

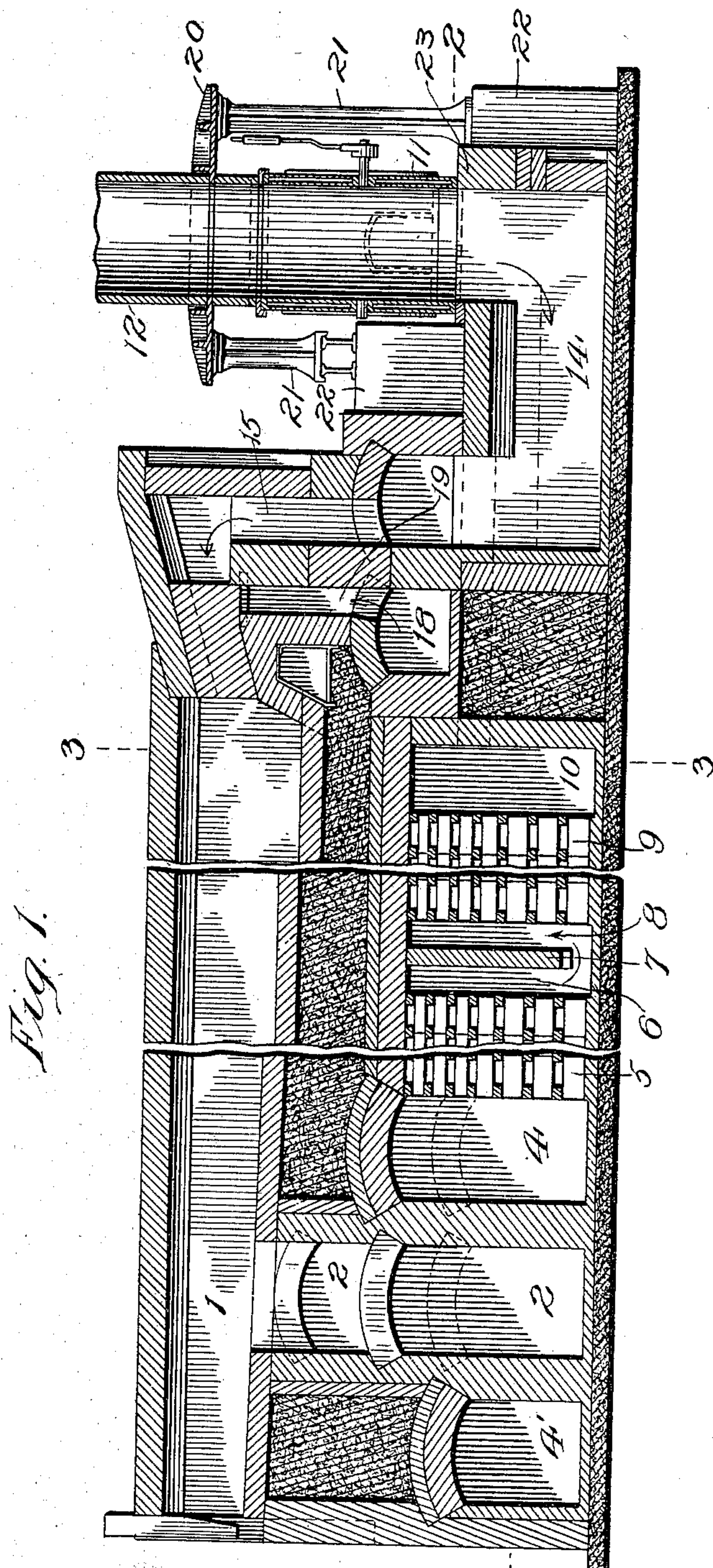
No. 732,939.

PATENTED JULY 7, 1903.

J. A. HERRICK.
REGENERATIVE APPARATUS.
APPLICATION FILED MAR. 7, 1903.

NO MODEL.

4 SHEETS—SHEET 1.



Witnesses
F. J. Hartman.
Wiley E. Crane Jr.

