

(No Model.)

3 Sheets—Sheet 1.

J. WHITE.
HOT WATER HEATER.

No. 604,484.

Patented May 24, 1898.

Fig. 1.

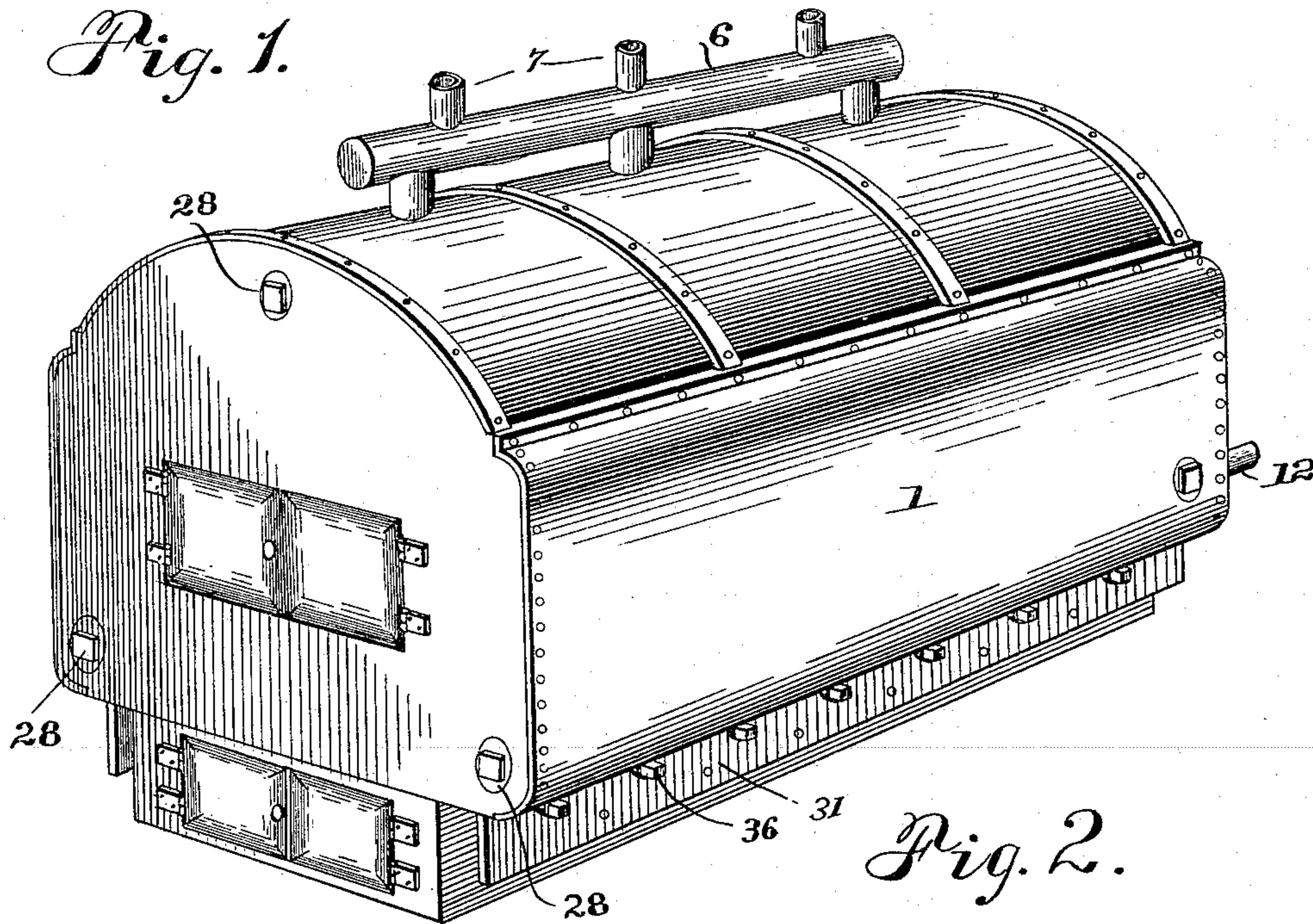
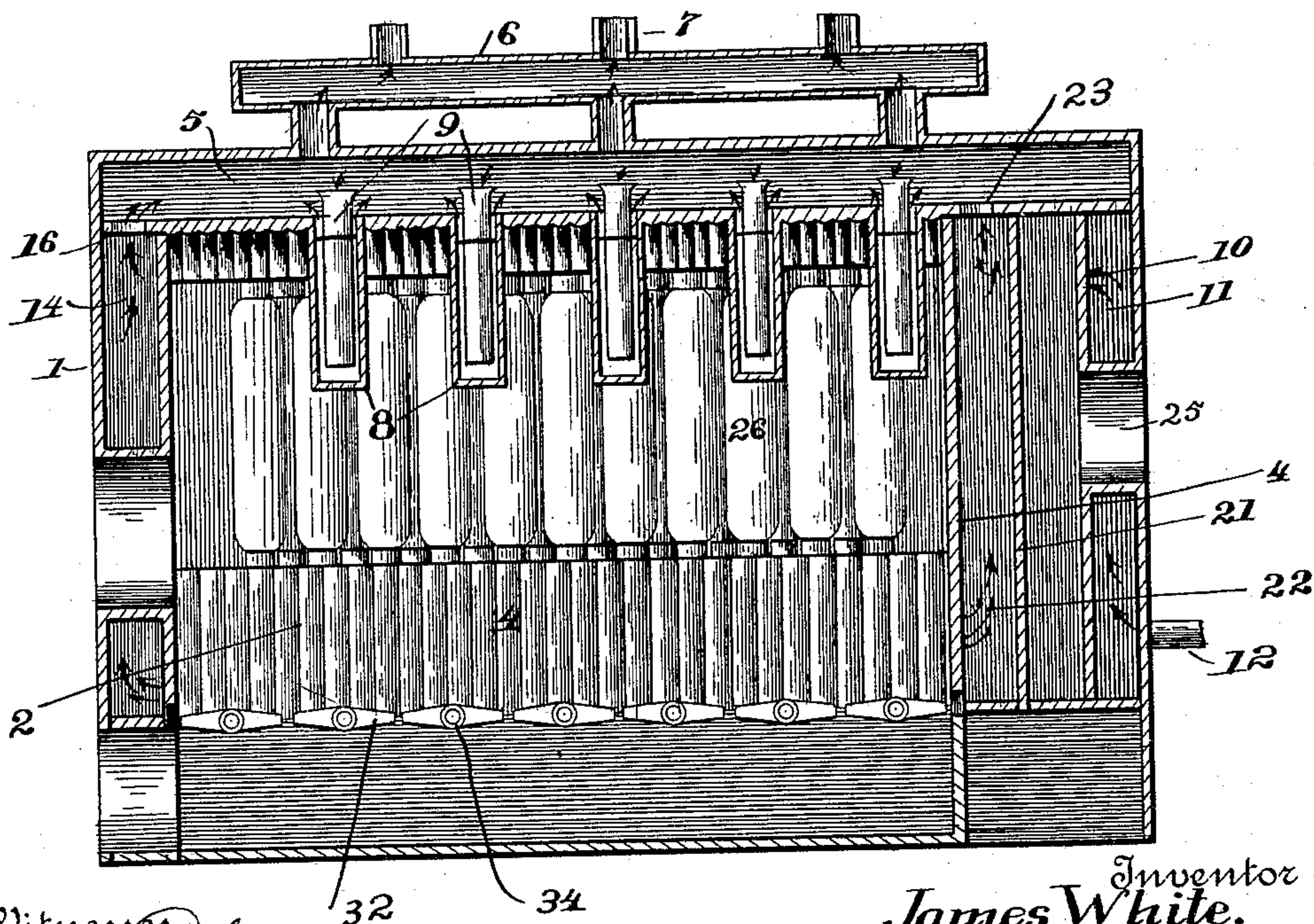


