

No. 690,580.

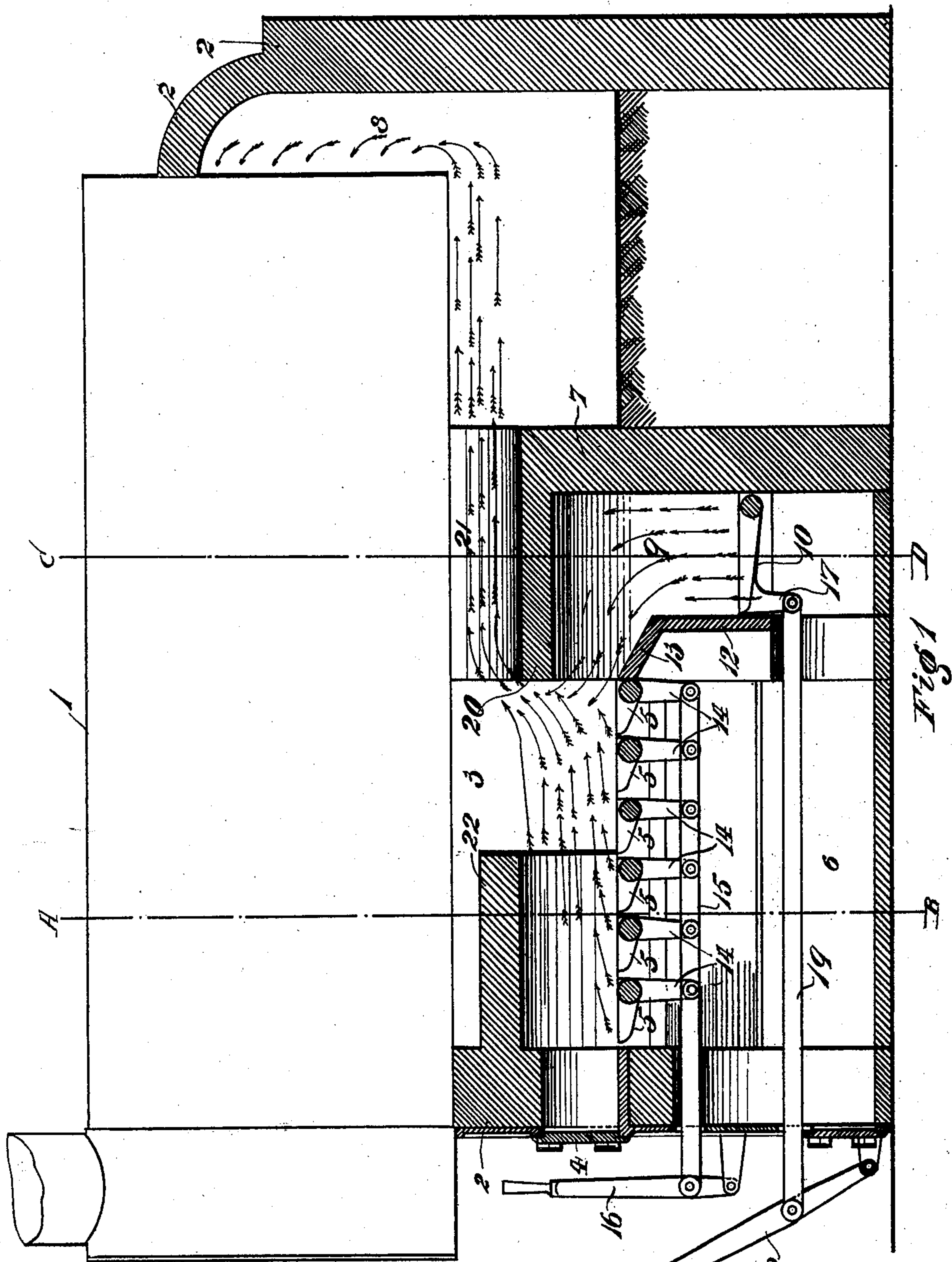
Patented Jan. 7, 1902.

G. S. & J. J. HUFF.
SMOKE CONSUMING FURNACE.

(Application filed Nov. 5, 1900.)

(No Model.)

