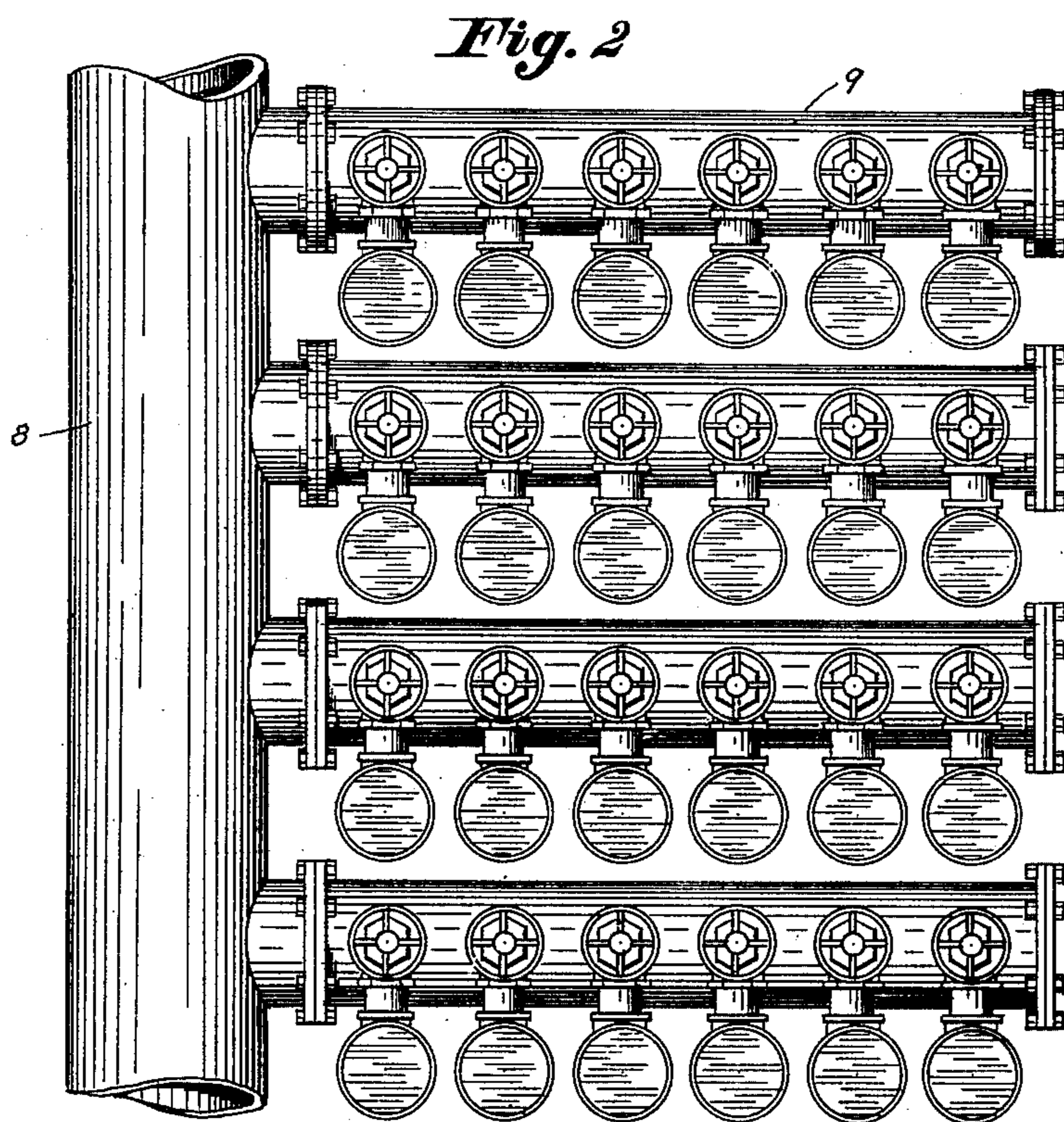
