

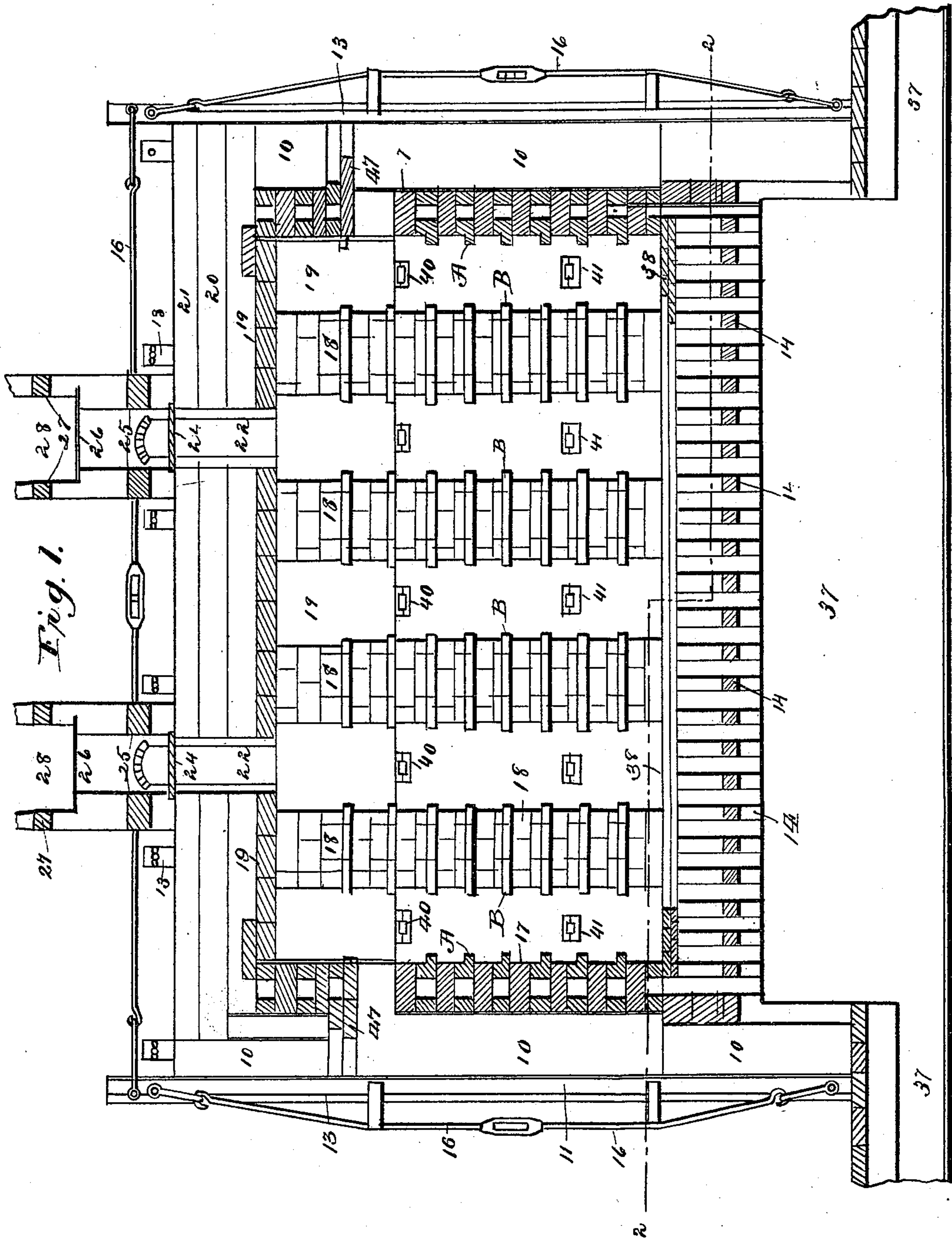
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5 Sheets—Sheet 1.

A. M. STRUSHOLM.
DOWN DRAFT MUFFLE KILN.

No. 518,012.

