No. 684,513. Patented Oct. 15, 1901.

T. J. KIELEY.

HEATING DEVICE.

(Application filed Jan. 9, 1901.)

(No Model.) 2 Sheets—Sheet 1.

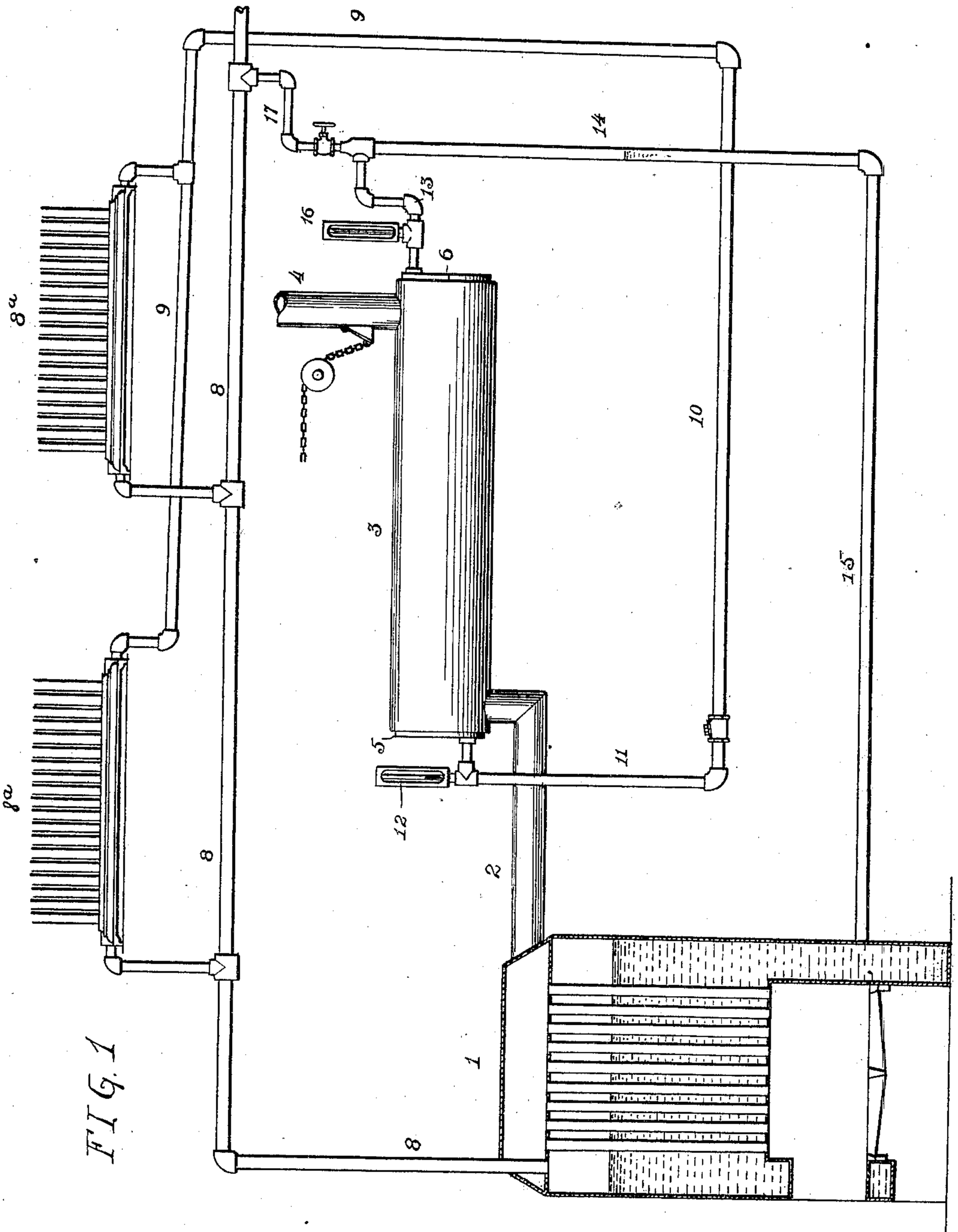

FIG. 1

Witnesses
May M. Plyer.
Albert Popkins.

