No. 767,020. PATENTED AUG. 9, 1904.

R. STOKER.

SMOKE CONSUMING FURNACE.

APPLICATION FILED NOV. 23, 1903.

NO MODEL.

FIG. 1.

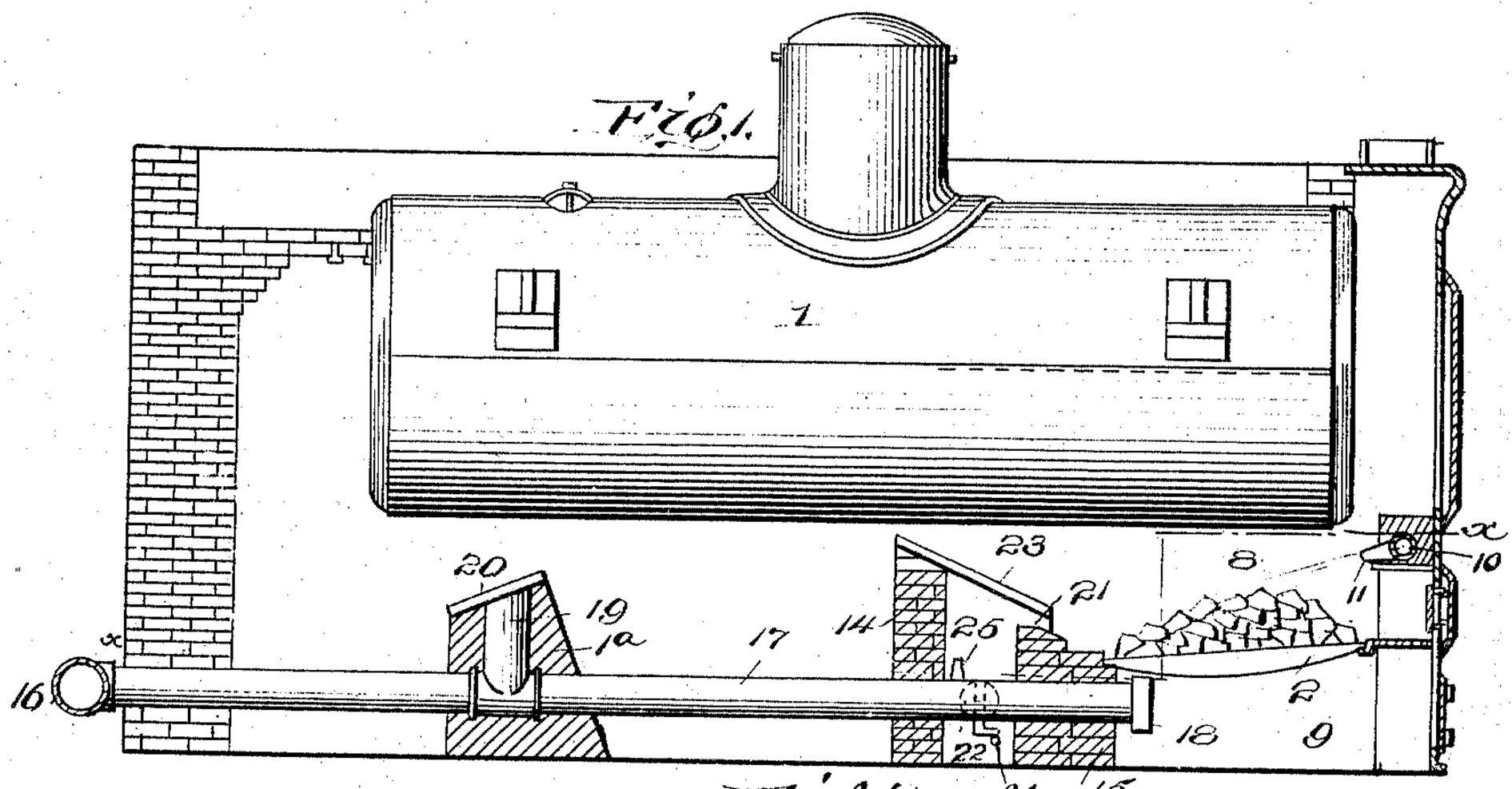


FIG. 2.

