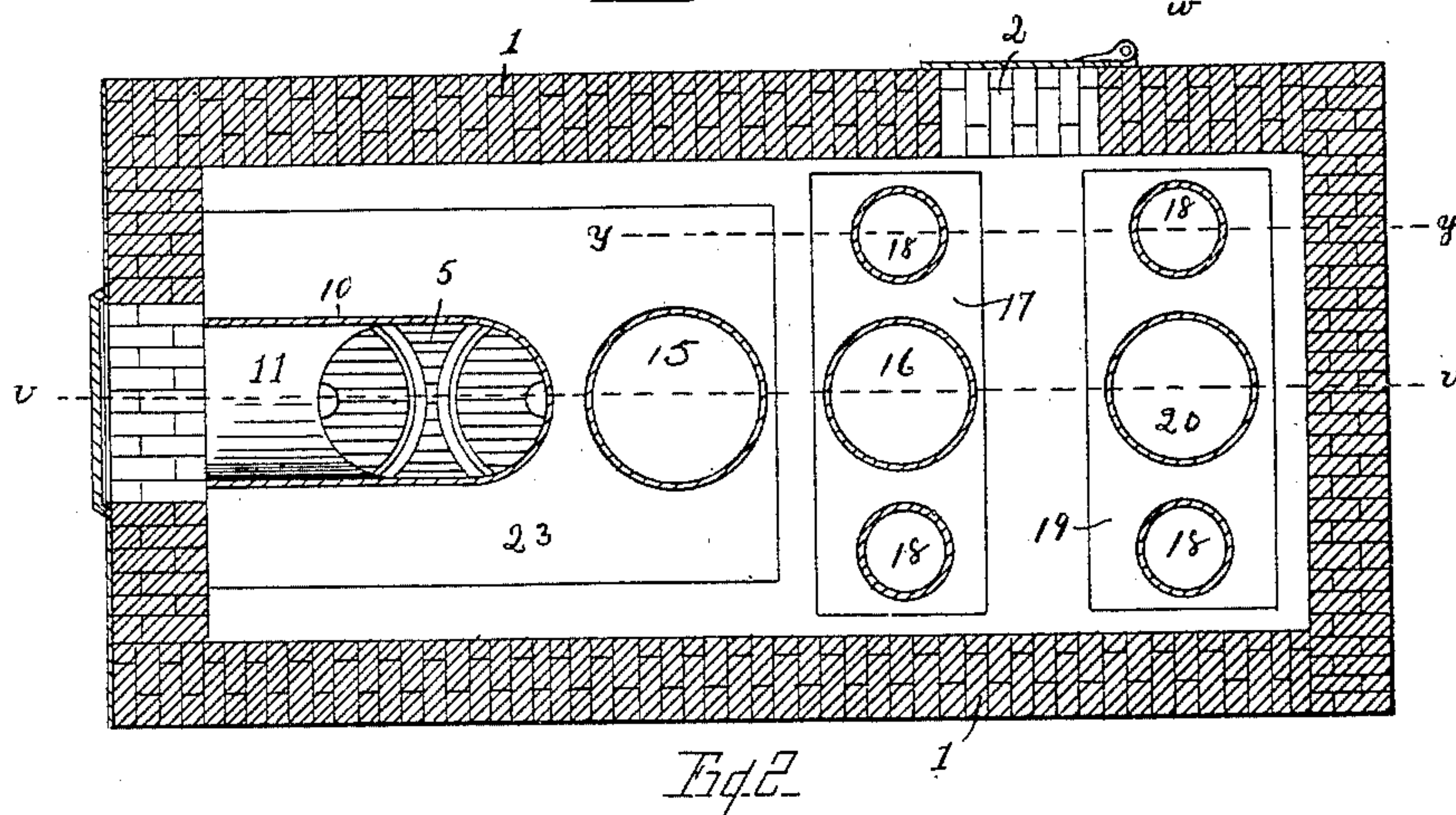


3 Sheets—Sheet 1.

No. 454,482.

Patented June 23, 1891.



WITNESSES

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(No Model.)

