

No. 632,958.

Patented Sept. 12, 1899.

E. M. BOSLEY & W. WURDACK.  
HEATING SYSTEM.

(Application filed Mar. 14, 1898.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 4.

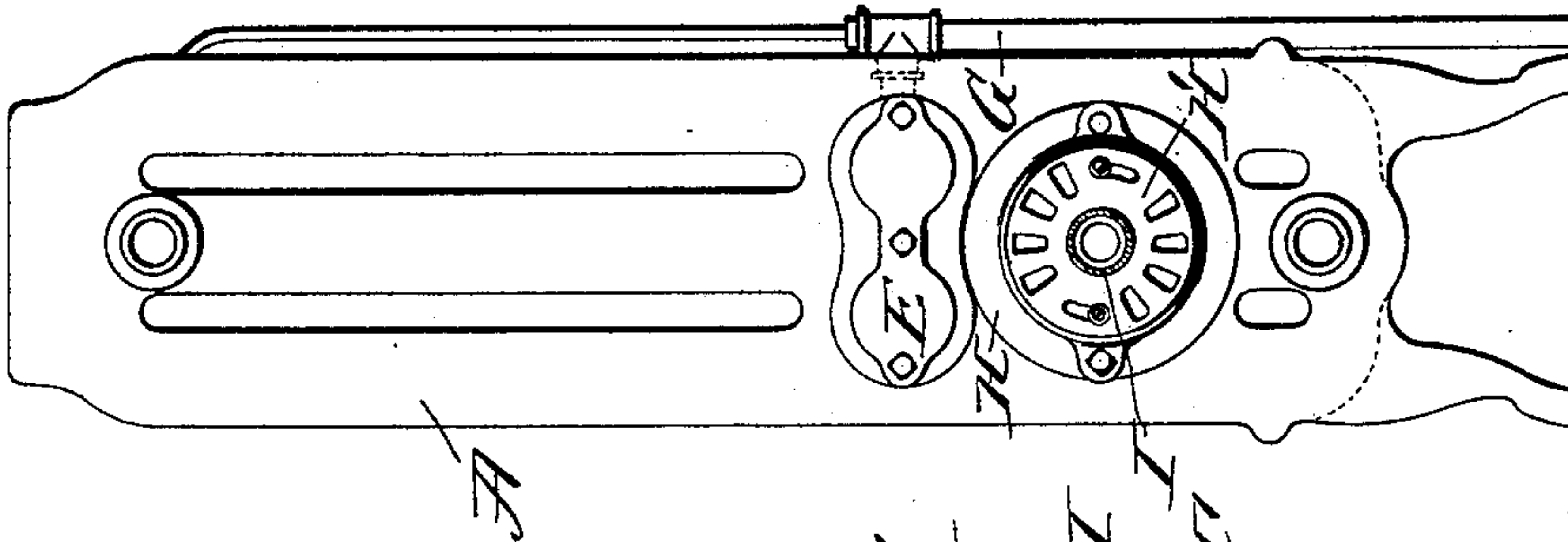


Fig. 2.