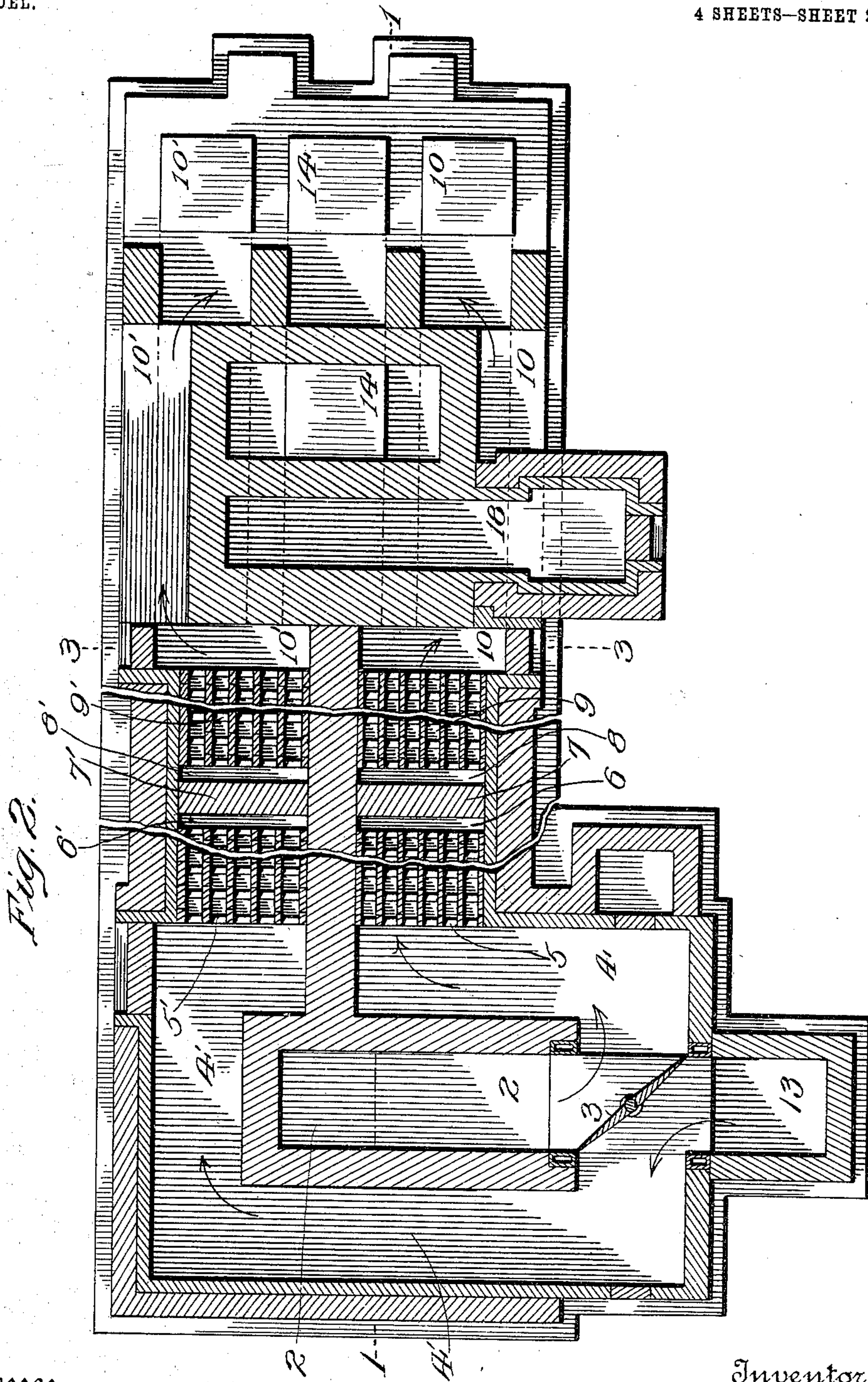
Inventor
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

Fig 3.