Patented Apr. 10, 1894.



witnesses

J. M. Fowler Jr

H. M. Richardson.

Inventor
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By Davis & Co.
Attorneys

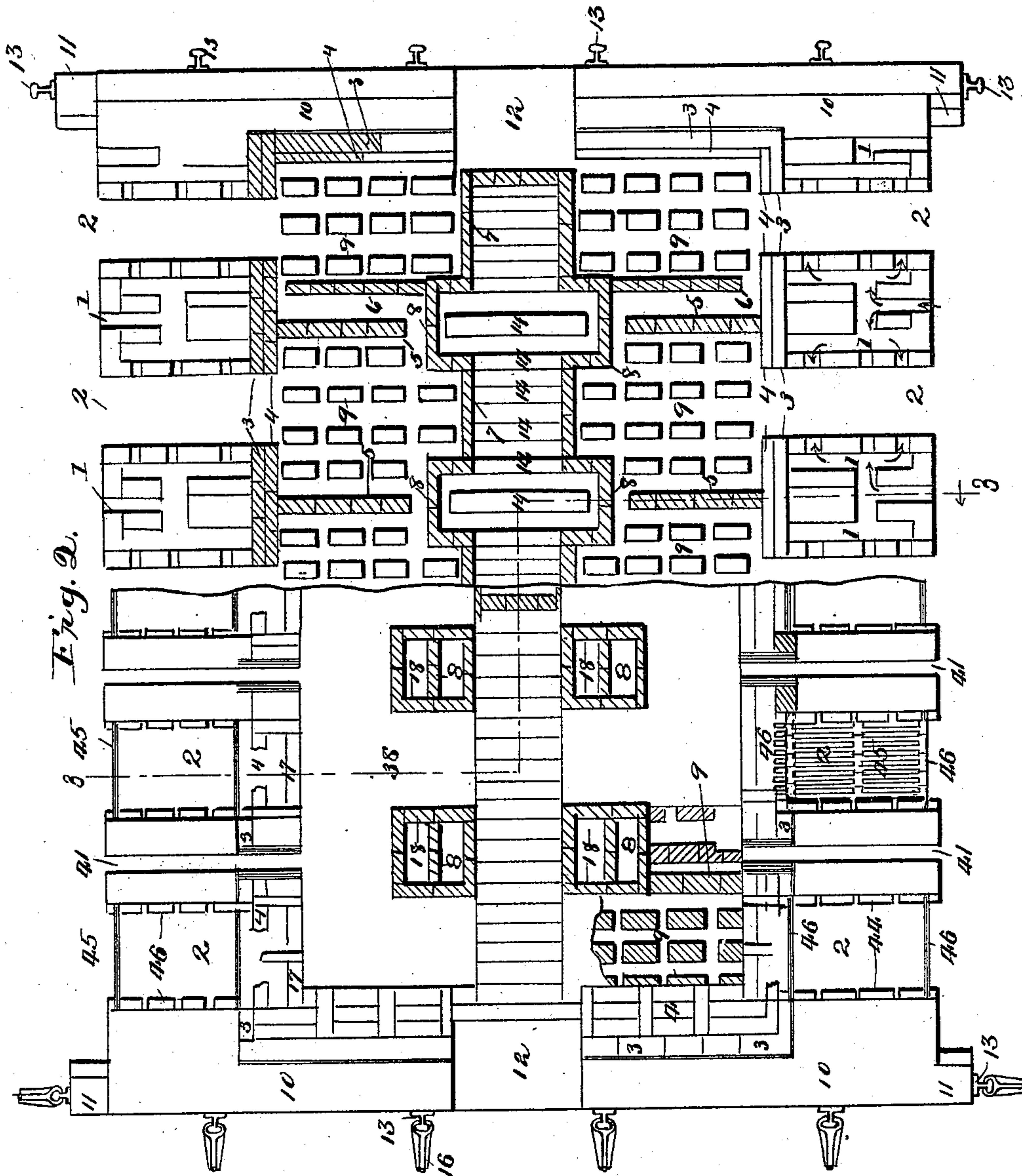
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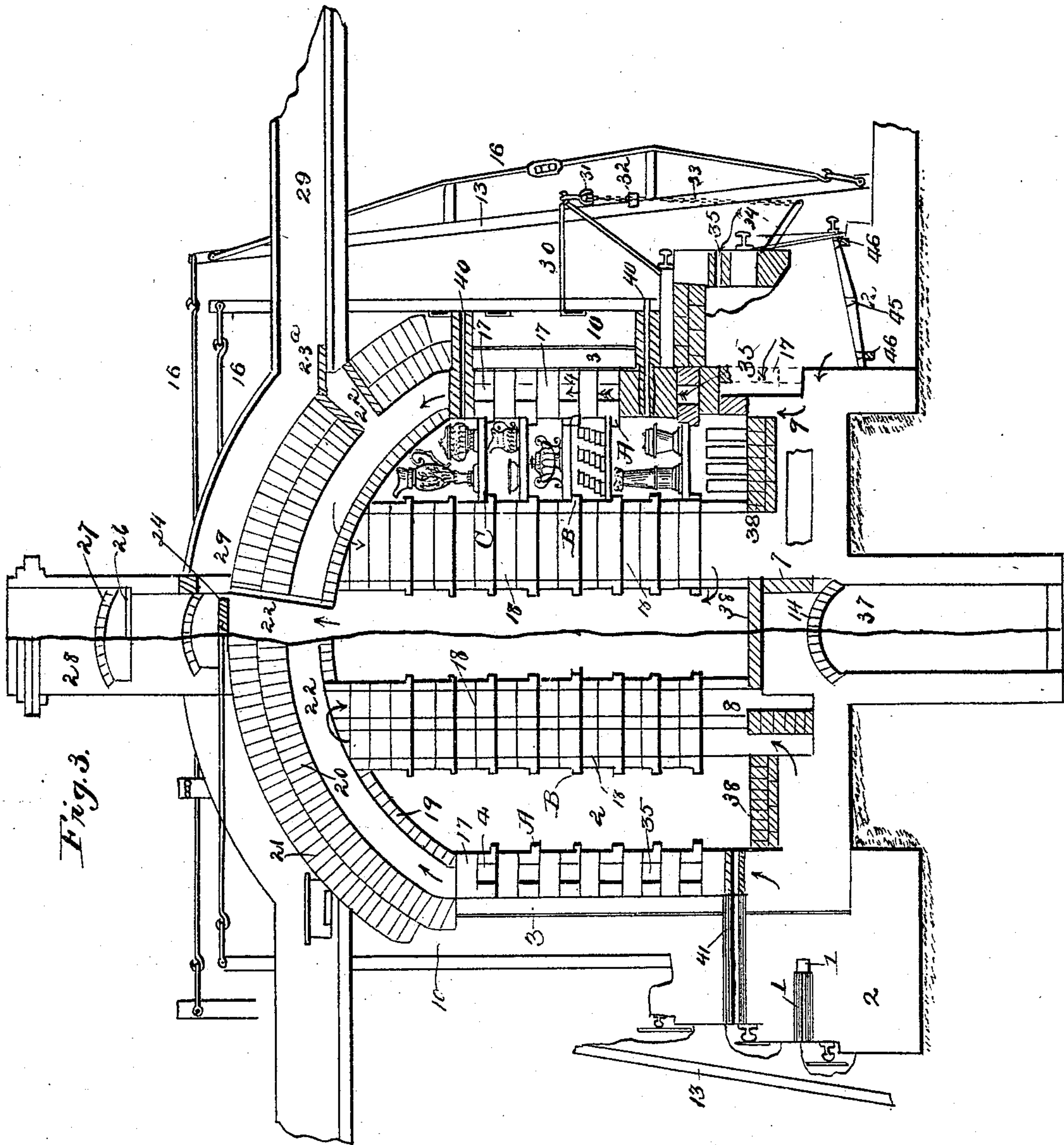
