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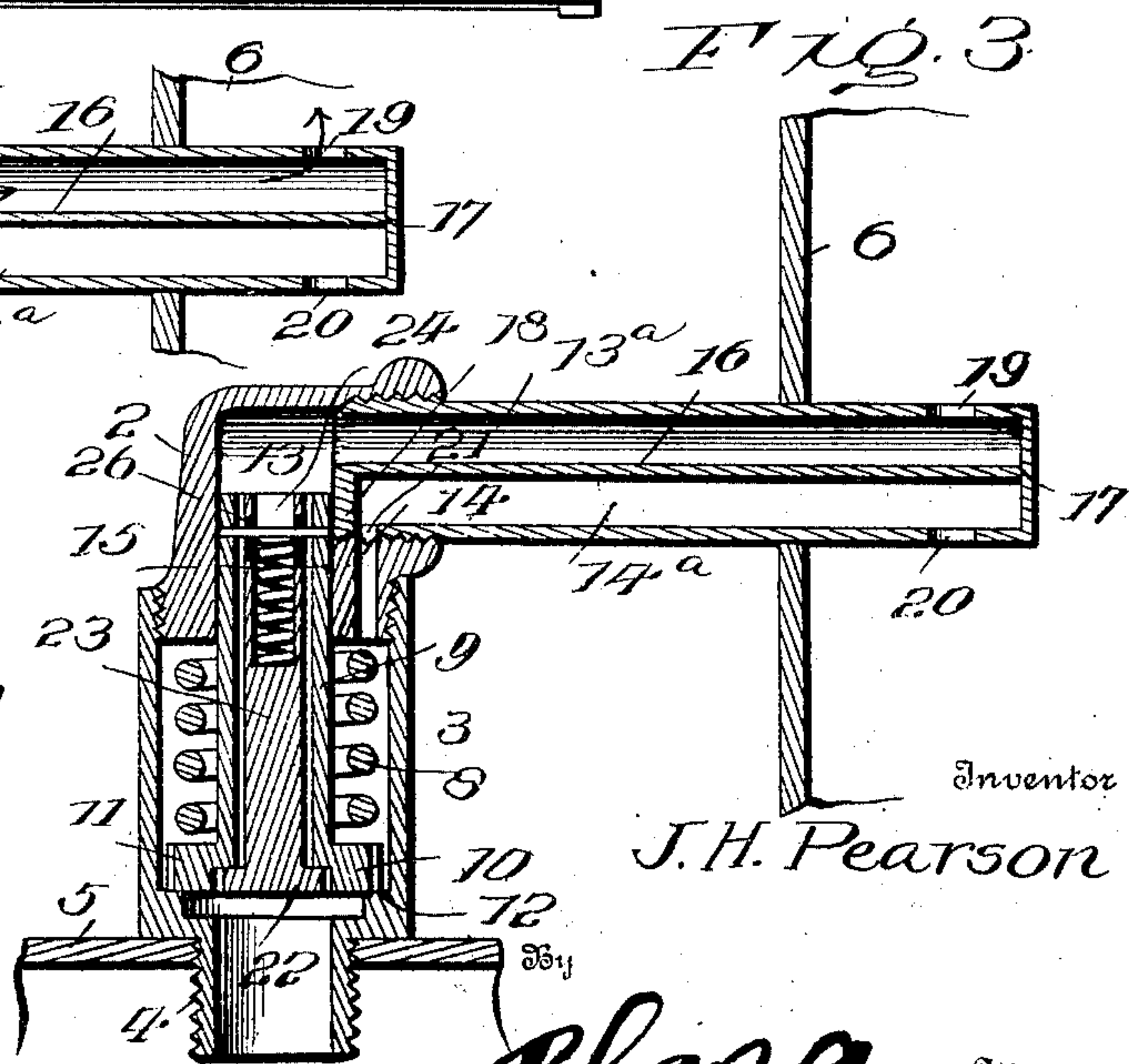