2 Sheets—Sheet 1.



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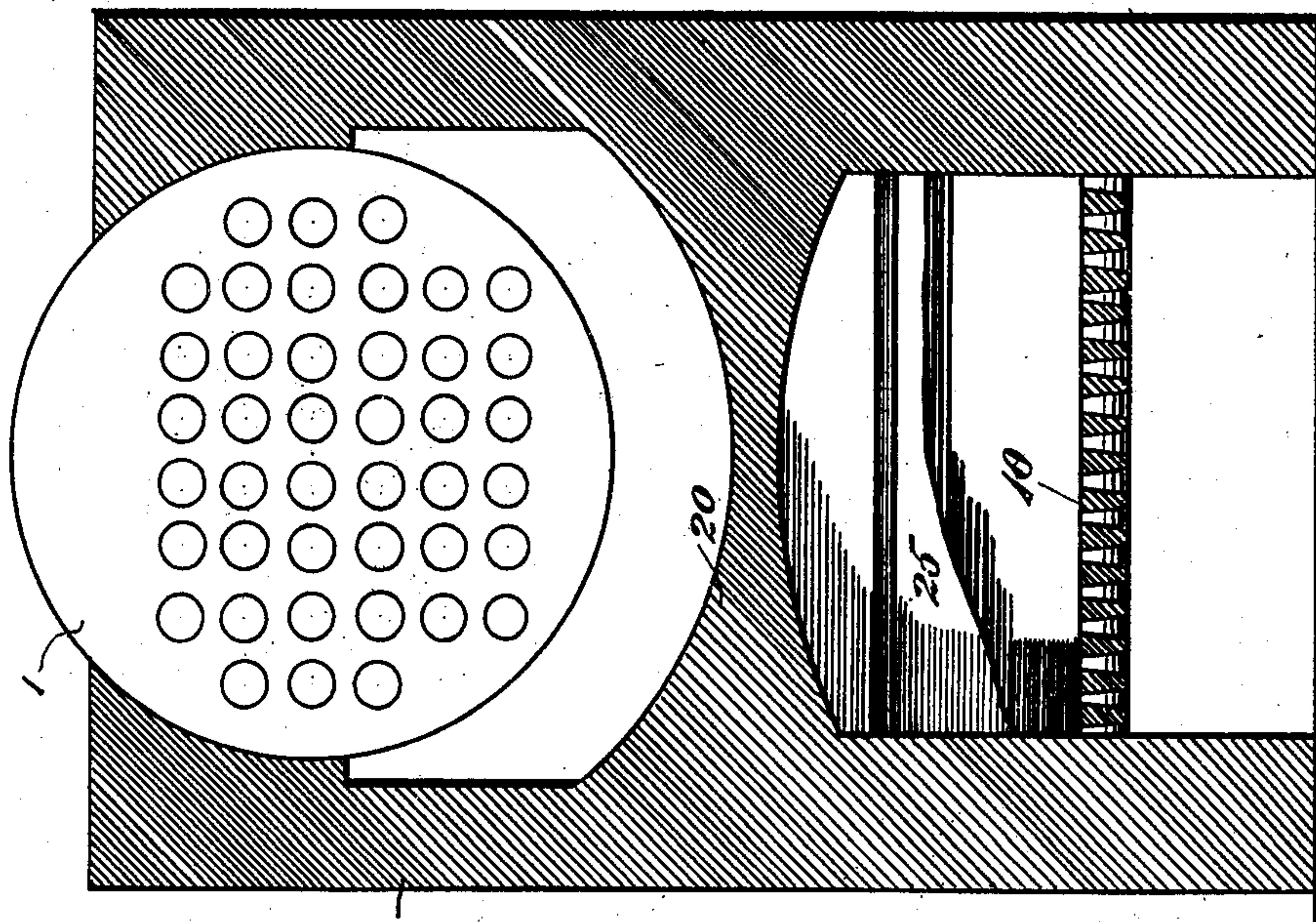