Fig. 2.



Witnesses

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Fig. 3.

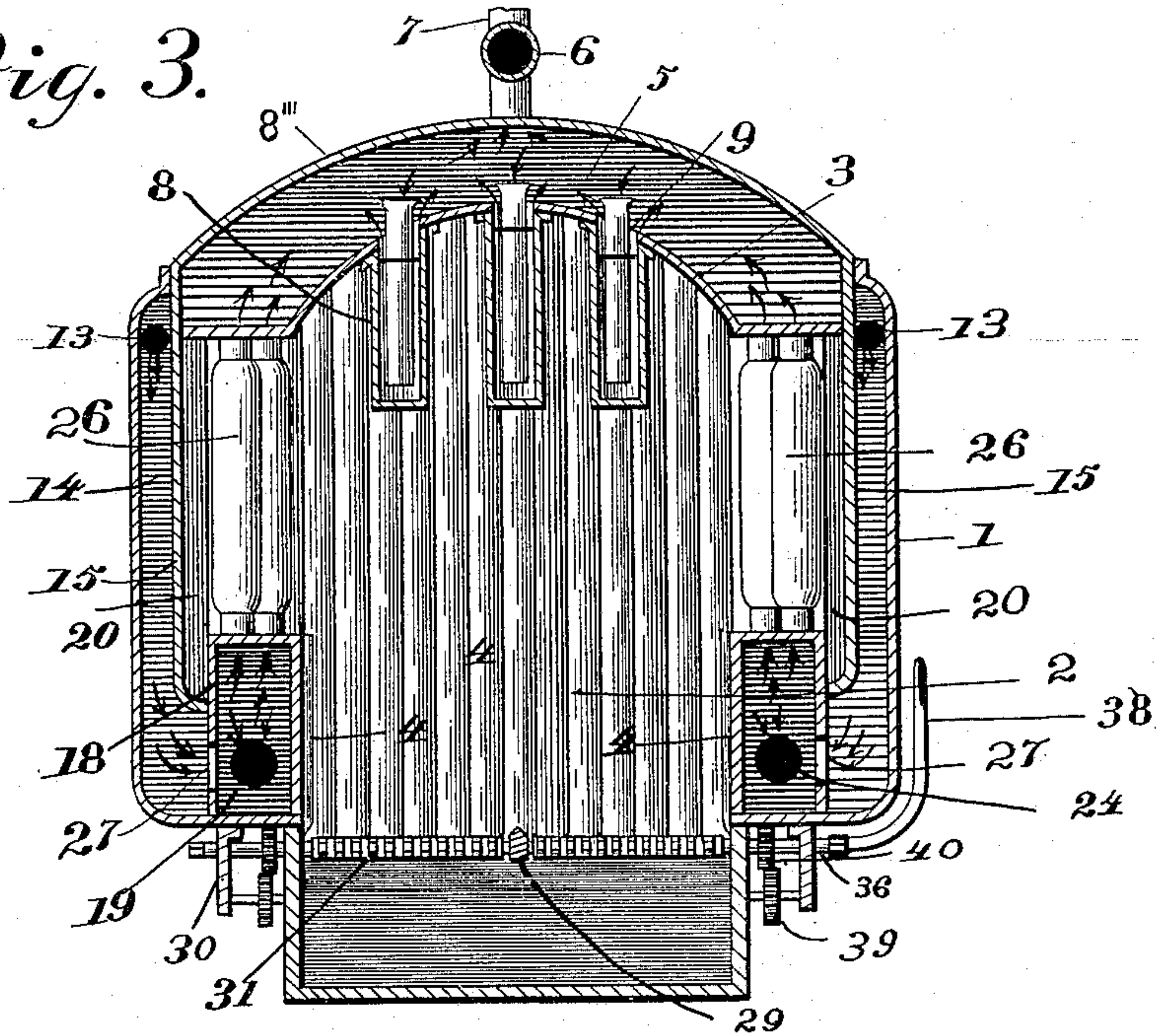
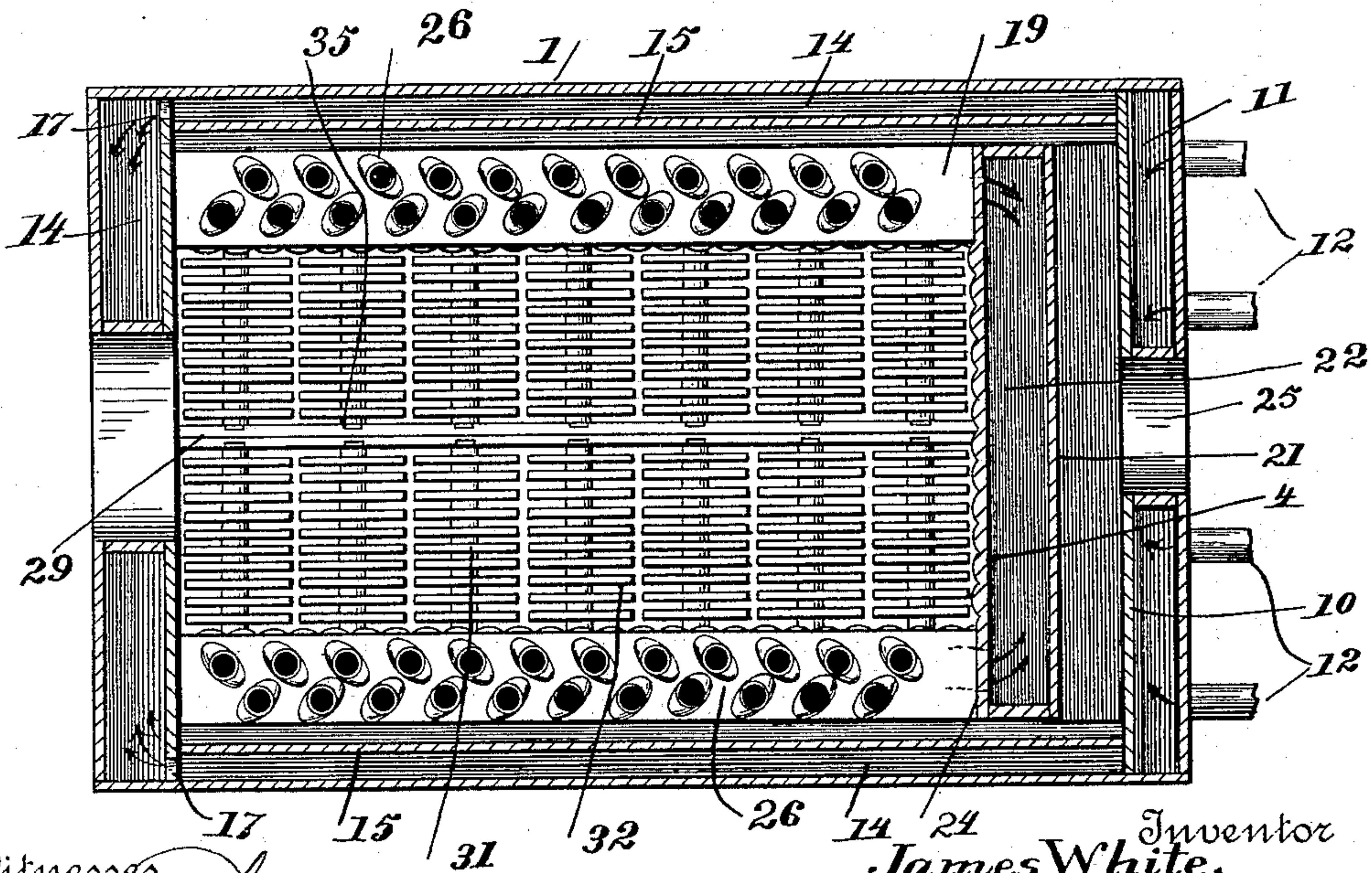


