

(No Model.)

2 Sheets—Sheet 1.

H. K. ERNSBERGER.  
HEATING SYSTEM.

No. 578,482.

Patented Mar. 9, 1897.

FIG. 1.

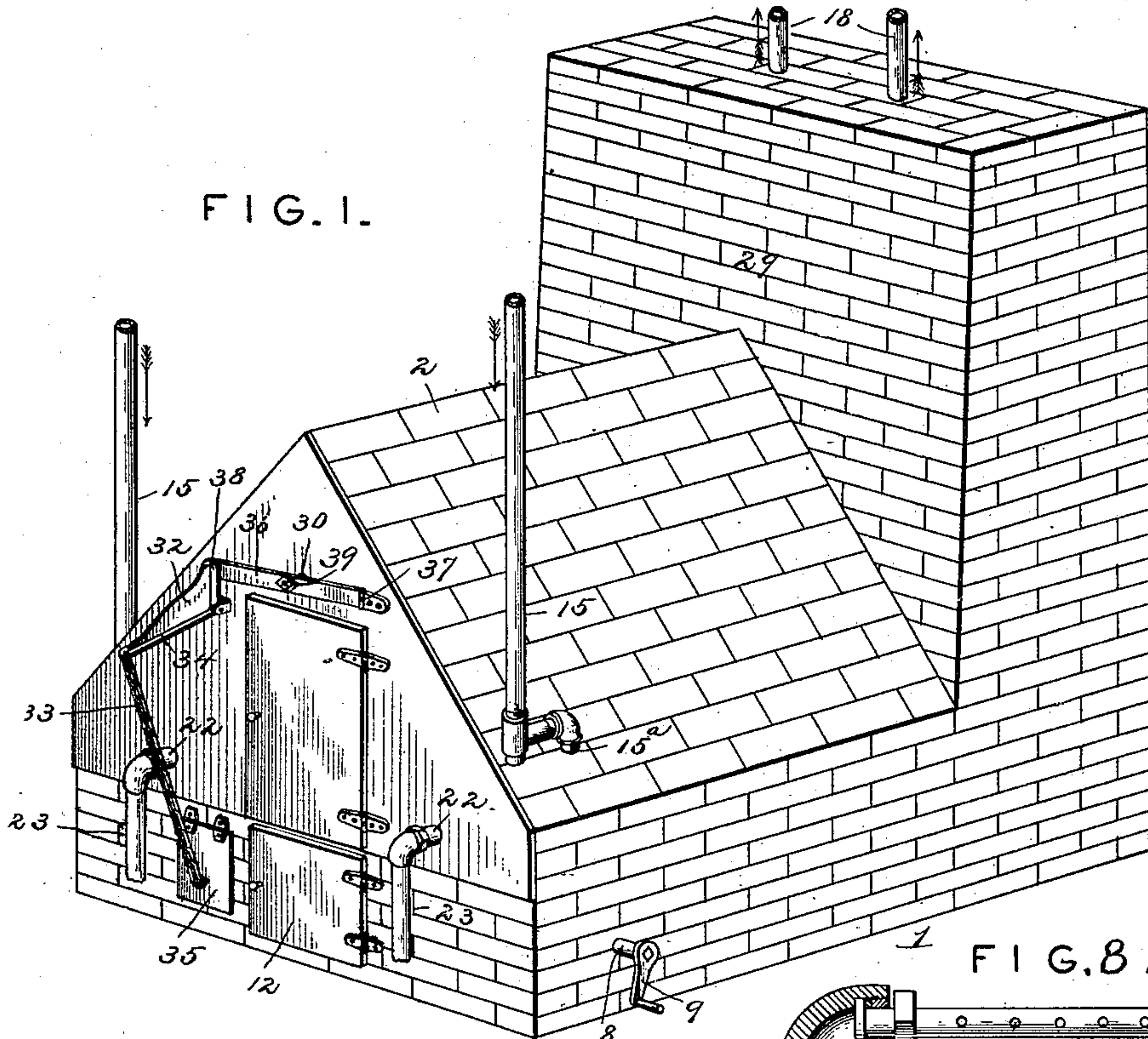


FIG. 8.