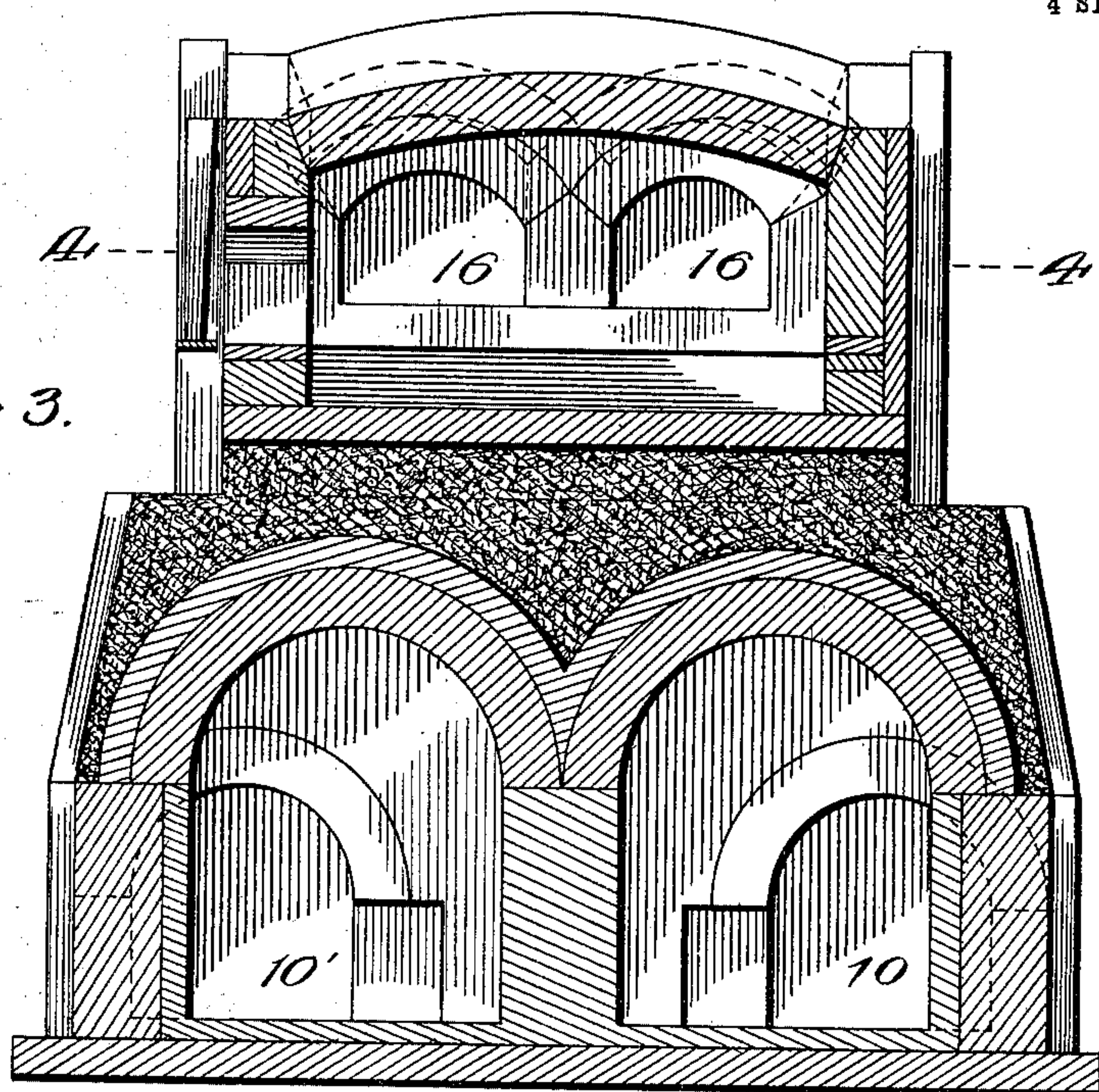
