

No. 715,656.

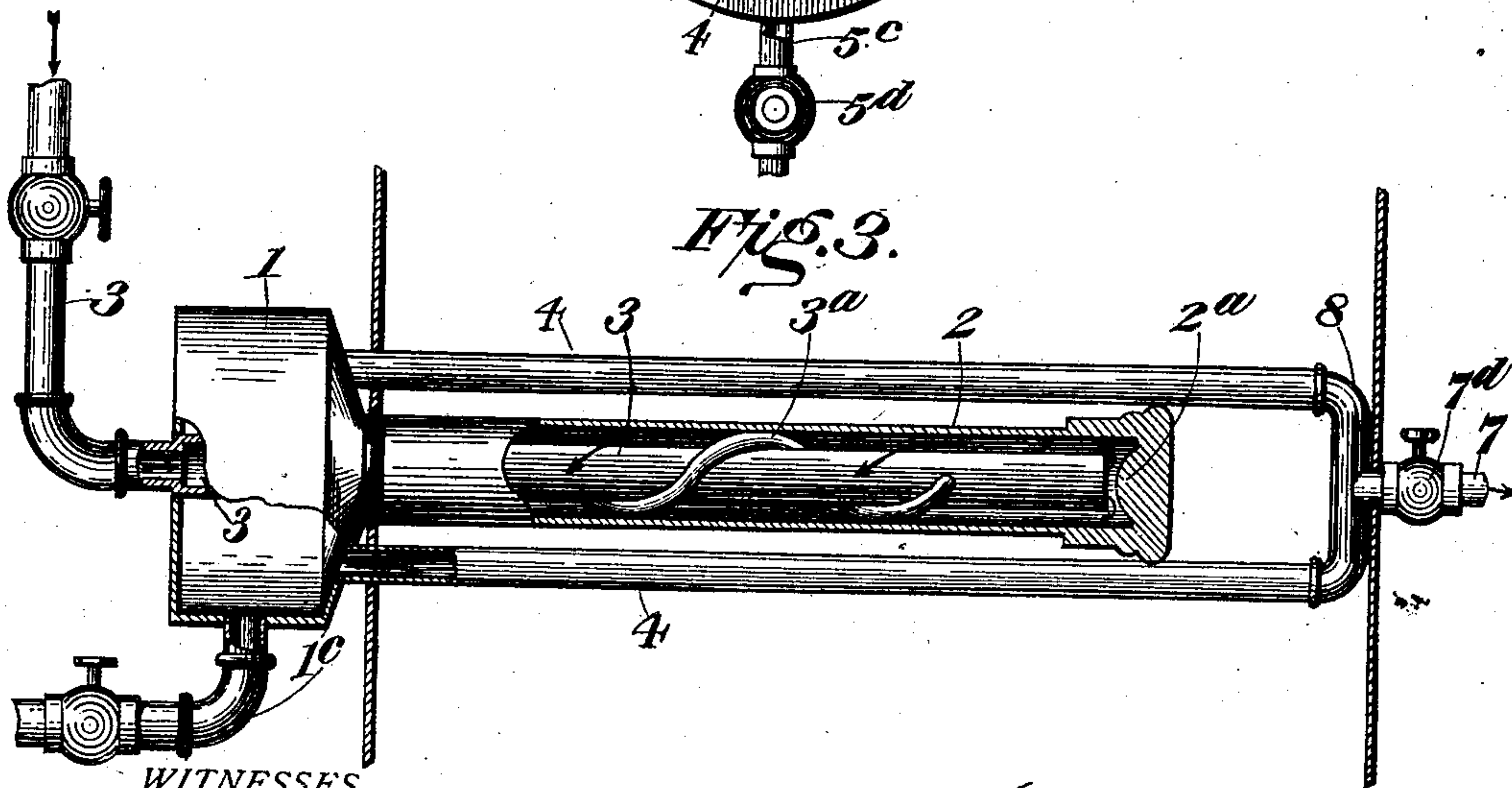
