

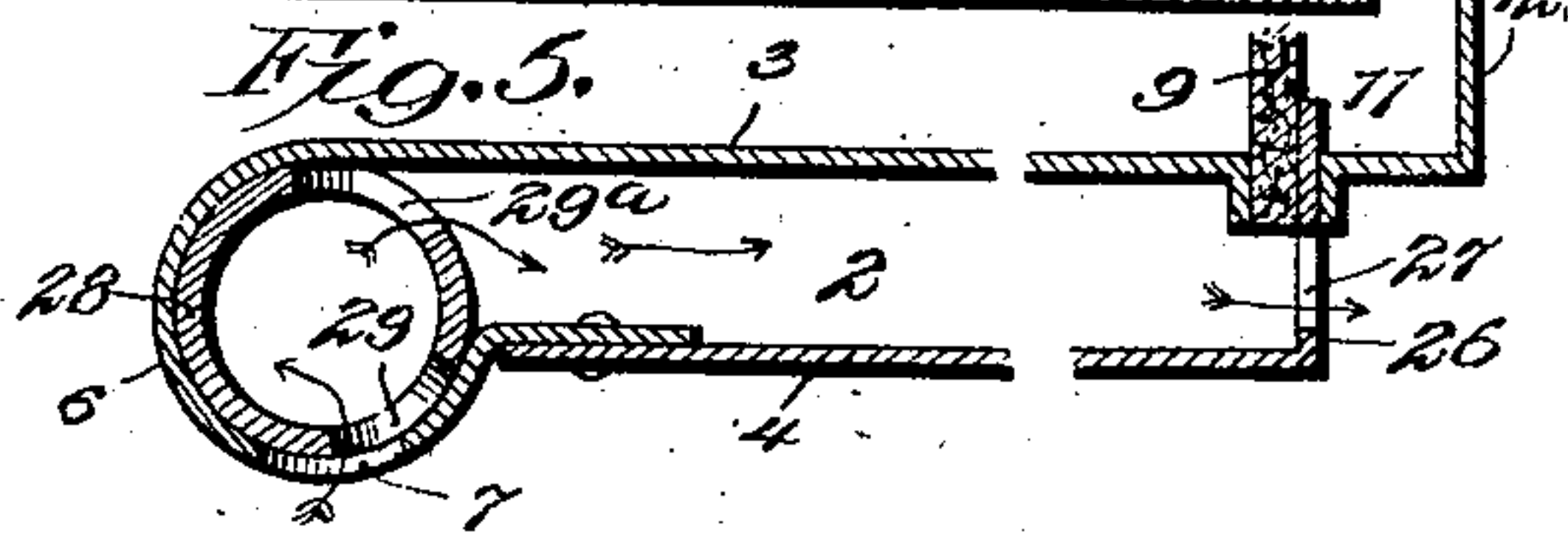