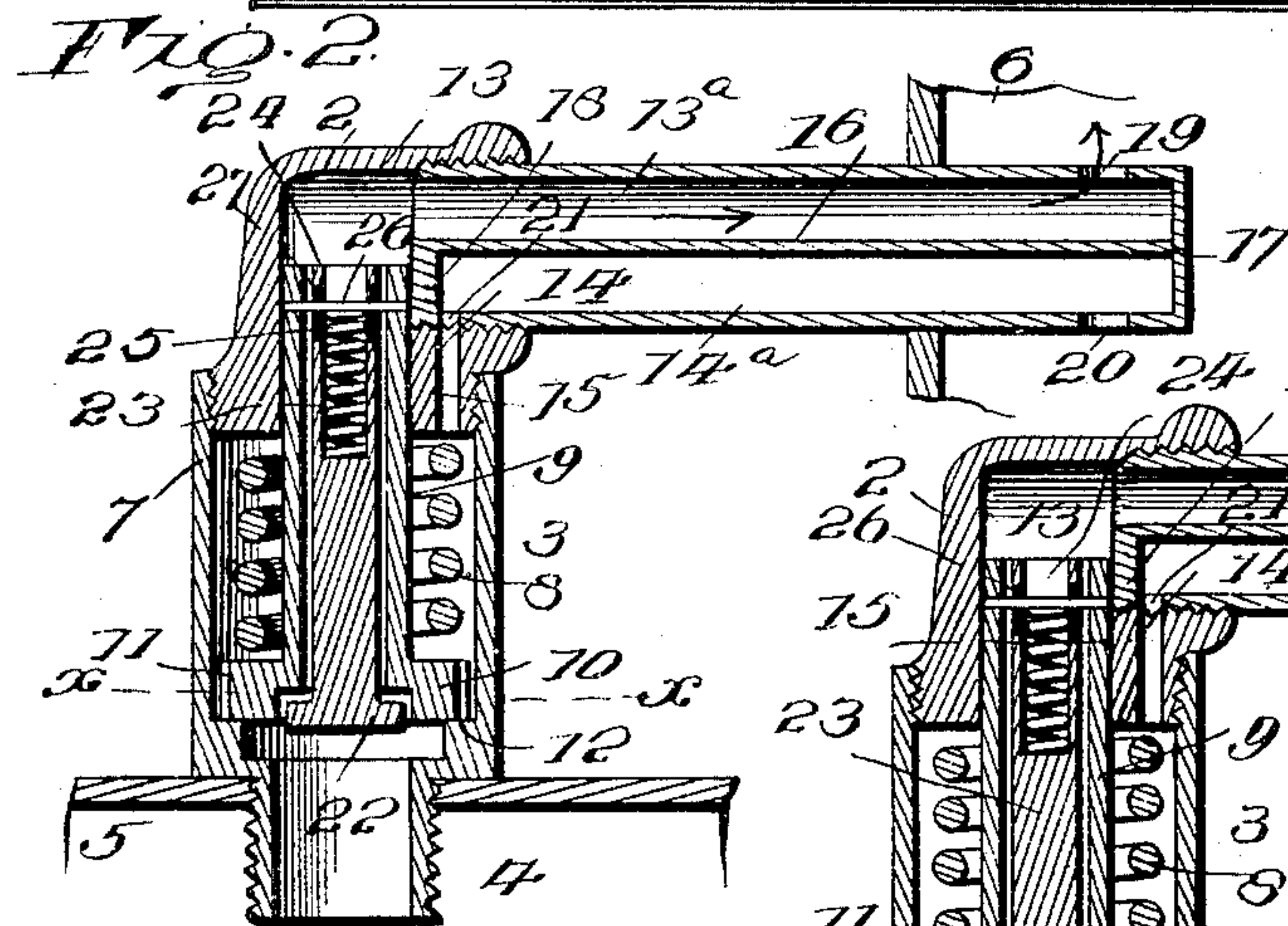
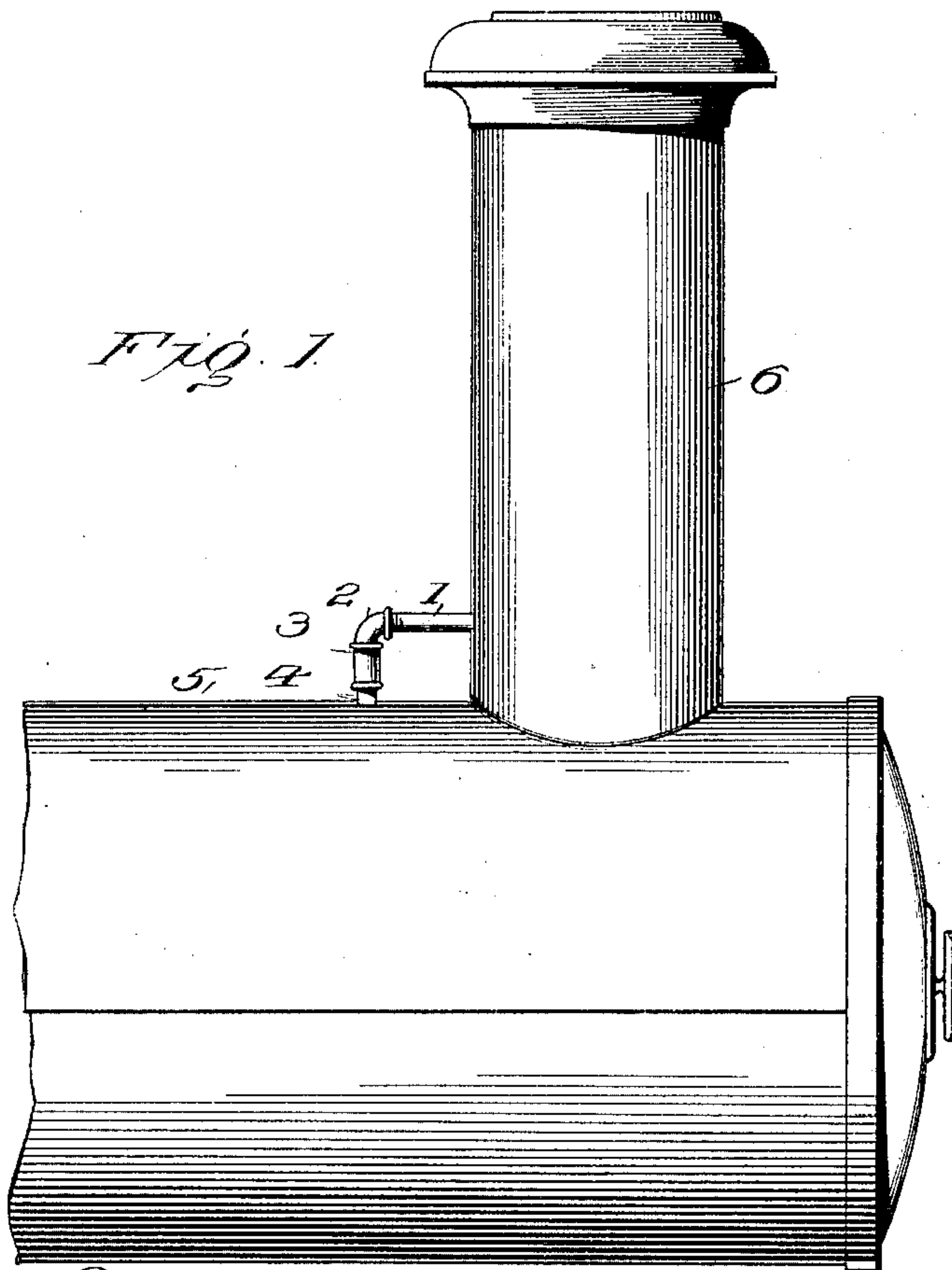
Patented Dec. 3, 1901.