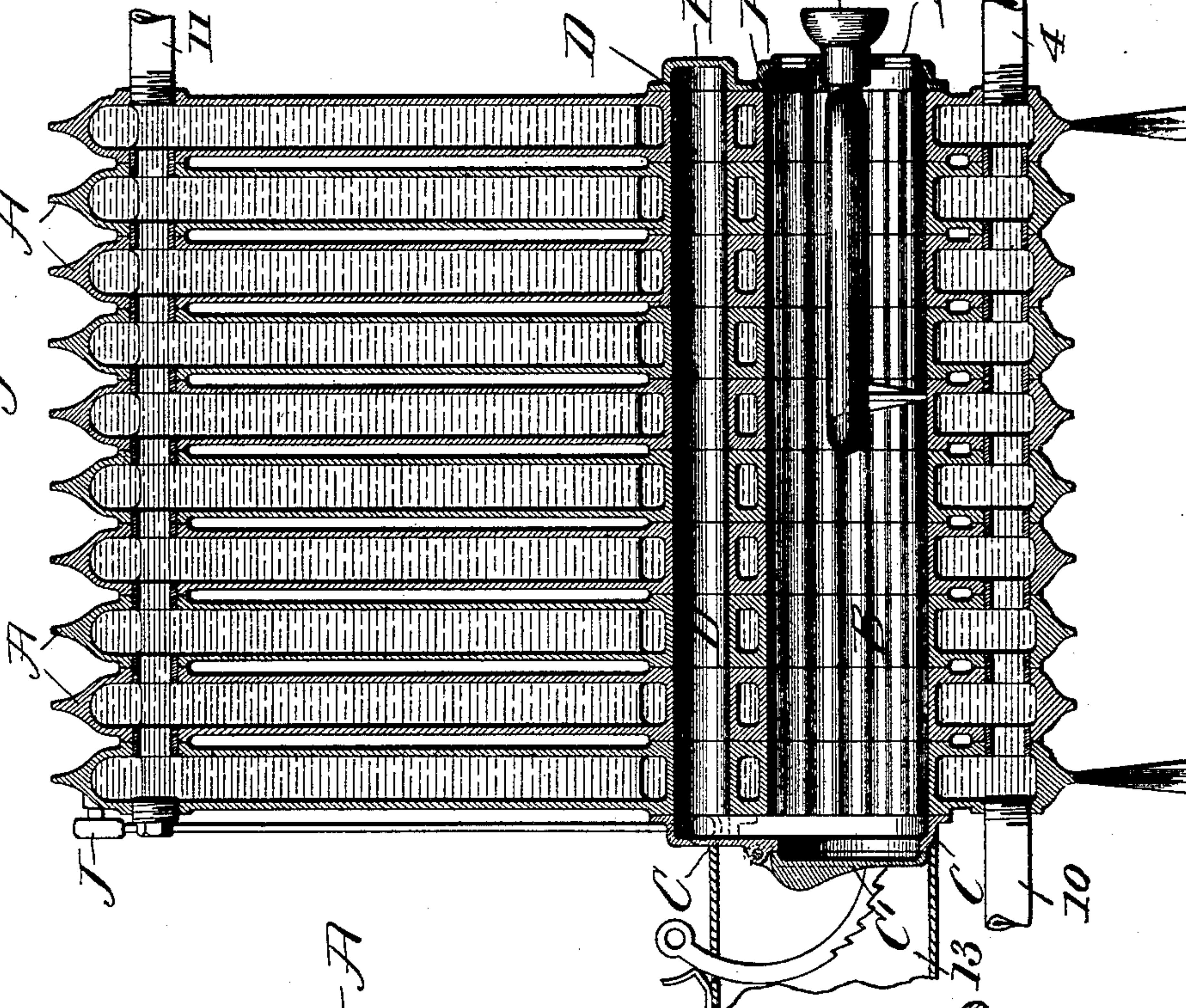