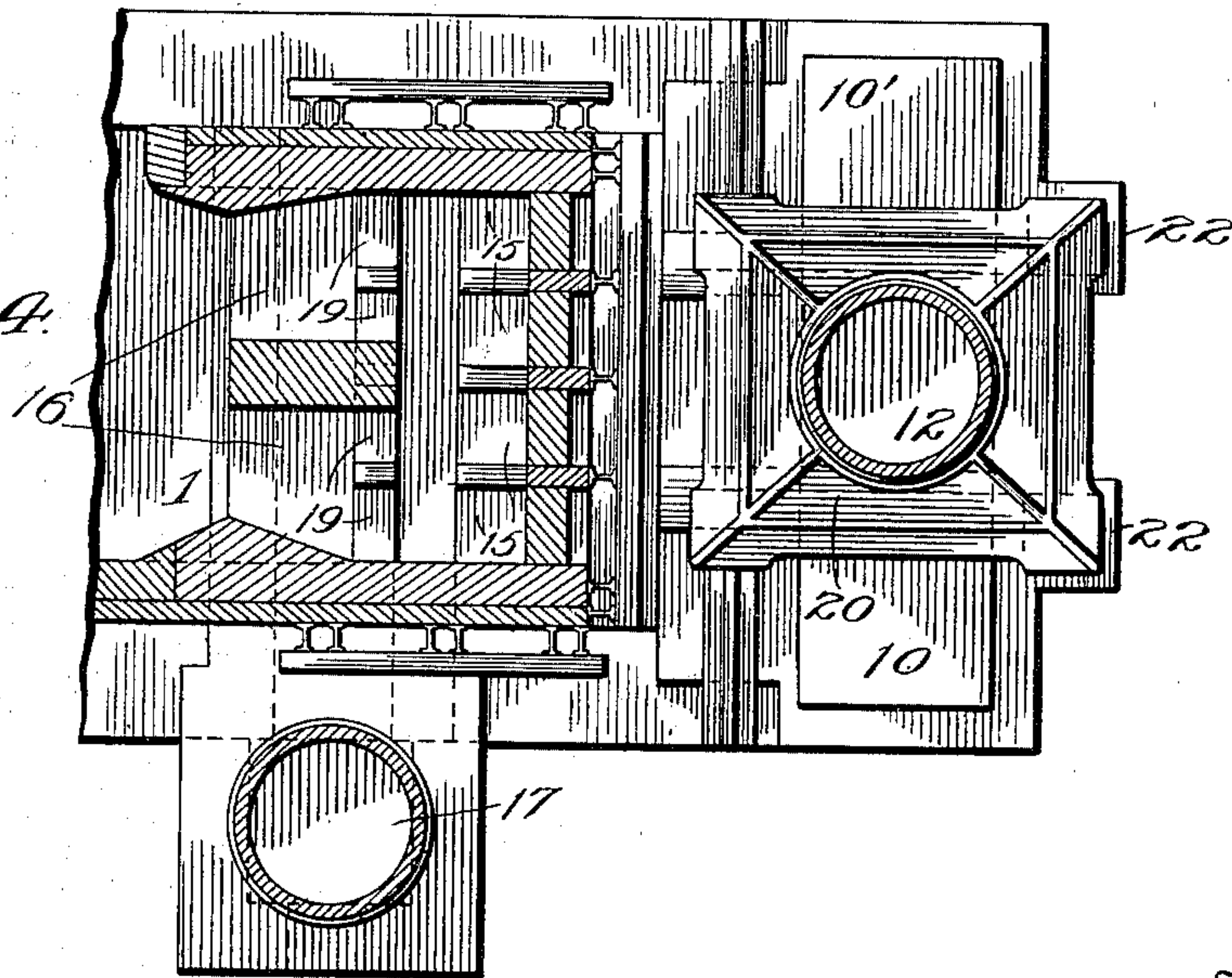


