

No. 663,429.

Patented Dec. 11, 1900.

F. H. FITZLER.  
AUTOMATIC WATER CIRCULATOR.

(Application filed Sept. 7, 1900.)

(No Model.)

2 Sheets—Sheet 1.

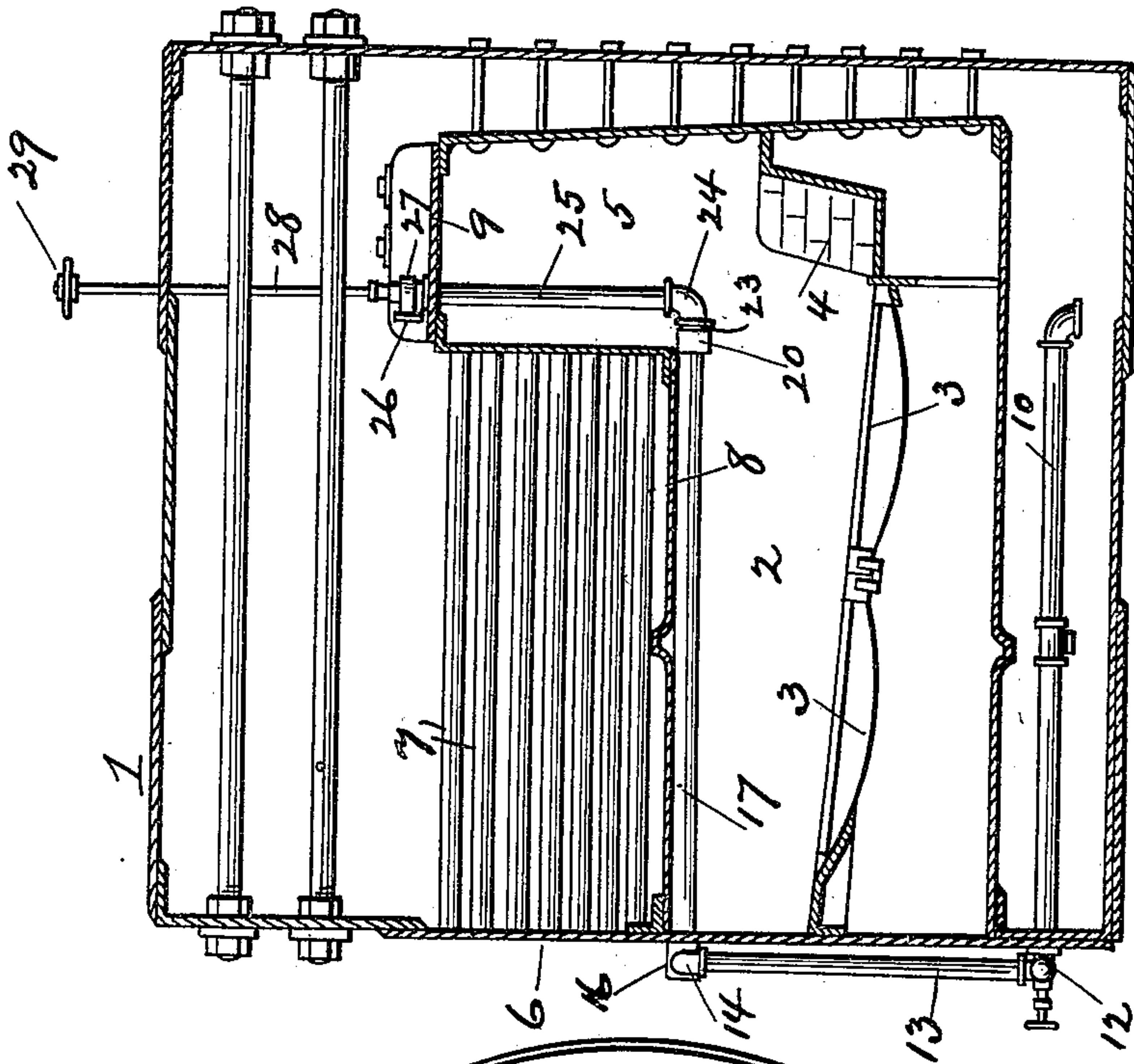


FIG. 2.

