

No. 658,634.

Patented Sept. 25, 1900.

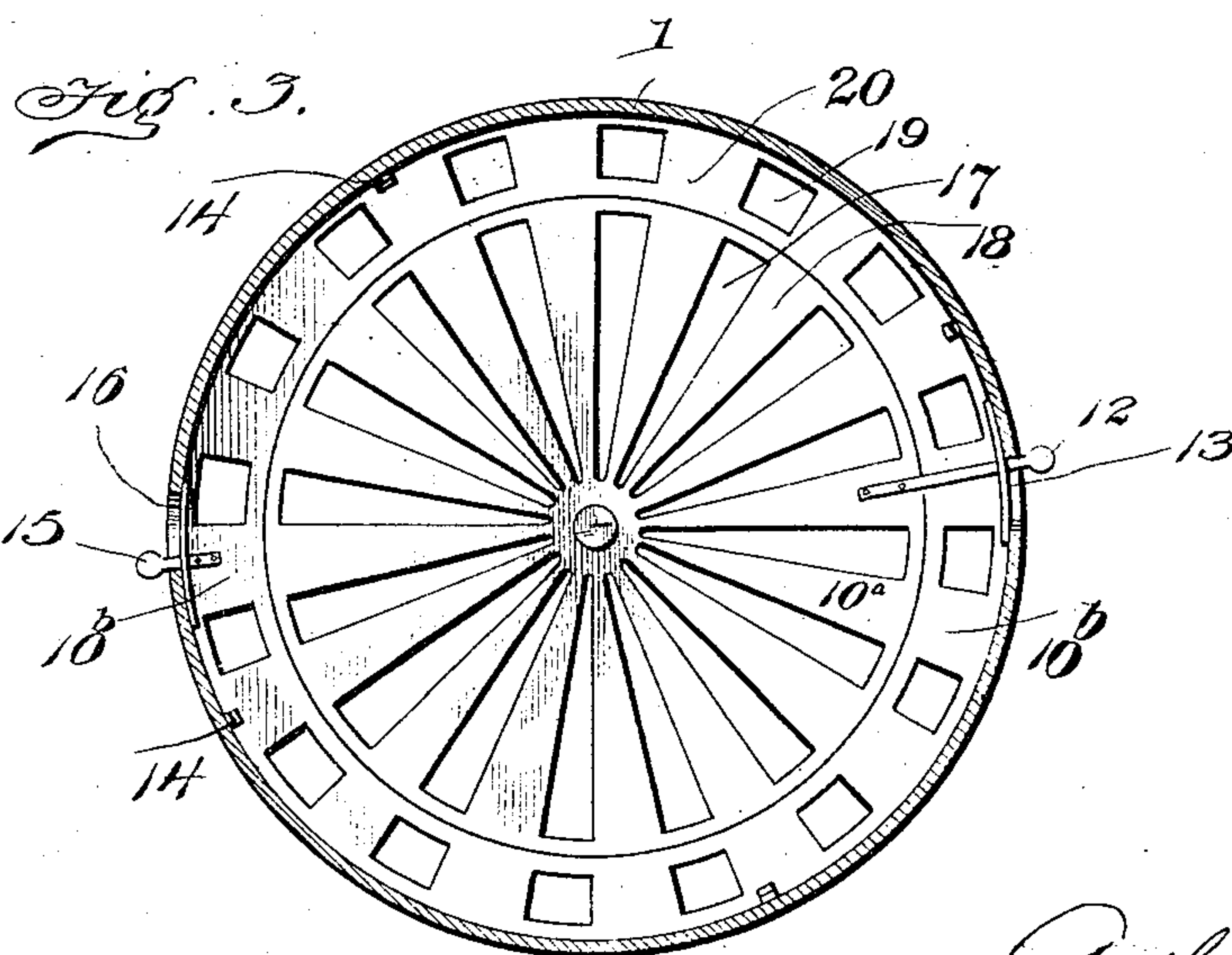