Inventor
Timothy J. Kieley
by George Cook
his Attorney.

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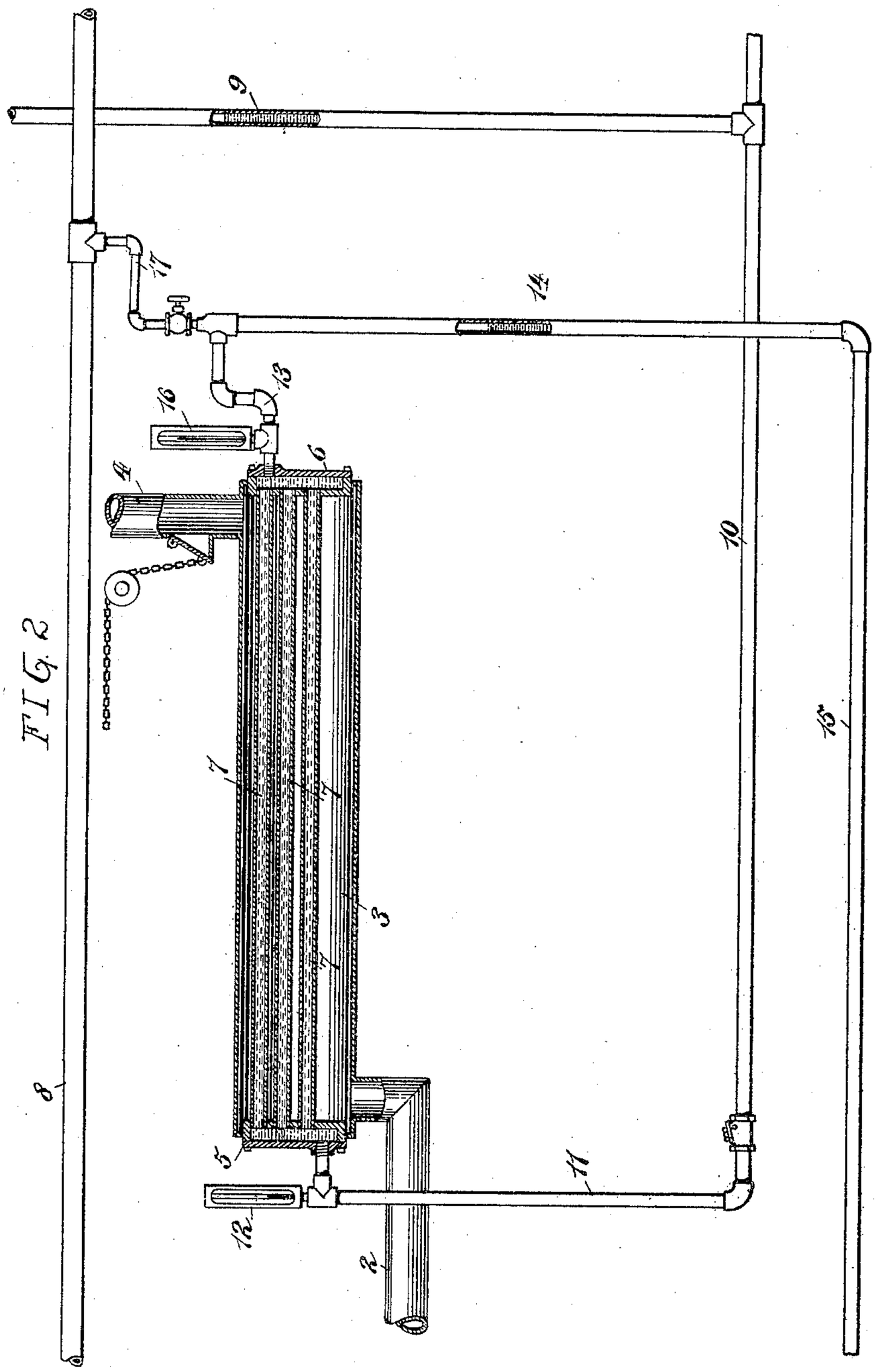

FIG. 2

WITNESSES:

May M. Plyer.