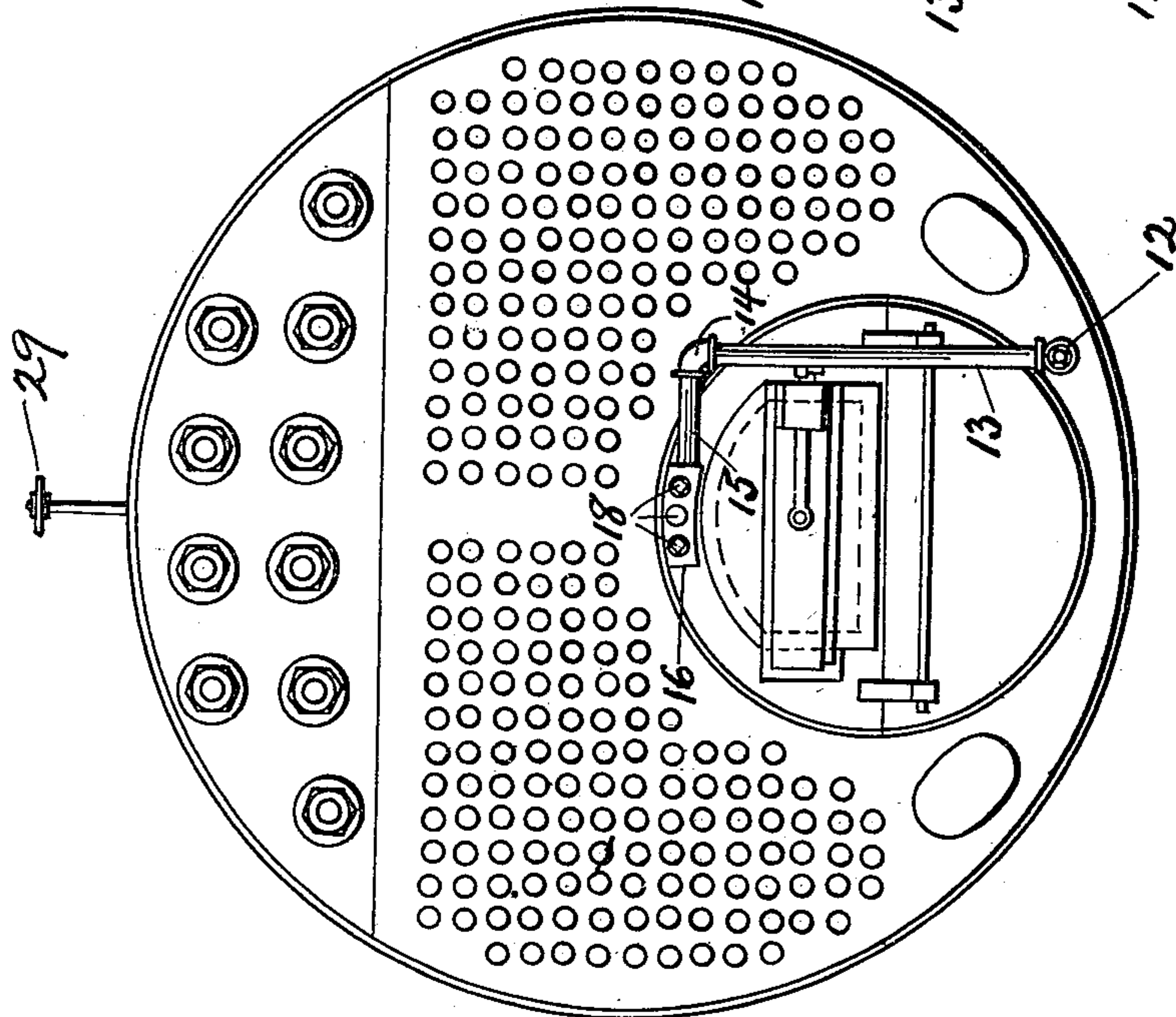


FIG. 1.

WITNESSES.

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INVENTOR.