3 Sheets—Sheet 2.

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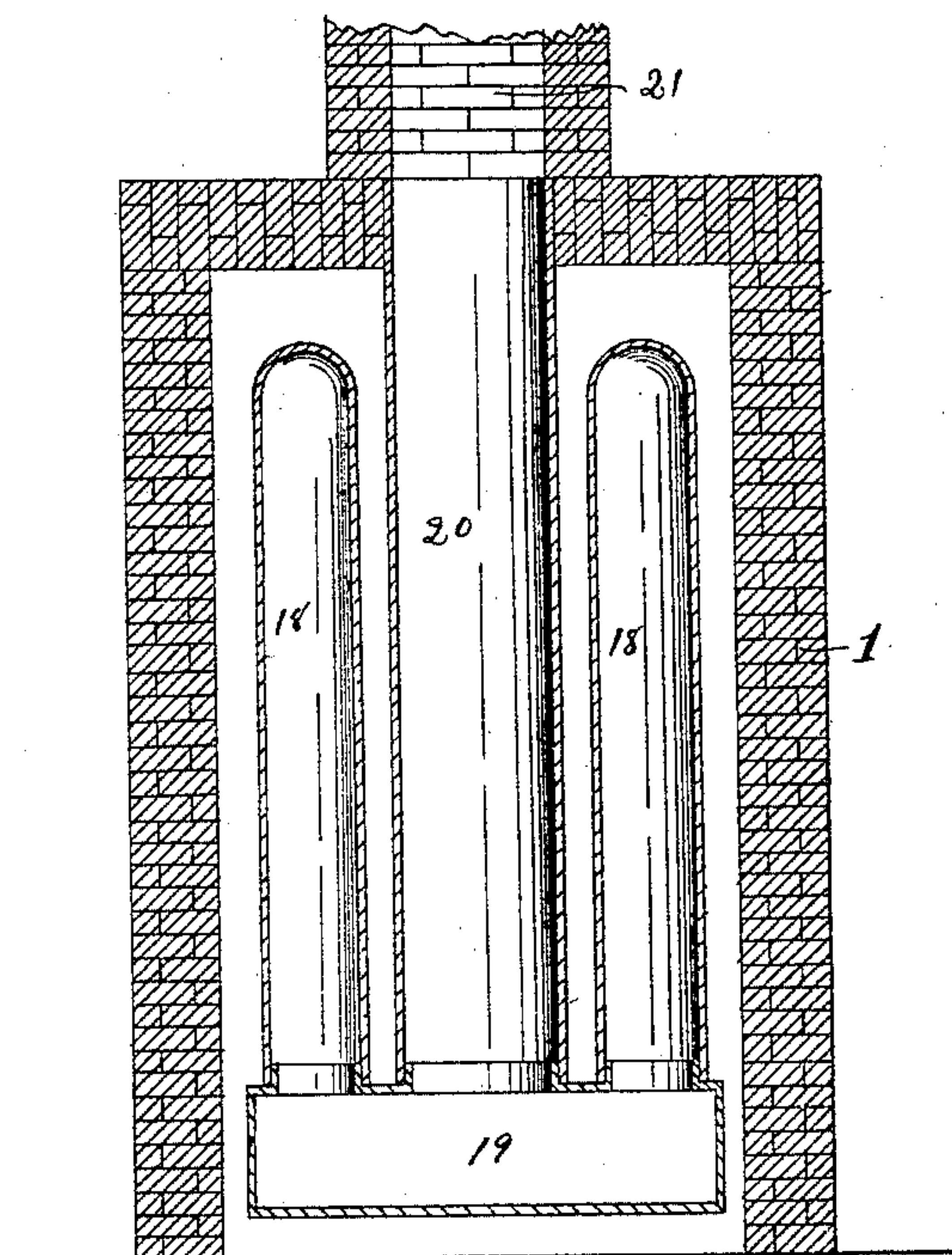