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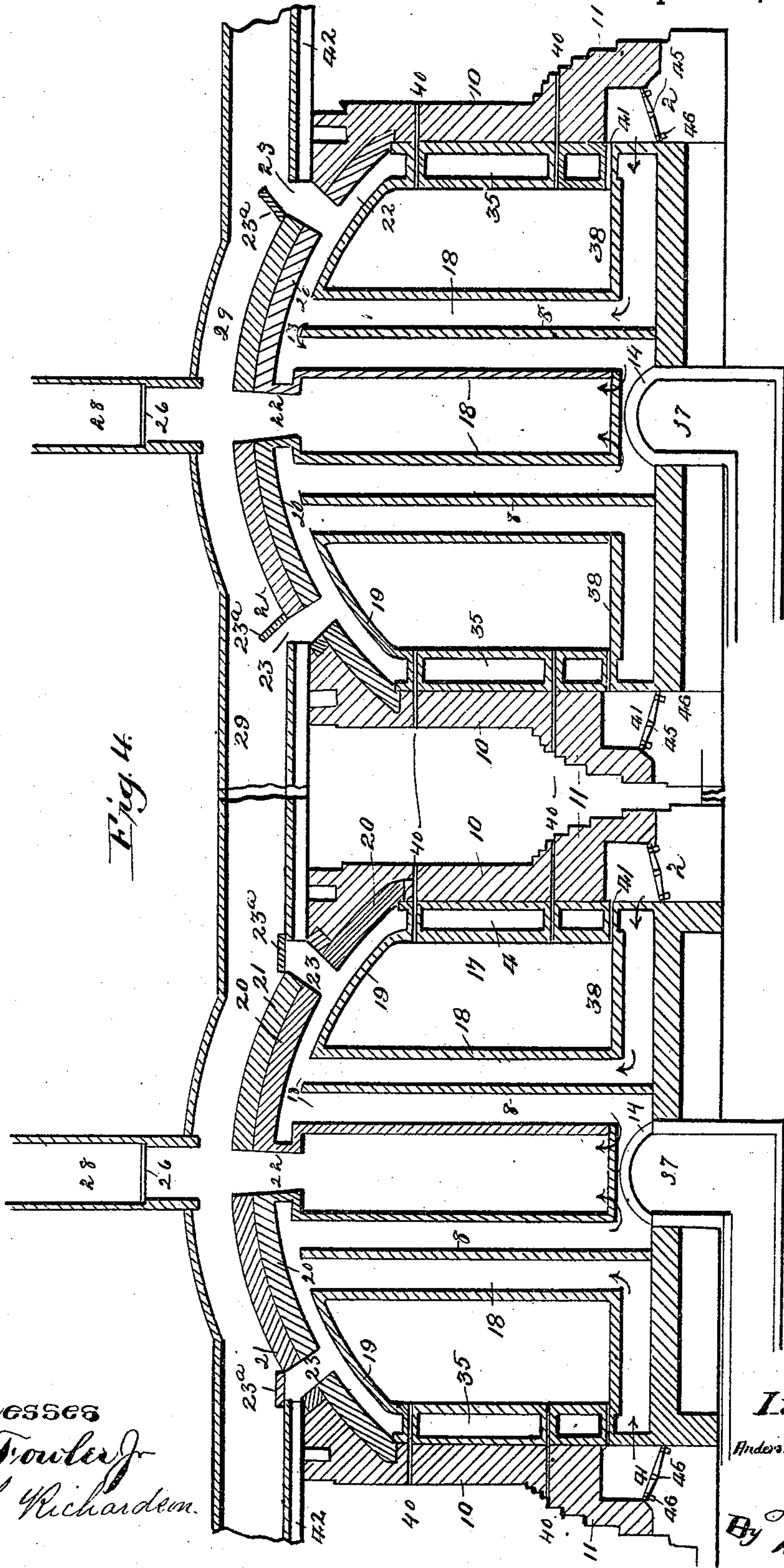
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