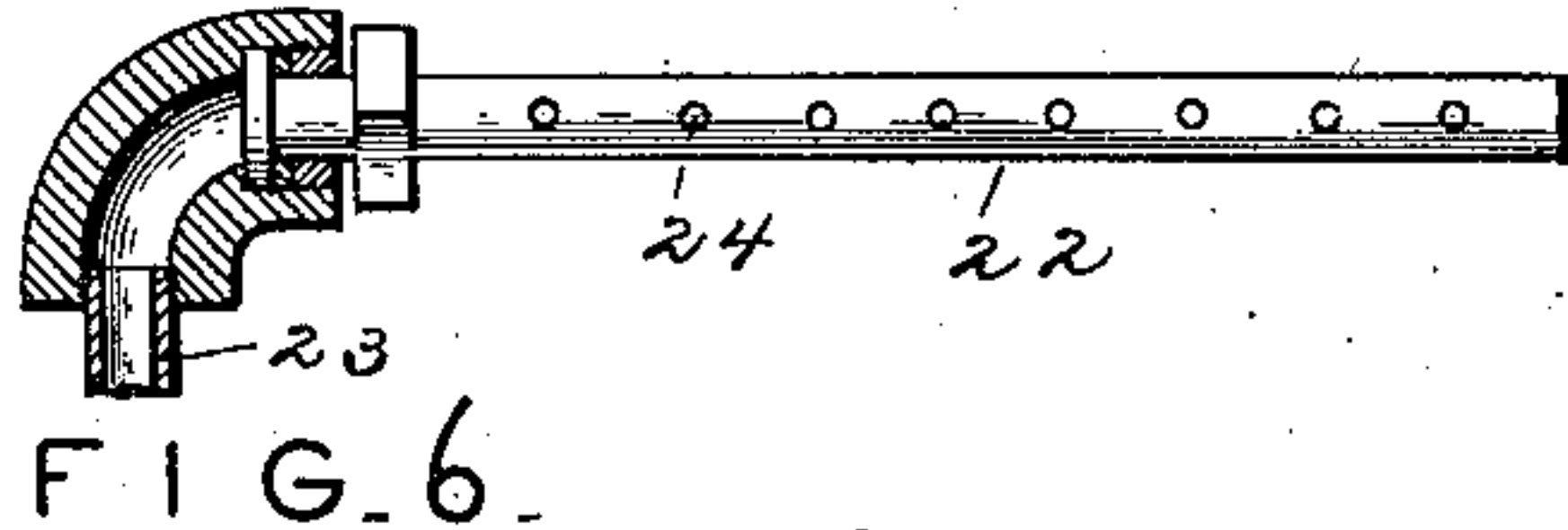