Fig. 3

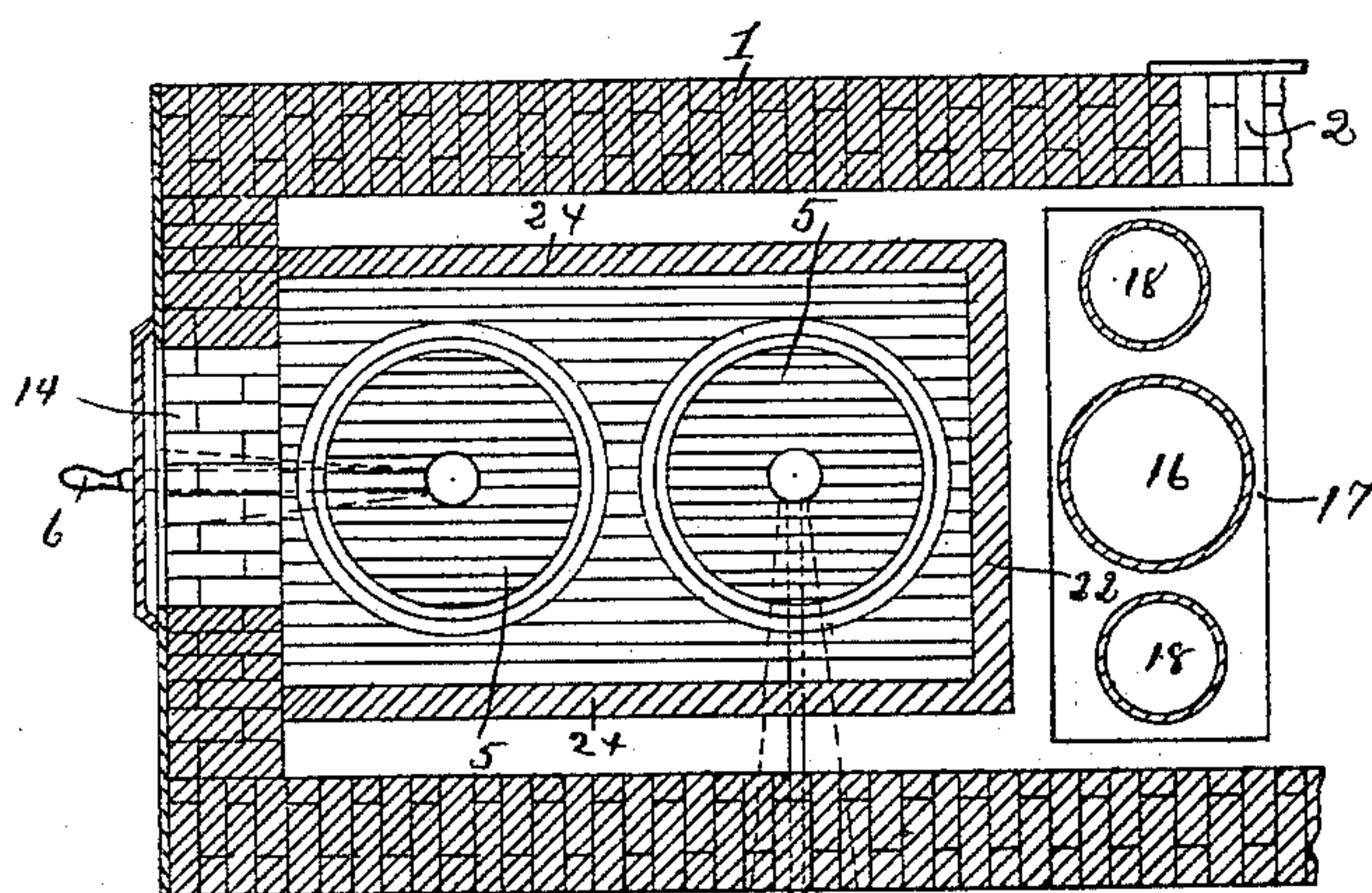


Fig. 4

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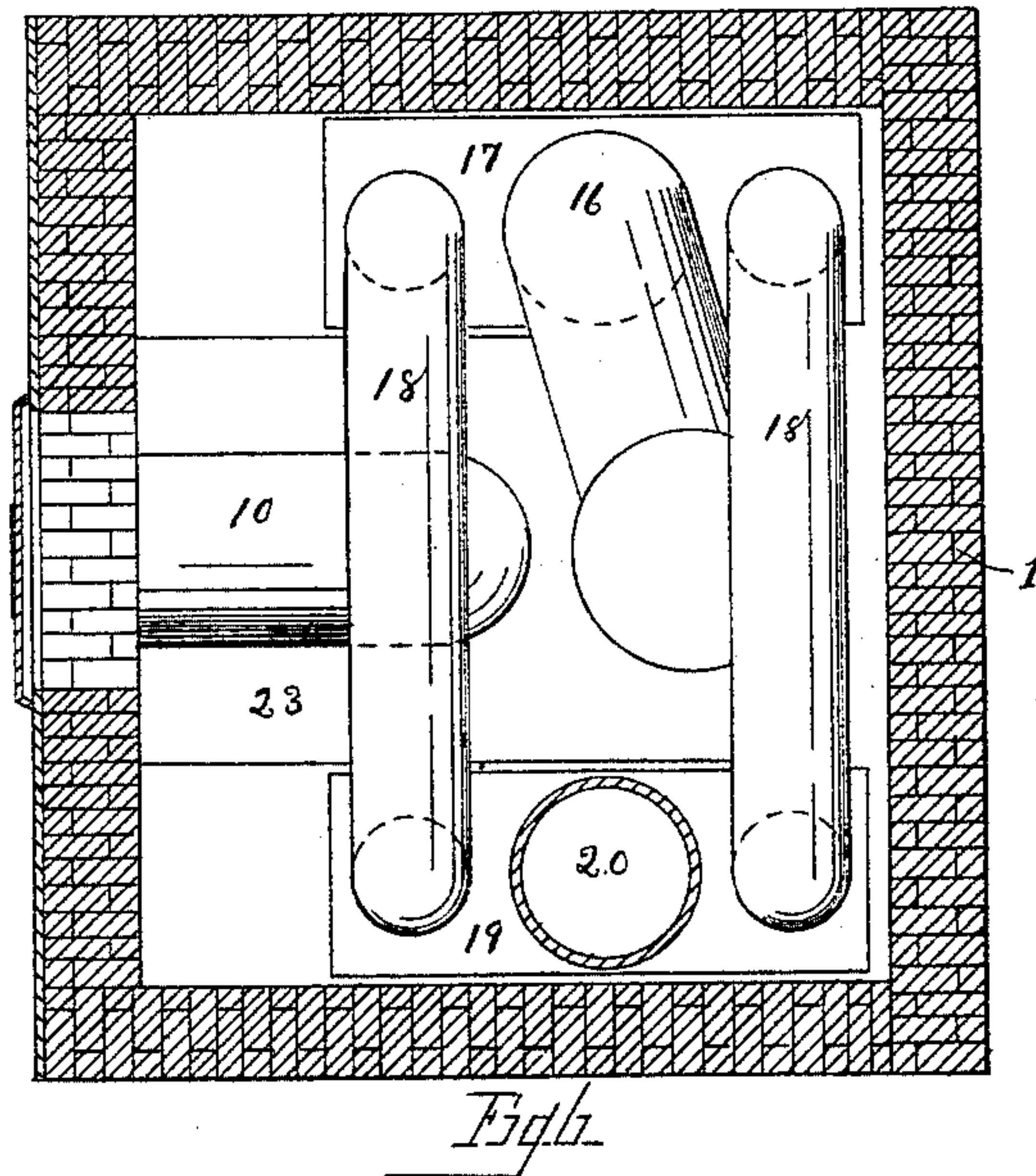