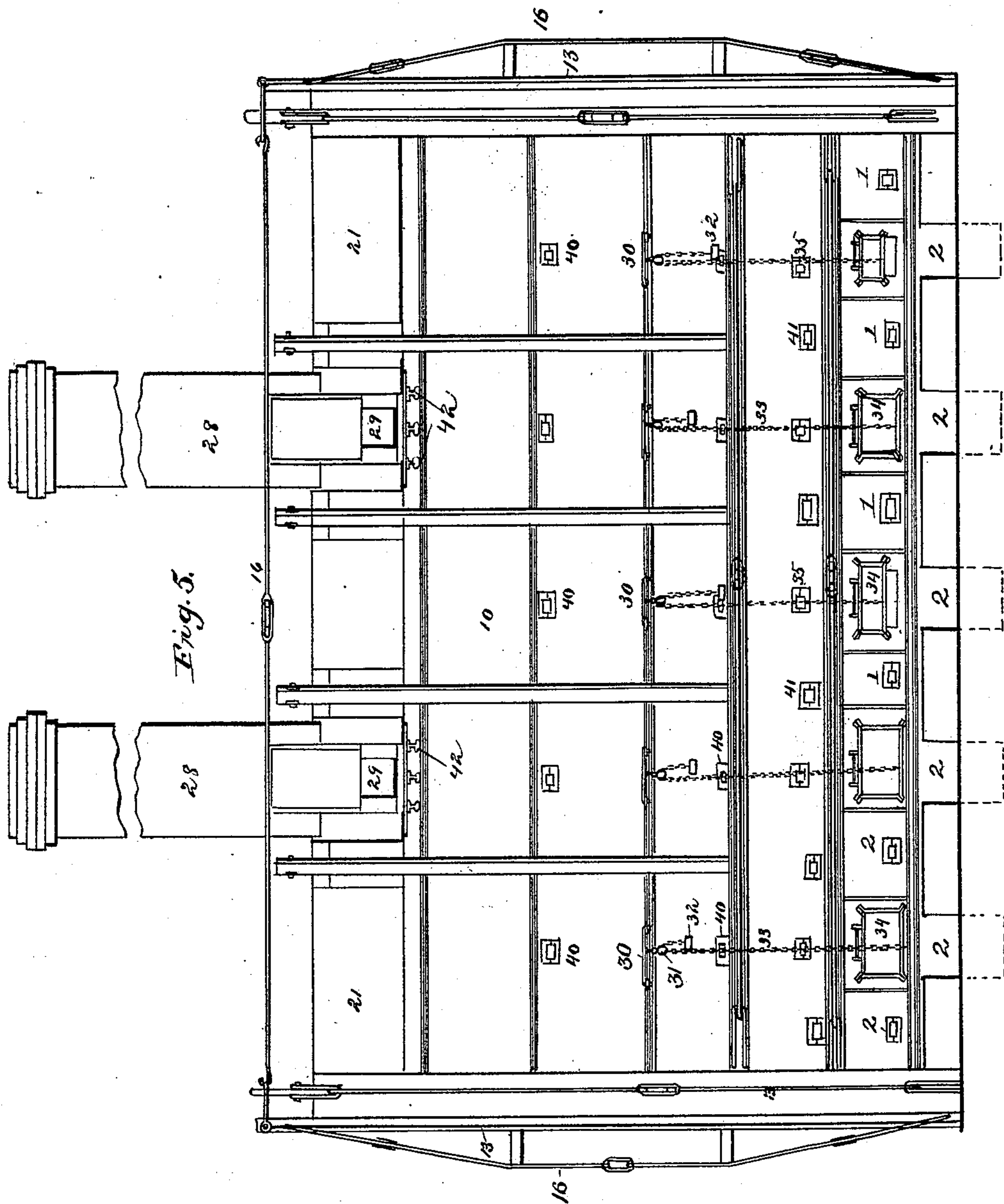
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UNITED STATES PATENT OFFICE.