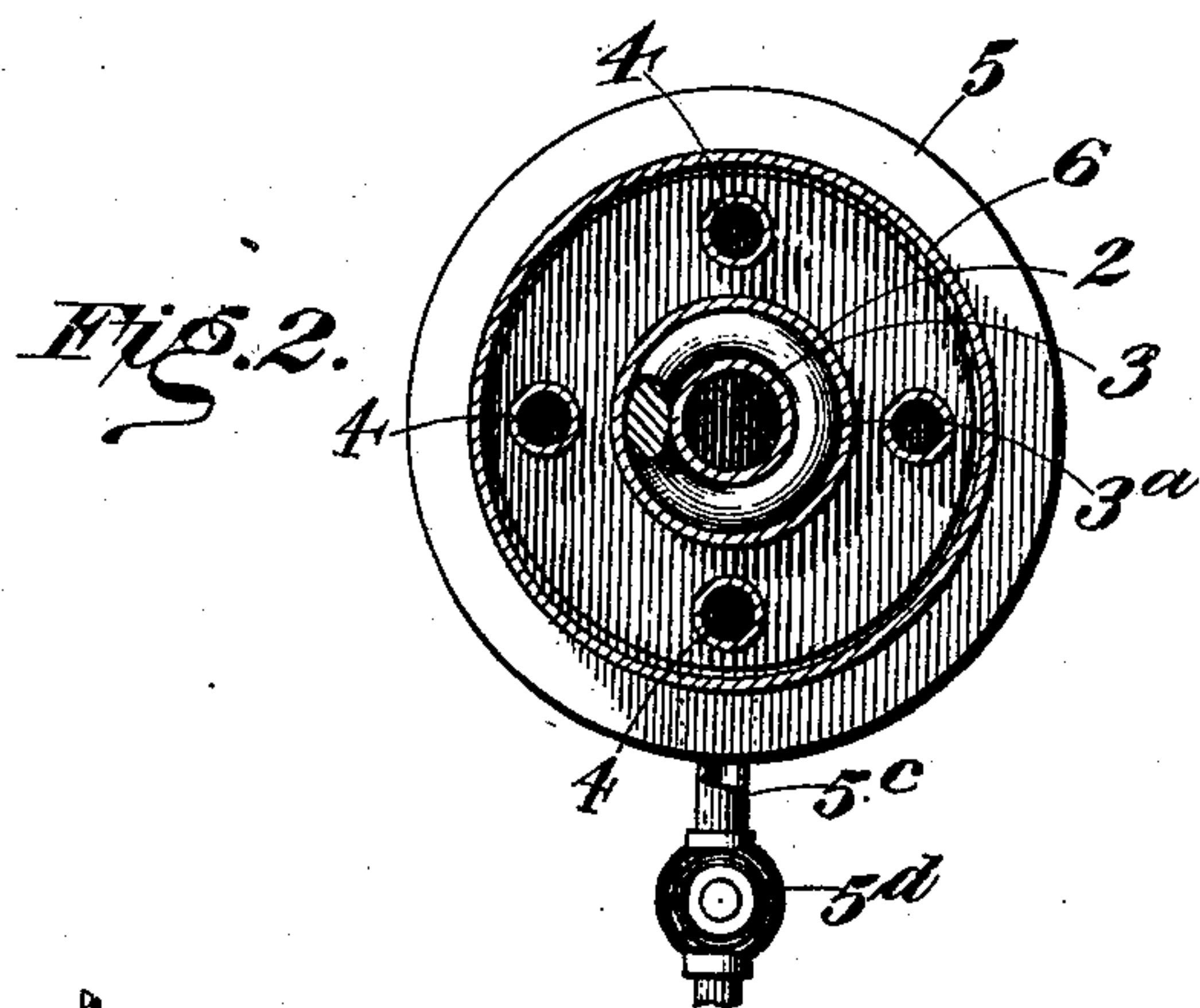