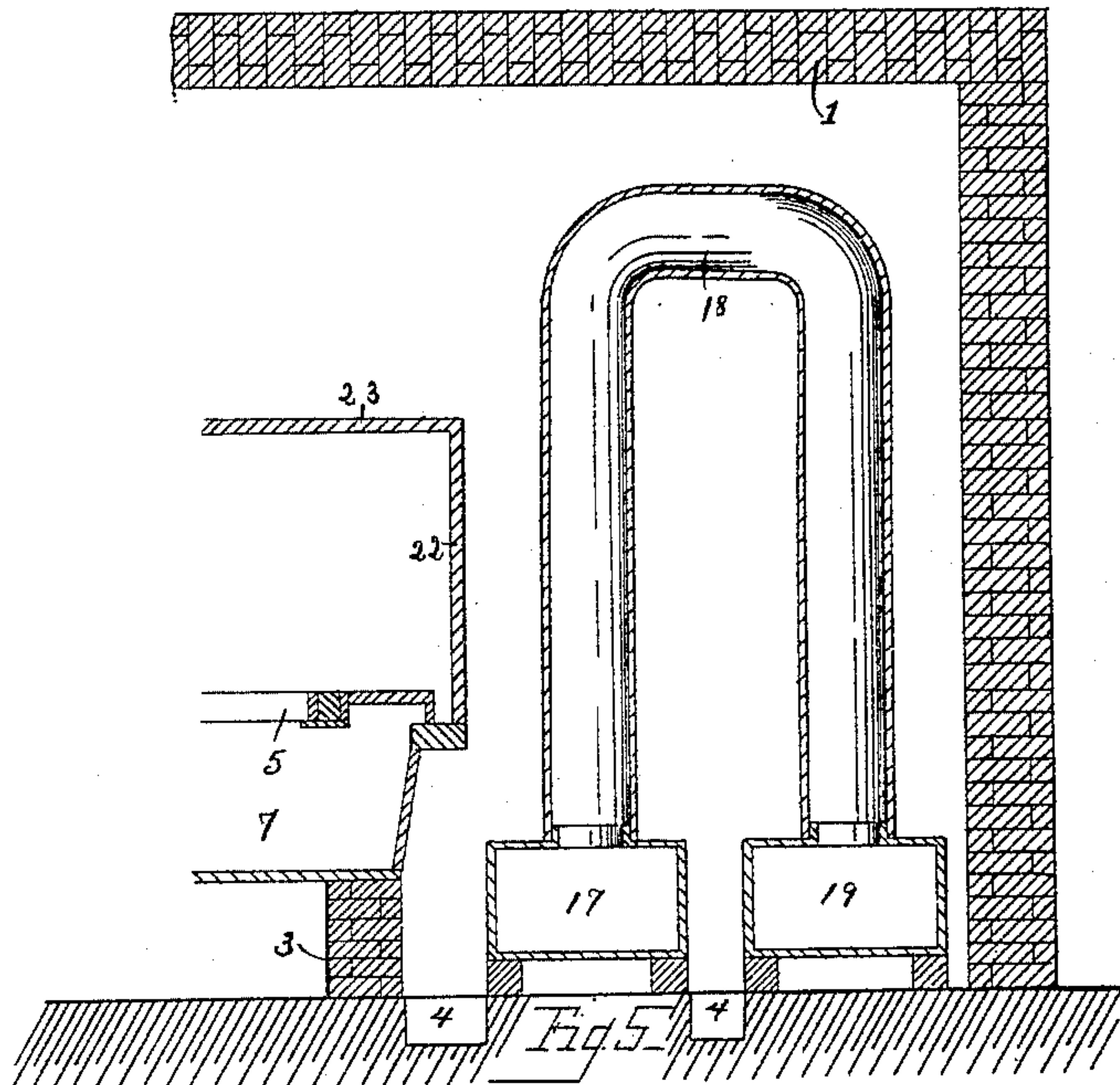
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3 Sheets—Sheet 3.