Fig 3

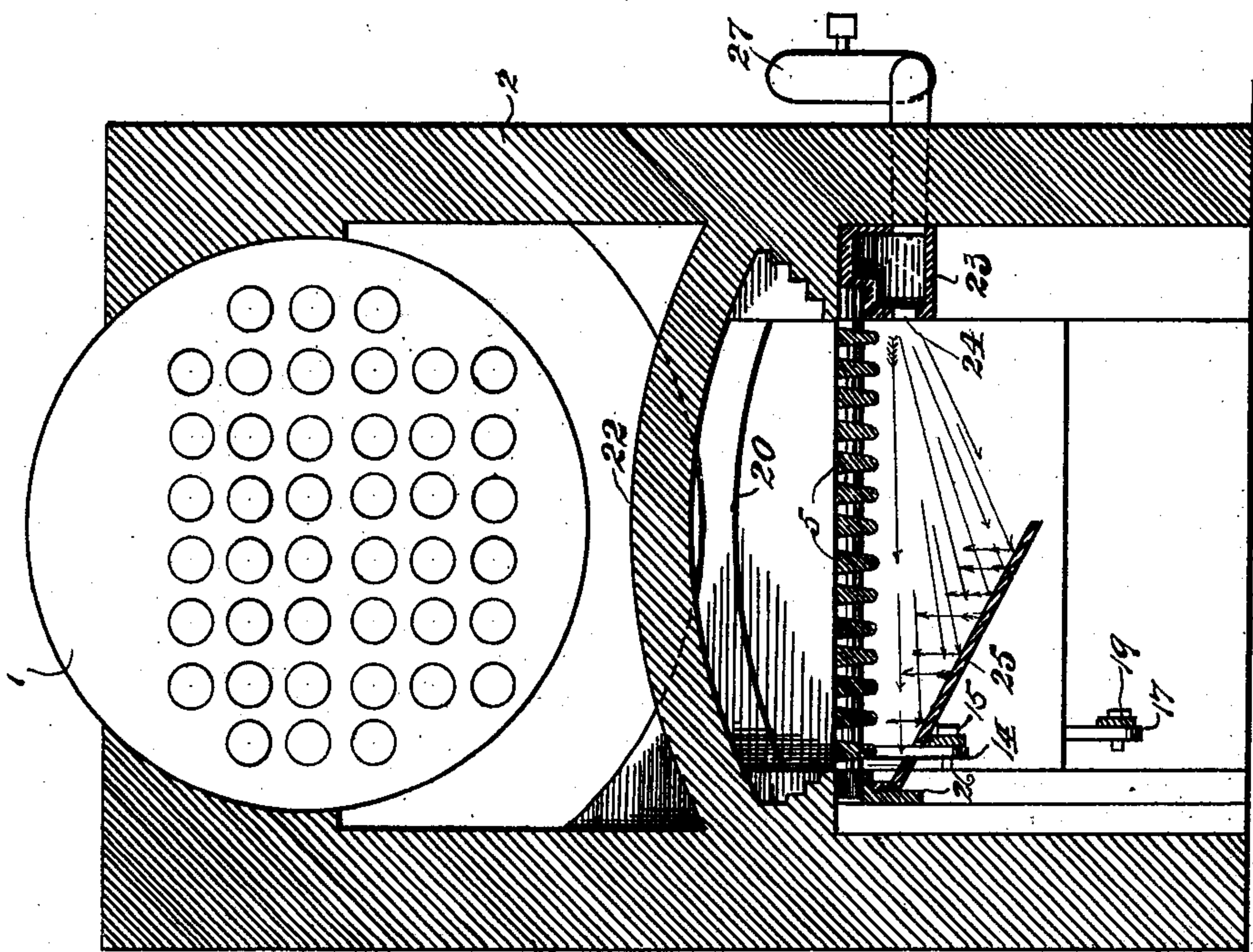


Fig 2

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UNITED STATES PATENT OFFICE.

GEORGE S. HUFF AND JAKE J. HUFF, OF INDIANAPOLIS, INDIANA,
ASSIGNORS OF TWO-FIFTHS TO FRANK H. EWERS AND JOSEPH M.
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SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 690,580, dated January 7, 1902.

Application filed November 5, 1900. Serial No. 35,524. (No model.)

To all whom it may concern:

Be it known that we, GEORGE S. HUFF and JAKE J. HUFF, citizens of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented new and useful Improvements in Smoke-Consuming Furnaces, of which the following is a specification.

Our invention relates to certain new and useful improvements in furnaces, and is particularly applicable to steam-boiler furnaces, and will be hereinafter more fully set forth in this specification and particularly pointed out in the claims.

The object of our invention is to provide a furnace in which there are a series of deflecting-arches arranged in such a manner that the heat of combustion in the furnace is increased and the formation of smoke is effectually prevented. We attain these objects by means of the arrangement of the arches in the furnace and the form or construction of the furnace illustrated in the accompanying drawings, in which similar numerals of reference designate like parts throughout the several views.