Albert Popham

INVENTOR

Timothy J. Kieley

BY George Cook

ATTORNEY.

UNITED STATES PATENT OFFICE.

TIMOTHY J. KIELEY, OF NEW YORK, N. Y.

HEATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 684,513, dated October 15, 1901.

Application filed January 9, 1901. Serial No. 42,596. (No model.)

To all whom it may concern:

Be it known that I, TIMOTHY J. KIELEY, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have made and invented certain new and useful Improvements in Heating Devices, of which the following is a specification.

My invention relates to an improvement in devices whereby the heat contained in the hot gases or products of combustion ordinarily lost in the uptake flue or chimney from a steam-generator may be utilized for raising the temperature of the water of condensation prior to its reëntering into the boiler.

My improved apparatus is particularly designed for use in connection with steam heating apparatus employed for warming buildings and similar purposes and wherein steam is used under a low pressure, the water of condensation being returned to the boiler to be again converted into steam and sent through the mains and radiators, in contradistinction to those devices and systems utilized for the purpose of driving engines wherein the exhaust-steam is allowed to escape into the atmosphere or employed for heating the feed-water.

The principle upon which my invention is based is the utilization of the heat after it passes through the steam-generator for reheating the water of condensation by inserting in the flue a water-drum or series of water-pipes, which water of condensation by reason of its travel through the return has become more or less cooled and which also by reason of the fact that the heat as it leaves the generator must be at a higher temperature than the temperature of the steam which is generated will be raised approximately to the boiling-point. As a matter of fact in several devices which I now have in operation I have found that at times the return water will be raised above the boiling-point by means of this heat ordinarily wasted, thereby effecting a large saving in the consumption of coal. In practice I have found that the temperature of the return water upon leaving the heating device in the flue will average fifty degrees higher than when entering the device. I am well aware that many different devices and systems have been employed for utilizing the heat ordinarily escaping from the chimney or flue. In some instances these devices have been so constructed and arranged as to heat the water prior to its entrance into the boiler and in other instances the apparatus has been especially designed for heating water circulating through pipes and radiators, the device in such instances being entirely separate from and independent of the furnace or steam-generator, and I therefore expressly disclaim the same; but I am not aware that any apparatus has been constructed and arranged in the manner in which I have illustrated and hereinafter described the same and wherein the device is utilized for reheating the return water of condensation prior to its reëntering the boiler.

In the accompanying drawings, Figure 1 is a view illustrating my device in connection with a suitable steam generator and radiator system; and Fig. 2 is a view on a somewhat-larger scale, partly in section and partly in elevation, showing the more essential details of the device.

Referring to the drawings, which represent a suitable steam-generator of any suitable character, 2 represents the flue leading therefrom.

3 is a cylinder, preferably made of sheet metal and communicating at its forward end with and practically forming a continuation of the flue 2, and 4 a pipe or flue leading to a chimney or stack, it being understood that the heat, smoke, and products of combustion pass from the furnace or steam-generator through the flue 2, cylinder 3, flue 4, and into the stack or chimney.

The sheet-metal cylinder 3 may be made of any suitable length and diameter and is provided at its forward end with the water-head 5 and at its rear end with a similar head 6, said heads 5 and 6 having fitted therein a series of pipes 7, preferably located near the top or in the upper portion of said cylinder 3, said pipes 7 opening into the heads 5 and 6 to allow of the circulation of water through them. From the steam-generator leads the main 8, communicating with radiators 8^a for supplying steam thereto in the ordinary way. Ordinarily the return-pipe from such radi-

ators lead directly to the boiler for conveying the water of condensation thereto; but in my improved apparatus I attach these returns 9 to the main return 10, which latter instead of leading to the lower portion or return-drum of the boiler I connect to the vertical pipe 11, which at its upper end leads into and communicates with the water-head 5, a thermometer 12, if desired, being secured to the extreme upper end of said pipe 11 for the purpose of communicating the temperature of the return water of condensation to the reheating apparatus. From the water-head 6 leads the outlet-pipe 13, connected by means of the pipe 14 to the return-pipe 15, leading into the boiler, a thermometer 16 being attached, if desired, to the outlet-pipe 13 to show the temperature of the water of condensation as it issues from the reheating device prior to its entrance into the boiler. To the pipe 14 are also attached what I term an "equalizing-pipe" 17, which is also attached to the main 8, whereby any steam into which the water from the reheating device may be converted is led into the said main 8.