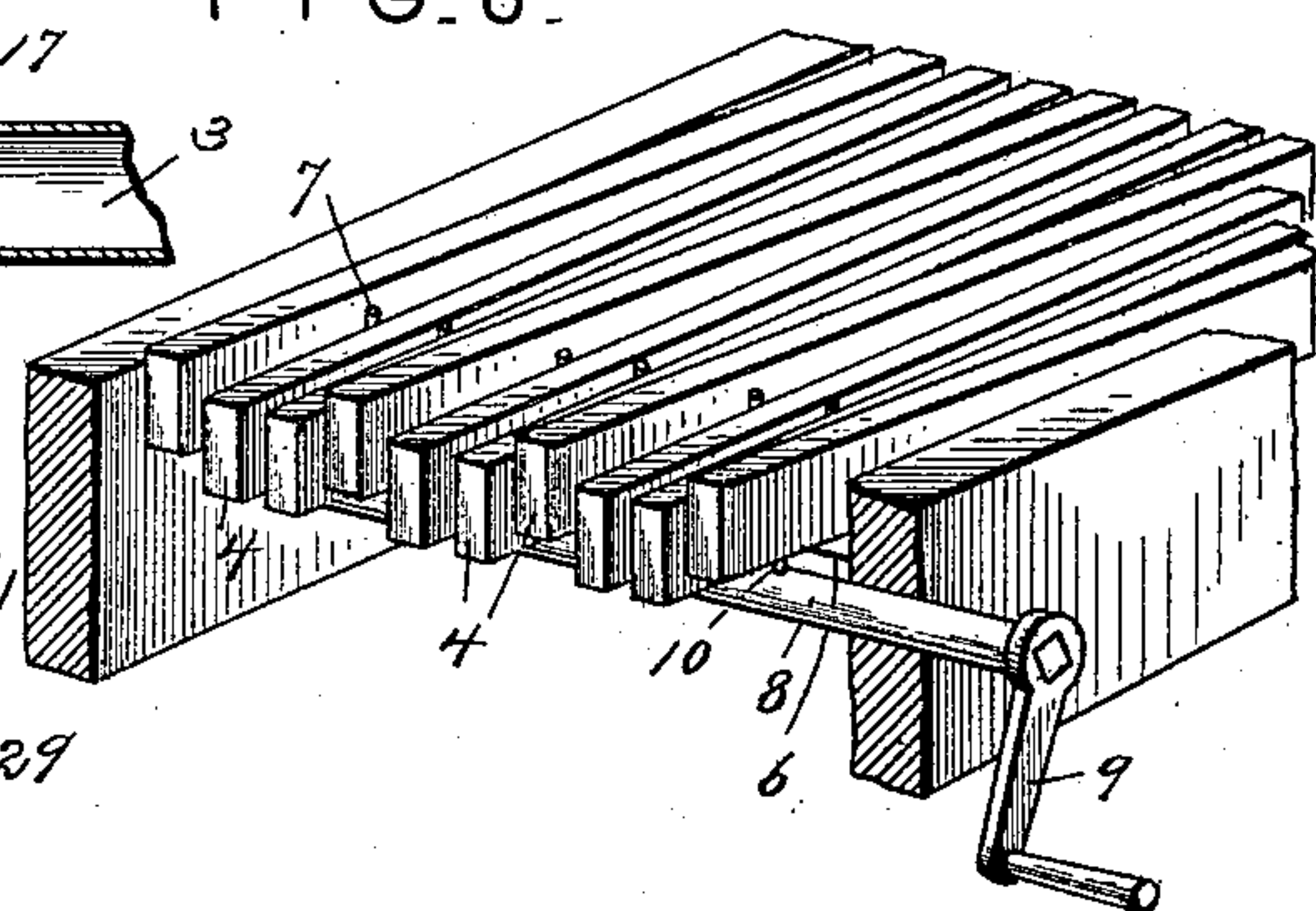
