No. 717,280. Patented Dec. 30, 1902.

A. M. ROEMER.

HEATING APPARATUS.

(Application filed Mar. 22, 1902.)

(No Model.) 4 Sheets—Sheet 1.

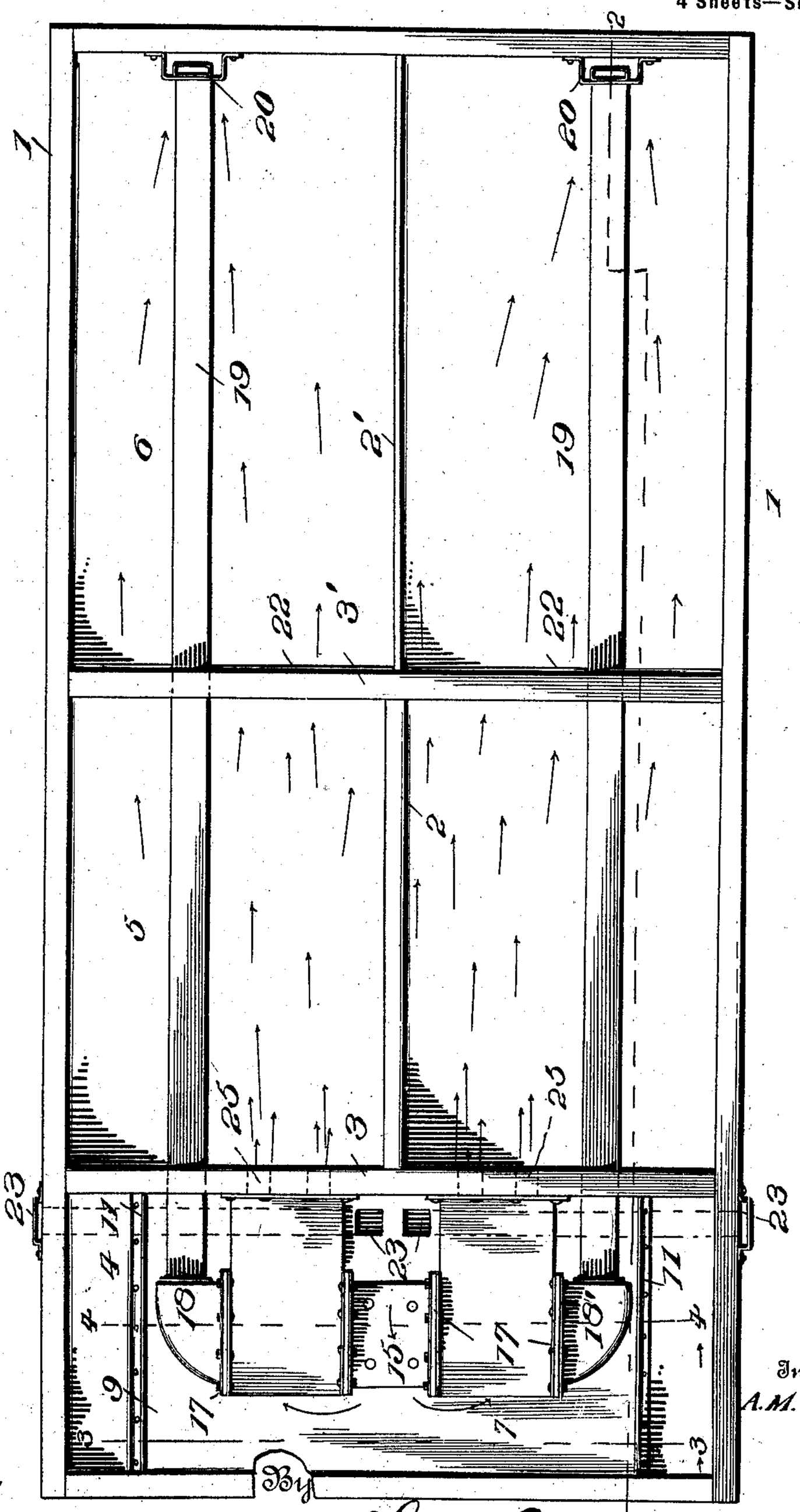

FIG. 1.