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ROBERT W. LYLE, OF NEW YORK, N. Y.

DOWNDRAFT MUFFLE-KILN.

SPECIFICATION forming part of Letters Patent No. 518,012, dated April 10, 1894.

Application filed June 18, 1892. Serial No. 437,142. (No model.)

To all whom it may concern:

Be it known that I, ANDERS M. STRUSHOLM, a citizen of the United States, residing at Woodbridge, in the county of Middlesex and State of New Jersey, have invented a certain new, useful, and valuable Improvement in Downdraft Muffle-Kilns, of which the following is a full, clear, and exact description.

This invention relates generally to kilns and particularly to that class thereof which are employed for burning pottery articles which must be kept separate and cannot maintain the weight of others upon them.

The object of my invention is to provide a kiln of this description which shall be a muffle down draft kiln and a further object of my invention is to provide separate compartments separate from the action of the products of combustion, in which the articles to be burned are arranged, and a still further object of my invention is to provide means for utilizing the waste heat of one kiln while cooling for heating or drying the next kiln.

With these various objects in view my invention consists in the peculiar construction of the several parts and their novel combinations or arrangement all of which will be fully described hereinafter and pointed out in the claims.

In the drawings forming a part of this specification, Figure 1 is a vertical longitudinal section. Fig. 2 is a horizontal sectional view taken on the line 2—2 of Fig. 1. Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2. Fig. 4 shows the method of utilizing the heat of a cooling kiln for heating or drying a kiln ready to be fired. Fig. 5 is a front elevation of the kiln.

In constructing my improved kiln I provide a suitable foundation of concrete or other suitable material and upon this foundation I build the walls 10 of the kiln, and in the side walls I construct a series of arch ways, within which are arranged the fire grates 45, said grates resting upon metal bars 46, secured in the sides of the walls. The walls between the arch ways are formed with cold air flues 1, Figs. 2, 3 and 5, by means of which air is supplied to the fuel and at the same time the bottom of the kiln is prevented from melting. The walls 10 are of common building brick

and are lined with fire brick 3 and inside of this fire brick lining is arranged the outside wall 4 of the muffle. Solid brick walls 5 (Fig. 2) are built within the kiln and separate the same into a series of compartments beneath the floor of the kiln. 6 indicates similar walls built to throw the ends of the kilns in connection with the end furnaces.

A chimney flue 37 is built beneath the furnace, and over said flue is built an arch 14 and resting over said arch is a wall 7 which supports the floor 38, of the kiln, the portions 8 of the wall 7 serving as partitions in the interior flues, thus causing the heat to rise to the crown or top of kiln upon one side and descend upon the other side, before entering the flue 37 through openings in the arch 14.

9 indicates a series of columns which support the floor and provide a series of flues beneath the floor.

Doors 12, are formed at each end of the kiln through which the operator may enter and arrange the articles within the kiln.

Flues 18 are built within the kiln as clearly shown, said flues forming a communication between the space beneath the floor, and the arched chamber, produced between the inner crown of fire brick 19, and outer arches 20 and 21 of fire and ordinary brick respectively. The arch 20 rests upon the fire brick lining 3, while the jacket arch 21 rests upon the common building brick 10. The inner crown arch 19, rests upon the inner lining 17 of the muffle, a sufficient space being produced between the linings 17 and 4 to permit the heated products to pass therebetween, thus providing a muffle kiln. The flues 18 are divided by the partition 8 as before described.

Cold air passages 41 are produced in the walls of the kiln and enter the same near the bottom, to prevent the bottom becoming too warm.

28, indicates a waste-heat chimney arranged on top of kiln and communication is had between this chimney and interior of kiln through an opening 22. A damper 24 is arranged at the top of this opening and an arch 25 made in the side of chimney through which the damper is operated. A second damper 26 is arranged in the chimney and an arch 27 is provided for operating it. A conduit 29 passes

over the top of kiln and leads to the next adjacent kiln and openings 23 are produced in the crowns 20 and 21 which lead to this conduit. The openings 23 are also provided with valves or dampers 23^a.