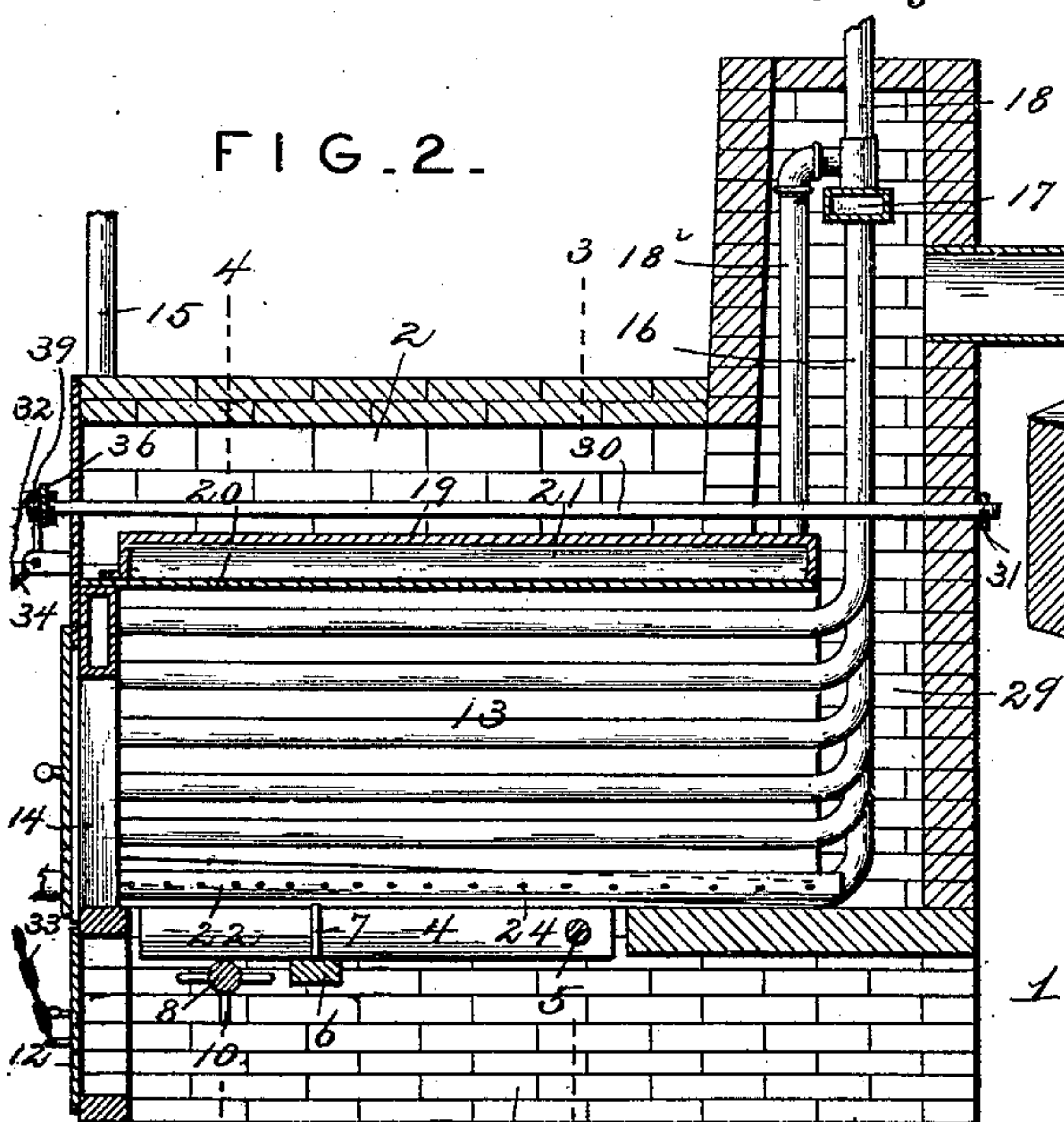