Witnesses

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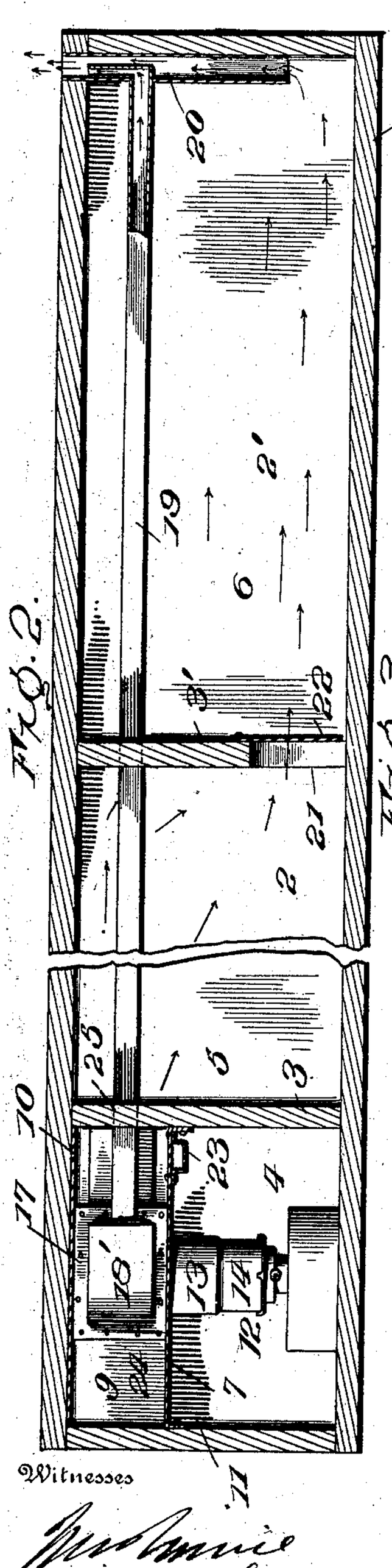

FIG. 2.