In boilers or steam-generators of ordinary construction a damper or door is usually provided in the back and operated by means of a regulator attached or secured to the boiler. This I omit and instead thereof place a similar door or damper in the flue 4, whereby the cold air is allowed to enter the flue or chimney beyond the reheating device, which would not be the case were the door to be employed in the back of the steam-generator, for in the latter event the cold air would be allowed to pass through the flue 2, through the cylinder 3, and out through the flue 4, and thereby cool the water in the pipe 7.

It will be understood from the foregoing that the heat from the boiler or steam-generator passes through the flue 2 into the cylinder 3, wherein it circulates around the pipes 7, thereby reheating the water of condensation to a temperature nearly equal to that in the boiler. This water of condensation passes through the pipe 13, the upper end of which is slightly higher than the uppermost pipe 7 in order to insure said pipes 7 being constantly filled with water, and down the pipe 14, through the pipe 15, and into the boiler, the level of the water in the pipe 14 being the same as that in the boiler. It will also be understood that as the steam in the main 8 and in the radiators condenses it passes down into the return 9, the level of the water of condensation therein being on a level with that in the pipe 13, the effect of which is that as the water of condensation, drop by drop, passes down into the pipe 9 the same quantity will issue from the pipe 13 and drop down into the pipe 14, the level of which will be maintained the same as that in the boiler. In other words the level of the water in the returns 9 will be that of the level of the water in the pipe 13, and the level of the water in the pipe 14 will be that in the boiler.

It will be understood that several changes might be made in the construction and arrangement of my improved device, as, for instance, the number of pipes 7 may be increased or decreased, as desired, and as a matter of fact I have used with good effect one large single pipe instead of the several pipes. Again, my device and system are applicable not only to steam heating apparatus, but also to hot-water systems, and therefore I do not limit my invention to the precise construction and arrangement of parts as illustrated and described; but,

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

1. A device of the character described, consisting of a pipe or pipes located in the flue or chimney, radiators, returns leading therefrom to said pipe or pipes, a boiler, and a return leading from said pipe or pipes to said boiler substantially as described.

2. In a device of the character described, the combination with a flue, of a pipe or pipes located in said flue, radiators, return-pipes from the latter and communicating with said pipes in said flue, a boiler and a return-pipe communicating with the latter and with said pipe or pipes in said flue, substantially as described.

3. In a device of the character described, the combination with a cylinder, of a flue leading into one end and out of the other end of said cylinder, a pipe or pipes located in said cylinder, radiators, return-pipes from the latter communicating with the forward end of said former pipes, a boiler, and a return-pipe, communicating with said boiler and with the opposite end of said former pipe, substantially as described.

4. In an apparatus of the character described, the combination with a cylinder into and out of which leads a flue, of a pipe or pipes located in said cylinder, radiators, a return from the latter leading into said pipe or pipes, a boiler, and a return leading from the latter and communicating with said pipes in said cylinder, and at a point above said cylinder, substantially as described.

5. A device of the character described, consisting of a cylinder, into and out of which leads a flue, a pipe or pipes located in said cylinder, radiators, returns from the latter communicating with the pipes in said cylinder, a boiler, a return-pipe to said boiler and communicating with said pipe or pipes in said cylinder, a steam-main, and an equalizing-pipe communicating with said steam-main and with the return-pipe to the boiler, substantially as described.

6. In a device of the character described, the combination with a cylinder containing a pipe or pipes, radiators, a return from the latter communicating with said pipe or pipes in

said cylinder, a boiler, a return to the boiler and communicating with said pipe or pipes in said cylinder, a flue leading into one end of said cylinder and out at the opposite end, and a damper located in said flue above and beyond said cylinder, substantially as described.

Signed at New York, in the county of New York and State of New York, this 7th day of January, A. D. 1901.

TIMOTHY J. KIELEY.

Witnesses:

GEORGE COOK,

M. VAN NORTWICK.