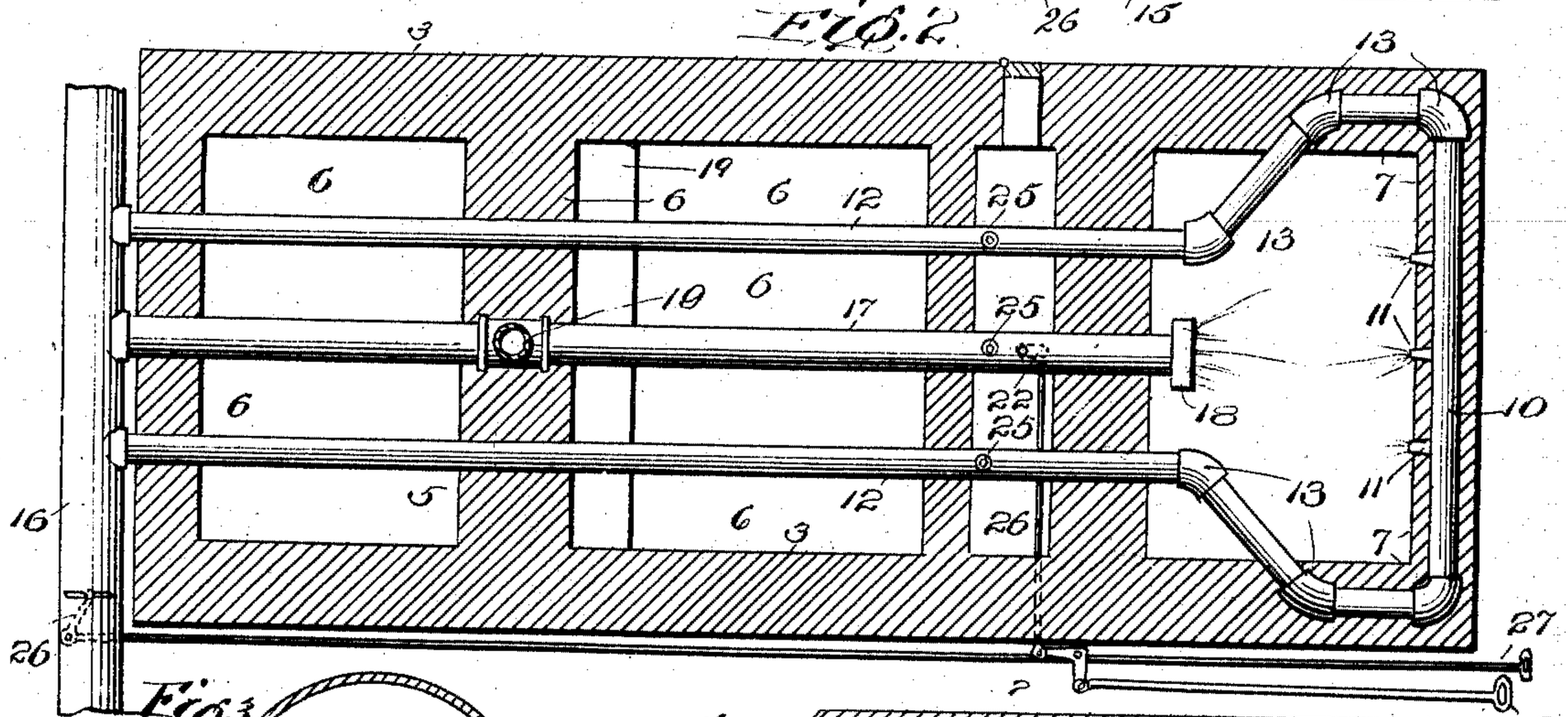


FIG. 3.