J. H. PEARSON.  
DRAFT REGULATOR.

(Application filed Apr. 16, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses

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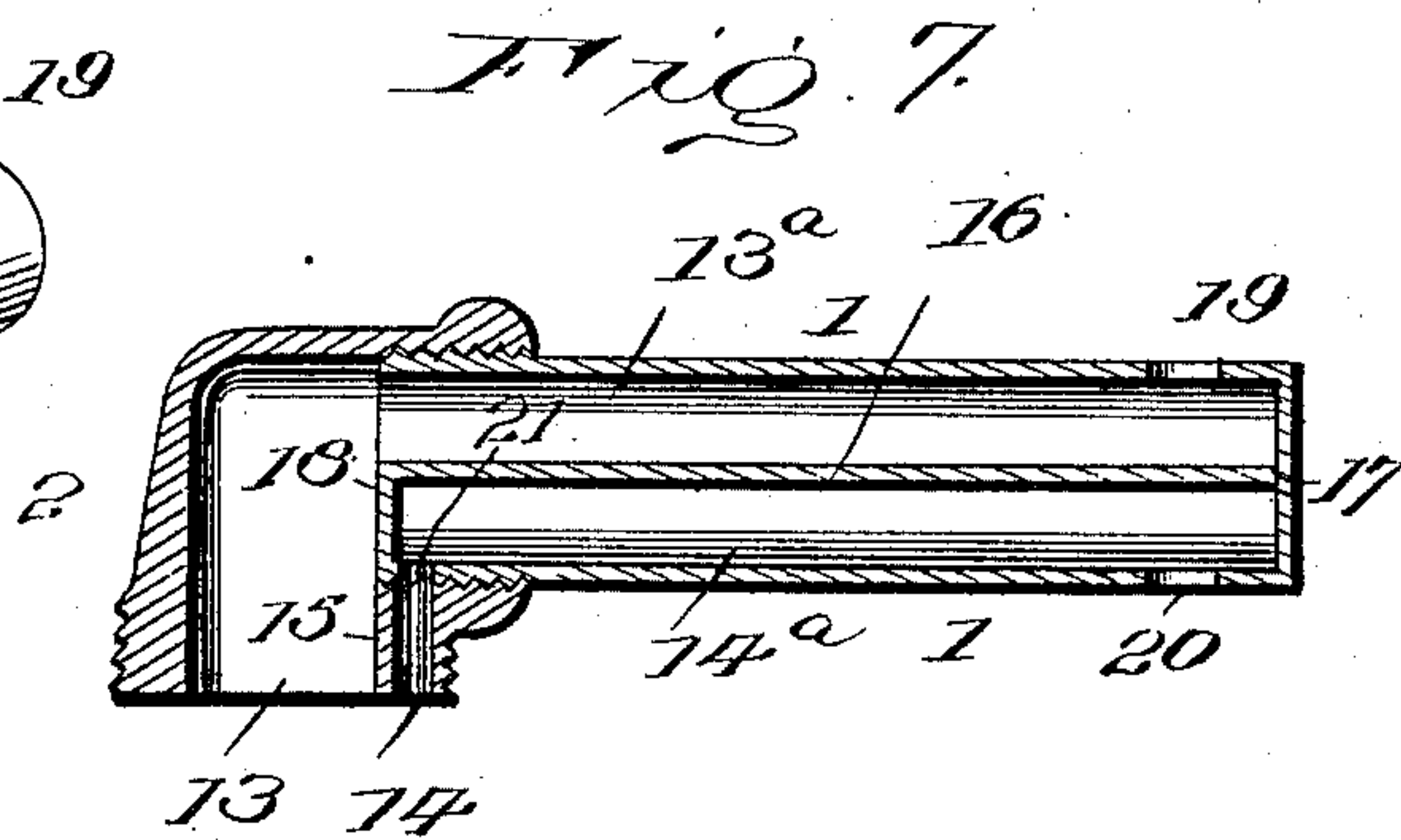
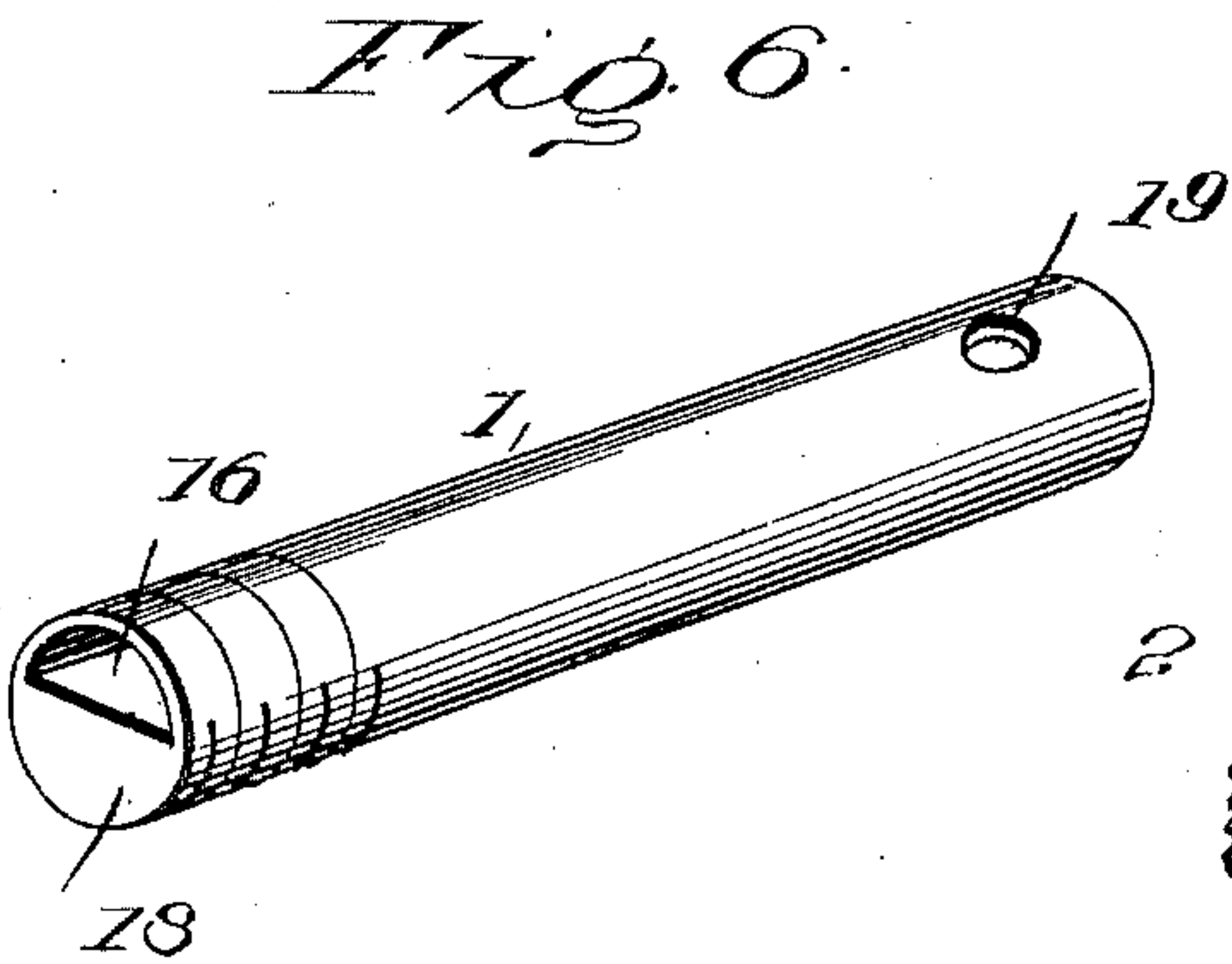
