania, have invented certain new and useful Improvements in Injectors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to an improved injector, and consists in certain details of construction, and combination of parts as will be fully described hereinafter.

In the accompanying drawings, Figure, 1 is a sectional side elevation of my improved double automatic injector which is constructed in accordance with my invention. Fig. 2 is a slight modification of the same. Fig. 3 is a sectional elevation of my improved double acting overflow valve. Fig. 4, is a side sectional elevation of a modified form of a set of forcing tubes, which may be used in place of those shown at Fig. 1 on the drawings. Fig. 5, is a modified form of a set of lifting tubes used with the forcing tubes shown at Fig. 4. Fig. 6, is a side sectional elevation of a single automatic injector used with water under pressure. Fig. 7, is an elevation showing a different arrangement of the overflow. Fig. 8 is a side elevation of one of my improved lifting tubes. Fig. 9 is an end elevation of the same. Fig. 10 is a side elevation of the other lifting tube. Figs. 11 and 12 are side elevations of my improved forcing tubes.

To construct a lifting and forcing injector in accordance with my invention I provide a shell 1 of a suitable size and form of construction, and having a steam inlet 2, a water outlet 4 to the boiler, and over-flow passages 6, for putting the injector in operation. Arranged in the upper barrel of the shell 1 are a set of lifting tubes, consisting of the jet tube 15 having a tapering orifice 17 through the center of the same terminating opposite to the water inlet pipe 5. This jet lifting tube 15, is extended into the mouth of the other lifting tube 16, which is provided with a tapering orifice 18, extending through

the same, and with radial openings 26, formed about the periphery of the front end of the said tube. (See Fig. 8.) By forming these openings 26 in this manner the two tubes 15, and 18 in contact with each other, and thereby easily gaged or set in the proper position, and also the area of the said openings 26 are such as to admit of a certain amount of water to be discharged through the said tube into the forcing chamber. Arranged beneath these lifting tubes above described is a set of forcing tubes, consisting of a steam jet tube 19 in communication with the steam inlet pipe 2, having a large orifice for the passage of the steam, terminating in a small discharge at the forward end. This forcing tube 19 enters the tapering orifice formed in the other forcing tube 27, in the same manner as that of the lifting tubes above described. This forcing tube 27 is provided with openings 28 arranged about its forward periphery in the same manner as the tube 16 above described, and the orifice through the same contracted to a smaller area than the discharge of the tube 19. Formed in one end of the tube 19 is a valve seat in which a valve 21 is operated to close or open the passage through the said tube 19. Beneath the junction of the forcing tubes 19, and 28 is a valve seat 8, leading to one of the over-flow passages 6 against which a gravity valve 7 is made to operate. This valve 7 is held in position by a cross piece 14 attached in the over-flow passage 6, and is operated by the pressure of water from another over-flow passage 6, leading from the forward end of the forcing tube 27. Beneath this valve 7, is another 9 adapted to close both passages 6, while the injector is in operation. This valve 9 consists of a cylindrical casing 13, having an integral valve seat 10, formed therein, and a cross piece 11, through which the stem of the valve operates and a spiral spring 12, adapted to keep the said valve off its seat when the injector is not in operation.

This injector as above described is for the purpose of lifting and forcing water into boilers, and other like purposes, and the operation is as follows. The valve 21 is closed, the valves 7, and 9 open, which is the normal position of the said parts when the injector is at rest. The steam is now admitted through the

inlet 2, entering the lifting tubes 15—16, and passing through the same creates a vacuum in the water inlet chamber, thereby drawing or lifting the water through the water pipe 5, after the valve of the same has been opened. This operation of the lifting tubes discharges the water against the end wall of the lifting barrel which returns and escapes through the overflow passage 6. After the water begins to show at the overflow, the valve 21 is opened, and also the entrance to the boiler. The forcing tubes now being in operation, the back pressure of the water and of the boiler closes the overflow valves 7, and 9, and the water forced into the boiler. By forcing the water through the lifting tubes, and against the end of the lifting barrel, the same is fed gently to the forcing tubes, and the openings 26, and 28, being proportioned to feed but a certain quantity of water to the tubes, the same cannot be choked by an over supply of water thereby making the working of the injector even, and uniform.

In Figs. 2 and 3 on the drawings I have shown a slight modification of the above described injector in which a single valve is made to operate the two overflow passages leading from the lifting and forcing tubes. This valve consists of a shell 29 having valve and seat formed in the ordinary manner, and a partition 30 separating the one passage from the other. Formed along the top of this partition 30 is a small passage leading to the exit 31, which will take the leakage from either of the overflow passages, and prevent the same from passing over the partition, which might interfere with the proper working of the tubes on that side. By the use of this valve on the injector above described, the two valves 7, and 9 are dispensed with.

The construction and arrangement of the several parts of this injector are such as to prevent heating, the steam being on the one side and the water on the other, and the barrels of the lifting tubes being separated from that of the forcing tubes, permits a free circulation of air about the same, as well as to keep the steam from the water end of the injector, which is an essential feature in operation of the same.

Lifting and forcing tubes such as shown at Figs. 4 and 5 may be used in this injector with good results, but I prefer to use those shown in the other views of the drawings.

At Fig. 6 on the drawings I have shown a single injector, to be used where water under pressure can be obtained which will require no lifting. This injector is constructed exactly as the lower or forcing portion of the injector shown at Fig. 1 of the drawings, except one of the overflow valves and passages is dispensed with.

The operation of this injector is as follows: The steam is admitted through the inlet 2, and the water through the inlet 5. The valve 21 is now opened, admits the steam through

the forcing tubes and operates the overflow as before described.

Fig. 7 of the drawings shows an injector similar to that described while referring to Fig. 1, except that the valve 13 is used to close one of the overflows 6, and an ordinary globe valve the other. The valve 13 will close automatically, and the globe valve 30 by the operator.

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

1. The herein described shell for injectors consisting of two barrels the one arranged above and parallel to the other, a steam passage connecting the one with the other, a water passage connecting the two barrels a steam inlet located at the top, and water inlet at the side, the overflow passages beneath the lowest barrel, and exit openings leading to the boiler, constructed and arranged, substantially as described.

2. In combination with an injector the lifting tubes constructed as described, one of which is provided with radial openings to admit water to the same, as described.

3. In combination with an injector the forcing tubes constructed as described, one of which is provided with radial openings for admitting water to the same as described.

4. The herein described double, or lifting and forcing injector, consisting of the shell 1, constructed and arranged as described, the lifting tubes provided with radial openings to admit water to the same, the forcing tubes also having radial openings 28, for the admission of water to the same, the overflow valve 7, and seat 8, adapted to close one of the passages 6, and the valve 13 automatically operated to close the two overflow passages, all arranged and combined for service substantially as and for the purpose described.

5. The herein described single or forcing injector, consisting of the shell having a steam and water inlet the tubes constructed as described, one of which is provided with openings 28 proportioned to the amount of water it is desired to admit to the said tubes, and the automatic valve 13, constructed as described, for regulating and controlling the overflow, substantially as set forth.

6. The herein described means for regulating and controlling the overflow passages, consisting of the shell 29, having a valve and seat, a partition separating the one overflow from the other, and a groove to collect any leakage, all arranged for service substantially as described.

In testimony that I claim the foregoing I hereunto affix my signature this 26th day of August, A. D. 1892.

GEORGE W. MASON. [L. S.]

In presence of—

JAS. J. MCAFEE,
M. E. HARRISON.