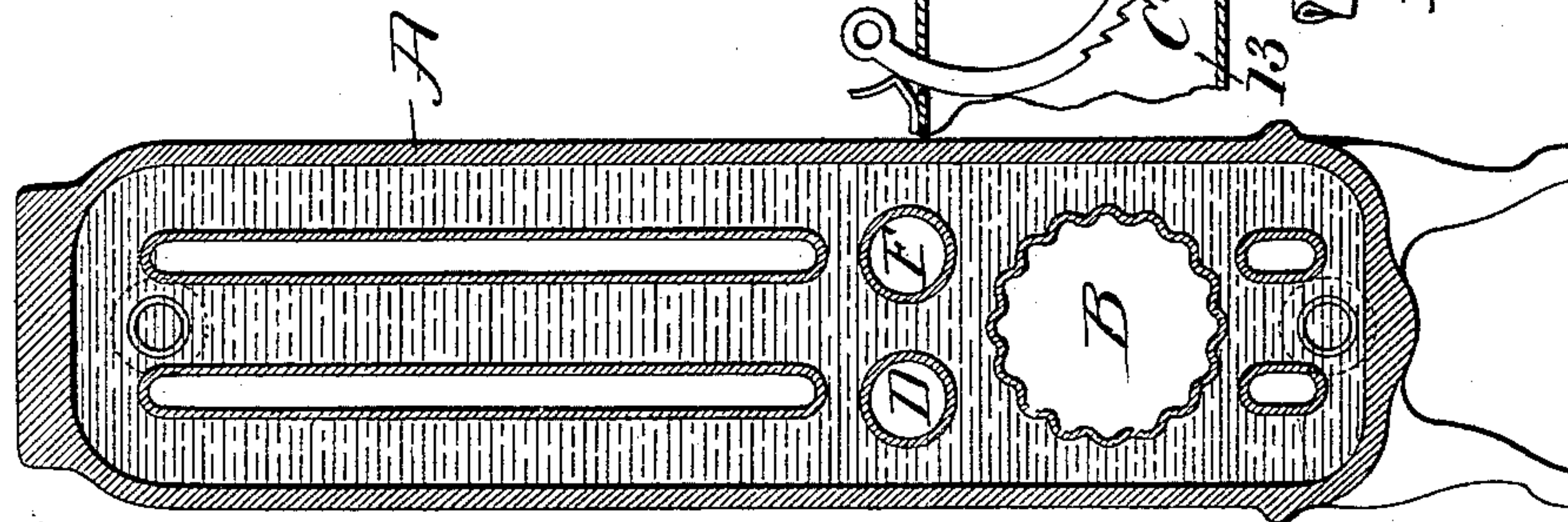