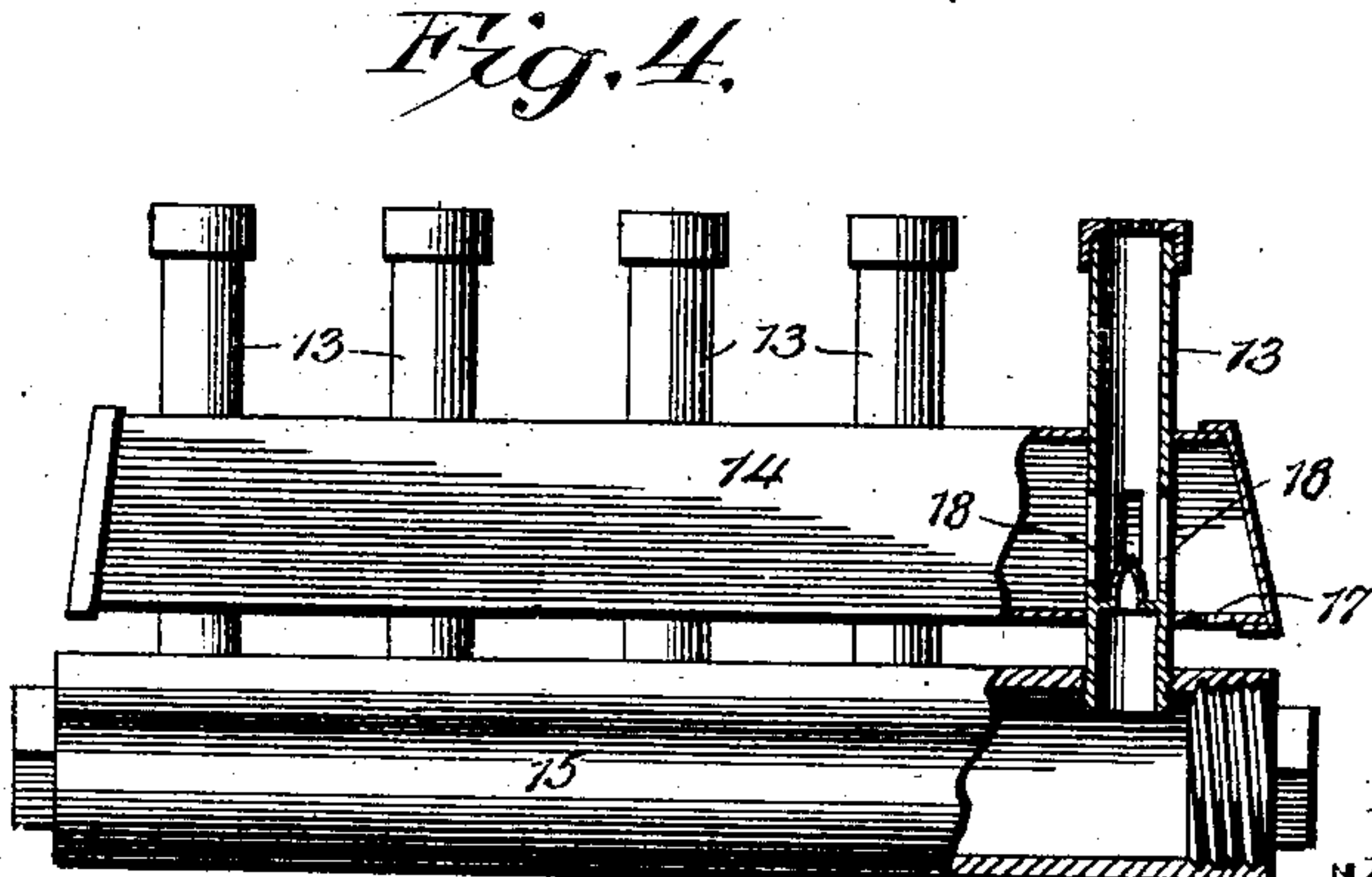
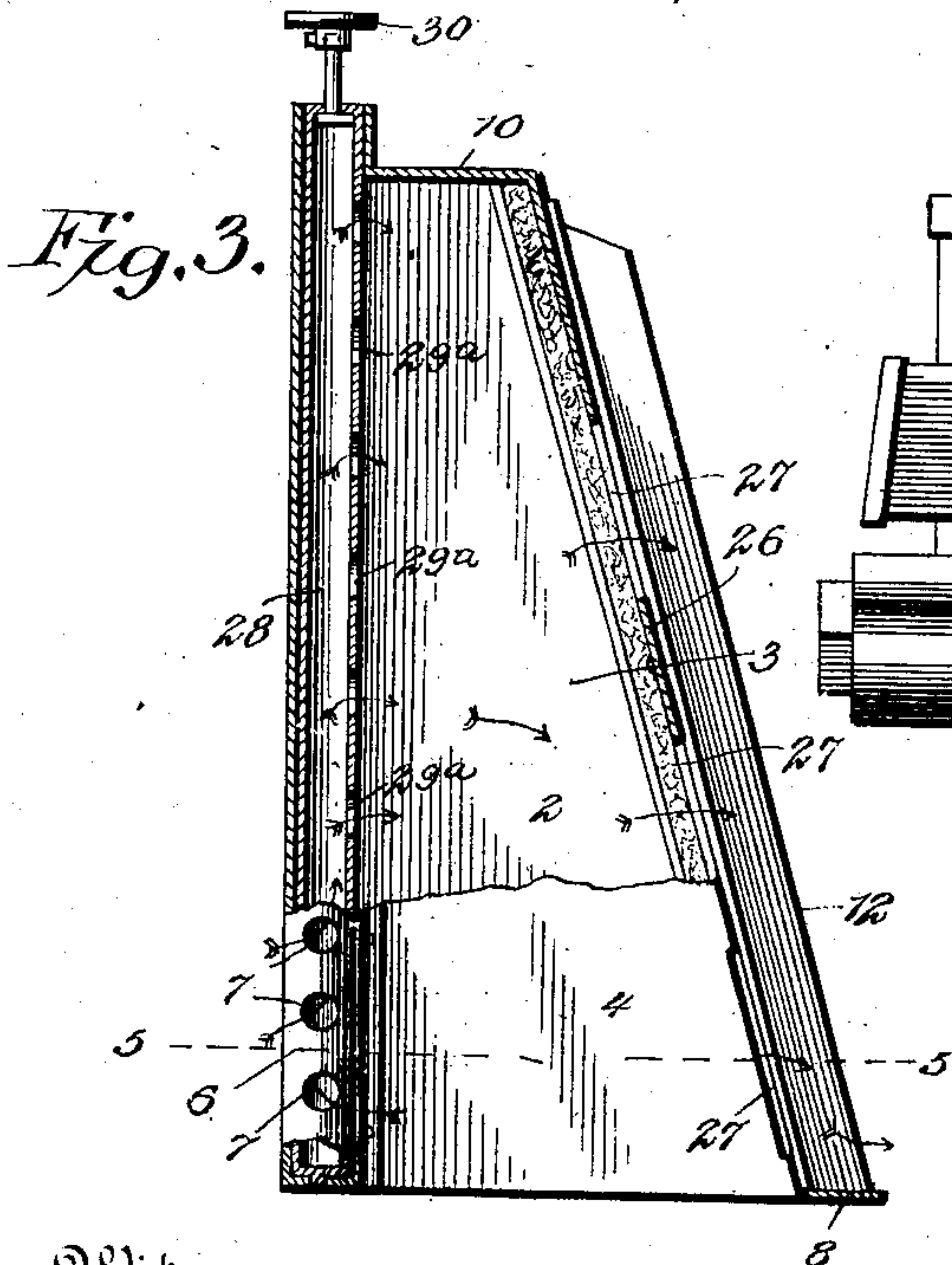