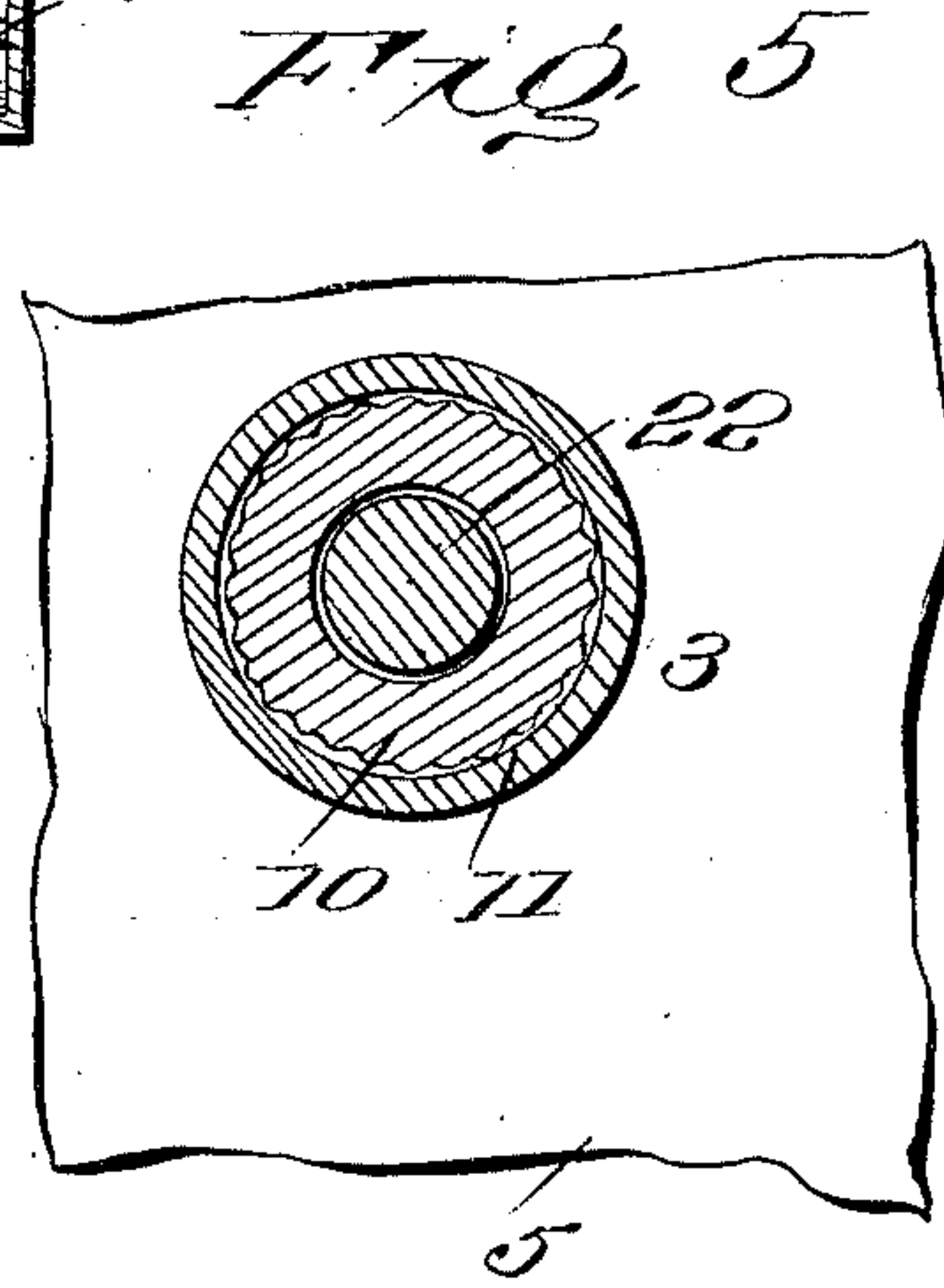
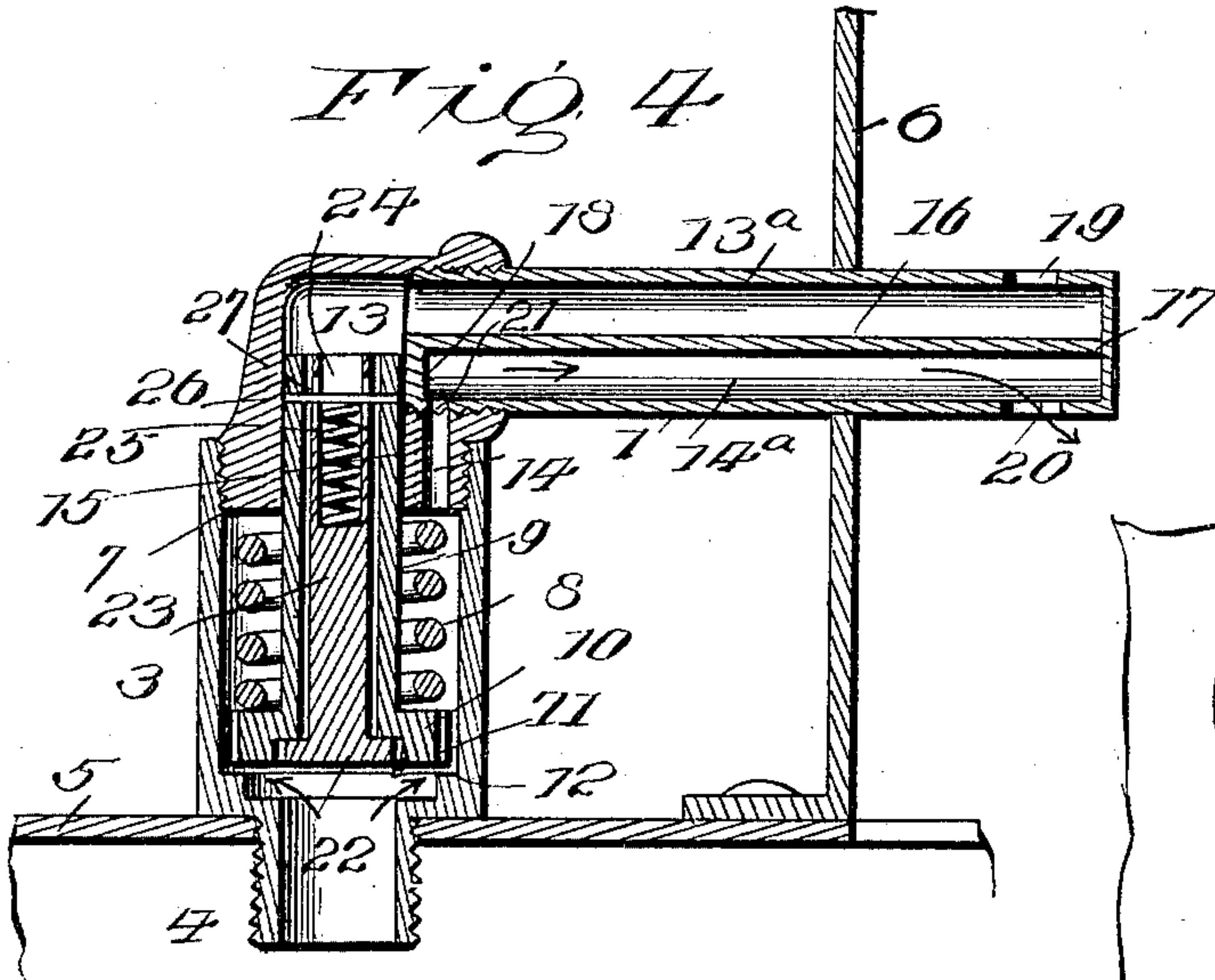
Patented Dec. 3, 1901.