Figure 1 is a longitudinal sectional elevational view of our invention of a furnace. Fig. 2 is a transverse sectional elevational view of the same, taken through the line A B, (see Fig. 1;) and Fig. 3 is a similar view, taken through the line C D. (See also Fig. 1.)

The boiler 1, which may be of any of the well-known types in general use, is mounted in the setting 2 over the furnace 3 in the usual way.

The furnace 3 is provided with the door 4, the grate 5, which may be either of the shaker type, as illustrated in the drawings, or of any other form applicable to this type of furnace, the ash-pit 6, the bridge-wall 7, and the rear uptake 8.

To the rear of the grate 5 and directly in front of the bridge-wall 7 is situated a secondary furnace or fire-pit 9, which is provided with a dumping-grate 10, the top surface of which latter is situated below the level of the top of the grate 5, and between said furnace-grates 5 and said dumping-grate 10 is situated the dividing plate or wall 12, which extends

downwardly from the grate 5 to the dumping-grate 10 to close communication between the fire-pit and the ash-pit 6. The top portion of the plate 12 is preferably of cast-iron and is constructed with the inclined shelf 13, which inclines downwardly from the grate 5 toward the fire-pit 9, and said inclined shelf is provided for the purpose of facilitating the fall of the fuel from the grate 5 into the fire-pit or secondary furnace 9.

The series of depending arms 14 formed on the grates 5 are connected together by a common connecting-rod 15, to be operated to simultaneously shake or dump the grate 5, and the outer prolonged end of said connecting-rod 15 is connected to the lever 16, by which means said grates 5 are manually operated.

The dumping-grate 10 is provided with a depending arm 17, which is connected to the dumping-lever 18 by the connecting-rod 19, and by which means the said dumping-grate 10 is either held in the position shown or manually operated to dump.

A fire-arch 20 extends forwardly from the bridge-wall over the fire-pit 9 and has its forward open portion directed toward the main furnace. The top of the arch 20 is also concaved to conform with the curvature of the bridge-wall and to form the fireway 21, between the top of said arch and the boiler.

The forward fire-arch 22 is closed at its front end by the front of the setting and the fire-door, and has its bottom or concave surface slightly higher or above the level of the bottom or concave surface of the fire-arch of the fire-pit 9, and the said arch extends backwardly from the boiler-front toward the rear of the furnace and has its open end directed toward the open end of the fire-pit arch 20 for the purpose of directing or conducting the colder gases generated by the combustion of the "green" or fresh fuel when fuel is placed in the furnace against the hotter gases as they are discharged from the mouth of the fire-pit 9, and by this means reheat or superheat said cooler gases and promote their perfect combustion and prevent the formation of smoke.

In order to further promote the combustion of the fuel in the grate 5 of the main fur-

nace, particularly that portion of the gases under the forward arch, we provide the air-box 23, which extends along the side of the ash-pit directly under the main grates, and said air-box is provided with a series of outlet-openings 24, through which the air under pressure escapes and impinges against the deflecting-plate 25, which latter is inclined downwardly and toward said air-box for the purpose of deflecting the air upwardly against the under side of the grate. The deflecting-plates 25 extend along the side of the ash-pit its entire length and are bolted or otherwise secured to the grate-bar supports 26. Air under pressure is supplied to the air-box 23 by a suitable fan or blower 27, which may be driven by belt-power or taken from a motor direct.

Fuel is first placed upon the grate 5 of the main furnace 3, directly under the front fire-arch 22, and when said fuel has been thoroughly ignited is moved backwardly toward the fire-pit 9 to make room for a fresh charge of fuel. The gases escaping from the fuel on the grate of the main furnace are directed toward the mouth of the fire-pit to meet the heated air and gases as they are discharged from said fire-pit 9 to reheat or superheat and support the combustion of the said gases escaping from the main furnace, and thereby absolutely prevent the formation of smoke. The fuel is gradually moved on the main grates toward the fire-pit 9, into which it falls at the time it has been completely coked and reduced to the incandescent state. It is at once clear that all the air passing through the incandescent fuel contained in the fire-pit 9 will be heated to a degree sufficient to maintain a perfect combustion of the combustible gases escaping from the fuel on the grates of the main furnace, and it will also be seen that the arrangement of the secondary furnace 9 in its relation to the main furnace 3 is such that the escaping gases from the secondary furnace will discharge directly toward the main furnace and intercept the gases from the latter as they pass to the uptake 8. Hence it is obvious that as the gases from the main furnace come in contact and become intermingled with the intensely-heated gases from the secondary furnace the former become consumed by the latter.