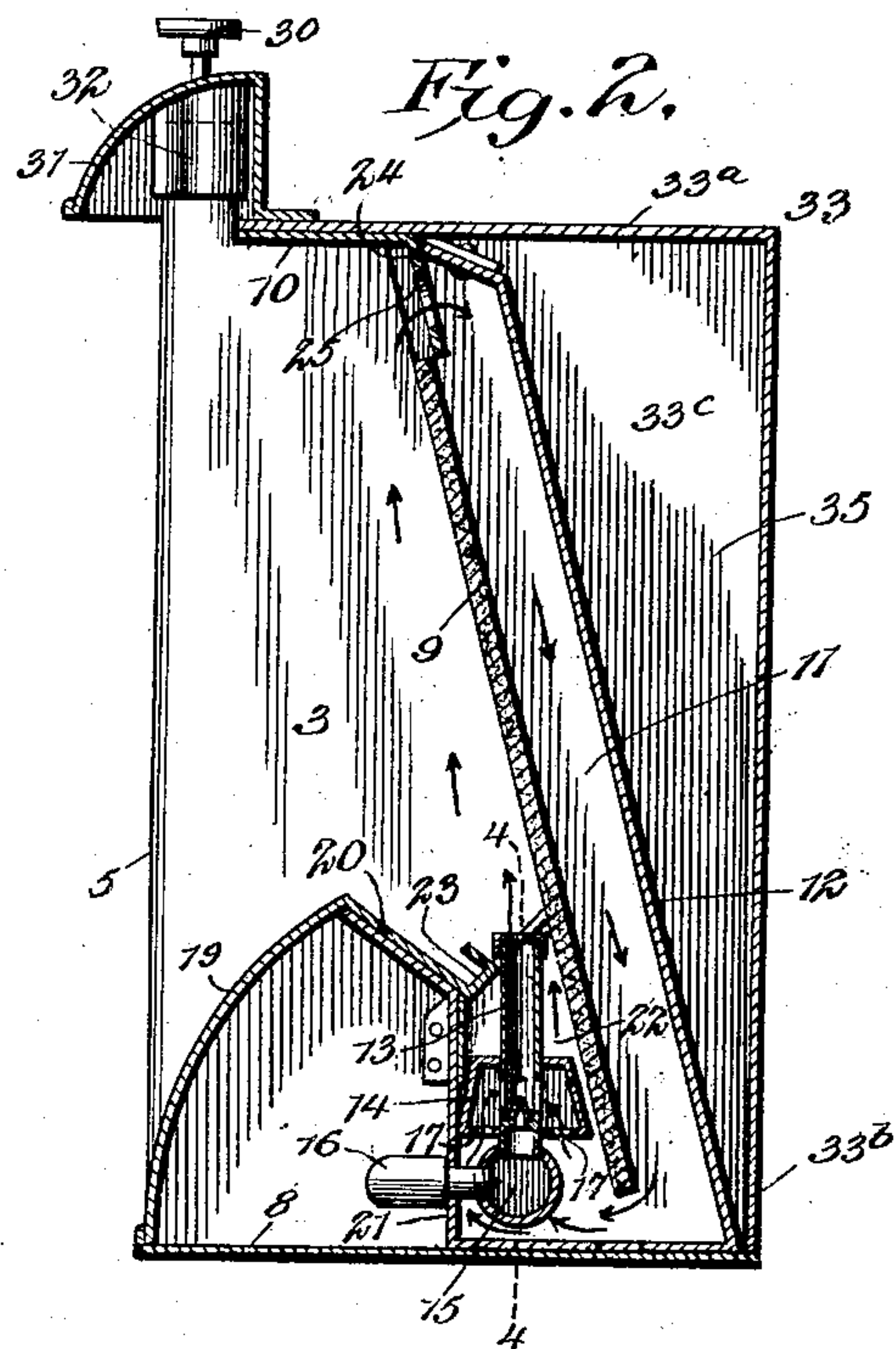