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UNITED STATES PATENT OFFICE.

MARTIN KOEHLER, OF TOLEDO, OHIO.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 454,482, dated June 23, 1891.

Application filed April 7, 1890. Serial No. 346,951. (No model.)

To all whom it may concern:

Be it known that I, MARTIN KOEHLER, of Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful
5 Improvements in a Hot-Air Furnace; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same,
10 reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form part of this specification.

My invention relates to hot-air furnaces,
15 and has for its object to construct a furnace with an arrangement of caloriducts that effectually provide for the utilization of all the heat arising from the products of combustion; and a further object is to provide for a great
20 heat-radiating surface without occupying great space within the setting in which the furnace is located.

In the accompanying drawings, forming part of this specification, and in which like
25 numerals of reference indicate corresponding parts, Figure 1 is a longitudinal vertical sectional view of the furnace and pipes, taken on the line *u u* of Fig. 2. Fig. 2 is a sectional plan view on the line *v v* of Fig. 1. Fig. 3 is
30 a transverse vertical sectional view on the line *w w* of Fig. 1. Fig. 4 is a sectional plan view on the line *x x* of Fig. 1, illustrating the grate-bars and shaking-grates. Fig. 5 is a sectional elevation on the line *y y* of Fig. 2;
35 and Fig. 6 is a top plan view of a modified construction, the top of the furnace being removed to disclose the arrangement of the pipes, this modification being especially adapted to economy of space.

40 Referring to the drawings, 1 designates the casing of the furnace, which is by preference built of brick and provided with a door 2 to admit of a person entering to clean the furnace, and 3 the base, in which are formed
45 suitable induction-ports 4, through which the air to be heated is admitted to the furnace. At a point, preferably at the front of the furnace, are located the grate-bars 5, sections of which are movable and may be operated by means of levers 6, and beneath which
50 is the ash-pit 7, access to the latter for the purpose of removing the incomplete products

of combustion being had through an opening 8, which is normally closed by a door 9.

