

S. D. OLIPHANT.
FURNACE CONSTRUCTION.
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949,402.

Patented Feb. 15, 1910.

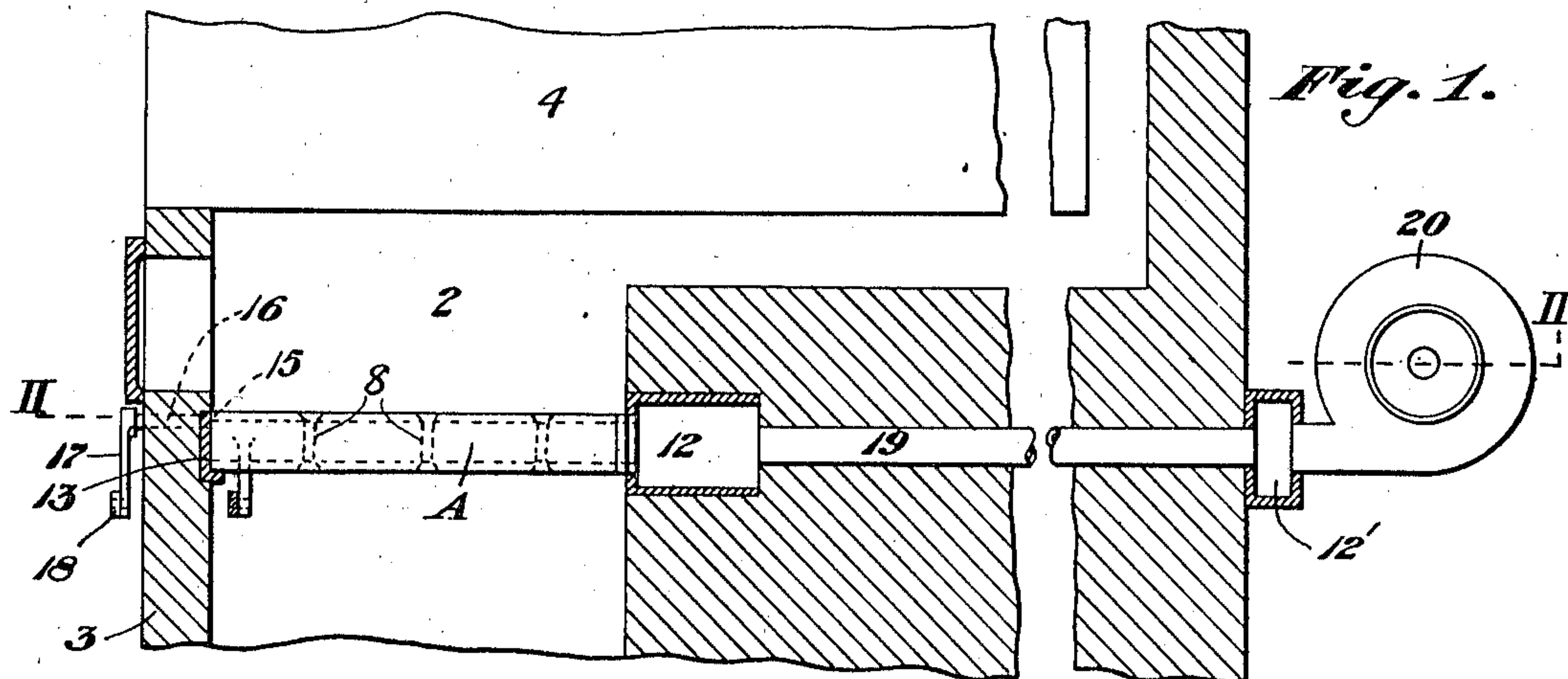


Fig. 2.