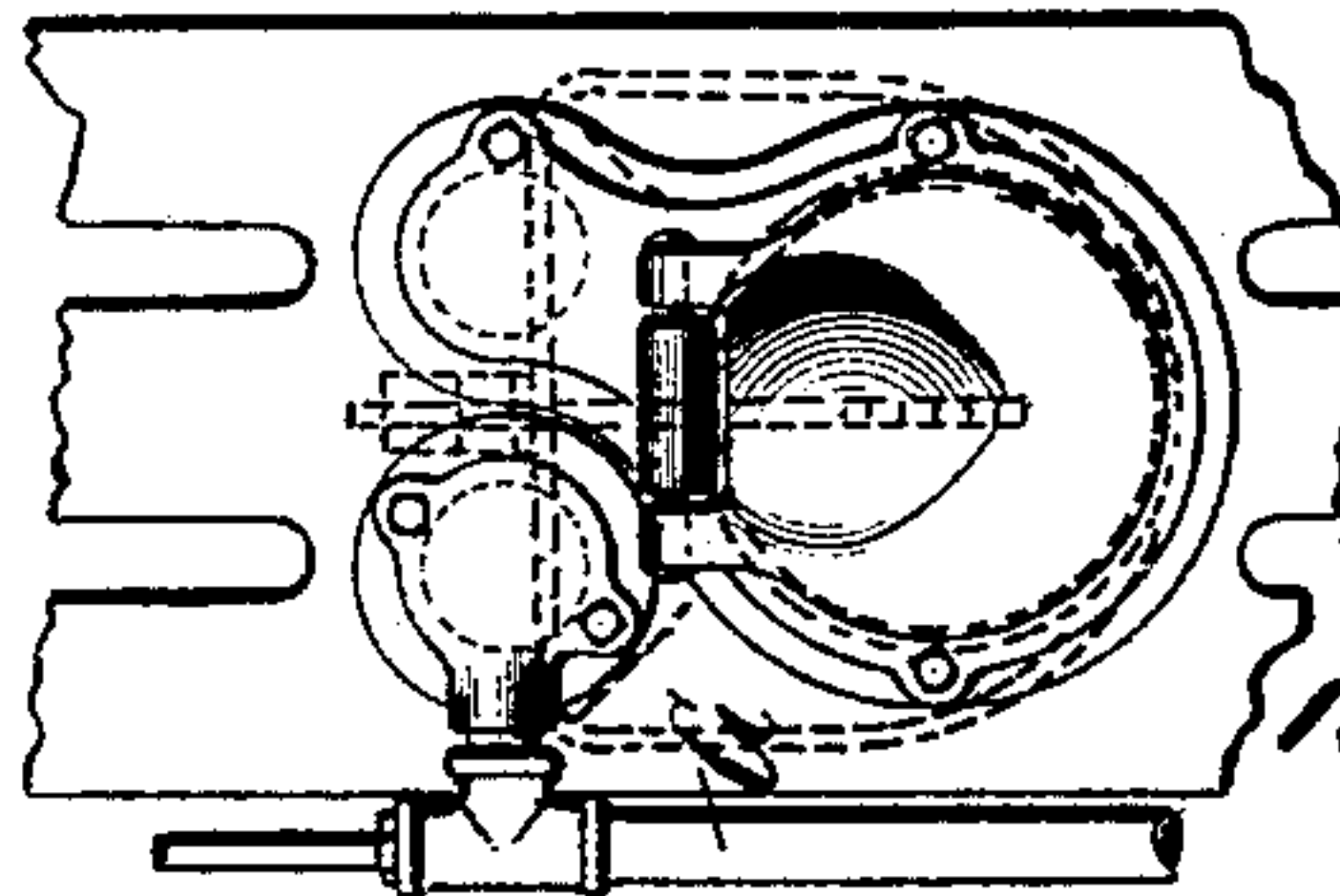