FIG. 2.



Inventor

Harvey K. Ernsberger.

By His Attorneys,

C. A. Snow & Co.

Witnesses  
Harry L. Amer  
[Signature]



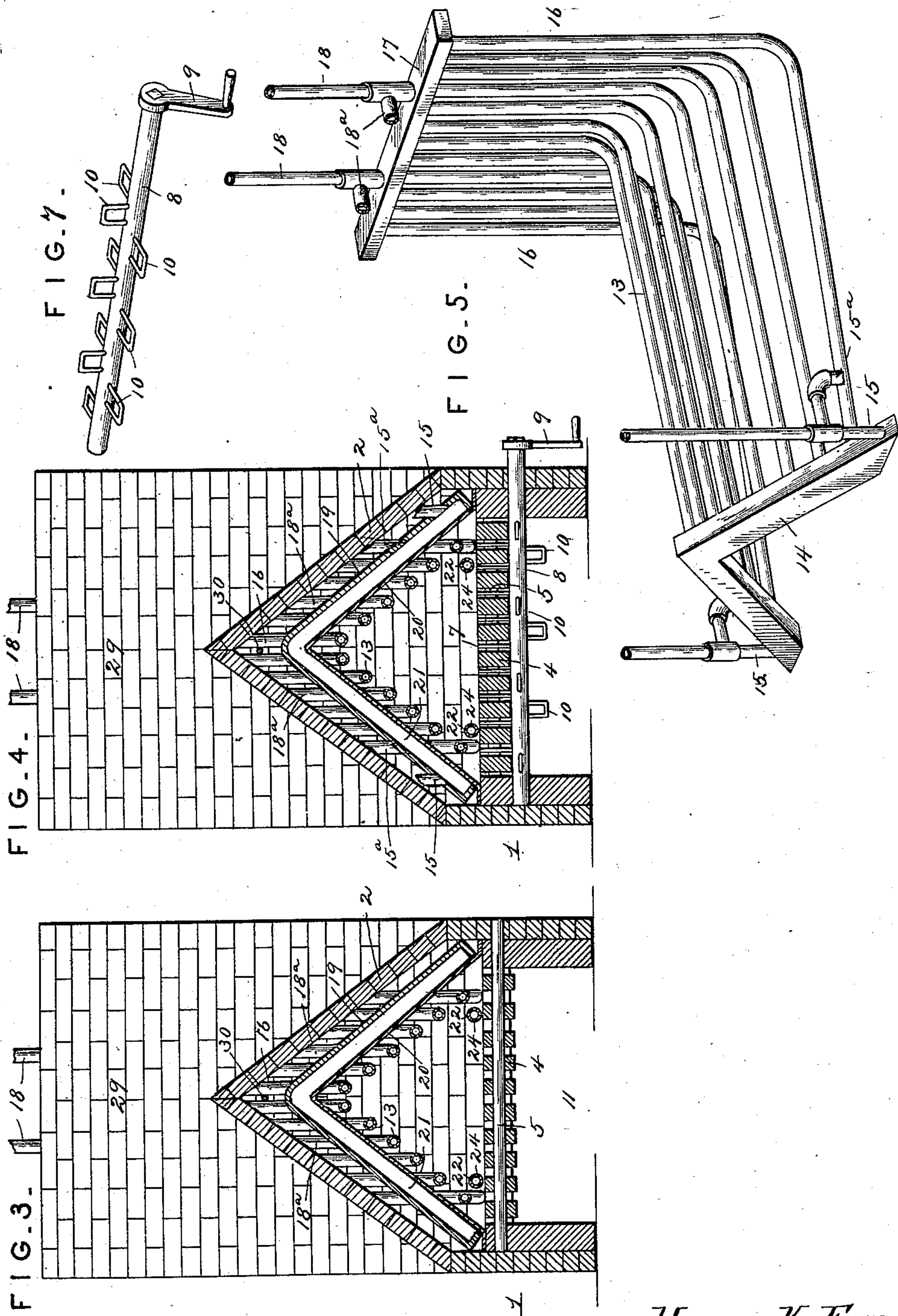
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2 Sheets—Sheet 2.

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By His Attorneys,

*Ca. Snow & Co.*



# UNITED STATES PATENT OFFICE.

HARVEY K. ERNSBERGER, OF NORWALK, OHIO.

## HEATING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 578,482, dated March 9, 1897.

Application filed March 23, 1895. Serial No. 542,952. (No model.)

*To all whom it may concern:*

Be it known that I, HARVEY K. ERNSBERGER, a citizen of the United States, residing at Norwalk, in the county of Huron and State of Ohio, have invented a new and useful Heating System, of which the following is a specification.

My invention relates to a heating system, and particularly to a water heating and circulating device for use in connection with distributing and radiating means, the objects in view being to provide a simple and efficient construction and arrangement of parts whereby the heat is applied directly to the water or steam circulating pipes and the heat which ordinarily escapes through the flue, particularly during the starting of the fire, is utilized to raise the temperature of the heat-conveying medium, and, furthermore, to provide improved means for producing the initial ignition of the fuel in the heat-generating device or furnace.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a perspective view of a water heating and circulating device constructed in accordance with my invention. Fig. 2 is a vertical longitudinal section of the same. Fig. 3 is a transverse vertical section thereof on the line 3 3 of Fig. 2. Fig. 4 is a similar view to show the means for agitating the grate-bars, taken on the line 4 4 of Fig. 2. Fig. 5 is a detail view in perspective of the water-circulating pipes detached. Fig. 6 is a detail view in perspective, partly broken away, of the grate. Fig. 7 is a detail view in perspective of the drum for operating the grate-bars. Fig. 8 is detail view, partly in section, of one of the rotary burners.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