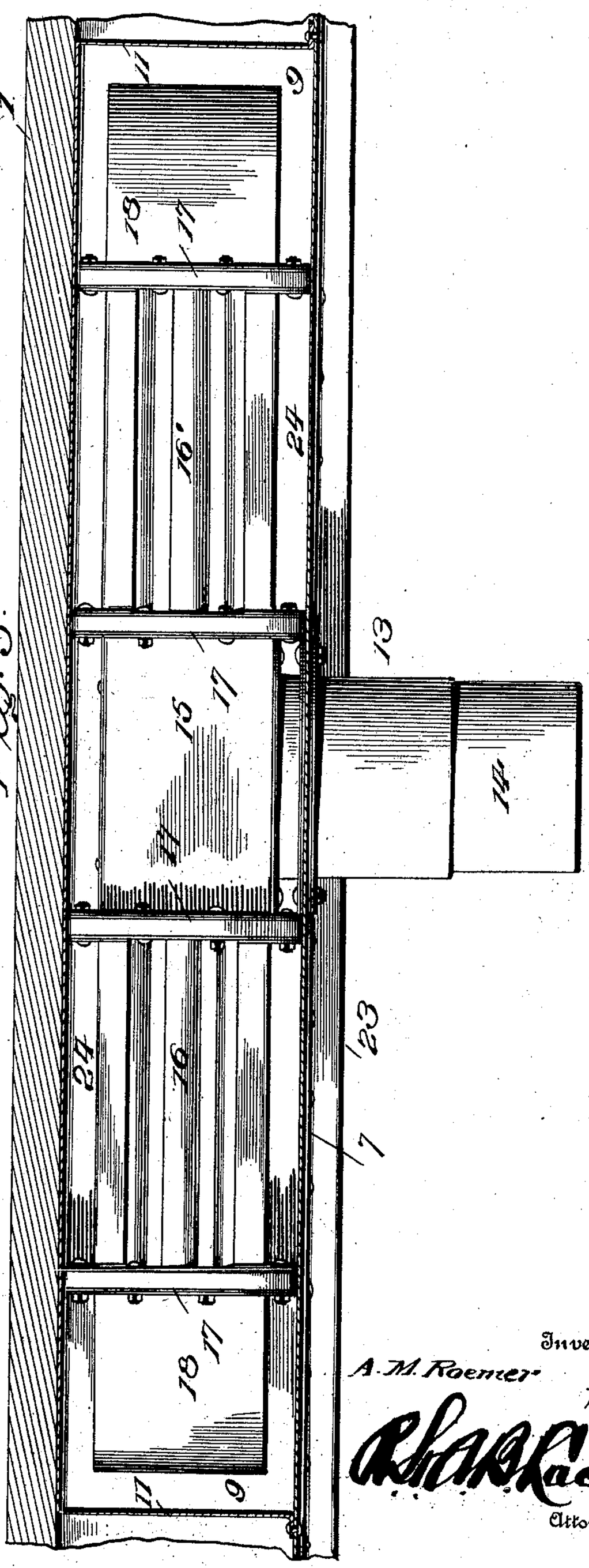

FIG. 3.

Witnesses

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Fig. 4.

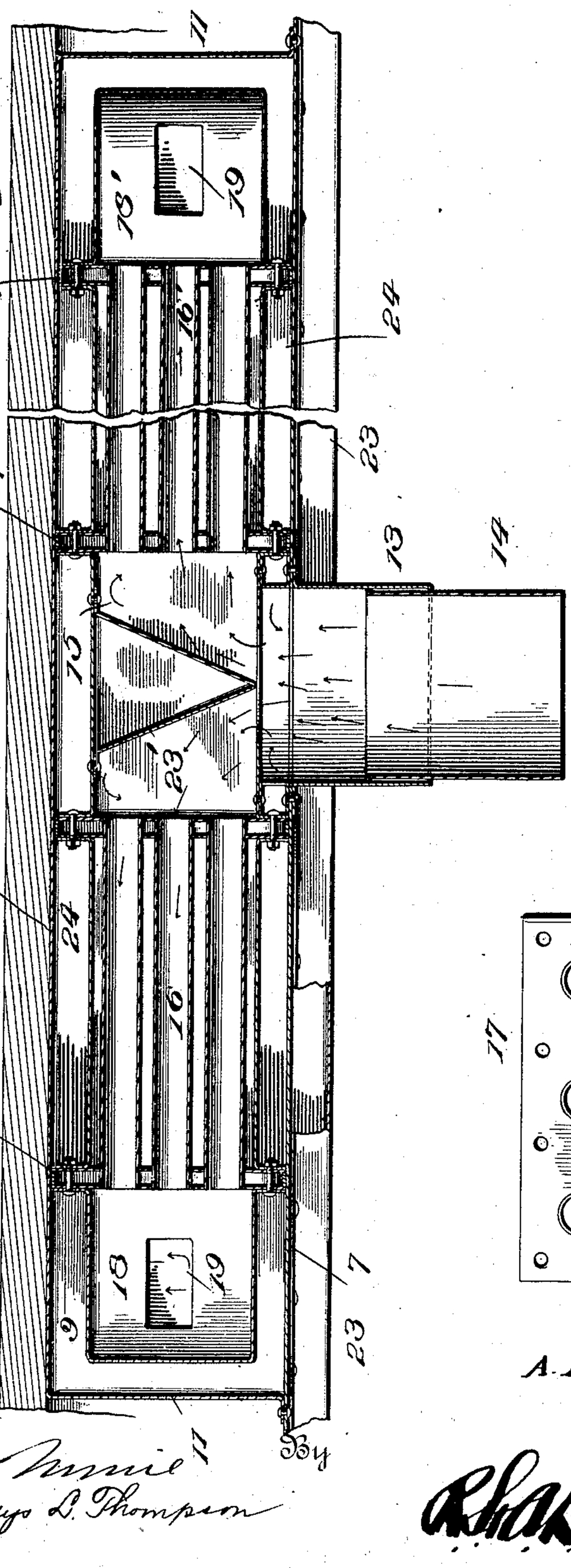
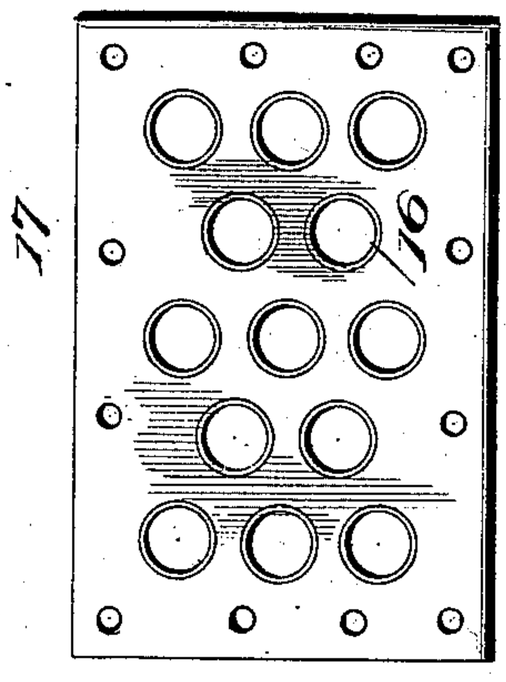