J. H. PEARSON.  
DRAFT REGULATOR.

(Application filed Apr. 18, 1901.)

(No Model.)

2 Sheets—Sheet 2.



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# UNITED STATES PATENT OFFICE.

JAMES H. PEARSON, OF WORTHINGTON, INDIANA.

## DRAFT-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 688,195, dated December 3, 1901.

Application filed April 16, 1901. Serial No. 56,124. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES H. PEARSON, a citizen of the United States, residing at Worthington, in the county of Greene and State of Indiana, have invented certain new and useful Improvements in Draft-Regulators; 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 appertains to make and use the same.

This invention provides a device of novel construction for automatically regulating the draft of steam-boiler furnaces, accelerating the draft when the fire is slow, and retarding the draft when the fire is too brisk and the pressure of steam in excess of a given point.

For a full description of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result reference is to be had to the following description and drawings hereto attached.

While the essential and characteristic features of the invention are necessarily susceptible of modification, still the preferred embodiment of the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a detail view in elevation, showing the application of the invention. Fig. 2 is a sectional detail, on a larger scale, showing the normal position of the parts when the updraft-valve is open, the arrows indicating the direction of the steam to increase the draft through the stack. Fig. 3 is a view similar to Fig. 2, the updraft-valve being closed. Fig. 4 is a view similar to Fig. 3, the main valve being open and the arrows indicating the direction of the steam to retard the draft through the stack. Fig. 5 is a horizontal section on the line X X of Fig. 2. Fig. 6 is a perspective view of the divided outflow-pipe. Fig. 7 is a detail section of the divided elbow and outflow-pipe connected.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