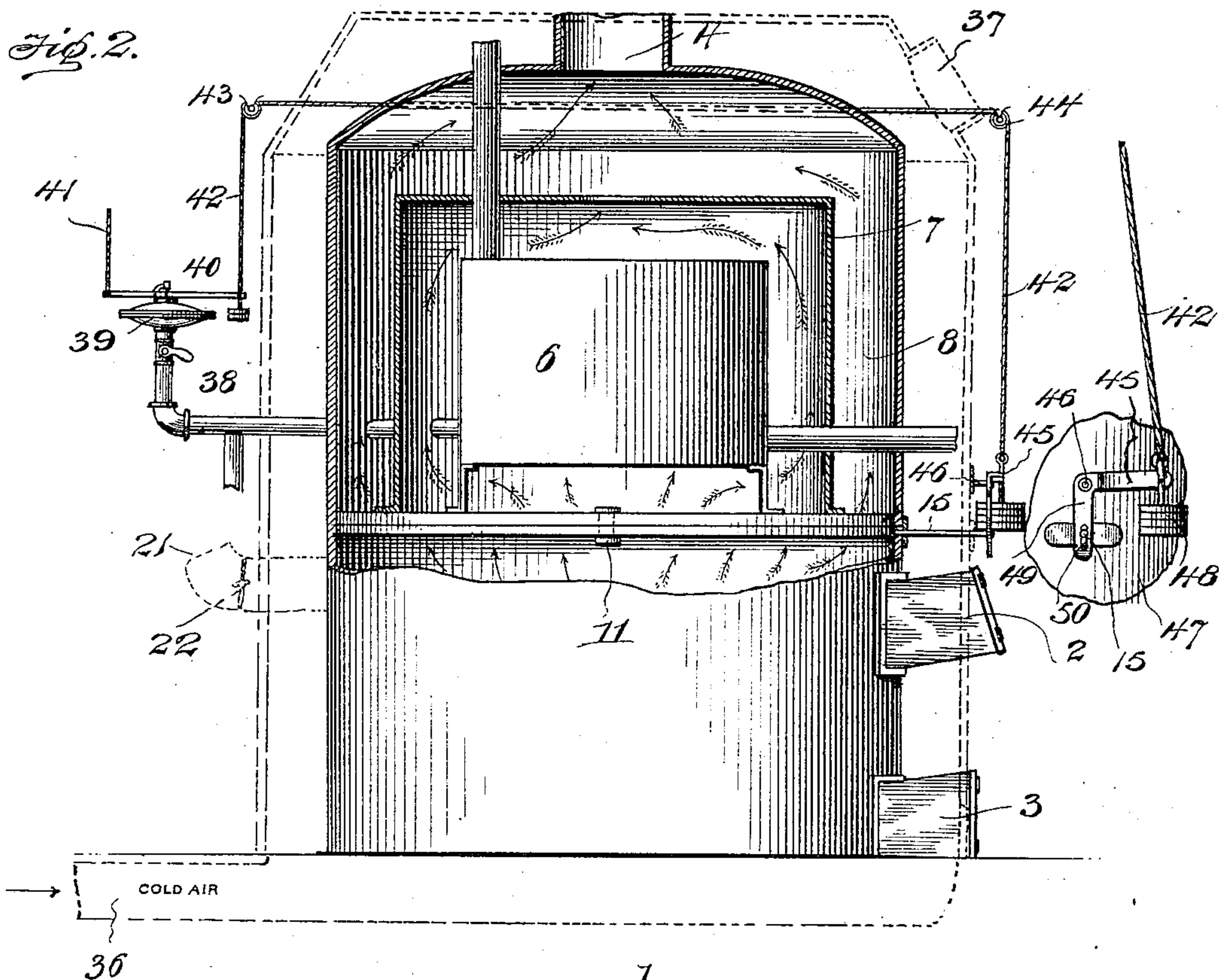
A. E. GAY.