Fig 4.



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4 SHEETS—SHEET 4.

Fig. 5.

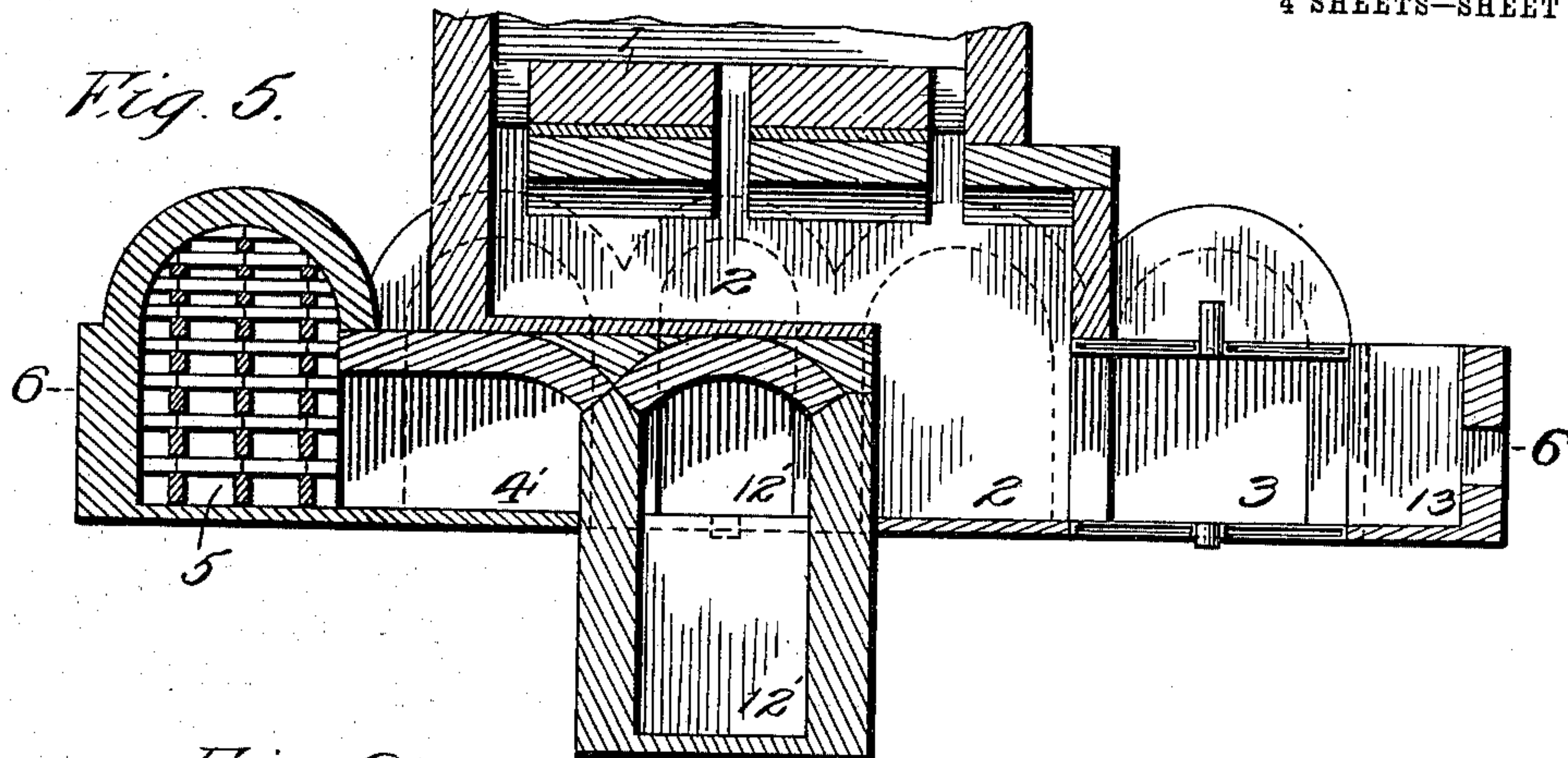
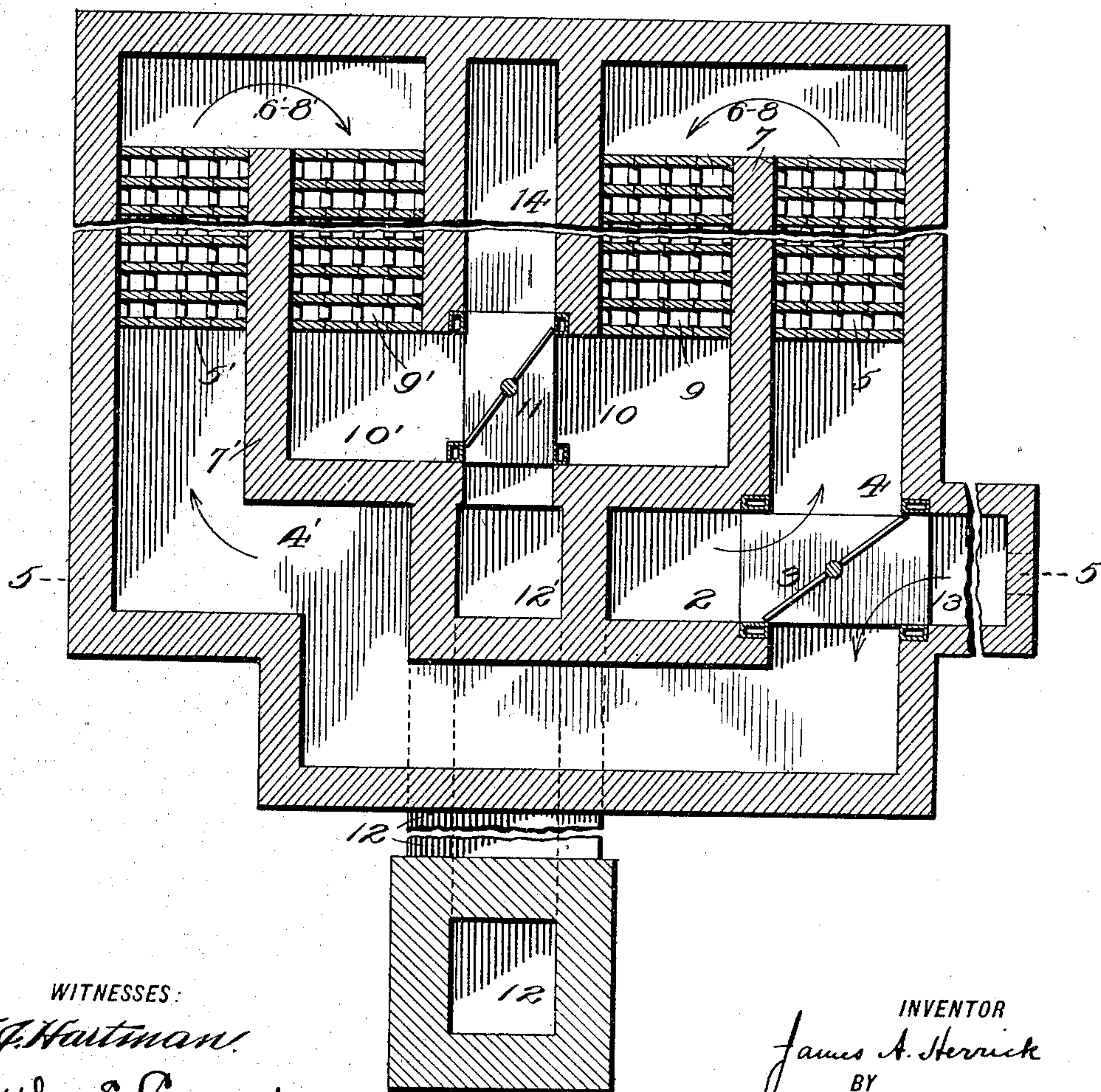


Fig. 6.