Fig. 5.



Witnesses:

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(No Model.)

4 Sheets—Sheet 4.

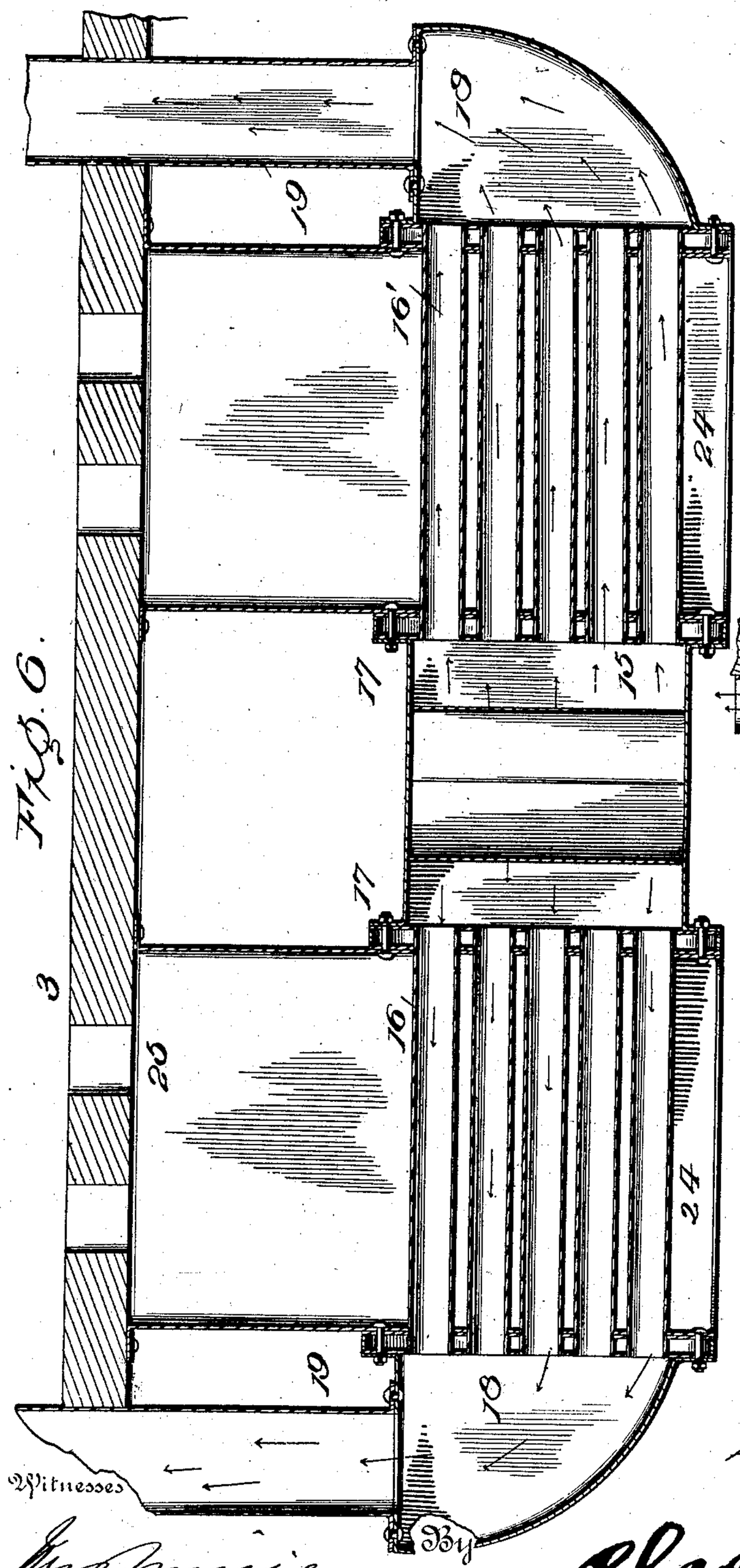

Fig. 6.