Immediately above the grate-bars is located
55 the coal-receiver 10, consisting of a frusto-conical mouth-piece or chute 11 and a vertical reservoir 12, to the lower end of which is removably secured collars or rims 13, designed to be removed when it is desired to burn wood
60 instead of coal in the furnace, in which event the wood is fed through a door 14. At a point adjacent to the coal-receiver is a primary escape-pipe 15, which opens into the main vertical escape-pipe 16, the lower end
65 of which opens into a transverse duct 17, which extends nearly across the casing and is closed at both ends, but is provided with an opening to admit of the interior being cleaned. With this duct connects one end
70 of each of two inverted-U-shaped auxiliary escape-pipes 18, Fig. 5, the opposite ends of which connect with another transverse duct 19, in which is secured the chimney-flue 20 for conveying off the incomplete products of
75 combustion to the chimney 21. In order to prevent the gases from the fuel mingling with the air in the hot-air space, a vertical partition 22 is employed, which connects with a horizontal partition 23, located above the
80 lower part of the coal-receiver, (see Fig. 2,) and with these are connected two vertical partitions 24, the four partitions, in conjunction with the front of the furnace, forming a box-like inclosure constituting the combustion-chamber proper. The back of the ash-pit is also made solid, as shown in Fig. 1, thereby effectually preventing the possibility of any gaseous products finding their way to the hot-air chamber.

90 The hot-air pipes may be located at any point that will be found most advantageous or convenient, and in this instance are located at the top of the casing, as shown at 25, at which point the flues running to the different rooms of a building may be connected.

In Fig. 6 I have shown a modification, by means of which space may be economized by arranging the different parts so as to occupy the least possible room. This difference of
100 arrangement only effects the flues and transverse ducts into which they open.

By reference to the figure above mentioned it will be seen that the transverse ducts 17

and 19 are arranged parallel to the sides of the casing, instead of at right angles thereto, as in Fig. 2, and that the inverted-U-shaped pipes 18 are correspondingly changed in their position. This change makes it necessary for the joint of the pipe 15 to be extended obliquely across in order to connect with the vertical pipe 16, and for the chimney-flue to be arranged at the side instead of at the back of the casing, as in Fig. 2. These changes, however, do not affect the efficiency of the device, but add to its utility, inasmuch as by the arrangement just described this furnace in its compact form may be adopted whereas it might be impracticable to use it if its construction were always as shown in Fig. 1.

From the foregoing description the operation of the furnace will be readily understood, for it will be seen that as soon as the fire is started in the fire-box the products of combustion will immediately pass up the pipe 15 and down through the pipe 16 to the transverse duct 17, from thence through the inverted-U-shaped pipes 18 to the duct 19 and the pipe 20, and finally escape through the chimney to the open air. By this tortuous route of the hot air the flues are constantly heated, thus presenting to the cold air in the hot-air chamber an ever-changing hot surface. It will be found that the air in the hot-air chamber will be thoroughly and evenly heated, and from the fact that by entering the bottom of the casing and having to contact with all the pipes before escaping to the hot-air flues all danger of cold air passing through the said flues will be overcome.

In order to facilitate access to the front of the furnace, should it be desirable to repair the main escape-pipe or coal-receiver, an opening may be provided of sufficient size to admit a man's body passing through.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a hot-air furnace, an outer casing having air-inlets and an escape-opening for the hot-air, a combustion-chamber in said casing, a primary pipe leading from said chamber, ducts extending transversely of the casing, a main pipe connecting the primary pipe with one of the ducts, an auxiliary pipe located on each side of the main pipe and connecting the ducts, and a smoke-flue leading from the last duct.

2. In a hot-air furnace, an outer casing having air-inlets and an escape-opening for the hot-air, a combustion-chamber in said casing, a primary pipe leading from said chamber, transverse ducts located at the base of the outer casing, a main pipe connecting the primary pipe with one of the ducts, a U-shaped auxiliary pipe located one on each side of the main pipe and connecting the ducts, and a smoke-flue leading from the last duct.

In testimony that I claim the foregoing as my own I hereby affix my signature in presence of two witnesses.

MARTIN KOEHLER.

Witnesses:

WILLIAM WEBSTER,
ROBT. M. ELLIOTT.