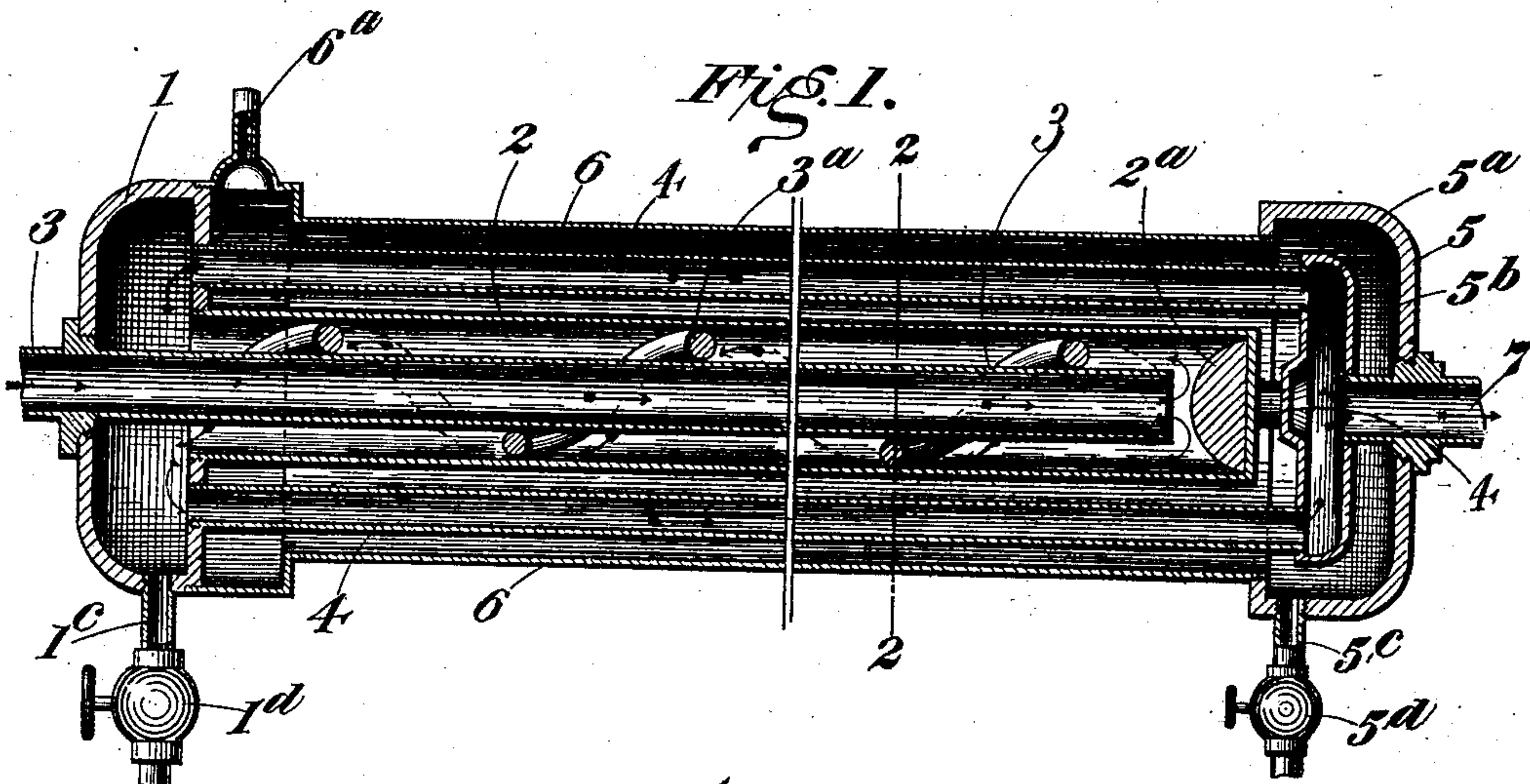
Patented Dec. 9, 1902.