COMBINATION HOT AIR AND STEAM OR HOT WATER HEATER.

(Application filed Apr. 3, 1900.)

(No Model.)

2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

ARTHUR E. GAY, OF NASHUA, NEW HAMPSHIRE.

COMBINATION HOT-AIR AND STEAM OR HOT-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 658,634, dated September 25, 1900.

Application filed April 3, 1900. Serial No. 11,332. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR E. GAY, a citizen of the United States, residing at Nashua, in the county of Hillsborough and State of New Hampshire, have invented certain new and useful Improvements in Combination Hot-Air, Steam, or 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 apparatus for heating water or generating steam for heating dwellings, churches, stores, and other buildings in combination with a hot-air furnace.

The object of the invention is to provide an improved apparatus of this class wherein means are provided for conducting the products of combustion through or into contact with the hot-water or steam boiler or around the same without contacting or but partially contacting therewith or partially through and partially around said boiler, as may be desired, to regulate the amount of heat imparted to the contained water.

With this object in view the invention consists in the improved construction, arrangement, and combination of parts of a heater of the character mentioned, which will be hereinafter fully described and afterward specifically pointed out in the claims.

In the accompanying drawings, Figure 1 is a view, partly in elevation and partly in section, illustrating the application of my invention to a heating apparatus provided with a tubular boiler, the outer hot-air casing being omitted. Fig. 2 is a similar view illustrating the application of the invention to a heating apparatus provided with a non-tubular boiler, the hot-air casing and cold-air-supply pipe being shown in dotted lines. Fig. 3 is a horizontal sectional view taken on a plane extending through an apparatus of either class just below the register or damper, illustrating one form of register in bottom plan; and Figs. 4 and 5 are plan views of modified constructions of registers or dampers detached from the heater.

Corresponding parts in the several figures will be designated by the same numerals of reference.

Referring to the drawings by numerals, 1 indicates the outer casing of a heater, which incloses the fire-pot and boiler and is provided with the usual fuel-door 2 and ash-door 3, as well as any ordinary form of exit for attaching a smoke-pipe 4 either at the side, as in Fig. 1, or at the top, as in Fig. 2.

In Fig. 1 I have illustrated an apparatus provided with a tubular boiler 5, while in Fig. 2 I have illustrated the application of a non-tubular boiler 6. In either case the boiler may be supported in the casing by any approved means, such supporting means forming no part of this invention. In the latter instance the boiler is inclosed in an interior casing 7, a space between said interior casing and the boiler forming the flue through which the products of combustion are conducted when brought into direct contact with the outer surface of the boiler 6. In either construction an outer space 8 is provided, through which the products of combustion may be conducted when it is desired to impart a less degree of heat to the contents of the boiler. In either of these constructions the fire-box is separated from the boiler by means of a pair of registers 9 and 10, the former above the latter and both mounted upon a central pin or pivot 11, whereby one of them may be rotated—preferably the lower one—to change the relative positions of the several openings in the registers, as hereinafter described.

In carrying out my invention I may use several forms of registers—as, for instance, that shown in Fig. 3, in which the lower register is composed of an inner circular plate 10^a and an outer annular plate 10^b. The inner circular plate 10^a is mounted upon a central pin 11 and provided with a handle 12, projected through a slot 13 in the casing 1, whereby the plate may be rotated. The outer annular plate 10^b is supported upon brackets 14, secured to the inner face of the casing 1, and is provided with a handle 15, projecting through the slot 16 in the casing 1, whereby the plate 10^b may be turned. The inner plate 10^a is provided with a series of openings 17, alternating with solid spaces 18, while the outer annular plate 10^b is provided with a series of openings 19, alternating with solid spaces 20. With this construction I use the