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UNITED STATES PATENT OFFICE.

JAMES A. HERRICK, OF PHILADELPHIA, PENNSYLVANIA.

REGENERATIVE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 732,939, dated July 7, 1903.

Application filed March 7, 1903. Serial No. 146,609. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. HERRICK, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Regenerative Apparatus, of which the following is a specification.

This invention relates to improved means for handling the air and products of combustion in regenerative furnaces, and is designed to provide for the introduction of the air through the valve for reversing the flames or products of combustion as they leave the furnace-chamber, to effect a uniform distribution of the air and the products of combustion over the surfaces of the regenerators, to provide efficient means for combining the incoming gas and air, and for removing the waste gases in a system of economical construction.

The nature and characteristic features of the improvements will more fully appear by reference to the accompanying drawings in illustration thereof, of which—

Figure 1 represents a vertical longitudinal sectional view taken on the line 1 1 of Fig. 2. Fig. 2 represents a horizontal sectional view taken on the line 2 2 of Fig. 1. Fig. 3 represents a vertical sectional view taken on the line 3 3 of Figs. 1 and 2. Fig. 4 represents a horizontal sectional view of details of construction, taken on the line 4 4 of Fig. 3. Fig. 5 represents a vertical sectional view taken on the line 5 5 of Fig. 6, illustrating a modified form of the invention; and Fig. 6 represents a horizontal sectional view taken on the line 6 6 of Fig. 5 in illustration of the modified construction.

Referring to the drawings, with the mechanism arranged as shown particularly in Figs. 1 to 4, inclusive, the furnace-chamber 1 discharges its flames or products of combustion into the flue 2, whence they flow through the reversing-valve 3 into the flue 4, thence through the checkers 5 into the chamber 6, thence beneath the baffle 7 into the chamber 8, thence through the checkers 9 into the flue 10, and thence through the valve 11 to the stack 12. The air is introduced by the inlet 13 through the valve 3 into the flue 4, whence it flows through the checkers 5' into the chamber 6', thence beneath the baffle 7' into the

chamber 8', thence through the checkers 9' into the flue 10', and thence through the valve 11 and flue 14, having the passages 15 leading to the inlet-ports 16 and the furnace-chamber 1. The parts of the respective regenerators being of similar construction, upon reversing the valves 3 and 11 the products of combustion are directed into the flue 4' and reach the stack 12 by the flue 10', while the air is directed into the flue 4 and reaches the flue 14 by the flue 10. The gas-tube 17, leading from the producers, discharges gas into the flue 18, having the passages 19 leading to the furnace-chamber 1.

In Figs. 5 and 6 a modified arrangement is shown which is particularly adapted for use where a higher temperature is required to be imparted to the air and to the furnace charge and where a short compact-working hearth is required. In this arrangement the flue 2 carries the heated products of combustion from the furnace through the reversing-valve 3 into the chamber 4, thence through the checkers 5 into the chambers 6 8, thence through the checkers 9, separated by the baffle or wall 7 from the parallel checkers 5 into the flue 10, thence through the valve 11 and the flue 12' to the stack 12. The air is introduced from the inlet 13 through the conduit 4' to the checkers 5', thence by the chambers 6' 8', through the checkers 9', separated from the parallel checkers 5' by the wall or baffle 7', thence by the flue 10' and valve 11 to the flue 14, and thence to the furnace-chamber. This compact arrangement reduces the loss of heat through walls exposed to low temperatures and highly heats the conduit 14, which is placed between the regenerators and directly beneath the hearth 1.

The checkers, as shown, are provided with larger openings and freer passages at their bottoms than at their tops by the use of progressively-smaller bricks closer spaced from the bottoms to the tops to provide for the more uniform distribution of the gases and air therethrough by increasing the resistance in the upper regions, where they tend to circulate, and decreasing the same in the lower regions.