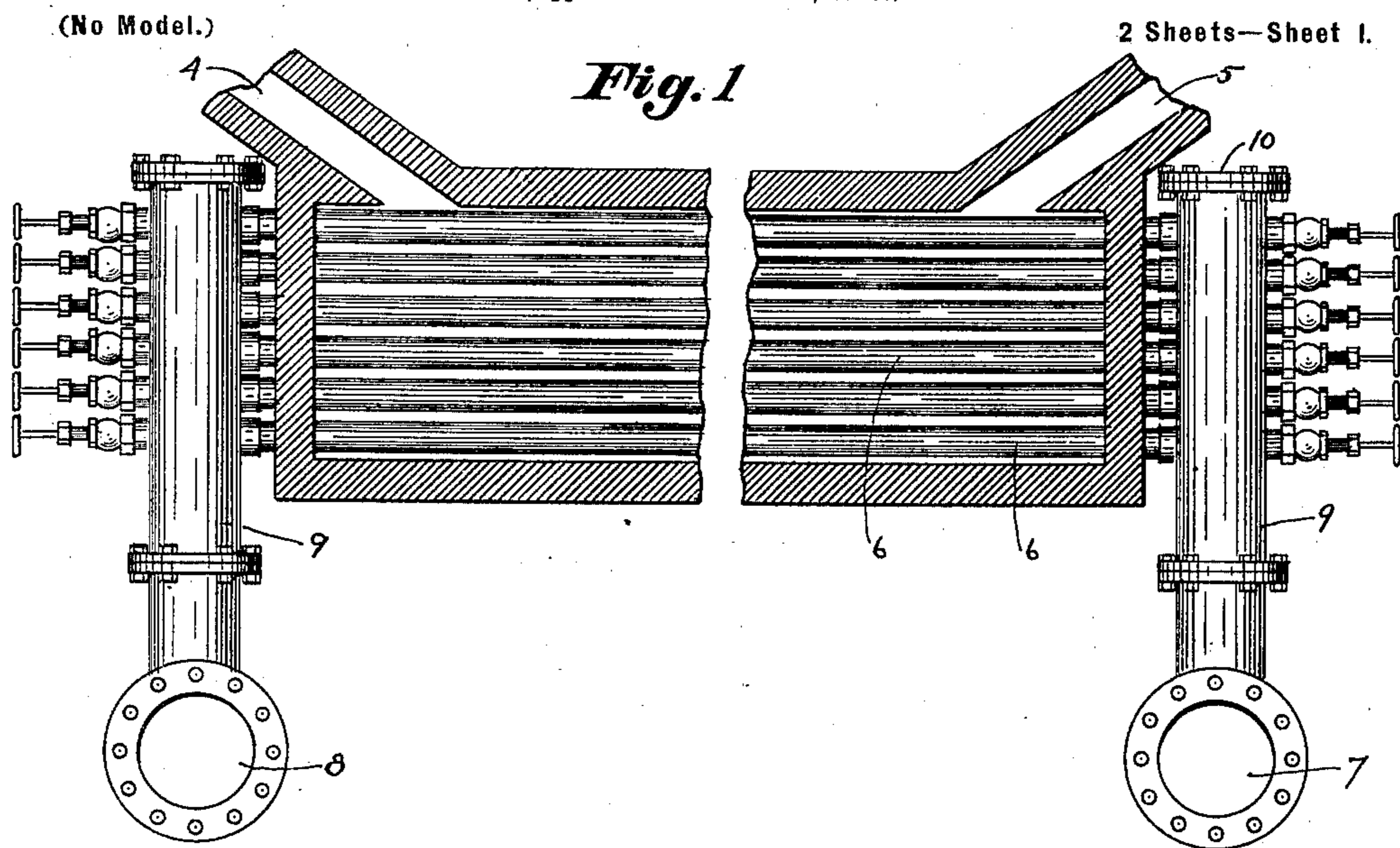