Fig. 1.



Attest:  
Wm. A. Scott  
Ralph K. Kish

Fig. 3.



Inventors  
E. M. Bosley  
Wm. Wurdack  
by  
Baker & Cornwall  
their attys.



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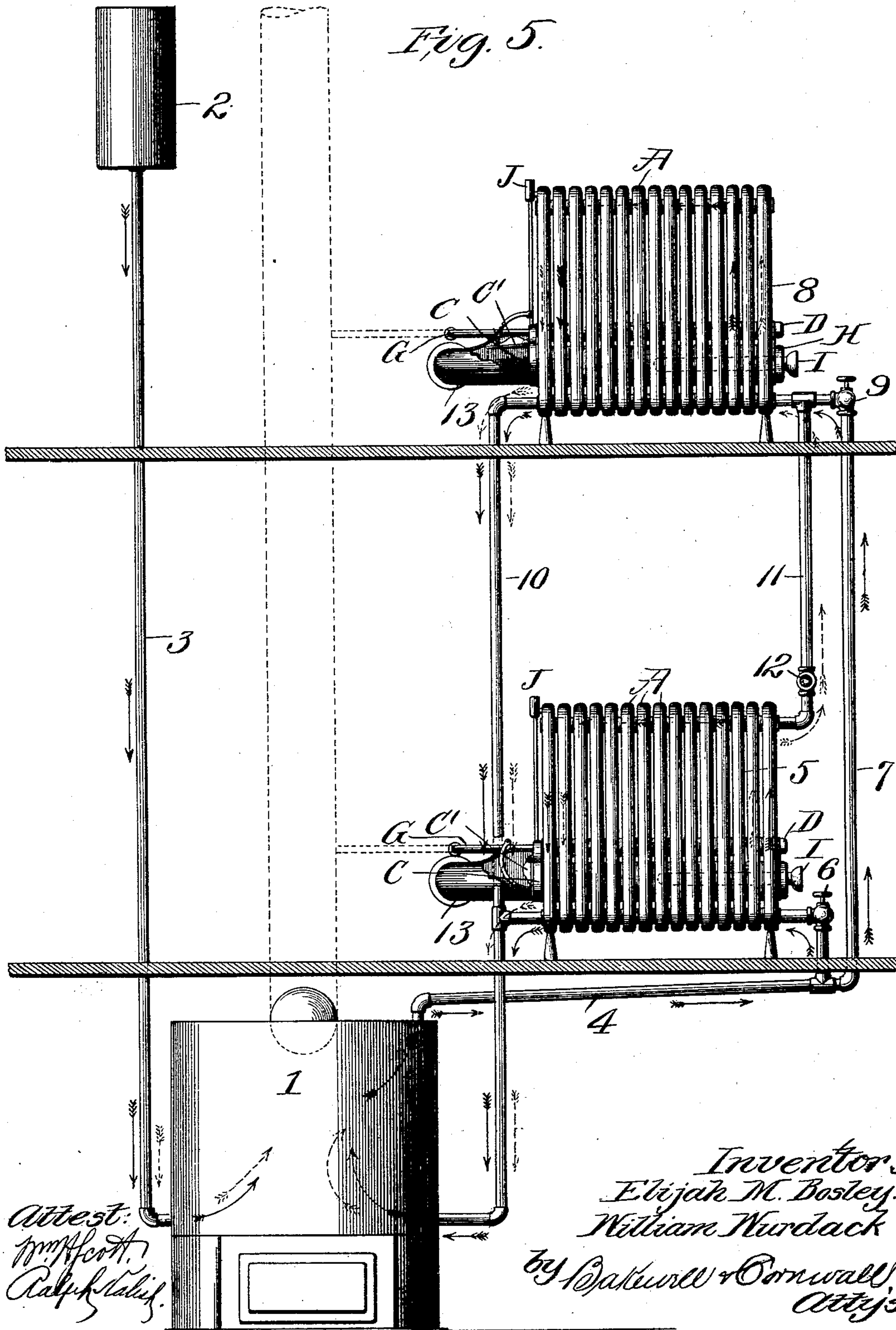
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2 Sheets—Sheet 2.

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# UNITED STATES PATENT OFFICE.

ELIJAH M. BOSLEY AND WILLIAM WURDACK, OF ST. LOUIS, MISSOURI.

## HEATING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 632,958, dated September 12, 1899.

Application filed March 14, 1898. Serial No. 673,736. (No model.)

*To all whom it may concern:*

Be it known that we, ELIJAH M. BOSLEY and WILLIAM WURDACK, citizens of the United States, residing at St. Louis, State of Missouri, have made a certain new and useful Improvement in Heating Systems, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a cross-sectional view through a radiator employed in our improved heating system. Fig. 2 is a longitudinal sectional view of the same. Fig. 3 is a view of a portion of our improved radiator, illustrating the rear end thereof. Fig. 4 is a front end elevational view, and Fig. 5 is a diagrammatic illustration, of a heating system in which our improved radiator is employed.

This invention relates to a new and useful improvement in heating systems, the object being to construct a radiator for use as a hot-water or steam radiator in an ordinary heating system, in which radiator gases or oil may be employed as fuel when the radiator is used as an individual heater.

In the event that the radiator is used in a heating system suitable pipe connections may be made, as are well understood, and, if desired, pipe connections may be made to another radiator located in the same room or in an adjoining room, whereby when gas or oil is used for fuel the radiator will heat one or more rooms. When the radiator is used in a circulating hot-water system, as shown in Fig. 5, in which a boiler or furnace is used, if it is not desired to start said boiler or furnace and circulate water through the entire system any individual radiator may be heated, which individual heating of the different radiators may also be employed to advantage to assist the boiler when rapid heating is required, as when the fire in the furnace is low or in extreme cold weather.