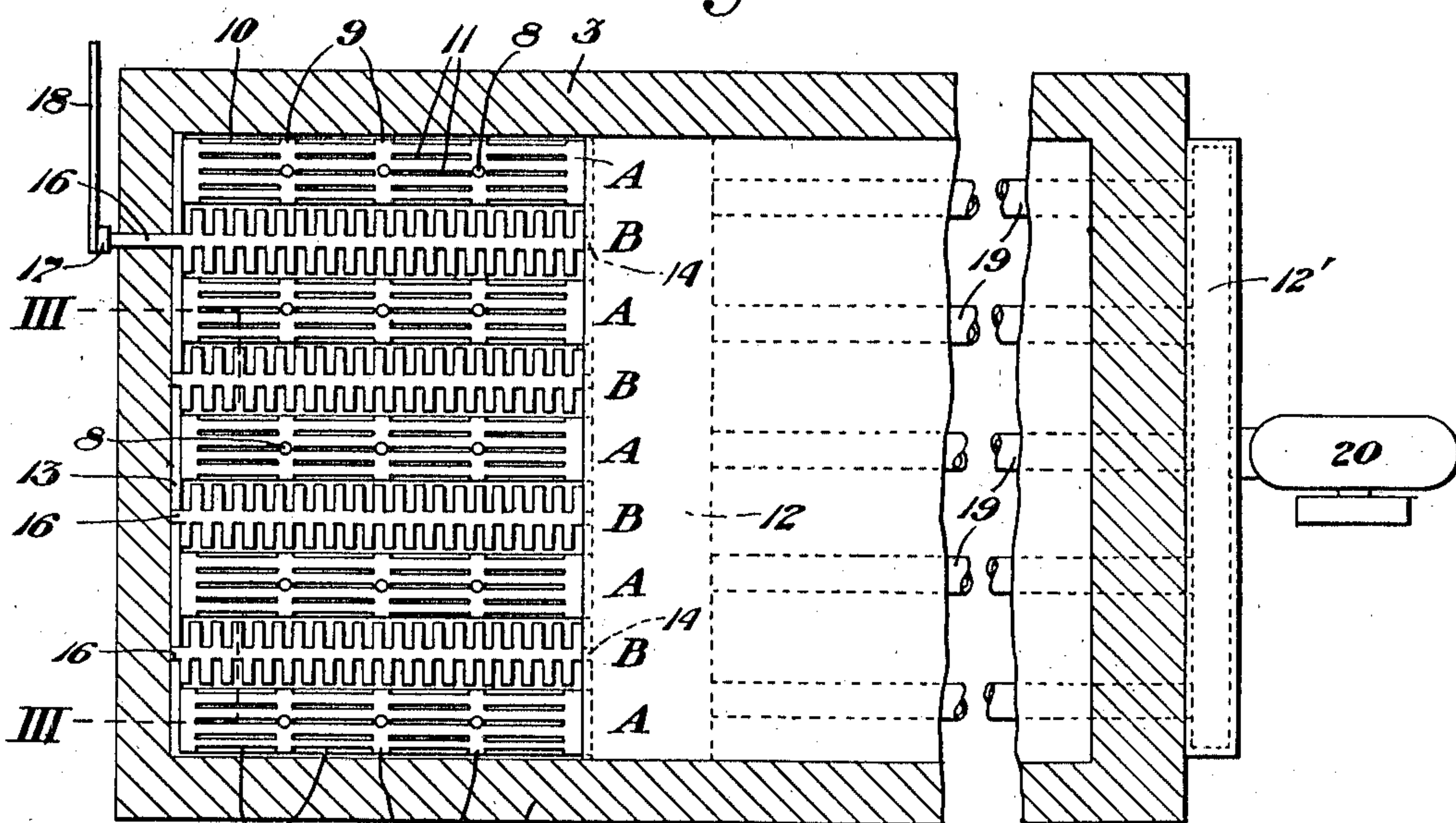
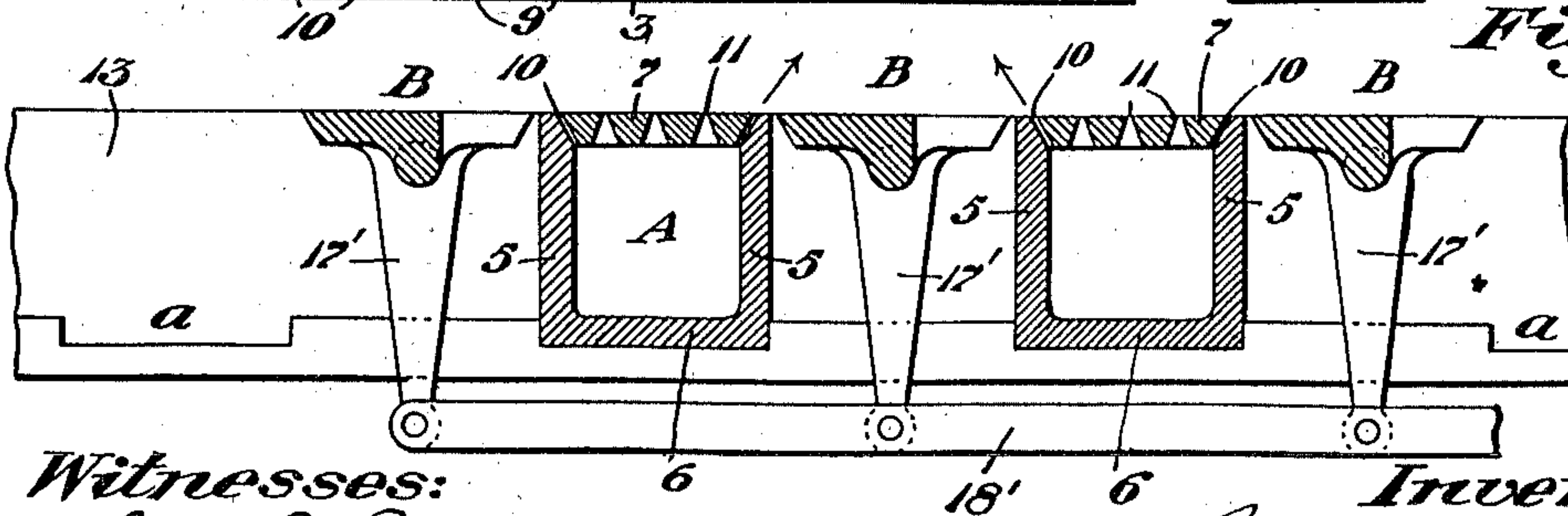