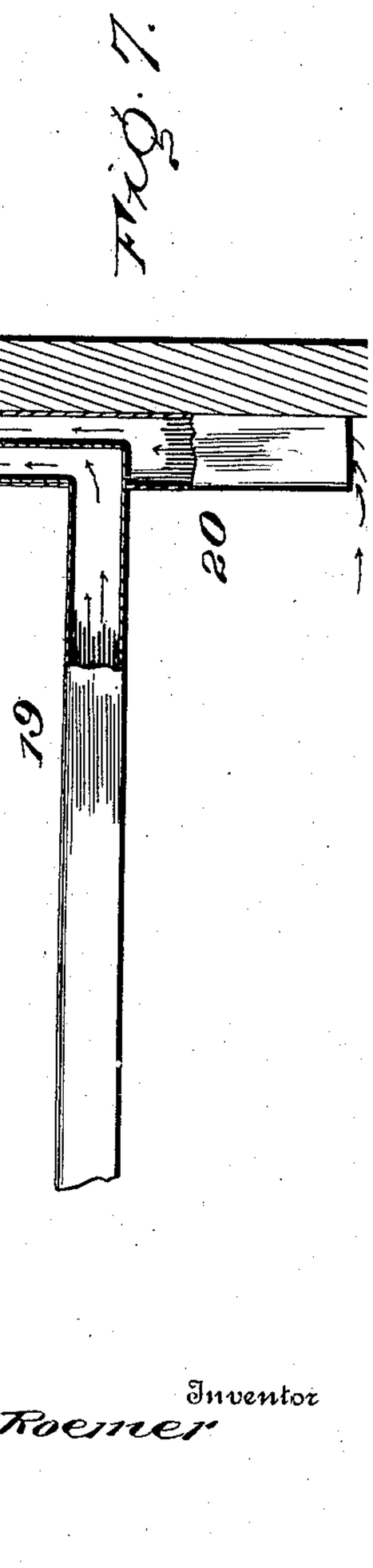

Fig. 7.

Witnesses

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UNITED STATES PATENT OFFICE.

ARTHUR MARTIN ROEMER, OF CLEVELAND, OHIO.

HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 717,280, dated December 30, 1902.

Application filed March 22, 1902. Serial No. 99,525. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR MARTIN ROEMER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Heating Apparatus; 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.

This invention has relation to improvements in heating apparatus or systems for brooders, incubators, and other structures, and has for its object the production of an apparatus in which especial provision is made for heating and circulating induced currents of hot air in such a manner as to secure perfect ventilation and the discharge of foul air and odors.

The main purpose of the invention is to provide an apparatus combining simplicity of construction with maximum efficiency and durability in use and which will maintain a substantially uniform temperature throughout the entire structure.

For a full description of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result reference is to be had to the following description and drawings hereto attached.

While the essential and characteristic features of the invention are susceptible of modification, still the preferred embodiment of the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view looking from above down upon the interior of the brooder. Fig. 2 is a longitudinal section of the same on line 2 2 of Fig. 1. Fig. 3 is a section on the line 3 3 of Fig. 1. Fig. 4 is a section on line 4 4 of Fig. 1. Fig. 5 is a view looking toward one of the headers. Fig. 6 is a horizontal section through the heating drums and pipes. Fig. 7 is a detail section showing the outlet-flue for the products of combustion and foul air.

In the present instance I have shown the application of the invention to a brooder without, however, intending to limit the invention thereto or to the details of construction which for the purpose of illustration I have set forth.

It will of course be understood that the invention is equally as well adapted for use in incubators, houses, and structures of all kinds without material alteration of the parts or departing from the gist or spirit of the invention.

The heat-producer, which in the present instance is shown as an ordinary oil-lamp, may be a stove, furnace, or any other form of heater which will subserve the purpose.