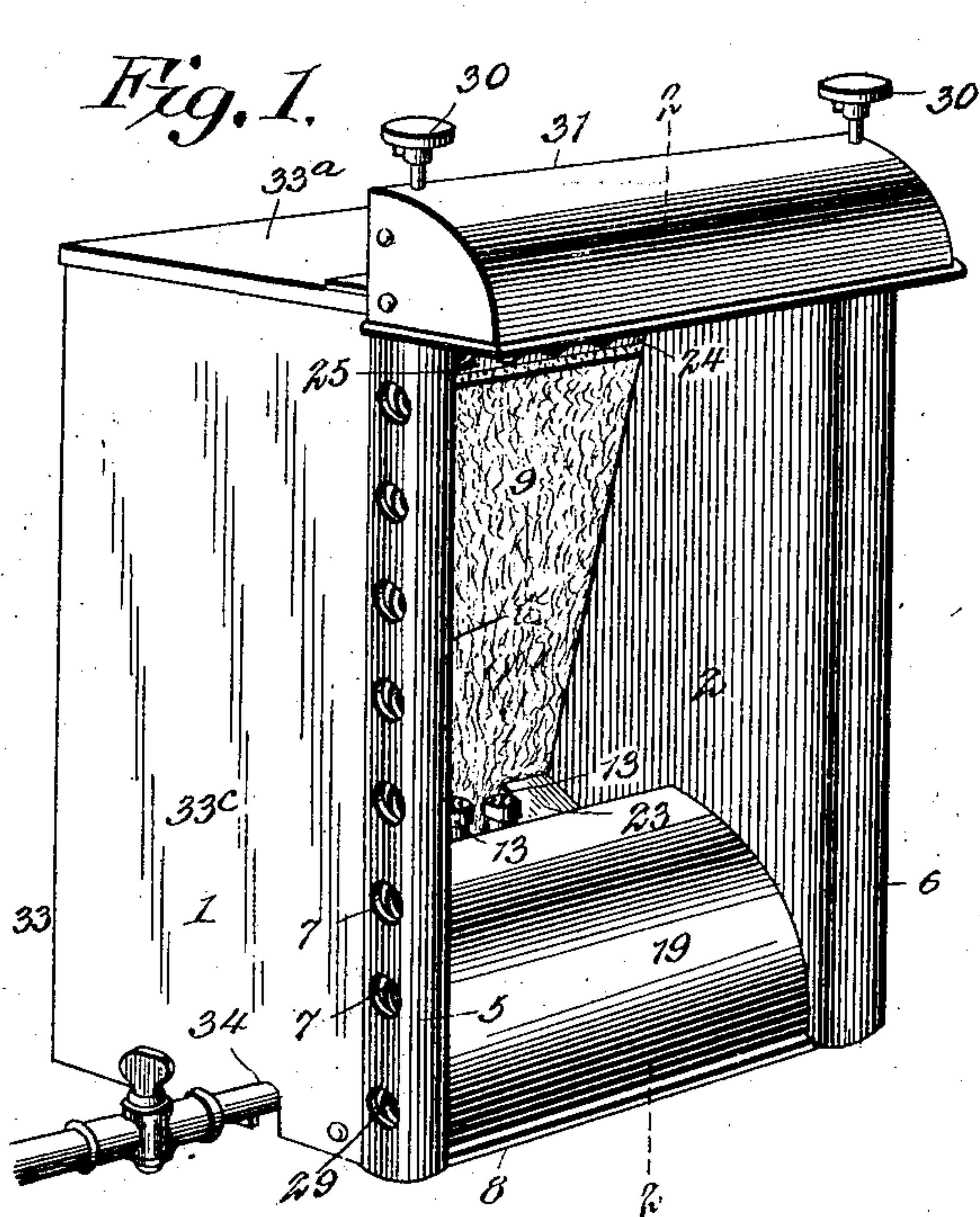
No. 699,123.