1 designates the shell or casing of the furnace, preferably consisting of brickwork, with an arched or inclined top 2 and a communicating flue 3. The grate consists of a series of parallel juxtaposed bars 4, which are fulcrumed near their rear ends upon a transverse

pivot-rod 5, and are supported near their front ends by a transverse bar 6, said bar being provided with vertical guide-pins 7, between which the ends of the grate-bars operate. Mounted parallel with and contiguous to said supporting-bar 6 is a rotary shaft or drum 8, provided at one end beyond the contiguous wall of the furnace with a crank 9 and within the furnace with a series of radial projections or ears 10, arranged in different planes and adapted, as the shaft or drum is rotated, to engage and elevate the free ends of the grate-bars successively. This alternate vertical vibration of the grate-bars causes the agitation of the fire supported thereby to remove ashes which drop into the ash-pit 11, accessible through an ash-door 12.

Arranged in the fire-box above the plane of the grate and preferably extending the entire length of the fire-box are the horizontal water-circulating pipes 13, arranged parallel and out of contact throughout their lengths and arched transversely to conform to the construction of the dome or top of the fire-box. It is obvious that the top of the fire-box may be constructed to form a round or a pointed arch without departing from the spirit of the invention, the pointed arch, however, being preferable and being shown in the drawings. The front ends of the water-circulating pipes communicate with an arched connecting-pipe 14, the ends of which rest upon the bed of the furnace in front of the grate, and communicating with this connecting-pipe at its lower extremities are the return or "inflow" pipes 15, by which the heat-conveying medium may be returned to the circulating-pipes after having performed its function. The rear ends of the water-circulating pipes are turned up or extended vertically in a common plane, as shown at 16, to adapt them to pass upwardly within the flue 3, and they communicate at their extremities with a straight transverse connecting-pipe 17, from which extend the "outflow-pipes" 18 to carry the heated medium from the heating device.

Arranged above and contiguous to the circulating-pipes and closing the space above the fire-box is a water-back 19, having a sheet-metal inner or lower side 20 and a hollow cast-



metal body portion 21 to form a water-receiving cavity of an inch, more or less, in depth. Communicating with the interior of this water-back at the front end of the furnace and near its lower edges are return-pipes 15<sup>a</sup>, which communicate with the pipes 15, and communicating with the interior of the water-back near the rear end of the furnace and at its top or apex are the auxiliary outflow-pipes 18<sup>a</sup>, which communicate with the main outflow-pipes 18.

Arranged in the fire-box upon opposite sides of the grate are longitudinal burners 22, communicating with the gas-supply pipes 23 and provided with perforations 24, through which the gas may escape. These burner-tubes are mounted for partial rotation in the furnace, whereby they may be turned to project the flame toward the fuel on the grate or toward the circulating-pipes. In starting a fire it is advantageous to turn said burner-tubes to project the flame into the fuel, and it is advantageous under other circumstances to project the same against the circulating-pipes—as, for instance, when increased heat is desired or when the amount of heat required may be supplied by said burners without a fire in the grate.

The water-circulating pipes are arranged in a series forming an inverted-V-shaped arch in order to enable the flame of the burners to be brought into contact with the surfaces of all of the pipes simultaneously, said burners being located at the intersections of the series of pipes with the plane of the grate, and any suitable means may be employed for turning the burners, such as a wrench, the burners being provided outside of the casing of the furnace and contiguous to the couplings by which they are connected to the pipes 23 with wrench-seats.

Any suitable means for controlling the draft may be employed, and I preferably use those which are regulated by thermostat-bars arranged within the fire-box, whereby the dampers are arranged to lessen the draft as the heat increases in intensity and to increase the draft as the heat diminishes.