Referring now more particularly to the drawings, the numeral 1 represents the inclosing walls of the brooder or structure which is to be heated and which is illustrated as being divided by longitudinal partitions 2 2′ and transverse partitions 3 3′ into a heating-chamber 4 and rooms or compartments 5 and 6, which are to be heated by hot air supplied from said heating-chamber. The inclosing walls may be of any construction shown in structures of this character.

The heating-chamber 4 is subdivided by a horizontal metallic wall or partition 7 to provide a lower compartment to receive the heating device and an upper compartment 9 for containing the radiating devices which heat the air prior to its introduction into the rooms or apartments 5 and 6 of the brooder or structure. If desired, also, the hot-air compartment 9 may be directly closed at top by a metallic wall or ceiling 10 and at its ends by similar vertical walls 11, so as to increase the surface for the storage of heat from the heating device in order that there may be a more thorough and effective transmission of heat by radiation to the entering currents of air.

The heating device 12, arranged in the base-compartment 8 of the heating-chamber, consists in the present instance of an ordinary oil-lamp stove of the character commonly employed in incubators and brooders. The chimney of this lamp projects upwardly into a flue or conductor 13, extending up through the wall 7 into the compartment 9, said flue having a vertically sliding or telescoping lower section 14, adjustable to permit of the insertion and removal of the chimney of the lamp. Arranged above the flue 13 and in open communication therewith is a main heating-drum 15, and located on opposite sides of said

drum are banks of heat-radiating pipe 16 and 16′. These pipes extend transversely of the compartment 9 and are mounted at their ends in headers 17, each of which consists of a pair of suitably-spaced metallic sheets united by bolts or rivets. The headers supporting the outer ends of the pipes serve as supports for auxiliary heating-drums 18 and 18′, disposed, respectively, in longitudinal alinement with the two sets of chambers or apartments 5 and 6 on opposite sides of the longitudinal partitions 2 and 2′. From these drums 18 extend flues or conductors 19, which project through the partitions 3 and 3′ along the upper portions of the apartments 5 and 6 and connect at the opposite end of the brooder or structure from the heating-chamber 4 with vertical outlet-flues 20, leading to the atmosphere through the top of the brooder or structure. The said flues 19 open into the vertical flues 20 near the upper ends of the latter, and said flues 20 project down to near the bottom of the apartments 5 and 6 and are open at their lower ends for the discharge of the foul air and odors from said apartments in the manner hereinafter described. The compartments 5 and 6 are in communication through doorways or openings 21, which when the invention is embodied in a brooder may be closed by flexible curtains or flaps 22, which are adapted to readily open to allow the heated air to pass from the apartments 5 to the apartments 6 and also to allow the chicks to pass from one compartment to the other, said curtains being constructed of a material which will yield easily under pressure for these purposes.

The main drum 15 contains a V-shaped divider or deflector 23′, which is located centrally above the opening connecting said drum with the flue 13 and is adapted to deflect the products of combustion flowing from the heater in opposite directions and equally to both sets of radiating-pipes 16 and 16′. From the drum the products of combustion and hot air passing upward through the flue 13 are thus caused to circulate in equal ratio or proportions to said pipes 16 and 16′ and to flow therethrough to the auxiliary drums 18 and 18′, and thence to pass from said drums into the flues 19 and through the latter along the entire length of the brooder or structure in the upper portions of the compartments 5 and 6, and finally to pass out to the atmosphere through the vertical outlet-flues 20. The discharge of the products of combustion into the top of these flues 20 causes the production of a partial vacuum in said flues, whereby the foul air contained within the chambers 5 and 6 is caused to pass up into the flues by the suction or draft thus induced and then to discharge to the atmosphere, by means of which the automatic continuous circulation of air through the compartments 5 and 6 is established and a constant discharge of the foul or vitiated air produced.