W. A. GIBSON.

FEED WATER HEATER AND PURIFIER.

(Application filed June 24, 1902.)

(No Model.)



WITNESSES

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UNITED STATES PATENT OFFICE.

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FEED-WATER HEATER AND PURIFIER.

SPECIFICATION forming part of Letters Patent No. 715,656, dated December 9, 1902.

Application filed June 24, 1902. Serial No. 112,998. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. GIBSON, of Muscatine, in the county of Muscatine and State of Iowa, have invented certain new and
5 useful Improvements in Feed-Water Heaters and Purifiers; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this
10 specification.

This invention is a novel feed-water heater and purifier, and is an improvement upon the feed-water heater for which Letters Patent No. 669,921 were granted to myself and J. W.
15 DeForrest, March 12, 1901, the present invention being adapted for use in connection with all classes of steam-boiler and water-heating furnaces; and the objects of the present invention are, first, to so construct the device
20 that it can be used either on the inside or outside of the boiler; secondly, to increase the water-heating surface, and, thirdly, to increase its separating action or capacity whereby impurities in the water are more readily
25 and thoroughly separated therefrom.

The invention therefore consists in the novel improved construction and combinations of parts hereinafter summarized in the claims and illustrated in the accompanying
30 drawings, forming part of this specification, which shows two forms of apparatus embodying the invention.

Figure 1 is a longitudinal sectional elevation through the preferred form of improved
35 feed-water heater and purifier as adapted to external use and to be heated by live or waste steam. Fig. 2 is a transverse vertical section on line 2-2, Fig. 1. Fig. 3 is a longitudinal sectional view of a form of heater adapted
40 for use in the fire-chamber or shell of boiler.

1 designates a drum or head, from which extends a tube 2, which opens at one end into the center of the head and projects axially therefrom. The other end of said tube is
45 closed, but has an interior inwardly-projecting baffle or dispersing plate or projection 2^a, as shown. Extending axially through head 1 and into tube 2 is a feed-pipe 3, which terminates close to baffle-plate 2^a and is adapted
50 to discharge water thereagainst, the water

returning through the tube exterior to pipe 3 back to head 1, as indicated in the drawings. Surrounding pipe 3 within tube 2 is a spiral deflector 3^a, which may be of any suitable construction, so as to cause the water re-
55 turning through the tube around pipe 3 to gyrate or rotate therein. A rod or wire twisted around the pipe 3 serves as an efficient deflector.

Connected to the inner end of head 1, at
60 points adjacent to tube 2, are a plurality of pipes 4, which lead back parallel with the tube to a secondary head 5, in which is a water-compartment 5^a, communicating with
65 these several pipes 4, and a steam-compartment 5^b, which communicates with the steam space or chamber surrounding the tube and pipes 4, which chamber, as shown in Figs. 1 and 2, is within an exterior cylindrical casing 6,
70 connected at its opposite ends to heads 1 and 2. Live or waste steam from any suitable source can be admitted into casing 6 at 6^a and can be exhausted therefrom through a pipe connected to the lower part of head 5 at
75 5^c. When live steam is admitted into the casing, pipe 5^c can be closed by a suitable cock 5^d or automatic steam-trap, except when it is desired to withdraw water of condensation from the casing.

The head 1 is provided with a blow-off outlet 1^c, which can be closed by a suitable cock 1^d. The chamber 5^a is connected with an outlet-pipe 7, which leads to the boiler or place of utilization of the purified and heated
80 water, said pipe passing out through the chamber 5^a, as shown.

In Fig. 3 the casing 6 and head 5 are omitted, and in place of the latter the rear ends of pipes 4 are connected by a pipe-bend 8, which is centrally connected to the pipe 7.
90 The pipe 7 may be provided with a suitable valve 7^d, so it can be closed when the purifier is being cleansed or repaired. The pipe 3 in both instances is connected to the head 1 by a suitable detachable joint, so that pipe 3 can
95 be detached and, with spiral 3^a, removed from the head and tube without disturbing other portions of the apparatus, thus facilitating cleansing thereof.

The construction shown in Figs. 1 and 2 is 100

particularly adapted for use exterior to the boiler and furnace, where the casing 6 can be filled with live or waste steam, as described. The form shown in Fig. 3 is adapted to be placed within the steam space or chamber of the boiler, as described in the aforesaid patent, or it can be located in the fire-chamber or at any convenient heating-chamber, where the tube 2 and pipes 4 will be subjected to hot gases, so as to heat them and the water circulated therethrough.