No. 686,860.

Patented Nov. 19, 1901.

R. J. MAIN.
WATER HEATER.

(Application filed Nov. 23, 1900.)



Witnesses.
Fred D Sweet.
Walter Sammarise

Inventor.
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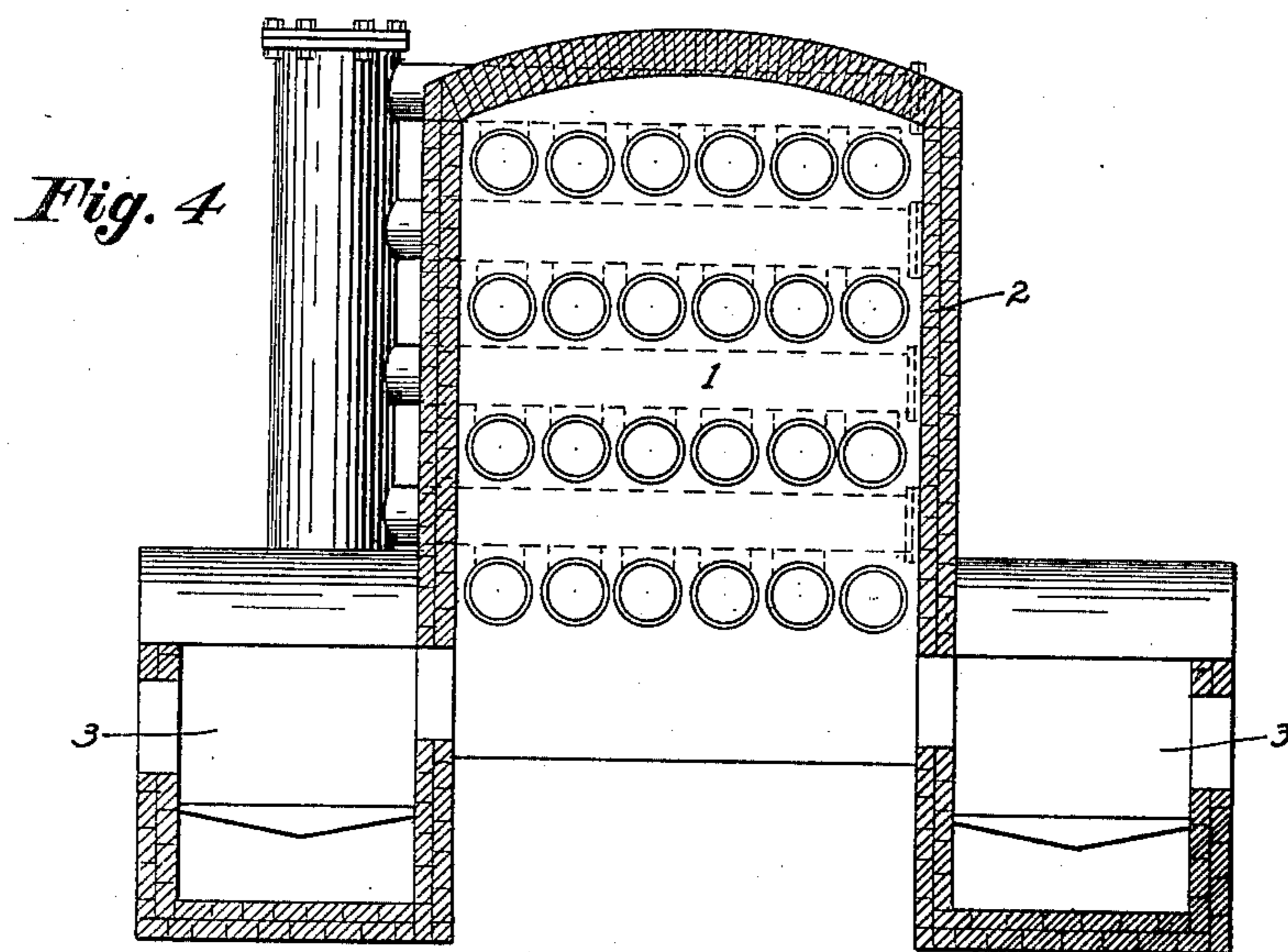
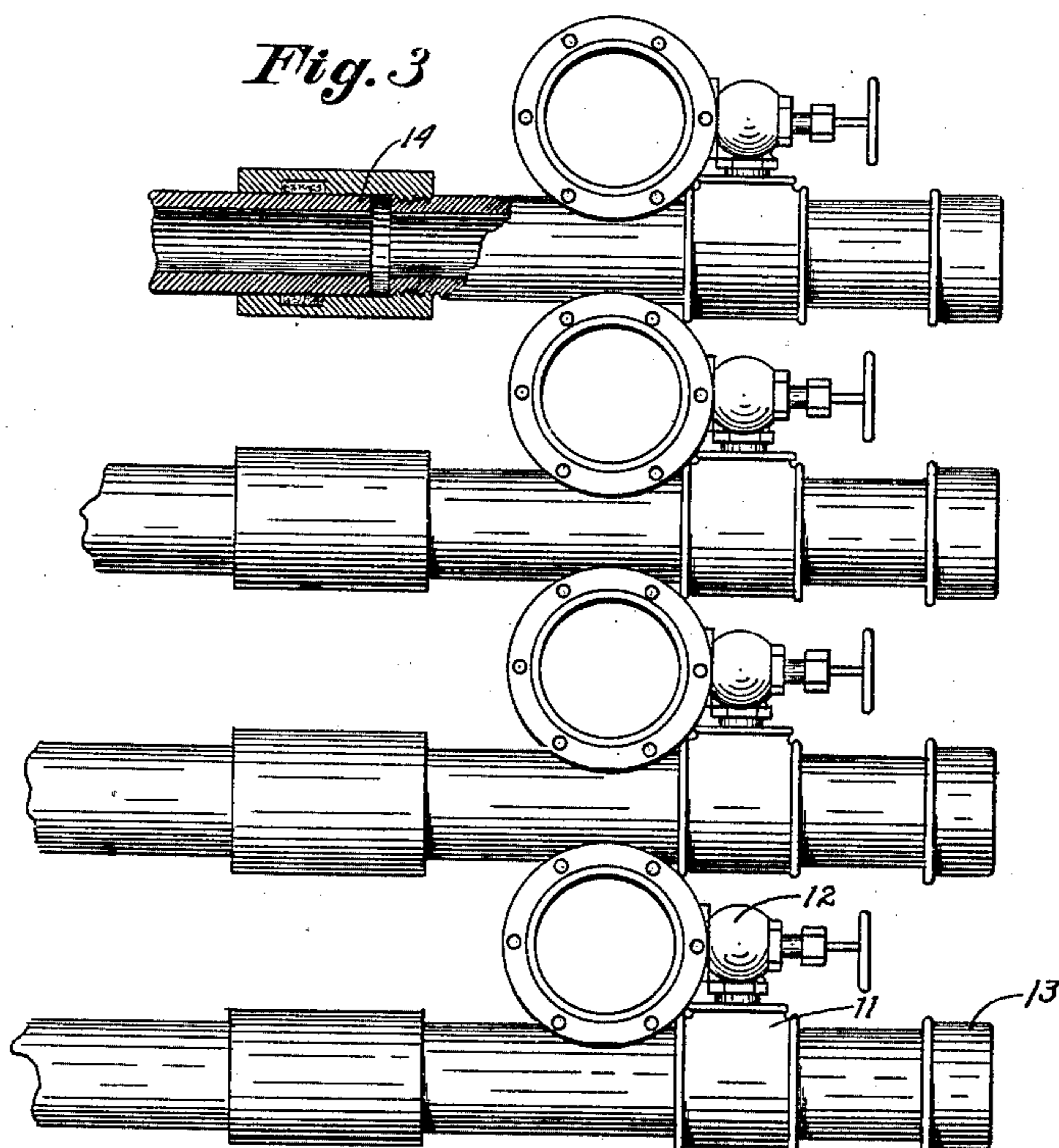
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

ROBERT J. MAIN, OF SWAYZEE, INDIANA.

WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 686,860, dated November 19, 1901.

Original application filed July 19, 1900, Serial No. 24,145. Divided and this application filed November 23, 1900. Serial No. 37,463. (No model.)

To all whom it may concern:

Be it known that I, ROBERT J. MAIN, a resident of Swayzee, in the county of Grant and State of Indiana, have invented a new and useful Improvement in Water-Heaters; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to an improvement in water-heaters, and is more specially designed to provide a heater for utilizing waste heat from regenerative, glass, and other furnaces, as described in my application for patent for a heating system filed July 19, 1900, Serial No. 24,145, of which said application this application is a division.

The object of my invention is to so improve water-heaters that each one of the tubes or pipes can be readily removed and replaced by another or cleaned without throwing the others out of operation; and to this end it consists in having the water tubes or pipes project through the walls of the heating-chamber and providing outside of said chamber independent and detachable connections between each tube or pipe and the mains.

To enable persons skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a sectional plan view of my improved water-heater. Fig. 2 is an end elevation of a main and the water tubes and pipes connected thereto. Fig. 3 is an enlarged detail showing the manner of connecting the tubes or pipes to the mains, and Fig. 4 is a cross-section of a water-heater provided with auxiliary furnaces.

My improved water-heater comprises a chamber 1, having walls of masonry 2, which chamber preferably is of considerable length. This chamber is supplied with heat either by the auxiliary furnaces 3 (shown in Fig. 4 and located on the sides of the heating-chamber) or through the flue or passage 4, coming from a regenerative, glass, or other furnace when the invention is used to utilize waste heat from such furnace. The flue 4 leads into the heating-chamber 1 at one end of the latter and the flue 5 leads from the other end of said chamber to the stack. (Not shown.) Extending through the chamber 1 are the water

tubes or pipes 6, said pipes or tubes being arranged in horizontal rows placed one above the other, as shown in Figs. 2 and 4; but it is obvious that they may be arranged in any other manner desired. These pipes project through the end walls of the heating-chamber and beyond the water-mains. At the end of the chamber nearest the outlet-flue 5 is the cold-water main 7 and at the opposite end of said chamber is the hot-water main 8. Projecting out horizontally from the mains 7 and 8 are branch mains 9, which project across the ends of the heating-chamber 1. In the specific form illustrated each main has four branches connected thereto; but the number thereof will of course depend on the height of the heating-chamber 1. These branch mains are closed at their outer ends by suitable water-tight caps 10, as shown. The pipes 6 project underneath these branch mains and beyond the same, and each pipe is connected at both of its ends to one of the branch mains by the couplings 11, in which couplings are cut-off valves 12. The projecting ends of the pipes 6 are closed by suitable water-tight caps 13. Owing to the expansion and contraction to which said pipes are subjected in the heating-chamber it is necessary to apply a slip-joint, as shown at 14, Fig. 3, to each pipe outside of the heating-chamber.

In case the invention is used to utilize the waste heat coming from regenerative and other furnaces it is desirable to also provide the auxiliary furnaces 3, (shown in Fig. 4,) so that the chamber 1 may be supplied with heat in case the regenerative or other furnace should become disabled or is put out of operation. These auxiliary furnaces may also be used to assist the waste heat coming from the regenerative or other furnace if found necessary.