As shown in Figs. 1 and 4, the stack 12 is supported by a chair having the seat 20, on which the bottom of the stack rests, the seat

being supported by the legs 21, which rest upon the foundation 22. The valve 11 is constructed independently of the stack 12 and rests upon the foundation 23 above the air-flue 14, so that it is readily removed and replaced without disturbing the stack.

By the mode of operation described, in which the cold air is introduced through the valve 3 for passing the flames from the furnace-chamber 1 to the regenerators 5 9 and 5' 9', the air-cooling of the valve is effected, which otherwise by reason of its constant exposure to high temperatures is quickly cut out. As the air and flames flow in the same direction, the air is introduced at the most highly heated parts of the regenerators, and for this reason, as well as by reason of the arrangements for the better distribution of the air and gases in the regenerators, lower resistance and increased heating efficiency are obtained. As the passages 15 discharge the air into the ports 16 directly above or across the passages 18, which discharge the gases thereto, intimate mixing of the air and gases is effected, while the construction is such that the walls forming the passages and ports may readily be repaired or changed to vary the ports.

Having described my invention, I claim—

1. In a regenerative apparatus, a reversing-valve common to two regenerators, said valve being disposed so as to simultaneously direct the incoming cold air through one set of regenerators and the hot gases from the furnace through the other set of regenerators, substantially as specified.

2. In a regenerative apparatus, in combination with a furnace-chamber, a pair of regenerators, a reversing-valve, a flue connecting said furnace-chamber and valve, a pair of flues respectively connecting said valve with said regenerators, and an air-inlet to said valve, said valve simultaneously directing the incoming air into one of said regenerators and the gases from the furnace into the other of said regenerators, substantially as specified.

3. In a regenerative apparatus, a furnace having reversing-valves, in combination with two regenerators each comprising two sets of checkers, a baffle between said sets of checkers, and a passage beneath said baffle, one of said valves being disposed so as to direct cold air through one of said regenerators and live gases from the furnace through the other of said regenerators, substantially as specified.

4. In a regenerative apparatus, a pair of regenerators each comprising two distinct sets of checkers, a baffle between said sets of

checkers, and a passage beneath said baffle, in combination with a reversing-valve for controlling the passages leading to said regenerators and mechanism for passing hot gases and cold air in the same direction through each of said regenerators, substantially as specified.

5. In a regenerative apparatus, a set of regenerators, a stack, passages connecting said regenerators and stack, a reversing-valve beneath said stack for controlling the passages from said regenerators to said stack, and a pedestal for supporting said stack independently of said valve, substantially as specified.

6. In a regenerative apparatus, in combination, a plurality of regenerators, a furnace-chamber, and mechanism for passing the gases from the furnace-chamber and the air to the furnace-chamber in the same direction through the respective regenerators, substantially as specified.

7. In a regenerative apparatus, in combination, a furnace-chamber, a plurality of regenerators, a passage between said regenerators leading to said chamber, a valve for directing hot air from each of said regenerators into said passage, a passage leading from said chamber to each of said regenerators, and a valve for directing the gases from said chamber into each of said regenerators, substantially as specified.

8. In a regenerative apparatus, in combination, a furnace-chamber, a pair of regenerators each divided into sections arranged in parallel, a passage directly connecting sections of each regenerator, a passage between said pair of regenerators which connects the same with said chamber, and a passage leading from said chamber which connects the same with said regenerators, substantially as specified.

9. In a regenerative apparatus, in combination, a furnace-chamber, regenerative mechanism comprising checkers having larger openings and freer passages through their lower than through their upper parts, mechanism for passing the gases from said furnace-chamber through said checkers, and mechanism for passing air through said checkers to said furnace-chamber, substantially as specified.

In testimony whereof I have hereunto set my hand, in the presence of the subscribing witnesses, this 5th day of March, A. D. 1903.

JAMES A. HERRICK.

Witnesses:

UTLEY E. CRANE, Jr.,
THOMAS S. GATES.