Having thus fully described this our invention, what we claim as new and useful, and desire to cover by Letters Patent of the United States therefor, is—

1. In a furnace, the combination with a main furnace, and the bridge-wall thereof, of a division-wall arranged between said main furnace and said bridge-wall to form a secondary furnace between the main furnace and said bridge-wall, the secondary furnace being in a plane below the main furnace and adapted to receive the fuel in a coked state from the main furnace, a fire-arch arranged at the front of the main furnace and adapted to deflect the

gases of combustion rearwardly, and a fire-arch extending forwardly from the bridge-wall and over the secondary furnace, whereby the gases from the secondary furnace are discharged into the main furnace and caused to intercept and consume the combustible gases of the main furnace in their passage to the stack.

2. In a furnace, the combination with a main furnace, and the bridge-wall thereof, of a division-wall arranged between said main furnace and said bridge-wall to form a secondary furnace between the main furnace and said bridge-wall, the secondary furnace being in a plane below the main furnace and adapted to receive the fuel in a coked state from the main furnace, a fire-arch arranged at the front of the main furnace and adapted to deflect the gases of combustion rearwardly, and a fire-arch extending forwardly from the bridge-wall and over the secondary furnace, said fire-arch terminating at a point immediately above and in vertical alinement with said division-wall, whereby the gases from the secondary furnace are discharged into the main furnace and caused to intercept and consume the combustible gases of the main furnace in their passage to the stack.

3. In a furnace, the combination with a main furnace, and the bridge-wall thereof, of a division-wall arranged between said main furnace and said bridge-wall to form a secondary furnace between the main furnace and said bridge-wall, the secondary furnace being in a plane below the main furnace and adapted to receive the fuel in a coked state from the main furnace, the top of said division-wall being inclined toward the secondary furnace to facilitate the passage of the fuel to the latter, a fire-arch arranged at the front of the main furnace and adapted to deflect the gases of combustion rearwardly, and a fire-arch having its upper and lower sides concaved extending forwardly from the bridge-wall and over the secondary furnace, whereby the gases from the secondary furnace are discharged into the main furnace and caused to intercept and consume the combustible gases of the main furnace in their passage to the stack.

4. In a furnace, the combination with a main furnace and the bridge-wall thereof, of a division-wall arranged between said main furnace and said bridge-wall to form a secondary furnace between the main furnace and said bridge-wall, the secondary furnace being in a plane below the main furnace and adapted to receive the fuel in a coked state from the main furnace, the top of said division-wall being inclined toward the secondary furnace to facilitate the passage of the fuel to the latter, a fire-arch arranged at the front of the main furnace and adapted to deflect the gases of combustion rearwardly, and a fire-arch having its upper and lower sides concaved extending forwardly from the bridge-wall and over the secondary furnace, whereby the gases

from the secondary furnace are discharged into the main furnace and caused to intercept and consume the combustible gases of the main furnace in their passage to the stack, said fire-arches being arranged in different horizontal planes.

5. In a furnace, the combination with a main furnace, and the bridge-wall thereof, of a division-wall arranged between said main furnace and said bridge-wall to form a secondary furnace between the main furnace and the bridge-wall, a fire-arch arranged at the front of the main furnace and adapted to deflect the gases of combustion rearwardly, a fire-arch extending forwardly from the bridge-wall and over the secondary furnace, whereby the gases from the secondary furnace are discharged into the main furnace and caused to intercept and consume the combustible gases of the main furnace in their passage to the stack, means at one side and below the grate of the main furnace for feeding air thereto, and

means for deflecting the air upwardly through said grate.

6. In a furnace, the combination with a main furnace, a secondary furnace, and a dividing-wall between said main furnace and said secondary furnace, of an air-box extending longitudinally beneath the grate of the main furnace and provided with a series of air-outlet openings discharging below said grate, a deflecting-plate arranged beneath said grate and opposite to said air-box, whereby the discharged air is deflected upwardly, and means for supplying air under pressure to said air-box.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

GEORGE S. HUFF.
JAKE J. HUFF.

Witnesses:

THOMPSON R. BELL,
JOS. M. BERAUER.