Fig. 4.



Witnesses

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Fig. 5.

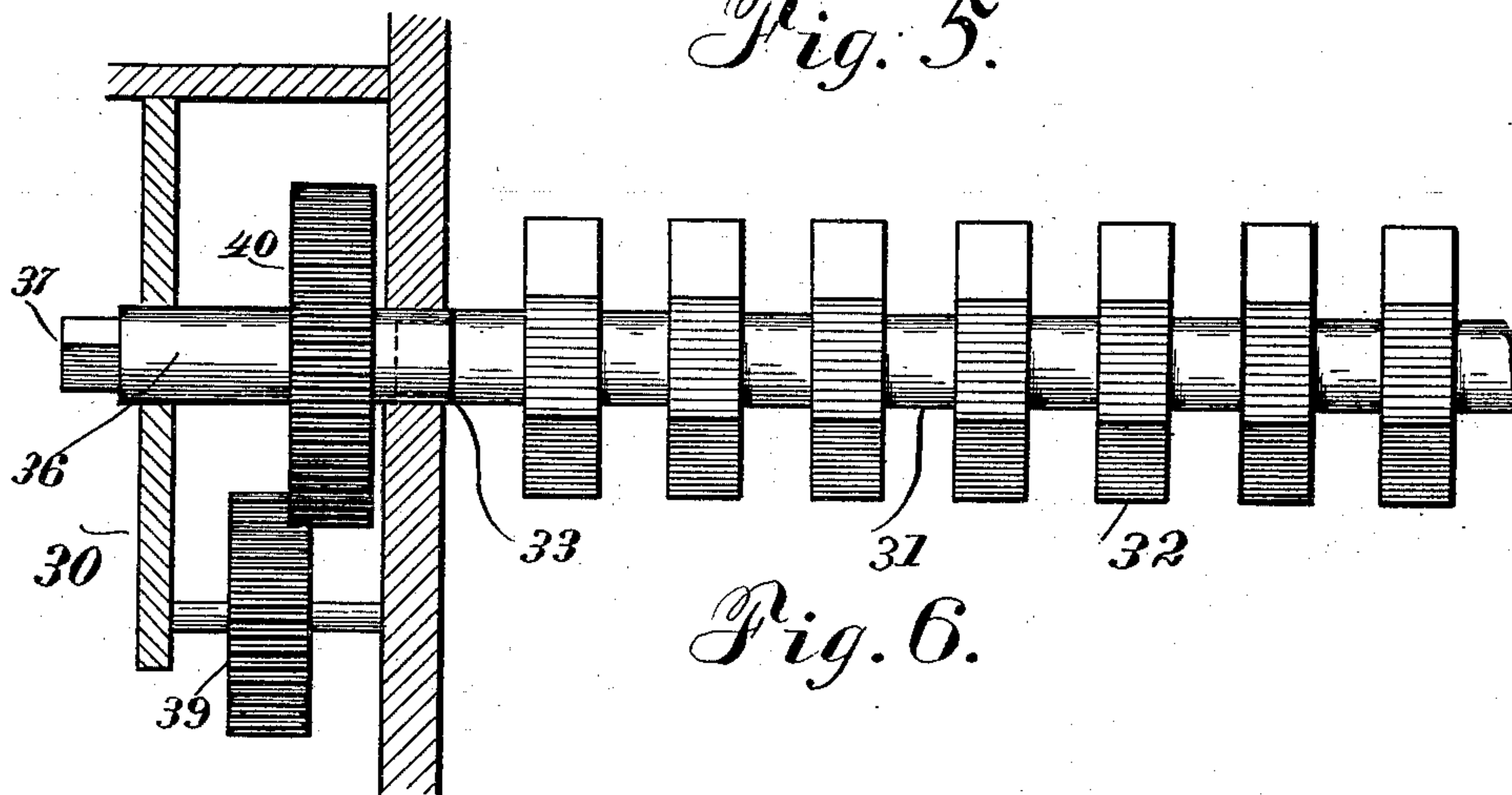