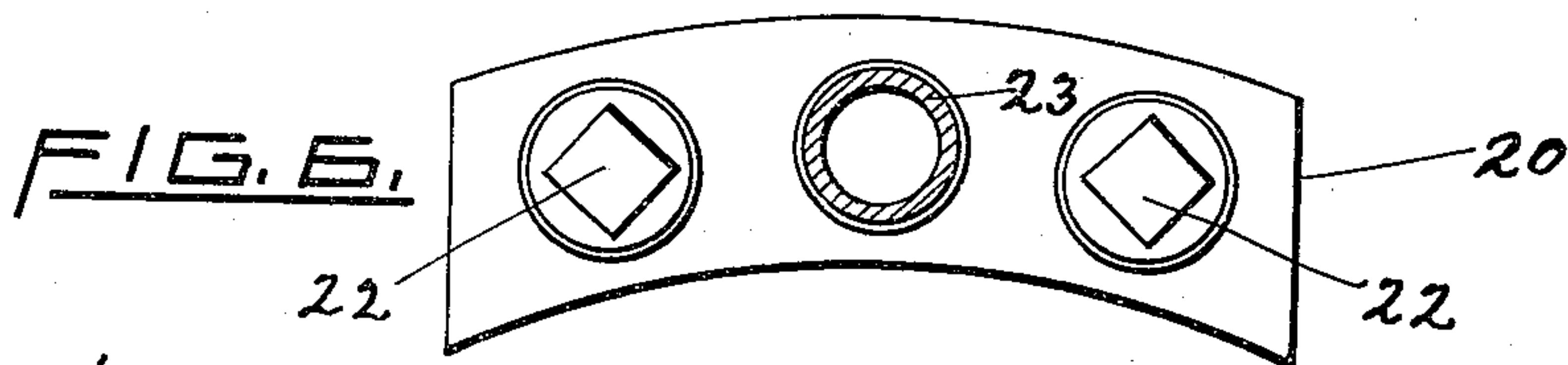
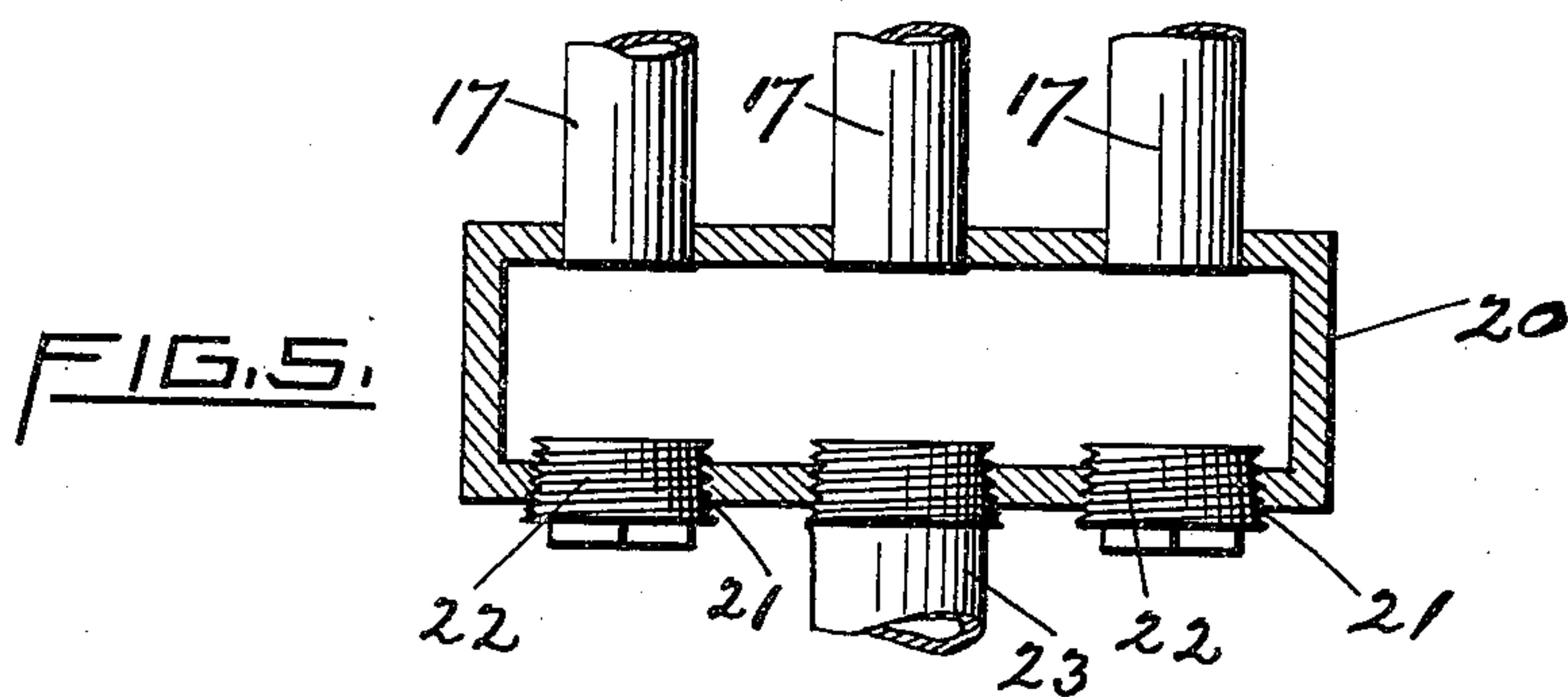
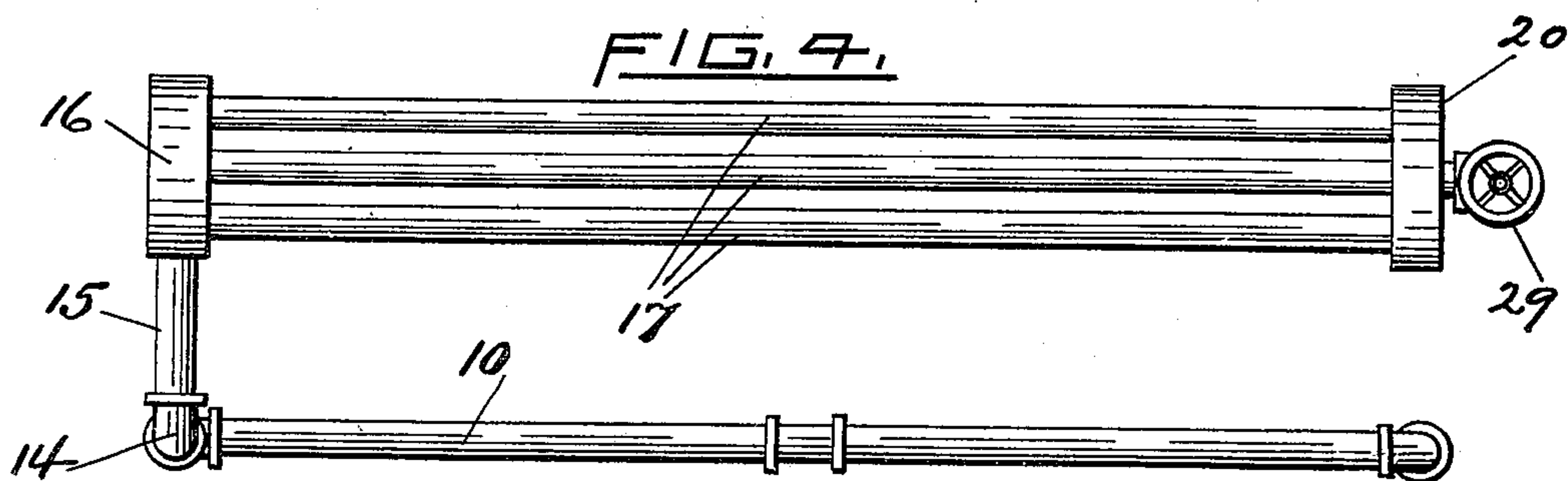