This radiator may be used as a direct indirect radiator—that is, when the local burner is not in operation a fresh-air pipe from the outside connected to the combustion-chamber introduces fresh air thereinto to be heated

and admits the same after it has been warmed into the room. By this arrangement the radiator can be used alternately as a primary heater or as a direct indirect radiator.

In the drawings, A indicates the different sections of our improved radiator, which are joined together in the usual manner, said sections being connected at top and bottom for the circulation of water, there being also three water-columns provided. Arranged longitudinally through the lower portion of these sections A is a combustion-chamber B, which opens out at each end, one end being closed by a cap C, carrying a door C', said cap leading the products of combustion to a return-flue D, which is somewhat smaller than the chamber B, said flue D also having a cap E at its opposite or front end, which leads to a parallel flue F, from the opposite or rear end of which leads a pipe G. The front end of combustion-chamber B is closed by a cap H, carrying a damper H'.

I indicates a burner located in the combustion-chamber B.

If it is desired to individually heat the radiator or use the same as a local heater, the burner is lighted and the draft-openings in the front end of the combustion-chamber opened. The products of combustion pass rearwardly into and through the return-flue D and into and through the return-flue F, whence they are led by pipe G to the chimney or to the exterior. The reduced diameter of pipe G is sufficient to carry off the spent gases and also to cause the heat to linger in the flues, whereby the best results are obtained. The radiator as thus used has a relief-valve J, which valve discharges into pipe G. Thus it will be seen that the burner when lighted will heat the water contained in the radiator, causing the same to circulate therein—that is, the hot water will rise to the uppermost point of said radiator, while the cold water sinks to the bottom, where it will remain until sufficiently heated to rise, said water then heating the radiator and causing the same to heat the surrounding atmosphere, as is well understood.

We will now describe the system illustrated in Fig. 5, wherein our improved radiators are employed in an ordinary hot-water system.



1 indicates a boiler and furnace which is generally located in the lower part of a system, as in the basement of a building, said boiler, and, in fact, the whole system, being  
 5 provided with an expansion-tank 2, communicating with said boiler through the medium of a pipe 3. This expansion-tank is located above the highest point of the system and is designed to compensate for the expansion or  
 10 contraction of the water in the system, as is usual in systems of this kind.

4 indicates a pipe leading from the top of boiler 1 to the lowest point of the radiator 5, located, preferably, in the first room  
 15 above the basement, said pipe 4 being provided at a point near to its entrance to the radiator with a valve 6, controlling the admission of water thereto.

7 indicates a pipe which is practically a  
 20 continuation of pipe 4 and is attached to the lowest point of a radiator 8 and is shown as being located in the second room above the basement, said pipe 7 being provided with a valve 9, located near the radiator 8 and con-  
 25 trolling the admission of water to said radiator in like manner to valve 6 to the radiator 5.

The lowest points of the radiators 5 and 8 are preferably provided with a return-pipe  
 30 10, which enters the boiler 1 at the lowest point and is designed to permit the coolest water of the system to return to said boiler to be reheated.

11 indicates a pipe connecting the upper end of radiator 5 with the lower end of radiator 8, said pipe being provided with a valve  
 35 12, designed to open or close communication between said radiators when it is desired to use the lower radiator as a generator for the upper radiator or use said lower radiator separately.  
 40

13 indicates a pipe or air-duct, one end of which communicates with the combustion-chamber B of the radiator and the other end of said pipe communicates with the atmos-  
 45 phere.

When it is desired to heat a room by direct indirect radiation, the door C' of the radiator is raised, as shown in the upper radiator in Fig. 5, and the burner in said radiator is not  
 50 lighted; but the water in said radiator is heated either by the burner in the lower radiator or by the furnace and boiler, as is obvious. When said water in the upper radiator is heated, the cool air from the exterior  
 55 will be drawn into the chamber wherein the burner (not in use) is located and will become heated and pass out through the openings in the damper-plate H' at the front end of the radiator into the room. When it is  
 60 desired to use the burner in this radiator for a local heater or a generator for other radiators, the door C' is closed, which will then act as a check-valve, preventing the cool air from the exterior from entering the radiator,  
 65 the same being undesirable when it is necessary to use this burner. When this radiator is used as a heater, the door C' is closed, as

before stated, it being hinged at the top, so that when the burner is ignited should any explosion occur in the combustion-chamber  
 70 said door will yield in an outward direction to prevent the force of the explosion having injurious effects on the radiator.