Fig. 6.

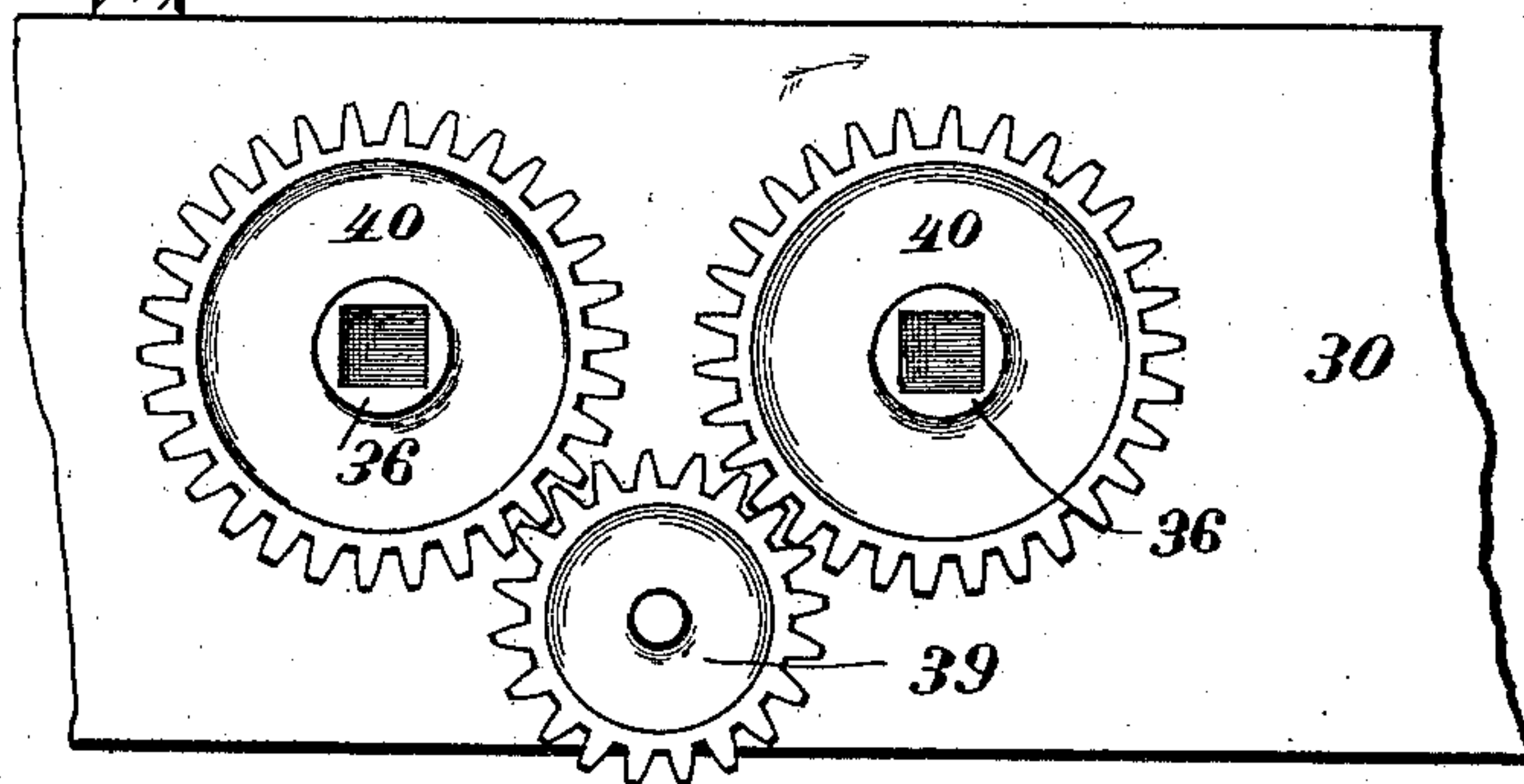
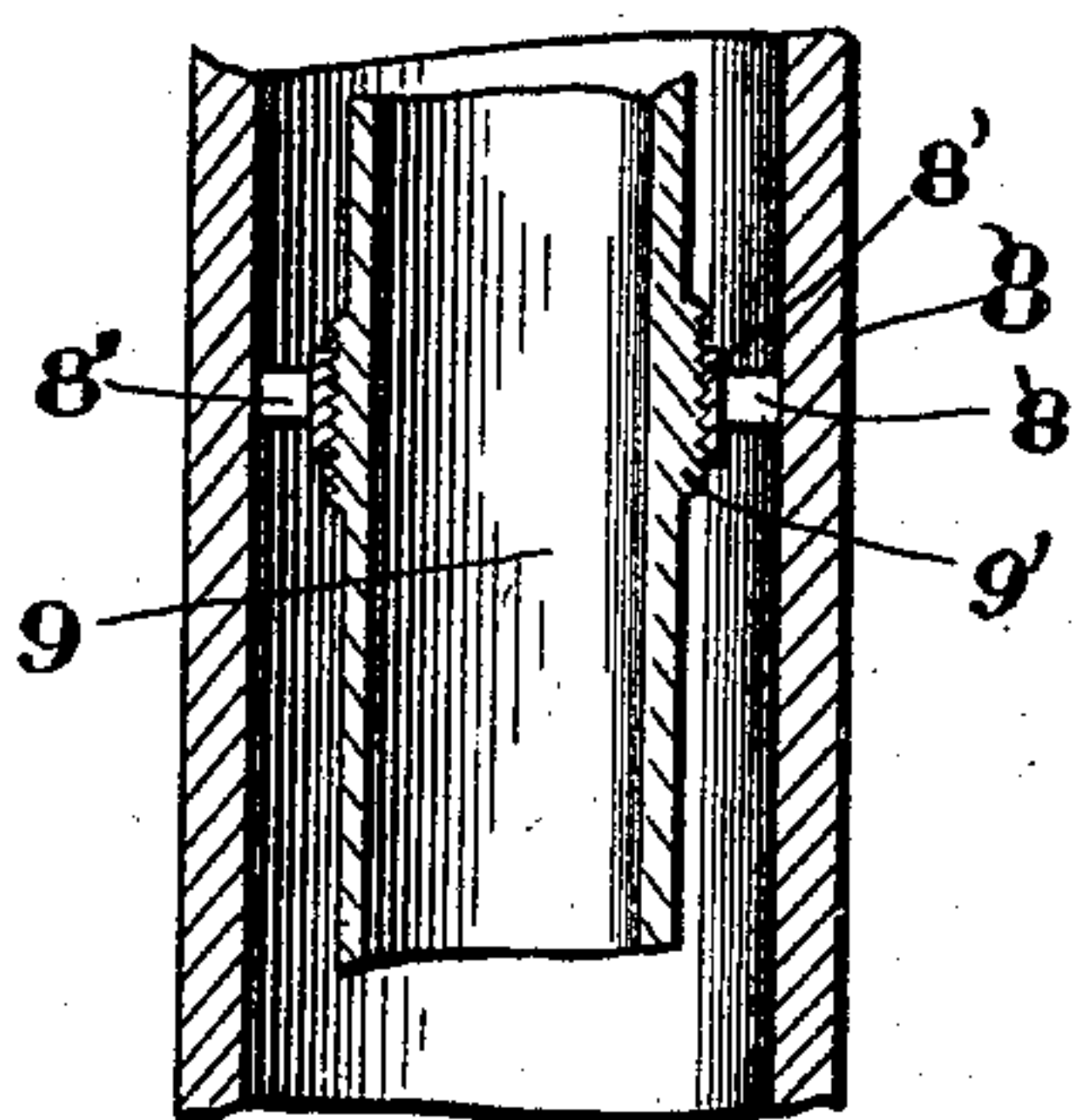