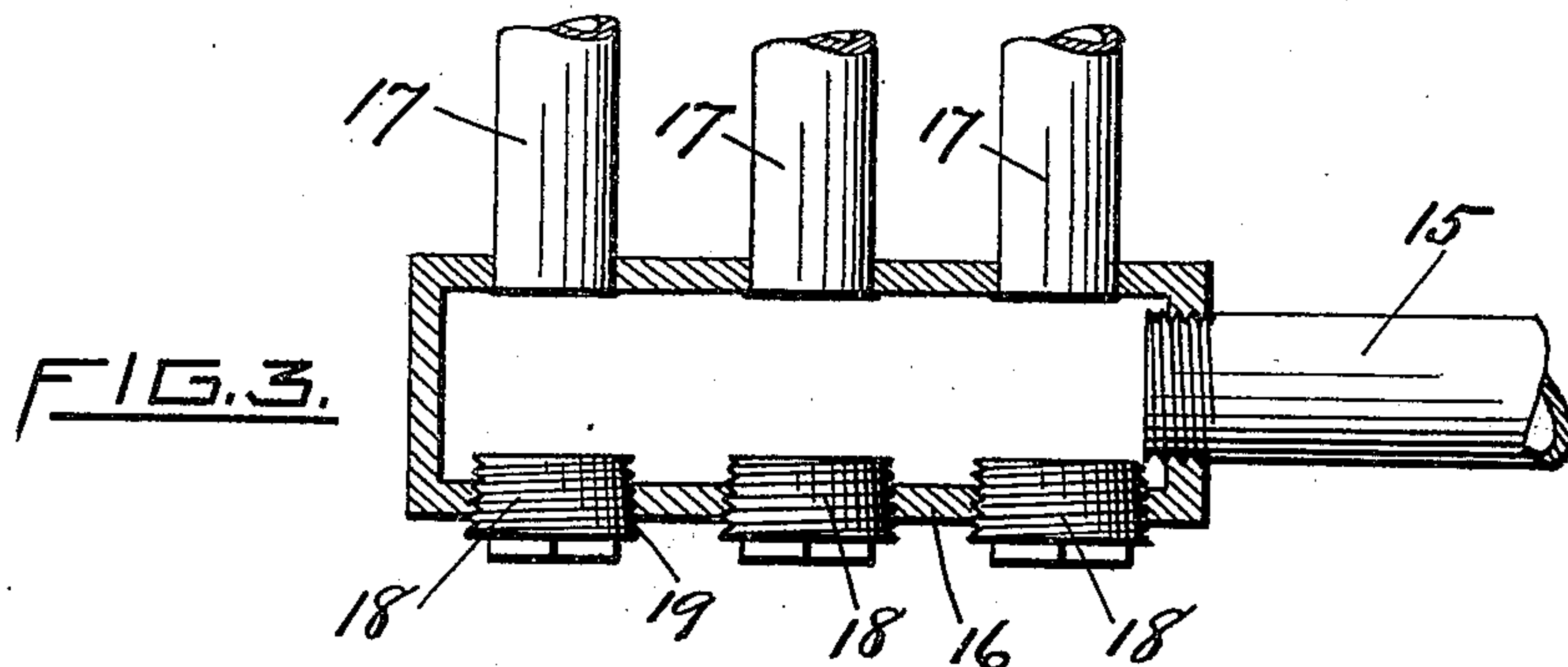
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2 Sheets—Sheet 2.