In the operation of my water-heater the heat and flame coming from the auxiliary furnace 3 or through the flue 4 enter the chamber 1 at one end and travel the length thereof, passing out at the opposite end through the flue 5 to the stack. The cold water from the main 7 enters the water tubes or pipes 6 at the end nearest the outlet of the flame, and as it travels toward the opposite end of said pipes it gradually becomes heated,

so that the flame and heat entering the chamber 1 from the furnace 3 or flue 4 strike the pipes 6 at the point where the water is hottest, thereby producing a very high degree of heat, and as said flame and heat travel through the chamber 1 around and among the pipes 6 the heat thereof is gradually absorbed by the water, and in the latter part of its course through said chamber it comes in contact practically with cold pipes, so that by the time the air and flame from the furnaces pass out of the chamber 1 the heat is almost entirely absorbed. The hot water is drawn through the main 8 and may be used in hot-water systems for dwellings or for any other purpose desired.

It will be noted that by having each of the pipes 6 connected to the branch mains 9 independently of the other pipes 6 it is possible to remove any of said pipes in case it should become disabled without disturbing any remaining pipes. To do this, the valves 12 at both ends of the disabled pipe are closed and the couplings 11 are detached, when said pipe can be drawn out of the chamber 1 and another pipe inserted in its place. Furthermore, by having the pipes 6 projecting beyond the branch mains 9 said pipes can be cleaned individually without throwing the system out of operation. To do this, the valves 12 at both ends of the pipe are closed and the caps 13 removed from the ends of said pipe, when the pipe or flue cleaner, of rotary or other type, can be passed through said pipe, thoroughly cleaning the interior thereof. If desired, the pipe-cleaner can be inserted at the cold-water end of said pipe, the cap 17 on said end put in place, and the valve 12 then opened, and the pressure of the water will force the cleaner through the pipe without any further mechanical assistance.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a heating system, the combination with a heating-chamber, of the pipes extending through said chamber, mains outside said chamber, and detachable connections between each pipe and said mains.

2. In a heating system, the combination with a heating-chamber, of pipes extending through said chamber, mains outside said chamber, detachable connections between said pipes and said mains, and a cut-off valve at each of said connections.

3. In a heating system, the combination with a heating-chamber, of the pipes extend-

ing through said chamber, mains outside said chamber at each end thereof, said pipes extending beyond said mains and connected thereto, and removable caps on the ends of said pipes.

4. In a heating system, the combination with the heating-chamber, of the pipes extending through said chamber, mains outside said chamber at each end thereof, said pipes extending beyond said mains, removable caps on the ends of said pipes, and detachable connections between each pipe and said mains.

5. In a heating system, the combination with the heating-chamber, of pipes extending through said chamber, mains outside said chamber at each end thereof, said pipes extending beyond said mains, removable caps on the ends of said pipes, detachable connections between each pipe and said mains, and a cut-off valve at each of said connections.

6. In a heating system, the combination with the heating-chamber, of the vertical mains at each end thereof, the series of horizontal branch mains connected to said mains and extending across the ends of the heating-chamber, the battery of pipes extending through said chamber and projecting beyond said branch mains and connected thereto, and removable caps on the ends of said pipes.

7. In a heating system, the combination with the heating-chamber, of the vertical mains at each end thereof, the series of horizontal branch mains connected to said mains and extending across the ends of said chamber, the battery of pipes extending through said chamber and projecting outside thereof, and detachable connections between each of said pipes and said branch mains.

8. In a heating system, the combination with the heating-chamber, of the vertical mains at each end thereof, the series of horizontal branch mains connected to said mains and extending across the ends of the heating-chamber, the battery of pipes extending through said chamber, and projecting beyond said branch mains, detachable connections between each of said pipes and said branch mains, and removable caps on the ends of said pipes.

In testimony whereof I, the said ROBERT J. MAIN, have hereunto set my hand.

ROBERT J. MAIN.

Witnesses:

R. S. DOLING,
GEO. M. COOPER.