Fig. 3.



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UNITED STATES PATENT OFFICE.

STEPHEN D. OLIPHANT, OF BEAVER, PENNSYLVANIA.

FURNACE CONSTRUCTION.

949,402.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, STEPHEN D. OLIPHANT, a citizen of the United States, residing at Beaver, in the county of Beaver and State of Pennsylvania, have invented certain new and useful Improvements in Furnace Construction, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention refers to improvements in furnace construction for fuel combustion, for supplying heat to boilers, heating or melting furnaces, ovens, kilns, etc., and particularly relates to the construction and operation of the fuel supporting grates and the means for supplying air to the body of fuel.

Generally stated, the invention comprises a series of hollow air-furnishing fuel supporting boxes communicating with a source of air supply, preferably pre-heated, and having series of air supply slots or fissures so arranged as to distribute the air to the fuel. Also the combination with said air-furnishing boxes of agitating or shaking grates when the said boxes are stationary, with means for operating said grates, as well as means for mounting and shaking all or some of the boxes themselves, when movable, with other features of construction as shall be more fully hereinafter set forth.

Referring to the drawings:—Figure 1 is a view in sectional elevation of a furnace structure provided with my invention, partly broken away. Fig. 2 is a horizontal section on the line II. II. of Fig. 1. Fig. 3 is an enlarged cross sectional detail view through the grates and boxes on the line III. III. of Fig. 2.

2 represents the furnace or fire box chamber within the walls 3 of any desired structure, as a boiler setting, showing the boiler 4 in position.

A represents the hollow air boxes forming portions of the grate structure which may be stationary as in the principal figures of the drawing with the intervening shaking grates B, or which themselves may be rotatably mounted for shaking. When stationary, the box A is composed of a trough-shaped main body portion having the sides 5, 5, and bottom 6 with the covering top 7 securely held in place by bolts 8 connecting the top with bottom 6 as shown. The inner upper edges of sides 5 are preferably beveled as shown, while the edges of top 7 are simi-

larly beveled to interfit therewith, bearing at intervals along their length by lugs 9. Between the lugs 9 the edges are recessed, providing air slots 10 conforming in their direction to the slant of the beveled edges referred to, thereby directing the escaping air upwardly and outwardly at each side, and causing it to traverse angularly across the area of the grate bars B, as indicated by the arrows, Fig. 3. The body portion of cover 7 is provided with series of longitudinally arranged fissures or slots 11, corresponding generally to the slots 10 and preferably arranged throughout the entire length of the box covers, said fissures being preferably tapered upwardly and inwardly and terminating in narrow emission slots, as clearly shown.