30 indicates a bracket set in the wall near each furnace 2, said bracket carrying a pulley 31 over which passes a chain 33, said chain being connected with the furnace door 34 and carries a weight 32 nearly equal to the weight of the door, by which construction the door can be easily raised and lowered.

35 is an air duct leading to the top of furnace to prevent it getting too hot, and 40 indicates trial holes at the top and bottom of kiln to test the temperature of the same.

The floor 38 is made thicker at the sides than at the center for the purpose of preventing said bottom burning away too rapidly adjacent to the furnaces.

The ends of the kiln are built with piers 11, and iron brace bars 13 are employed, connected by stringer bars 16, thus holding the side of the kiln always in proper position.

42 (Fig. 5) indicates the iron bar upon which the conduit 29 is built.

The inner faces of the inner muffle 17 Fig. 3 are formed with horizontal ledges, A, arranged at regular intervals and upon the exterior of the flues 18 are formed similar ledges B, which correspond with the ledges A and are adapted to support a fire clay slab, C, between the muffle 17 and flue 18, and upon which rest the articles of pottery, &c., to be burned. By this means the articles are kept separate and all disfiguration of the articles which is sometimes caused by one resting upon the other, is avoided.

Suitable openings 17' (one only being shown in this instance) are produced in the walls of the kiln to permit the products of combustion to pass beneath the floor and up into the hollow muffle wall as most clearly shown in Fig. 3. The jacket arch 21 prevents the heat escaping by radiation.

The conduit 29 is used to conduct the heat of one kiln which is cooling into another kiln for the purpose of heating said second kiln. This will be explained farther on.

Now in operation, the kiln is entered at the doors 12, and the slabs C arranged upon the ledges A and B and the articles to be burned set upon said slabs. The doors 12 are then closed and fires started in the furnaces 2. The heat passes up through the hollow wall as indicated by the arrows and also beneath the floor. The dampers 23^a and 24 are of course closed. The heat passes up through the walls and one side of the flue 18 into the crown spaces whence it turns downward through the other side of flue down through the openings in the arch 14 to the chimney flue 37. When it is desired to allow waste heat to

escape the dampers 24 and 26 are opened. The heat circulating as described heats every part of the kiln thoroughly and at the same time the products of combustion do not come in contact with the articles to be burned. The cold air openings prevent any portion of the kiln from burning out. If it is desired to carry off the heat of one kiln to another I employ the conduit 29 (see Fig. 4) and close the damper 26 and open damper 24 while in the other kiln I open dampers 23^a and sometimes close 24. This form of conduit and valves may be employed upon other down draft kilns as well as the one I have here shown and described, and the idea of making ledges upon the walls and chimneys can be carried out also in other kilns.

Having thus described the construction, operation; and advantages of my improved kiln, what I claim is—

1. The combination with the floor and space beneath the same, the outer and muffle walls, the inner and outer crown walls providing a crown space, and the divided interior flues connecting the floor and crown spaces; substantially as shown and described.

2. The combination with the foundation and floor supported above the same, of the chimney-flue, the flues leading thereto, the exterior chimney connected with said flues, the inner and outer walls, the upper and lower crowns providing the crown space, the chimney 28, and passages leading thereto and the dampers 24, and 26, all arranged substantially as shown and described.

3. The combination with the hollow muffle walls, of the upper and lower crown walls, the conduit 29, and the passages 22 and openings 23 all arranged substantially as shown and described.

4. The combination with the walls of the kiln having air ducts 1, 35, 40 and 41, of the hollow muffle walls, floor 38, arches 19 and 20 and the flues 18 all arranged substantially as shown and described.

5. The combination with two or more kilns of the conduit 29 connecting the same, and the passages 22 and openings 23 provided with dampers substantially as shown and described.

6. The combination with the walls 4 and 17 of the floor 38 and columns 9, the partitions 8, the flues 18, the chimney-flue 37, the arch 14 over the same, the crown wall 19 and crown wall 20, and the furnaces 2 all arranged substantially as shown and described.

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

ANDERS M. STRUSHOLM.

Witnesses:

R. W. LYLE,

R. F. GARDNER, Jr.