WITNESSES.

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# UNITED STATES PATENT OFFICE.

FERDINAND H. FITZLER, OF TIVERTON, RHODE ISLAND.

## AUTOMATIC WATER-CIRCULATOR.

**SPECIFICATION** forming part of Letters Patent No. 663,429, dated December 11, 1900.

Application filed September 7, 1900. Serial No. 29,279. (No model.)

*To all whom it may concern:*

Be it known that I, FERDINAND H. FITZLER, a citizen of the United States, residing at Tiverton, in the county of Newport and State of Rhode Island, have invented a certain new and useful Automatic Water-Circulator, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to a system of automatic water circulation for fire-tube boilers of various types, but herein described in connection with the well-known Scotch boiler.

The objects of my invention are, first, to provide a water circulation; second, to effect this end automatically; third, to save fuel, and, fourth, to reduce the necessity for repairs to a minimum. I attain these objects by means of the system hereinafter described, and illustrated by the accompanying drawings, in which like figures of reference refer to like parts throughout.

Figure 1 is a front view of a fire-tube boiler. Fig. 2 is a vertical longitudinal section of the same, showing my devices attached in side elevation. Fig. 3 is a detail view, partially in section, of one of the front headers. Fig. 4 is a plan view of the tubes beneath the crown-sheet. Fig. 5 is a horizontal section of the rear header, with tubes and plugs in side elevation; and Fig. 6 is a face view of the rear header.

The boiler consists of a horizontal cylindrical shell 1, having an internal furnace-flue 2, in which the fire-grate 3 is located, and terminating in a bridge-wall 4 below the combustion-chamber 5. Extending horizontally from the combustion-chamber to the boiler-head 6 is the boiler-tube series 7, located above the crown-sheet 8, which forms the furnace-arch. A back connecting crown-sheet 9 arches the combustion-chamber.