Patented Apr. 29, 1902.

C. F. WILSON.
COMBINED GRATE FRONT AND STOVE.

(Application filed May 11, 1901.)

(No Model.)



Charles F. Wilson, Inventor,

By

E. G. Sigg

Attorney

Witnesses
Howard D. Orr
Rais G. Julihn

UNITED STATES PATENT OFFICE.

CHARLES FREMONT WILSON, OF CATLETTSBURG, KENTUCKY, ASSIGNOR,
BY DIRECT AND MESNE ASSIGNMENTS, TO GATE CITY STOVE WORKS,
INCORPORATED, OF CATLETTSBURG, KENTUCKY, A CORPORATION OF
KENTUCKY.

COMBINED GRATE-FRONT AND STOVE.

SPECIFICATION forming part of Letters Patent No. 699,123, dated April 29, 1902.

Application filed May 11, 1901. Serial No. 59,856. (No model.)

To all whom it may concern:

Be it known that I, CHARLES FREMONT WILSON, a citizen of the United States, residing at Catlettsburg, in the county of Boyd and State of Kentucky, have invented a new and useful Combined Grate-Front and Stove, of which the following is a specification.

My present invention relates to a combination grate-front and stove, and has for its object the production of a heater designed for the utilization of a fluid fuel—as, for instance, natural or artificial gas—and capable of being quickly converted for use either as a grate-front or stove.

The great objection to the use of gas-heaters generally is the peculiar odor produced by the imperfect combustion and the consequent liberation of noxious gases; and the elimination of this odor is one of the primary objects of the present invention. This object is accomplished by providing for a continuous recirculation of the products of combustion to the burners until every vestige of combustible gas is entirely consumed.

A still further object of the invention is to provide a heater of this character which by reason of the complete consumption of the fuel may be employed without a flue or chimney, if desired, and which by reason of a special peculiar equipment of cold-air chambers or drums will maintain a sufficient circulation of air within the apartment to insure the ventilation thereof without effecting the vitiation of the atmosphere circulating through the heater.

To the accomplishment of these and other objects, which will hereinafter more fully appear, one embodiment of the invention consists in the construction and arrangement of parts to be described, illustrated in the accompanying drawings, and defined in the appended claims, although it will be evident that a wide range of structural variation may be resorted to in adapting the heater for use in various connections without departing from the scope of the invention or materially affecting the advantages accruing therefrom.

In said drawings, Figure 1 is a perspective view of my device organized as a stove. Fig.

2 is a central vertical section thereof on the line 2 2 of Fig. 1. Fig. 3 is a side elevation of the device organized as a grate-front and showing the outer wall of one of the cold-air chambers broken away and certain other of the parts in section to show the manner in which the cold air circulates through the cold-air chambers or drums to effect the ventilation of the room when the stove-casing is removed and the device is being used as a grate-front. Fig. 4 is a detail view, partly in section, of the burner comprising a gas-cylinder, a series of Bunsen burner-tubes, and a mixing-chamber within which the gas is mixed with air preparatory to its delivery to the point of ignition. Fig. 5 is a detail horizontal sectional view of one of the cold-air chambers, showing one of the cylindrical dampers in section and indicating by arrows the direction of movement of the air circulation.

The precise manner in which the heater is built up is a matter of no importance so far as the invention involved is concerned, and instead, therefore, of detailing the construction and mode of connection of the various sheet-metal plates employed I shall devote myself rather to the consideration of the location and relative disposition of the apartments, flues, or chambers which go to make up the device as a whole and of the disposition and relation of the various walls, aside from the particular manner in which the latter may be designed or connected.