In its general construction the device comprises a casing, cooperating valves, and tension-springs. The casing consists of a pipe 1, an elbow 2, and a cup 3, the latter having a

threaded end 4, by means of which it is connected to the steam-boiler 5, to which the regulator is applied. The pipe 1 has its delivery end fitted to the smoke-stack 6 of the steam-boiler furnace and projected therein a suitable distance, so as either to accelerate or retard the draft as may be required to maintain a predetermined pressure of steam within the boiler. The several parts 1, 2, and 3 may be connected in any desired way, and, as shown, they are coupled by the usual screw-thread joints. The vertical branch of the elbow 2 is fitted into the upper end of the cup 3, thereby providing a shoulder 7 for the upper end of the spring 8 to obtain a purchase against, said spring being mounted upon the stem 9 of the main valve 10 and the lower end of the spring obtaining a bearing upon the outer portion of the valve 10 beyond the sides of the stem 9. This spring 8 serves normally to hold the valve 10 seated against the boiler-pressure when not in excess of a given point, thereby preventing passage of the steam from the boiler by the valve 10 and through the cup 3 exterior to the valve-stem 9. The valve 10 is of a diameter to fit snugly within the cup 3 and is formed in its edges with a series of grooves or channels 11, constituting passages for the outflow of steam when the valve 10 is unseated. This valve closes downward against a seat 12, provided at the lower end of the cup 3, the tension of the spring 8 being regulated so as to prevent the unseating of said valve until the pressure of steam within the boiler exceeds a predetermined pressure.

The elbow 2 is subdivided, so as to provide chambers or passages 13 and 14, which are in communication with corresponding passages 13<sup>a</sup> and 14<sup>a</sup> of the pipe 1. A partition 15 separates the passages 13 and 14, and its upper end extends above the lowermost wall of the horizontal branch of the elbow, so as to close the inner end of the passage 14<sup>a</sup> of the pipe 1. The upper end of the valve-stem 9 snugly fits within the lower portion of the passage 13, so as to prevent the escape of steam from the cup 3 into the passage 13 when the valve 10 is unseated.

The pipe 1 will be designated as the "outflow-pipe" and may be of any construction so



long as it comprises the passages 13<sup>a</sup> and 14<sup>a</sup>, which are in communication with the corresponding passages 13 and 14 of the intermediate portion of the casing. As shown, the pipe 1 is subdivided by a partition 16, and its outer end is closed by a header 17, and the inner end of the passage 14<sup>a</sup> is closed by a header 18, the inner end of the passage 13<sup>a</sup> being open. Openings 19 and 20 are provided at the outer end of the outflow-pipe and communicate with, respectively, the passages 13<sup>a</sup> and 14<sup>a</sup>. An opening 21 is provided at the inner end of the pipe and is in communication with the passage 14<sup>a</sup>. As hereinbefore stated, the outer end portion of the part 1 is adapted to be connected to the lower or base portion of the stack 6 in any desired way, and the delivery end portion projects into said stack a suitable distance, so as to secure all the advantages of the invention with reference to accelerating and retarding the draft. When the parts 1 and 2 are assembled, the header 18 abuts against the upper end portion of the partition 15, so as to prevent any steam from the passage 14 escaping into the upper portion of the elbow and entering the passage 13<sup>a</sup>.

The main valve 10 and its stem are hollow or bored to receive a valve 22 and its stem 23, constituting the updraft-valve. The upper portion of the stem 23 is hollow or bored, as shown at 24, to receive a coil-spring 25, by means of which the valve 22 is normally held unseated, so as to permit the free passage of steam thereby through the valve 10 and out through the passage 13<sup>a</sup> and up through the stack 6, so as to increase the draft after the manner of a blower and twyer. The valve 22 when closed is seated within the lower face of the valve 10 and is prevented from vertical displacement by means of a pin 26, supported at its ends in transversely-aligned openings of the stem 9 and passing through vertical slots 27 in diametrically opposite sides of the hollow portion of the valve-stem 23. The coil-spring 25 is confined in the opening 24 by means of the pin 26 and normally exerts a downward pressure upon the valve 22 to hold it unseated. The spring 25 is of less tension than the spring 8, so as to yield and permit of the seating of the updraft-valve while the main valve remains seated.