Fig. 7.



Witnesses

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UNITED STATES PATENT OFFICE.

JAMES WHITE, OF MELVALE, MARYLAND.

HOT-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 604,484, dated May 24, 1898.

Application filed May 19, 1897. Serial No. 637,194. (No model.)

To all whom it may concern:

Be it known that I, JAMES WHITE, of Melvale, in the county of Baltimore and State of Maryland, have invented certain new and useful Improvements in Hot-Water Heaters; 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.

My invention relates to combined hot-water and steam heaters.

My object is to provide an improved heater of the class described adaptable for maintaining a maximum amount of heat with a minimum quantity of fuel.

The foregoing objects are accomplished by the employment of a hot-water heater embodying certain improved features and novel combinations of parts appearing more fully hereinafter.

In the accompanying drawings, Figure 1 is a perspective view of my improved heater; Fig. 2, a longitudinal section; Fig. 3, a cross-section. Fig. 4 is a sectional plan view; Fig. 5, a detail of a grate-bar and its operating mechanism; Fig. 6, a detail view of part of the gearing for the grate-bars, and Fig. 7 a detail view of a drop-tube.

The numeral 1 designates the shell or casing, the same having a fire-box 2, which is defined by an arched top 3 and sides and ends 4, which are preferably corrugated. The top forms, in connection with the top of the casing, a dome 5, a cylinder 6 being in communication with the dome by the pipe-sections shown and having outlet-pipes 7, which lead to the various radiators, disposed about the building to be heated. Depending from the top 3 are a number of drop-tubes 8, closed at their lower ends and in which are located supplemental tubes 9, open at both ends and separated from the outer tubes. An internally-screw-threaded collar 8' is located within the outer tube, being secured thereto by arms 8''. The inner tube 9 has an enlarged threaded portion 9', which is screwed into the collar. The upper end of the inner tube is flared at 8''' and located somewhat above the top 3. The water rising to the top of the shell is deflected and passes down the supplemental tubes and up through the outer or drop tube and back again into the dome. The flared upper ends

of the inner tubes cause the water issuing from the outer tubes to be deflected laterally, so that the inflowing and outflowing currents are kept separate and a perfect circulation is obtained. These tubes being located directly over the fire receive the full effect of the heat, and the water is thus heated to a high temperature before issuing from the device.

A partition 10 at the back of the heater forms a water-back 11, into which all of the return-pipes 12 coming from the radiators around the building lead. This partition has openings 13 in its upper portion and the same lead into water-jackets 14, formed by partitions 15. Those portions of the water-jacket which are located at the front of the heater lead directly into the dome 5 at 16. The portions of the water-jacket located at the front of the heater are in communication with those at the sides by openings 17. Low partitions 18 extend longitudinally of the heater and form, in connection with the sides, additional water-jackets 19. They also form, in connection with the partitions 15, flues 20. The numeral 21 designates a partition at the back of the heater which forms, in connection with the rear partition 4, another water-jacket 22, which leads into the dome 5 by an opening 23. This other water-jacket 22 communicates with the jackets 19 by openings 24. The flues 20 lead to the back of the heater between the partitions 10 and 21 and out through the smoke-outlet 25.

At each side of the heater there are two rows (more can be used, if desired) of water-columns 26, the same having their upper ends in communication with the dome and their lower ends leading into the water-jackets 19, so that the water coming from jackets 14 and passing through openings 27 into the water-jackets 19 will flow up through the columns and into the dome. It will be observed that these water-columns are elliptical in cross-section and are located in rows, the columns of one row inclining in relation to those of the other row, so as to be substantially at right angles thereto and disposed with their ends overlapping. The inner columns have their major axes pointing toward the front of the fire-box. This construction and disposition is provided to form circuit-

ous passages for the heat and products of combustion, so that by thus staggering the same the best effect thereof will be obtained on the water within the columns. Furthermore, a great advantage is obtained by disposing these water-columns vertically, because as the water flows upward into the dome its temperature becomes higher and higher, and after flowing through the drop-tubes it has arrived at a very high temperature and will be taken in this condition into the pipes leading to the radiators.

The numerals 28 designate the plugs, so that access can be had to the water connections.

The circulation of the water will be apparent from the arrows showing the direction of movement. After having passed through the radiators disposed about the building in which the heater is located the water passes into the water-back 11, the coolest part of the heater, thence into the water-jackets 14, and a part into the front portions of said jackets and into the steam-dome. The greater part of the water, however, passes into the water-jackets 19, where it is directly heated by the fire in the fire-box. A part of the water passes from said jackets into water-jacket 22, and thence into the dome. The water in the jackets 19 passes up into the water-column and then into the dome. It will be seen that the water in the columns is heated by the direct radiation from the coal and also by the smoke and products of combustion, which after passing up to the top 3 and heating the water in the drop-tubes pass in between the water-columns, where they are staggered about, so that the greater part of their heating effect is obtained on the water in the columns. The products of combustion pass from the combustion-chamber upward and impinge against the arch 3, whence they are deflected and caused to act against the water columns or tubes 26. Passing between said columns they are carried against the walls 15 and along the side longitudinal flues 20 until they reach the rear flues comprised between the walls 4 and 10, finally escaping through the vent 25. It will be apparent that the water in the jackets 10 and 14 is also heated, its temperature rising as it nears the openings 27. The parts are all so disposed that the temperature of the cooled water entering the heater is gradually heightened by the successive heatings until it passes out again into the pipes leading to the radiators.