The grate-front, which is capable of being converted into a stove by the employment of a casing in a manner to be hereinafter specified, is defined between a pair of substantially parallel vertically-disposed cold-air chambers 1 and 2, defined between inner and outer walls 3 and 4, connected at their front ends by what may be termed “damper-casings” 5 and 6. These damper-casings, which are approximately of cylindrical form and are provided with vertically-disposed series of openings 7, are located, as shown, at opposite sides of the heater, at the front thereof, and serve to impart to it the symmetrical ornamental appearance which is desirable in this class of de-

vices. The chambers 1 and 2 being in spaced relation and preferably supported upon a suitable base 8 define an intermediate chamber having an open front and provided at the back with an asbestos fire-wall 9, terminating above the base 8 and below the top wall 10, which, like the base 8, closes the ends of the chambers 1 and 2 and serves to retain them rigidly in properly-spaced relation. This disposition of the grate or fire-wall 9, which inclines forwardly from its lower end, serves to define in the rear of the wall 9 a hot-air flue 11, the back wall 12 of which is located behind and in spaced relation to the wall 9 and is secured at its opposite sides to the walls 3 of the cold-air chambers, these walls being preferably extended rearwardly a sufficient distance to constitute the side walls of the hot-air flue 11.

Immediately in advance of the fire-wall 9 and adjacent to the lower end thereof is disposed a transverse series of Bunsen or other suitable burner-tubes 13, passing through a mixing-chamber 14 and supported at their lower ends by what may be termed a "gas-cylinder" 15, communicating, preferably at a point intermediate of its ends, with a gas-supply pipe 16, extending through the side of the heater adjacent to its bottom and communicating with a suitable source of supply. (Not shown.) The mixing-chamber 14 is provided, in a manner well understood in the art, with air-inlet openings 17 in its bottom wall, and the burner-tubes at a point within the chamber 14 are apertured, as indicated at 18, to permit the air passing into the mixing-chamber to mix with the gas, and thus form a highly-combustible fluid for ignition at the upper ends of the tubes in the usual manner. It will be evident that air supplied in this manner to the burners will furnish the oxygen necessary for the proper combustion of the gas. It is impossible, however, to supply sufficient oxygen to completely consume the fuel escaping from the tube, and it is for this reason that I contemplate a recirculation of the products of combustion or partially-consumed gas through the hot-air chamber 11 and back to the mixing-chamber 14, where after its partial consumption it is again supplied to the burner to be further consumed, this action being maintained in a continuing cycle until all noxious gases are completely burned, to the end that an absolutely odorless heater is secured. Obviously the circulation induced around the fire-wall will cause the drawing in of a considerable quantity of fresh air at the upper end of the flue 11, so that the mixer will be well supplied with oxygen.

In order to maintain this circulation, it is necessary to provide an upwardly-extending termination of the lower end of the flue 11, because it is essential that the upwardly-directed flame be made to produce a current sufficiently strong to induce a downward circulation through the flue 11, notwithstanding the natural tendency of the heated air to

rise. This is accomplished by providing at the front of the stove or grate-front a fender 19, the front wall of which is rearwardly curved and connects at its upper end with a top wall 20, inclined inwardly or downwardly from the upper end of the fender 19 and supported at its inner end by a vertical partition-wall 21, which constitutes the back wall of the fender and the front wall of what may be termed the "burner-chamber" 22, which, in effect, is a continuation of the flue 11, designed for the reception of the gas-cylinder 15, the mixing-chamber 14, and the burner-tubes 13, so that the hot air circulating through the flue 11 and escaping from the lower end thereof under the fire-wall 9 will heat the gas-cylinder 15, thereby raising the tension of the gas, and after performing this function will escape into the mixing-chamber to be again combined with the gas and reburned at the point of ignition. The upper end of the burner chamber or flue extension 22 is closed, at least partially, by a guard-plate 23, extending across the interval between the walls 3 and inclined from the upper end of the partition 12 to the front face of the fire-wall 9, forming, with the oppositely-inclined top wall 20 of the fender, a trough designed for the reception of any asbestos fiber which may become detached from the wall 9. The primary object of the guard-plate 23, however, is to so obstruct the upper end of the chamber or flue extension 22 as to increase the force of the circulation of air from the lower end of the flue 11 into the chamber 22 and around the burner-tubes, as it will be evident that all of the air passing from the flue 11 cannot be intermixed with the gas and must therefore pass upwardly around the mixing-chamber and tubes for consumption at the point of ignition. Another guard-plate 24 is located to protect the inlet-opening to the flue 11 above the upper end of the fire-wall 9, this guard-plate being preferably formed with a series of openings 25, through which the air readily passes from the front of the fire-wall to the rear thereof for redelivery to the burners.