In a boiler of the type described I introduce my circulation system in the following manner: A two-inch inlet water-pipe 10 extends horizontally along the lower portion of the boiler beneath the furnace, traversing the boiler-head and emerging into a globe angle-valve 12, which projects from the lower part of the boiler-front. Thence a second pipe 13 rises vertically to a point near the top of the fire-door, where it is connected by an elbow

14 to a similar water-pipe 15, which extends to and is inserted into the front header 16. This header, as shown in detail, has its rear side bored and reamed to receive the tubes 17, which are expanded therein. Opposite each of the tubes 17 the header is pierced with circular openings 19 for the insertion of threaded plugs 18 or, if preferred, T-bolted hand-hole plates. The assemblage of tubes 17 extend rearwardly from the header 16 beneath the crown-sheet 8 to a rear header 20, Fig. 5, wherein said tubes are expanded. In the face of this header are openings 21 and plugs 22, similar to those in the front header, and similarly located, except that opposite the central tube and projecting from the face of the header is a pipe 23, connected by an angle-joint 24 with a vertical pipe 25, which passes through the connecting crown-sheet 9, where it opens through a check-valve 27 and orifice 26 into the upper part of the boiler below the water-line. The stem 28 of said check-valve projects upwardly through the boiler-shell and carries at its extremity a hand-wheel 29 for operating the same.

The assemblage or coil of tubes 17 form the body of the circulation system. Each tube is about one and one-half inches in diameter. Three pipes are herein shown as constituting the coil; but a greater or less number may be employed. A convenient diameter for the piping is two inches.

The circulation is automatic. Thus when the fire is started the heat contacts with the tube-coil 17 and incites a gentle circulation, due to the difference of density and temperature in the tube-coil. An increase of heat soon stimulates an intense circulation throughout the system, which may be indefinitely prolonged by the continuance of the heat. The movement of the water is from the lower or cooler portion of the boiler upward through the pipes 10 13 15, tubes 17, and pipes 23 and 25, discharging itself through the orifice 26. The result is a more equalized temperature of water throughout the boiler.

When scale accumulates or for any other reason it is desired to cut off the water-supply from the pipe 25, the check-valve 27 is closed by means of the stem 28 and wheel 29. The valve 12 is used to shut off the water in case of any defect in the tubes 17. Said tubes



may be changed without disturbing other parts of the system by removing the plugs in the headers.

5 My invention is herein described as applied to a boiler having one furnace-flue only; but additional circulators like that described may be similarly applied to a plurality of furnaces in the same boiler.

10 My invention overcomes the common injury due to an unequal expansion of the upper and lower parts of the boiler when a fire is newly made, which is caused by the exclusive action of the heat upon the water in the upper part of the boiler, leaving the water below comparatively cold.

15 The tube-coil protects the crown-sheet from the direct action of the fire from below, and thereby lessens the danger of a collapse. The result is a saving of fuel and expense.

20 It is deemed important that the front header and the vertical pipe 13, elbow 14, and connecting-pipe 15 be arranged exteriorly of the furnace, where they are readily accessible, and by means of the plugs the tubes may be readily removed when desired without disturbing the other parts.

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

30 1. In a fire-tube boiler, a circulation system consisting of a water-pipe located in the lower part of the boiler, a vertical pipe connected therewith and disposed exteriorly of the shell, a header also arranged exteriorly of the shell

and with which said vertical pipe communi- 35 cates, a series of tubes supported at one end in said header beneath the boiler-tubes, a second header in which the other ends of said tubes are supported, and a vertical pipe connected with this second header and extended 40 above said boiler-tubes and communicating with the upper part of the boiler, as set forth.

2. In a fire-tube boiler, a circulation system consisting of a water-pipe located in the lower part of the boiler, an exteriorly-arranged ver- 45 tical pipe connected therewith, a header arranged exteriorly of the shell of the boiler and with which said vertical pipe connects, a series of tubes supported at one end in said header, a second header in which the other 50 ends of said tubes are supported, the connecting crown-sheet, a vertical pipe connected with the second header and extended through the connecting crown-sheet, to deliver the water into the upper portion of the boiler, a 55 valve at the junction of the first-mentioned vertical pipe and its header, a valve at the upper end of the second vertical pipe above the connecting crown-sheet, and a stem for the latter valve extended through the boiler- 60 shell, as and for the purpose specified.

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

FERDINAND H. FITZLER.

Witnesses:

GEORGE E. HUBBARD,  
HORATIO E. BELLOWS.