In the construction illustrated in the drawings I have shown a vertical extension or continuation of the fire-box which forms a part of the smoke-flue in that the products of combustion pass therethrough in order to reach the flue proper, this extension being of a width equal to the fire-box and being represented in the drawings by the numeral 29. The draft-controlling devices for the flue or chimney should be arranged in this extension.

Any ordinary or approved system of distributing-pipes and radiating devices may be employed in connection with the furnace for communication with the outflow-pipes 18 and inflow-pipes 15, whereby after the heat-conveying medium has passed from the outflow-pipes to the system it may be returned to the circulating-pipes in the fire-box through the inflow-pipes for reheating purposes. Thus

the tank forms a compensating device into which the surplus water flows through a safety-pipe 26 when the liquid contents of the system are expanded by high temperature and from which the liquid flows through the supply-pipe 27 as the temperature becomes lower. In this way the system is always maintained full and in operative condition.

The means which I employ for controlling the draft consist of a thermostat-bar 30, extending longitudinally through the fire-box, secured at its rear end by means of an exterior nut 31 in contact with the rear wall of the furnace and connected at its front end with the upper arm of a bell-crank lever 32, and a chain 33, connecting the outer or approximately horizontal arm 34 of said bell-crank lever with a draft-door 35, arranged in the front of the furnace. The connection between the front end of the thermostat-bar and the upper arm of the bell-crank lever is secured by means of an intermediate horizontal lever 36, which is hinged at 37 to the front wall of the furnace above the main door and at the other end, as shown at 38, to the upper arm of the bell-crank lever, the thermostat-bar being secured by means of nuts 39 to an intermediate point of said lever. By adjusting these nuts the desired position of the draft-door at any intensity of heat may be secured. It is obvious that when the heat in the furnace reaches a certain intensity and thereby expands the thermostat-bar the door will be closed partly or wholly, and when the temperature in the furnace lowers and allows the thermostat-bar to contract the draft-door is opened to produce greater draft through the fire.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

Having described my invention, what I claim is—

1. The combination with a heat-generating device having a grate, of an arched series of water-circulating pipes arranged within the fire-box and extending longitudinally thereof, the terminal pipes of said series being located contiguous to the plane of the grate, whereby the pipes are arranged at the top and sides of the fire-box, and the rear ends thereof being upturned in a common plane to pass into the flue of the heat-generating device and being connected terminally by suitable conductors, the conductors at the front ends of the pipes being arched, substantially as specified.

2. The combination with a heat-generating device, of a series of parallel closely-spaced water-circulating pipes communicating with each other at their extremities and extending through the fire-box to form the arched top thereof, a hollow water-back arranged above and contiguous to the series of water-circulating pipes, and outflow and return pipes



communicating with both the circulating-pipes and the water-back at opposite ends thereof, substantially as specified.

5 3. The combination with a furnace having a fire-box provided with an arched top, of an arched series of parallel, terminally-connected water-circulating pipes arranged longitudinally in and near the top of the fire-box, to form the sides and top of the fire-box, a hol-  
10 low water-back arranged above the water-circulating pipes and conforming with the series of water-circulating pipes to the top of the fire-box, said water-back having a sheet-metal inner or lower side whereby heat is  
15 readily communicated to the contents thereof, and outflow and return pipes communicating with opposite ends of the water-circulating pipes and with the water-back at contiguous points, substantially as specified.

20 4. A furnace having a fire-box including a grate, water-circulating pipes arranged in the fire-box and communicating with outflow and

return pipes, said water-circulating pipes being arranged in an inverted-V-shaped series with the downwardly-deflected sides of the  
25 series arranged contiguous to the plane of the grate, tubular perforated burners arranged at opposite sides of the fire-box adjacent to the line of intersection of the series of water-circulating pipes with the plane of the grate, 30  
said burner-tubes being mounted for partial rotation, whereby they may be turned to project flame toward the fuel on the grate or toward the water-circulating pipes, and supply-pipes communicating with the burners, 35  
substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

HARVEY K. ERNSBERGER.

Witnesses:

H. K. BECK,

P. P. KAUFMANN.