Operation: Water is admitted or forced through pipe 3 into tube 2 and discharged therein against the baffle or dispersing plate 2^a, which causes an immediate dispersion of the water, which rebounds into tube 2 and flows toward head 1. Both the plate 2^a and tube 2 are subjected to intense heat, and the water disseminated therein quickly absorbs heat therefrom, and the dissemination of the water causes the mineral and earthy matters in the water to separate therefrom at this point; but owing to the violent rush of the water the separated impurities are swept back toward and into head 1, and in their backward movement a swirling motion is given the water by contact with spiral 3^a, so that the water is discharged into head 1 with a violent gyratory action that facilitates the deposition of the separated impurities in the head 1, which acts as a mud drum or trap, while the purified water passes back through pipes 4 and is still further heated, eventually escaping through pipe 7 to the point of utilization. The spiral deflector on the inner pipe 3 materially assists in imparting a whirling motion to the water as it enters the head 1 and insures a more complete presentation of the water to the heating-surface of tube 2. Owing to the comparatively large diameter of head 1, the flow of water therein is slow as compared with its rush through tube 2. Hence the separated matters will more readily settle in head 1, and as the pipes 4 are preferably connected to the head at points close to tube 2 there will be a comparatively inert or quiet body of water in the head exterior to inlets of pipes 4, affording opportunity for the impurities to escape from the current with facility.

It will be observed that in both constructions the tube 2 and the return-pipes 4 are subject to heat in the chamber in which they are placed whether said chamber be formed by the casing 6 or the walls of the boiler-shell or fire chamber or flue in which the device may be placed. The additional heating-surface afforded by pipes 4 materially increases the temperature of the water delivered to pipe 7.

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

1. In combination, a hollow head, a tube attached thereto adapted to project into a heating-chamber and having its inner end

closed, a water-feed pipe extending axially into the tube and terminating near the closed end thereof and communicating therewith, and a spiral deflector between the pipe and tube, substantially as described.

2. In combination, a hollow head, a tube attached thereto adapted to project into a heating-chamber, a baffle-plate in the closed inner end of said tube, a water-feed pipe extending through the head and axially into the tube and terminating adjacent to said baffle-plate and communicating with said tube, and a spiral deflector surrounding the pipe within the tube, substantially as described.

3. The combination of the head, a tube attached thereto and projecting axially therefrom, a feed-water pipe passing through the head into the tube and terminating near the end thereof, a deflector between the pipe and tube, return-pipes connected with the head and leading back parallel with the tube, and a common outlet connected with the return-pipes, said tube and pipes being placed within a heating-chamber, substantially as described.

4. The combination of the head, a tube attached thereto and projecting axially therefrom into a heating-chamber and closed at its inner end, a feed-water pipe passing into the tube and terminating near the closed end thereof, a spiral deflector interposed between the tube and pipe, return-pipes connected with the head and leading back through the heating-chamber parallel with the tube, and a common outlet connected with the return-pipes, substantially as described.

5. The combination of the hollow head, a tube connected therewith at one end and projecting therefrom and closed at its other end, a feed-pipe extending through the head into said tube, a spiral deflector in the tube between it and feed-pipe, return-pipes connected to the head adjacent to the tube and extending parallel therewith beyond the rear end thereof, a common outlet for said return-pipes, and a casing inclosing the tube and pipes, substantially as and for the purpose described.

6. The combination of the hollow head, a tube connected therewith at one end, projecting therefrom, and closed at its other end, said closed end having a baffle or dispersing plate in it, a feed-pipe extending into said tube, a deflector in the tube between it and feed-pipe, return-pipes connected to the head adjacent to the tube and extending parallel therewith beyond the rear end thereof, and a casing surrounding the tube and pipes, substantially as described.

7. In a feed-water heater and purifier, the combination of the hollow head, a tube connected therewith at one end and closed at its other end, a feed-pipe extending through the head into said tube and terminating near the inner end thereof, a spiral deflector around the pipe within the tube, return-pipes con-

5 nected with the head adjacent to the tube, a second head having a water-chamber communicating with said return-pipes, an outlet-pipe from said water-chamber, and a casing interposed between and connecting said heads, said casing inclosing the pipes and tube, substantially as and for the purpose described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

WILLIAM A. GIBSON.

In presence of—

J. H. MUNROE,

FRED B. MUNROE.