upper plate 9, which is provided with two series of openings and solid spaces corresponding with the openings and solid spaces 17 and 18 of the inner plate and the openings 5 and solid spaces 19 and 20 of the outer annular plate. The inner circular plate 10^a is equal in diameter to the inner casing 7 or tubular boiler 5, as the case may be, and the outer annular plate 10^b is of the same width 10 as the space between the outer casing 1 and inner casing 7 or between the outer casing 1 and the tubular boiler 5. By rotating the inner plate on the central pin 11 its openings 17 may be made to register with corresponding 15 openings in the plate 9, so as to permit the products of combustion from the fire-pot to pass through the two plates without regard to the position of the outer annular plate 10^b, which may also be manipulated by means of 20 its handle to either open or close the outlets through the plate 9, which correspond in size and position with the openings 19. By means of this construction all of the products of combustion may be made to pass in contact with 25 the boiler either through the tubes, as in the construction of Fig. 1, or around the boiler and within the casing 7, as in the construction shown in Fig. 2, or all of the products of combustion may be made to pass through the 30 annular space surrounding the casing 7 or tubular boiler 5, as the case may be, or part of the products of combustion may be made to contact with or pass through the tubes in the boiler and part through the outer annular space, or the openings in the plates 35 may be entirely closed. In this last instance other means would necessarily be provided for disposing of the products of combustion, such as a supplementary smoke-pipe 21, leading 40 directly from the fire-pot, as shown in Fig. 2, such supplementary pipe being provided with a suitable damper 22, as shown in dotted lines.

In Fig. 5 I have illustrated the upper and 45 lower plates 9 and 10, each of a single piece, one plate being provided with radial openings 23 and 24, alternating with solid spaces 25, and the other with openings 26, as shown in dotted lines, alternating with solid spaces 27 50 and with radial openings, and alternating solid spaces corresponding and registering when in the position illustrated with the openings 23 and solid spaces 25 of the other plate. One of these plates is made rotatable 55 by means of a suitable handle, and when the plates are in the position shown in Fig. 5 the products of combustion from the fire-pot will pass through the openings 23 in both plates and through either the tubes of the boiler or 60 the interior space, (shown in Fig. 1,) and at the same time the outer annular space surrounding the boiler 5 or casing, as the case may be, will be closed. By using the movable plate on the central pin 11 the solid 65 spaces 25 of one plate will cover the openings 23 of the other, while the openings 24 and 26

will be brought into registration, thus cutting off the products of combustion from the boiler and conducting them through the outer annular space. With this construction only 70 this single movement is possible, and no means is provided for entirely cutting off the products of combustion.

In Fig. 4 I have shown the registers each formed of a single plate, one of which is provided with two radial openings 28 and 29, 75 alternating with the solid spaces 30 and with outer openings 31 and 32, the opening 31 being in the same radial lines as the openings 29 and the openings 32 in the same radial lines as 80 the solid spaces 30, while in the same radial lines as the openings 28 are provided solid outer spaces 33. The other plate is provided with sets of radial openings corresponding with the openings 29 and 31. It will of course 85 be understood that suitable means will be provided for moving one of the plates, and in this instance the movable plate may be moved one space in either direction from the position shown in Fig. 4. In this position 90 (shown in Fig. 4) the openings 29 and 31 of the one plate register with the corresponding openings of the other plate, so that the products of combustion will be conducted partly through or in contact with the boiler and 95 partly through the outer annular space within the casing. By moving the outer plate one space to the right the openings 28 of the one plate will be brought into register with the openings corresponding in the other plate to 100 the opening 29, all other openings being closed, thus conducting all the products of combustion through the central portion of the plate and into contact with or through the tubes of the boiler. By moving the movable 105 plate one space to the left from the position shown in Fig. 4 the openings 32 will be made to register with the openings in the other plate which correspond with the openings 21, and all other openings will be closed, thus 110 conducting all of the products of combustion through the outer annular chamber. By this construction it is possible to conduct all the products of combustion through or in contact with the boiler, or part thereof through or in 115 contact with the boiler and part thereof through the outer annular chamber, or all of the products through said outer annular chamber, as may be desired.