The inner ends of air boxes A are provided with shoulders at the sides and set in rectangular openings in the front wall of a common air supply box 12, as shown in Fig. 1, or otherwise mounted so as to communicate with a common air flue, corresponding to box 12, the other or front ends of the air boxes A being mounted in supporting frames of any suitable construction, as angles 13 set in the front walls of the furnace chamber. The lower flange of angle 13 is preferably recessed and shouldered as indicated at *a* to receive and retain against lateral movement of boxes A when set therein, (Fig. 3).

The shaking grates B in the construction shown in the principal figures of the drawings, are rotatably mounted by means of pivoting lugs 14 supported in receiving holes in the front wall of box 12 and in the recesses or grooves 15 in the vertical wall of angle 13, by extending gudgeon bearings 16, one of which projects outwardly to the front of the furnace chamber as shown in Fig. 2. Said extending gudgeon 16 is provided with any suitable actuating mechanism as a lever 17 and an operating rod 18, while it and the other grates are provided with levers 17' and connecting rod 18' within the ash pit, by which construction all of the grate bars may be rocked to the right or the left simultaneously. If desired, the grates may be connected by operating mechanism in separate sets, *i. e.*, the grates at either side of the center may be connected independently of those at the other side, thus providing for actuating but half of the grates at once. This allows for maintaining the fire at one side and shaking at the other or vice versa.

Air is furnished to the common air chamber 12 by any suitable circulation flues or pipes 19, preferably extending through the walls of the furnace structure so as to super-
 5 heat the air, and if desired air may be furnished therethrough to the chamber 12 by blower 20 or other suitable pressure apparatus, preferably delivering air into a common header 12' with which the pipes 19
 10 connect. As thus constructed it will be seen that a copious supply of air will be furnished to the interior of the box A and from thence through the distributing slots 10 and 11 to the entire mass of fuel in combustion.

15 The boxes A and also the grates B may be readily removed or inserted separately by merely lifting the front ends upwardly from their bearings in support 13 and withdrawing them outwardly from the receiving openings in the front wall of box 12,
 20 thereby obviating the necessity of removing the entire structure in case of any of the boxes or grates being burned out or broken or requiring renewal or repair.

25 The advantages of the invention result in the complete combustion of the fuel due to the copious supply of previously heated air equally to all parts of the fire bed, the agitation of the fuel and the shaking out of the
 30 ashes, while the resulting advantages of even temperature, ready and easy control, its adaptation to the burning of impure, cheap and fine fuel, and its economy of installation and maintenance, contribute largely to its
 35 adaptation to many and various operations requiring heat.

The invention may be greatly changed or modified in construction or adaptation or in different details by the skilled mechanic,
 40 but all such changes are to be considered as within the scope of the following claims:

What I claim is:—

1. In a furnace, the combination with a hollow supporting air box having alter-
 45 nately arranged grate connecting openings

and grate bearings, a series of air conductors extending through the brickwork of the furnace and opening thereinto and connected with a common air box header, said header, and means for furnishing air thereto; of a
 50 series of hollow grate boxes open at one end and inserted thereby into the openings of the supporting air box and closed at the other end, and having longitudinally slotted
 55 air openings, a transverse support for the closed ends of the grate boxes, and a series of alternating rocking grates rotatably mounted by their ends in the bearings of the
 60 air box and transverse support respectively, with means for actuating said grates, substantially as set forth.

2. In a furnace, the combination with a hollow supporting air box having alternately arranged grate connecting openings
 65 and grate bearings, a series of air conductors extending through the brickwork of the furnace and opening thereinto and connected with a common air box header, said header, and means for furnishing air there-
 70 to; of a series of hollow grate boxes open at one end and inserted thereby into the openings of the supporting air box and closed at the other end, and having longitudinally
 75 slotted air openings, a transverse support for the closed ends of the grate boxes, and a series of alternating rocking grates rotatably mounted by their ends in the bearings
 80 of the air box and transverse support respectively, said grates having rocking levers and an operating connecting rod located within the furnace cavity, and means
 for actuating one of said grates from the outside, substantially as set forth.

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

STEPHEN D. OLIPHANT.

Witnesses:

C. M. CLARKE,
 CHAS. S. LEPLEY.