The preferred form of grate is constructed as follows: Extending longitudinally of the base of the heater and centrally thereof is a supporting-bar 29, having a sharp top ridge to prevent lodgment of the ashes. The sides of the base are provided with depending ledges 30. The grate-bars are shown at 31 and located in rows on opposite sides of the bar 29. Each grate-bar has a number of parallel elliptical arms 32 extending out on opposite sides. The ends of the arms of one grate-

bar lie closely adjacent to those of the next bar. The outer end of each grate-bar is provided with a squared portion 33, and the inner end is formed into the journal 34, adapted for reception in a slot 35 in the supporting-bar 29. The numerals 36 designate a number of hubs journaled in the sides of the base and in the ledges 30 and provided with squared pockets which receive the portions 33. These hubs have squared outer ends 37 for the reception of an operating-lever 38. The numerals 39 designate idle-gears journaled on spindles secured in the ledges 30 and sides of the base. Said idle-gears are held in mesh with the gears 40 by spring-cotters 41. It will be seen, therefore, that by applying the operating-lever to the squared portion of any one hub all the grate-bars on one side of the bar 29 can be rocked simultaneously. There are, of course, operating-levers for each set of grate-bars. Any or all of the idle-gears can be slid out of mesh with the gears 40 by first removing the spring-cotters, and hence any grate-bar can be operated independently of the others or two or more bars can be turned together. The bars can be simply rocked or they may be completely reversed, and they can be entirely removed, if desirable. The construction of the grate-bars permits of the easy cleaning thereof.

As described, the heater is adapted for use as a hot-water or steam heater. When used as a steam-heater, slight changes might be necessary, as enlarging the dome, varying the sizes of the parts, &c.

There are many slight changes of construction which could be resorted to by those skilled in this art in constructing the various parts of my invention, and it is to be understood, therefore, that I consider myself entitled to all such changes as properly come within the spirit and scope of the invention.

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

1. In a heater, the combination with a fire-box, of rows of upright water-columns, substantially elliptical in cross-section, which are located at the sides of the fire-box and are inclined in relation to the longitudinal axis of the latter, the rows being disposed angularly in relation to each other.

2. In a heater, the combination with a fire-box, of a dome and rows of water-columns at the sides of the fire-box and leading into the said dome, the water-columns of each row being substantially elliptical in cross-section and having their transverse axes inclined to the columns and the rows being disposed angularly in relation to each other.

3. In a heater the combination of a fire-box, a dome located over the fire-box and drop-tubes depending from the dome, which tubes comprise an outer tube closed at its lower end and provided with an internal-threaded collar and an inner supplemental tube open at both ends, of less diameter than the outer tube and

provided with an enlarged threaded portion engaging the collar in the outer tube.

4. In a heater, the combination with a fire-box, of a dome and rows of water-columns at the sides of the fire-box and leading into said dome, the water-columns of each row having their transverse axes inclined to the columns and the rows disposed angularly in relation to each other, and drop-tubes depending from the dome, provided with inner supplemental tubes open at both ends and of less diameter than the outer tubes.

5. In a heater, the combination with a fire-box, of an outer water-jacket, inner water-columns at the sides of the fire-box, and flues between the water-columns and the jacket which are in communication with the fire-box by the spaces between the columns.

6. In a heater, the combination with a fire-box, and a water-jacket, of a dome, separated upright water-columns in communication with the dome and jacket aforesaid, an outer water-jacket in communication with the water-jacket aforesaid, and flues located between the outer water-jacket and the water-columns in communication with the fire-box by the spaces between said water-columns.

7. In a heater, the combination with a fire-box, of a water-back, inlet-pipes for said water-back, outer water-jackets at the sides and front of the heater, inner water-jackets at the sides of the heater and communicating with the outer water-jacket, an inner water-back communicating with the inner water-jackets, a dome in communication with the inner water-back and the outer water-jacket, upright water-columns in communication with the dome and the inner water-jackets, outlets

from the dome, a smoke-outlet, and flues leading from said outlet between the inner and outer water-backs, and the inner and outer water-jackets, and in communication with the fire-box by the spaces between the water-columns.

8. The herein-described heater, comprising a fire-box, water-backs, inlet-pipes leading into the water-backs, outer water-jackets at the sides and front of the heater, an inner water-back at the rear of the fire-box, inner water-jackets at the sides of the fire-box, which jackets are in communication with the outer water-jackets and with the inner water-jacket, a dome having outlets which dome is located above the fire-box and in communication with the front portions of the outer water-jackets and with the inner water-back and the inner water-jackets, said water-columns being located at the opposite sides of the fire-box, a smoke-outlet, flues leading from said outlet between the inner and outer water-backs, and the inner and outer water-jackets, and in communication with the fire-box by the spaces between the staggered water-columns, and drop-tubes depending from the dome above the fire-box, which drop-tubes comprise outer tubes having closed lower ends and inner supplemental tubes of smaller size which are open at both ends.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JAMES WHITE.

Witnesses:

GEORGE D. WATT,
EDWD. B. FOX.