Pure air to be heated is supplied to the interior of the compartment 9 through fresh-air ducts or flues 23, leading from the exterior through the opposite side walls of the brooder or structure beneath the bottom of said compartment—namely, beneath the partition 7—to the center of the heating-chamber and opening into said chamber at a point in line with the partition 2 and adjacent to the partition 3. The fresh air supplied through these flues or ducts passes into the front portion of the compartment 9 and circulates through said compartment and becomes heated by radiation from the metallic walls thereof and from the heating pipes and drums. To facilitate and promote the heating of the air, hot-air ducts 24 are preferably provided. These ducts are in communication at their lower ends with the bottom portion of the compartment 9 and extend upwardly and inwardly about and around the heating-pipes 16 and 16′ and have their upper and inner ends arranged in line with passages 25, formed in the transverse partition 3. By this means the air, which is preliminarily heated to a certain temperature by indirect radiation from the metallic walls of the heating chamber and drums, is caused to circulate about and around the heating-pipes 16 and 16′, and thus to become heated to a higher temperature before passing into the chambers 5. All of the available heat from the products of combustion from the heater is thereby utilized during the flow of said products through the apparatus to heat the air both by direct and indirect radiation. The course of the products of combustion through the brooder or structure has been previously described, and it will be seen that the heated air flowing through the passage 25 into the apartments 5 and 6 will be caused to flow rapidly through said compartments by the suction or draft created by the discharging products in the flues 20, so that all liability of sudden changes of temperature within the brooder will be effectually avoided. When the structure is employed as a brooder, the downward course of the air in passing from the inlets 25 to the doorways 20 will cause the same to pass immediately over the backs of the chicks contained in the apartments 5, thus keeping them warm and dry.

In order to establish a more thorough circulation and temporary retardation of the air within the hot-air chamber 9, I preferably mount the pipes 16 and 16′ in vertical rows, with the pipes of one row located in line with spaces between the pipes of adjacent rows, thus giving them a staggered relation, whereby the air is caused to circulate about to a greater extent in order to find an outlet through said pipes, and this becomes heated to a higher degree before entry into the chambers 5.

From the foregoing description, taken in connection with the accompanying drawings, the construction and mode of operation of the invention will be readily understood, and it will be seen that a simple and effective form

of apparatus is provided, whereby uniform heating of a brooder or other structure may be secured, the temperature at all times maintained at substantially the same degree, and a constant discharge of the foul air and odors produced, thus keeping the interior atmosphere constantly pure and wholesome.

Changes in the form, proportion, and construction of the parts, such as circumstances and variations in the mode of use of the apparatus may require, may be made within the scope of the invention without departing from the spirit or sacrificing any of the advantages thereof.

Having thus described the invention, what is claimed as new is—

1. In combination, a series of compartments in communication at their lower ends through a flap-controlled doorway, a heating-chamber having communication at its upper end with the compartment nearest thereto, an outlet at the farthest end of the remote compartment in communication with the lower end thereof, a heater in the heating-chamber comprising a drum, a pipe extended through the series of compartments and in communication with the said drum at one end and with the aforesaid outlet at its opposite end, and means for supplying fresh air to the heating-chamber, substantially as described.

2. In combination, a series of longitudinal and transverse compartments, a heating-chamber at one end of the compartments and in communication therewith, a center and end drums connected by a series of pipes, a divider in the center drum, pipes extended through the compartments and in communication with the drums, hot-air ducts surrounding the banks of pipes and communicating with the compartments nearest thereto, a heater and means for supplying fresh air to the heating-chamber, substantially as specified.

3. In a heating apparatus for brooders, incubators and other structures, the combination with a heating-chamber and compartments to be heated, of a heater in said chambers, a drum receiving the products of combustion from the heater, an auxiliary drum, heat-radiating pipes connecting said drums, a fresh-air flue for conducting air to the heating-chamber, a conducting-flue leading from the auxiliary drum through the compartments, an outlet for said flue, and a hot-air duct extending about the heat-radiating pipes for conducting the heated air from the heating-chamber to the compartments, substantially as set forth.

4. The combination with a brooder, incubator or other structure longitudinally and transversely partitioned to form a heating-chamber, and rows of apartments, said heating-chamber being in communication with the rows of apartments through hot-air passages and the apartments of each row in communication with each other through doorways in the dividing-partitions, of flexible flaps closing said doorways, a heater in the heating-chamber, a main drum in communication with said heater, auxiliary drums, radiating-pipes connecting the main drum with the auxiliary drums, ducts for conducting fresh air to the heating-chamber, hot-air ducts for conducting heated air from said chamber to the rows of compartments, conducting-flues leading from the auxiliary drums through the apartments, and outlets in communication at their lower ends with the apartments and at a point above with the flues, substantially as described.

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

ARTHUR MARTIN ROEMER. [L. S.]

Witnesses:

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M. L. SANTON.