We have now seen in what manner the burner is supplied and how the combustion is maintained for the purpose of completely consuming the fuel in order to obviate the necessity for a chimney or flue and to effectually dispose of the noxious gases which are usually thrown off by heaters burning gas as a fuel. In addition to this feature of the invention, however, I have premised that another object of the invention is to equip a heater of this character with means for heating and inducing a circulation of air within the compartment without vitiating such air by the consumption of the oxygen therein. This end is attained by means of the cold-air chambers or drums 1 and 2, located at opposite sides of the heater, as already pointed out. These cold-air chambers or drums are provided, as stated, with the damper-casings

5 and 6 at their front ends, and their rear ends are closed by walls 26, located in about the plane of the fire-wall 9, but beyond the opposite sides of the hot-air flue 11, and these walls are formed with openings 27 in order to permit the air of the compartment to flow freely into the front ends of the chambers or drums through the openings 7 in the damper-casings and to escape through the openings 27 after having traversed the heated walls 3, which, as we have seen, define the combustion-chamber of the heater.

The circulation of air through the chambers 1 and 2 is controlled by means of cylindrical dampers 28, located within the casings 5 and 6 and having openings 29, which may be brought into coincidence with the openings 7 by rotating the dampers through the medium of ordinary detachable hand-wheels or handles 30, located above a hood 31, disposed at the top of the stove and extended in front thereof in a manner to impart an ornamental finish to the heater, as well as to constitute an extension of the top wall calculated to assist in insuring the backward circulation of the hot air into the upper end of the flue 11. The dampers are also provided with other openings 29^a, which when the openings 29 are coincident with the openings 7 of the casing will permit the air flowing into the dampers to escape thence into the cold-air chambers for circulation therethrough prior to delivery through the openings 27 in the rear end walls of the chambers.

A convenient manner of attaching the hood is shown in the drawings, and consists in forming a pair of depending nipples 32 upon the interior thereof, arranged to fit over the cylindrical upper ends of the damper-casings 5 and 6, which are extended above the top of the heater to facilitate the attachment of the hood. This particular arrangement is not absolutely essential, but is believed to be a preferable construction, because it obviates the necessity for the employment of bolts or other securing devices and at the same time connects the opposite sides of the heater in a manner to insure their rigid retention in spaced relation. It will be noted that the openings 7 into the damper-casings are located at the sides thereof opposite the walls 3, so that the air passing into the chambers 1 and 2 does not come into contact with the heated products of combustion passing along the face of the fire-wall or even with the hot air radiated therefrom and passing into the room in front of the heater.

The foregoing description is complete as to the organization of the heater for use as a grate-front, and for the purpose of converting the heater into a stove it is simply necessary to provide a casing 33, preferably of rectangular form, as shown, and comprising the top wall 33^a, a back wall 33^b, and side walls 33^c. This casing is readily attachable and detachable for facilitating the conversion of the device for use either as a stove or grate-

front, and when applied the front edge of the top wall 33^a is preferably slipped under and retained by the rear side of the hood 31, the retention of the casing in place being additionally facilitated by the provision of a notch 34 in one of its side walls for the reception of the gas-pipe 16.

When the device is used as a stove, the dampers 28 are closed, and as the rear wall 33^b of the casing 33 is vertical a comparatively large dead-air chamber 35 may be defined within the casing 33 between the back wall thereof and the back wall 12 of the flue 11, and this dead-air chamber or space will be increased to the extent of the dimensions of the chambers 1 and 2, because these chambers are now in communication with the interior of the stove-casing, and the circulation of air is prevented by the closing of the dampers. It will now be seen that the heat generated by the combustion in front of the fire-wall will serve, by reason of the conductivity of the still air within the surrounding chambers, to heat the walls of the stove-casing and effect the radiation of heat in the manner well understood in the art.

From the foregoing it will be observed that I have produced a simple and effective combination grate-front and stove designed for the complete consumption of artificial or other gas and adapted for odorless operation without the use of a flue for carrying off the products of combustion and also embodying heating chambers or drums designed to heat and to maintain the circulation of air within the apartment, thereby simultaneously heating and ventilating the same; but while the present embodiment of the invention is thought at this time to be preferable I do not wish to limit myself to the structural details defined, as, on the contrary, I reserve the right to effect such changes, modifications, and variations thereof as may be fairly comprehended within the scope of the protection prayed.