In either construction the boilers will be 120 provided with the usual cold-water-inlet pipes 34, hot-water or steam outlet pipes 35, cold-air-inlet pipes 36, and hot-air-discharge pipes 37, the latter being shown in dotted lines in Fig. 2. 125

In order to make the operation of the dampers automatic, I provide means, as shown in Fig. 2, in which, for purpose of illustration, such mechanism is applied to handle 15 of 130 damper-ring 20, although it might be so applied as to actuate any other form of damper-plate. In this mechanism 38 indicates a pipe

leading from the boiler 6 through the outer casings and turned upward at its outer end. At the upper end of the vertical portion is mounted a casing 39, provided with any suitable diaphragm (not shown) or other device to be raised or lowered, according as the pressure in the boiler goes above or below a specified or fixed limit. 40 indicates a pivoted lever mounted above the casing 39 and acted upon by the diaphragm or other vertically-moving device. To the outer end of this lever is a chain 41, which leads to a damper in a smoke-pipe, (not shown,) while a chain 42 leads from the inner end of the lever over pulleys 43 44 to the horizontal arm 45 of an elbow-lever, pivoted at 46 to the outer casing 47. A weight 48 is suspended from said arm 45 of the elbow-lever, while its vertical arm 49 is slotted vertically at 50 to receive the other end of arm 15 or an arm of any other damper-plate to which the mechanism may be connected. When the pressure rises in the boiler above the set point, the lever 40 is operated, causing one end to rise and the other to fall, closing the damper in the smoke-pipe and opening the openings in the damper-ring 20, partially cutting off the draft in the smoke-pipe and permitting part or all of the products of combustion to pass outside of casing 7 and out of contact with boiler 6. This will rapidly cool the boiler and lower the pressure therein, permitting the lever 40 to return to its normal position. Upon a fall of the pressure in the boiler the opposite movements of all of the parts will occur, giving more draft and causing more or all of the products of combustion to pass between casing 7 and the boiler 6, thus raising the pressure to its normal point.

The utility and advantages of my construction will be readily understood from the foregoing description, and while I have specifically described the construction of the various parts I desire it to be understood that changes in the form and arrangement thereof, especially of the openings in the damper-plate, might be made without departing from the spirit and scope of the invention.

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

1. In a hot-water or steam and air heating apparatus, the combination with a casing, a vertical boiler therein, occupying the center thereof leaving a space for the passage of the products of combustion between the boiler and casing, and a fire-pot below the boiler, of a plate between the boiler and said space and the fire-pot, having suitable openings, and means for opening or closing said openings, whereby the path of the products of combustion may be changed to said space to lessen

their effect on the boiler, substantially as described.

2. In a hot-water or steam and air heating apparatus, the combination with a casing, a vertical boiler therein, occupying the center thereof leaving a space for the passage of the products of combustion between the boiler and casing, and a fire-pot below the boiler, of horizontal registering plates between the boiler and said space and the fire-pot, one plate being fixed and the other movable, said plates being provided with openings adapted to be brought into or out of register, whereby the path of the products of combustion may be changed to said space to lessen their effect on the boiler, substantially as described.

3. In a hot-water or steam and air heating apparatus, the combination with a casing having a boiler-space therein surrounded by an outer space or chamber, and a fire-pot below the boiler-space, of a fixed horizontal plate between said space and the fire-pot, having openings communicating between the fire-pot and either the boiler-space or the outer space or chamber of the casing, a second plate pivotally secured to the first and provided with openings which may be brought into register with either set of openings of the fixed plate for conducting the products of combustion wholly or partially through the boiler-space, or wholly or partially through the outer space or chamber of the casing, substantially as described.

4. In a hot-water or steam and air heating apparatus, the combination with a casing provided with a boiler-space and an outer space or chamber surrounding the same, of a fire-pot below the two spaces, a horizontal plate filling the casing between the two spaces and the fire-pot and provided with openings communicating between the fire-pot and the two spaces respectively, of a damper of a diameter equal to that of the boiler-space pivotally secured to the fixed plate and provided with openings adapted to be brought into register with one set of the openings of the fixed plate to permit the products of combustion to pass into the boiler-space, and an outer annular plate beneath the outer space or chamber provided with openings adapted to be brought into register with the outer set of openings of the fixed plate to permit the products of combustion to pass wholly or partially into the outer space or chamber, substantially as described.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

ARTHUR E. GAY.

Witnesses:

R. T. SMITH,
JOSEPH L. CLOUGH.