The introduction of the flues B, D, and F into the radiator will not materially change  
 75 the shape of the radiators now in use, as the same patterns employed for making standard radiators can be used for the radiator shown in the drawings with slight changes.

It will be observed from a glance at Fig. 2  
 80 that we are enabled by admitting air in the front end only of the combustion-chamber to gradually heat said air before it has commingled thoroughly with the fuel, thereby greatly increasing the combustion, which would not  
 85 be the case should cold air be admitted to the combustion-chamber at various points.

We are aware that minor changes in the construction, arrangement, and combination of the several parts of our radiators can be  
 90 made and substituted for those herein shown and described without in the least departing from the nature and principle of our invention.

Having thus described our invention, what  
 95 we claim, and desire to secure by Letters Patent, is—

1. In a radiator, the combination with a series of vertically-arranged sections arranged side by side and communicating with each  
 100 other, each of said sections being formed with openings which, in the assembled radiator, are alined to form a horizontally-disposed combustion-chamber and a horizontally-disposed draft-flue within the radiator proper,  
 105 and a connection on the end section of the radiator between said combustion-chamber and said draft-flue, substantially as described.

2. In a radiator, the combination with vertically-disposed sections arranged side by side and communicating with each other, each of said sections being formed with openings,  
 110 which, in the assembled radiator, are alined to form a horizontally-disposed combustion-chamber and a horizontally-disposed draft-flue within the radiator proper, a connection on the end section of the radiator between  
 115 said combustion-chamber and said draft-flue, a burner in said combustion-chamber, and a draft-regulating device at the front end of said combustion-chamber, substantially as described.  
 120

3. The combination with a heating system composed of a plurality of radiators connect-  
 125 ed to a source of hot-water or steam supply, said radiators being formed with combustion-chambers, to one end of which lead pipes 13, from the exterior, the other end of said combustion-chamber being closed by damper-  
 130 plates, burners in said combustion-chambers, which act as auxiliary heaters to the regular heating system, suitable pipe connections between two or more radiators whereby one of



said radiators may be employed as a primary heat-generator, and doors in the pipes 13, which are opened when the radiators are used as direct indirect radiators, said doors being  
5 closed when the burners are in operation, substantially as described.

4. The combination with a heating system, in which is included a plurality of radiators and a source of hot-water or steam supply,  
10 there being suitable pipe connections, said radiators being formed with combustion-chambers and draft-flues, which extend through all the sections composing said radiators, burners in said combustion-chambers,  
15 pipes for conducting off the products of combustion from each individual radiator, pipes 13 leading from the exterior to said combustion-chambers, and doors in said pipes 13 and the combustion-chambers whereby said doors  
20 may be closed when the burners are in operation to assist the heating system, and said doors may be opened, when the burners are

not in operation, for direct indirect radiation, substantially as described.

5. The combination with a radiator com- 25  
posed of a number of sections, said sections being provided with registering openings forming a combustion-chamber B and return-flues D and F, a cap C for connecting the ends  
of combustion-chamber B and return-flue D, 30  
a cap E for connecting return-flues D and F, a pipe G leading from the rear end of the return-flue F, and a burner arranged in said combustion-chamber, substantially as described. 35

In testimony whereof we hereunto affix our signatures, in the presence of two witnesses, this 8th day of March, 1898.

ELIJAH M. BOSLEY.  
WILLIAM WURDACK.

Witnesses:

F. R. CORNWALL,  
HUGH K. WAGNER.