What I claim is—

1. In a heater of the character described, the combination with a fire-wall and a back wall defining an intermediate hot-air flue, of a partition disposed in advance of the fire-wall at the lower end thereof and defining an intermediate burner-chamber constituting a continuation of the hot-air flue, a series of burner-tubes located within the burner-chamber and in communication with a source of gas-supply, said burner-chamber being provided with a constricted opening at its upper end through which the burner-tubes extend, whereby the combustion produced at the upper ends of the burner-tubes will induce a circulation of air around the fire-wall, through the hot-air flue, into the burner-chamber, and around the burner-tubes for redelivery at the point of ignition.

2. In a heater of the character described, the combination with a fire-wall and a back wall defining an intermediate hot-air flue, of a partition located in advance of the lower

end of the fire-wall to define an intermediate burner-chamber constituting a continuation of the hot-air flue, a series of burner-tubes located within the burner-chamber and extended through a constricted opening at the upper end thereof, a gas-cylinder supporting the burner-tubes and in communication with a source of gas-supply, a mixer located within the burner-chamber at a point above the gas-cylinder and having communication with the tubes and with the interior of the burner-chamber, respectively, whereby the combustion produced at the upper ends of the burner-tubes will induce a recirculation around the fire-wall and through the hot-air flue to the interior of the burner-chamber to cause the heated air to circulate around and heat the gas-cylinder, part of the heated air then passing into the mixing-chamber, and another part passing around the mixing-chamber and around the burner-tubes for redelivery at the point of ignition.

3. A heater of the character described having an open front and provided at its opposite sides with separate non-communicating vertically-disposed cold-air chambers defined between inner and outer walls connected at their front ends by a damper-casing, and at their rear ends by an apertured rear end wall, a fire-wall and a back wall defining an intermediate hot-air flue at the back of the heater, a gas-burner located in front of the fire-wall at the lower end thereof to effect a circulation around the fire-wall for the purpose specified, and dampers located within the damper-casings to control the circulation of air through the cold-air chambers.

4. A heater of the class described having an open-front combustion-chamber defined between cold-air chambers located at the opposite sides of the heater and having inner and outer walls connected at their front edges by apertured cylindrical damper-casings, and at their rear ends by apertured rear end walls, a fire-wall and a back wall disposed transversely between the cold-air chamber and defining a hot-air flue at the back of the heater, a gas-burner located in front of the fire-wall at the lower end thereof, to effect a circulation around the fire-wall for the purpose specified, and rotary dampers mounted within the damper-casings and designed to control the circulation of air through the cold-air chambers.

5. A heater of the character described, having an open-front combustion-chamber defined between cold-air chambers at its opposite sides and a hot-air flue at its back, inner and outer walls defining the cold-air chambers and connected at the front of the heater by damper-casings, and at the back of the heater by apertured rear end walls, a fire-wall

and a back wall located at the back of the heater and constituting the opposite walls of the hot-air flue, a gas-burner located in front of the fire-wall at the lower end thereof, to effect a circulation of air around the fire-wall for the purpose specified, dampers located within the damper-casings to control the circulation of air through the cold-air chambers, and a removable casing having an open front and designed to inclose the heater to convert the latter into a stove.

6. In a heater of the character described, the combination with inner and outer side walls defining cold-air chambers at the opposite sides of the heater, of apertured cylindrical damper-casings located at the front ends of the cold-air chambers and extended above the heater, a fire-wall and a back wall defining an intermediate hot-air flue extending between the rear ends of the cold-air chambers, a gas-burner located in front of the fire-wall at the lower end thereof, a hood provided with thimbles fitting over the upper ends of the damper-casings, and apertured dampers within the damper-casings.

7. In a heater of the character described the combination with inner and outer side walls defining cold-air chambers located at opposite sides of the heater, of apertured cylindrical damper-casings disposed at the front ends of the cold-air chambers and extended above the heater, a fire-wall and a back wall defining a hot-air flue extending between the rear ends of the cold-air chambers, a gas-burner located in front of the fire-wall at the lower end thereof, a hood provided with thimbles fitting over the upper ends of the damper-casings, apertured dampers within the damper-casings, and a stove-casing detachably retained by the hood.

8. In a heater of the character described, the combination with inner and outer side walls defining cold-air chambers at opposite sides of the heater, of apertured cylindrical damper-casings located at the front ends of the cold-air chambers, apertured rear walls defining the rear ends of said chambers, a hood connecting the upper ends of the damper-casings, cylindrical dampers located within the damper-casings, damper-operating devices connected with the dampers and located above the hood, a fire-wall extending between the cold-air chambers at the rear ends thereof, and a gas-burner located in front of the fire-wall.

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

CHARLES FREMONT WILSON.

Witnesses:

JOHN B. VINSON,
W. O. HAMPTON.