When in position, the lower portion of the casing is connected to the shell of the boiler 5 and is in communication with the steam-space thereof and its opposite end is connected to the smoke-stack. The valve 22 being open under normal conditions, the steam from the boiler passes thereby and through the main valve and into the stack by way of the passage 13<sup>a</sup> and the opening 19, and being directed upward into the stack creates a forced draft therethrough and through the furnace after the manner of a twyer, whereby the draft is greatly accelerated and the fire caused to burn briskly. The tension of the spring 25 may be set with reference to the area of the valve 22 so as to hold the latter

open until the required steam-boiler pressure has been reached, when the said spring will be compressed and the valve 22 closed, thereby shutting off the jet of steam through the stack. When the steam in the boiler exceeds a predetermined pressure, it overcomes the tension of the spring 8 and unseats the valve 10, when a portion of the steam will pass by the valve 10 through the cup 2, passages 14 14<sup>a</sup>, and out through the opening 20 into the stack 6, and being directed downward into said stack retards the draft therethrough and dampens the fire by choking off the draft therethrough. When the steam falls to the required pressure, the spring 8, regaining itself, closes the valve 10 and shuts off the reverse blast in the stack and permits the fire to burn under natural draft, and when the steam-pressure falls below the standard the spring 25 will unseat the valve 22 and again permit a forced updraft through the stack, whereby the fire is caused to burn more briskly and the steam generated more rapidly. When the steam-pressure is normal, the blast-creating device is inert, and when the pressure exceeds or falls below a given point a blast is created in the smoke-stack either in an upward or downward direction to accelerate or retard the draft to meet existing conditions.

Having thus described the invention, what is claimed as new is—

1. In a draft-regulator for steam-boiler and other furnaces a casing adapted to be connected with the stack and the steam-space of the boiler and having passages opening into said stack in an upward and a downward direction, and automatic valves for controlling the admission of steam into said passages, the valve which controls the passage opening upward in the stack being closed when a certain predetermined pressure in the boiler is reached, and the valve which controls the passage opening downward in the stack being opened when there is an abnormal pressure in the boiler.

2. In a draft-regulator for steam-boiler and other furnaces, a casing adapted to be connected with the steam-space and the stack of the furnace, said casing having passages opening upward and downward into the said stack, cooperating valves for controlling the said passages, and different-tensioned springs for holding the said valves in a normal position, the valve for controlling the downdraft being normally seated and the updraft-valve normally open, substantially as set forth.

3. In a draft-regulator, a casing having passages opening in an upward and a downward direction, and spring-actuated valves for controlling the admission of steam into the said passages, the valve which controls the passage opening upward being mounted within the valve which controls the passage opening downward and normally unseated and adapted to be closed when a certain predetermined pressure in the boiler is reached, and the valve



which controls the passage opening downward being opened when there is an abnormal pressure in the boiler, substantially as set forth.

4. In a draft-regulator, a casing having passages opening in opposite directions, a main valve normally seated and adapted to control the passage of steam through the passage opening downward, and an updraft-valve mounted within the main valve and normally unseated to permit of the escape of steam through the upwardly-opening passage and adapted to close by an excessive pressure of steam, substantially as set forth.

5. In a draft-regulator, a casing comprising approximately right-angularly-disposed members, the upper portion of the vertical member and the horizontal member being partitioned to form corresponding intercommunicating passages which open upwardly and downwardly at their delivery ends, and spring-controlled concentric valves located in the vertical member of the casing for controlling the aforesaid passages, the valve which controls the passage opening upward being mounted within the valve which controls the passage opening downward and normally unseated and adapted to be closed when a certain predetermined pressure in the boiler is reached, and the valve which controls the passage opening downward being opened when there is an abnormal pressure in the boiler, substantially as set forth.

6. A draft-regulator comprising a casing having passages opening in opposite directions, a main valve normally held seated and adapted to control the passage of steam through the passage opening downward and having an opening therethrough, an updraft-valve mounted in the opening of the main valve for controlling the passage of steam therethrough to the passage opening upward and having an opening in its upper end, and opposite slots, a spring fitted into the opening of the updraft-valve, and a pin for confining said spring and preventing displacement of the updraft-valve by passing through

the slots thereof and having its ends secured to the main valve, substantially as set forth.

7. A draft-regulator comprising a vertical member having its upper portion partitioned to form passages, a horizontal member having passages in communication with the respective passages of the vertical member and having upper and lower outlets, the upper portion of the partition of the vertical member overlapping the inner end of a passage of the horizontal member, and concentric valves for controlling the passage of steam through the said passages, the valve which controls the passage opening upward being mounted within the valve which controls the passage opening downward and normally unseated and adapted to be closed when a certain predetermined pressure in the boiler is reached, and the valve which controls the passage opening downward being opened when there is an abnormal pressure in the boiler, substantially as set forth.

8. A draft-regulator comprising a cup, a partitioned outflow-pipe having upper and lower outlets, a partitioned elbow connecting the cup and outflow-pipe, a main valve located in the cup and adapted to control the passage of steam through the passage opening downward and having a tubular stem operating in the vertical branch of the elbow, a spring normally holding the main valve seated, an updraft-valve slidingly mounted in the main valve and normally open, and adapted to control the passage of steam therethrough to the passage opening upward, a spring seated in the upper portion of the stem of the updraft-valve, and a pin for preventing displacement of the updraft-valve and confining the actuating-spring thereof, substantially as set forth.

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

JAMES H. PEARSON. [L. S.]

Witnesses:

JAS. E. WARD,  
CHARLES WHITE.