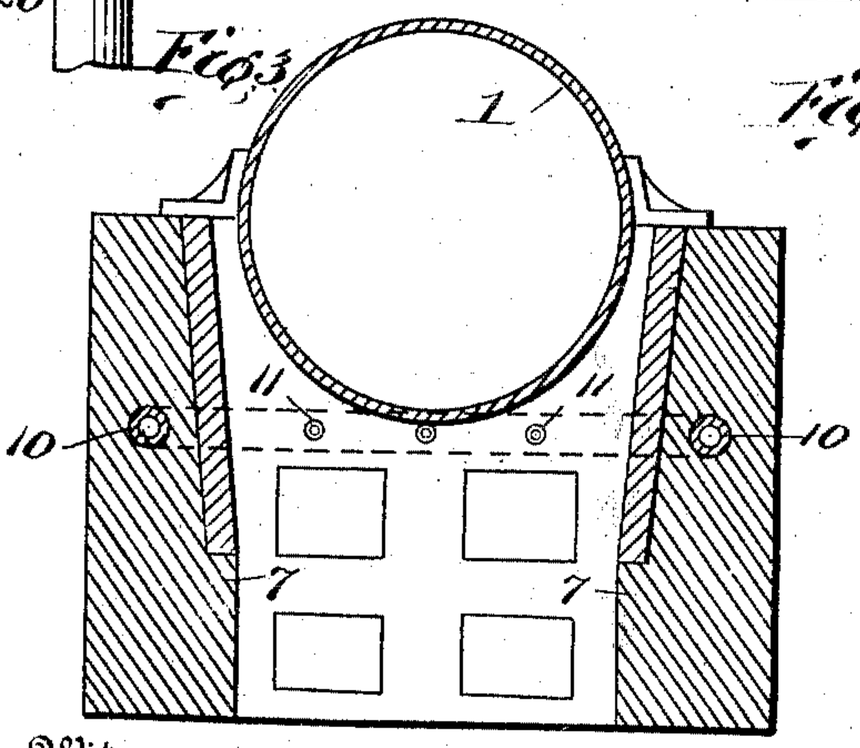
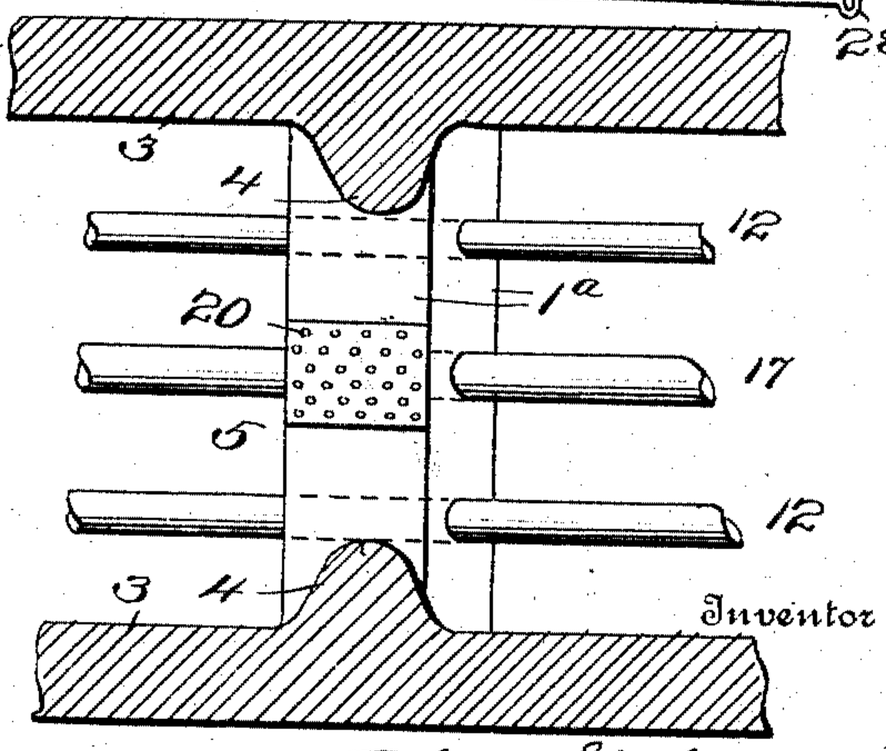


FIG. 4.



Witnesses
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No. 767,020. Patented August 9, 1904.

UNITED STATES PATENT OFFICE.

ROBERT STOKER, OF SALT LAKE CITY, UTAH.

SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 767,020, dated August 9, 1904.

Application filed November 23, 1903. Serial No. 182,259. (No model.)

To all whom it may concern:

Be it known that I, ROBERT STOKER, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Smoke-Consuming Furnaces, of which the following is a specification.

This invention relates to furnaces, and pertains especially to the class of smoke-consuming furnaces having blast or blow pipes discharging into the fire-box.

The object of the invention is to provide a furnace having flues so arranged as to supply hot-air to top and bottom of the grate-bars through the combustion-chamber, bridge-walls, and fire-box walls, with a supplemental hot-air discharge into the combustion-chamber, whereby hot-air is mingled with the gases and products of combustion and such gases and products are consumed and the heat units materially increased.

A further object of the invention is to provide in a smoke-consuming furnace a series of flues leading from a hot-air blast-pipe through the combustion-chamber and through the bridge-walls, one of said flues discharging under the grate-bars and the other of said flues or tubes being connected with hot-air ducts or channels in the walls of the fire-box which discharge into the fire-box above the grate-bars.

A still further object of the invention is to provide a furnace having transverse projections into the combustion-chamber from the walls thereof to form a throat which restricts or confines the heat at the rear of the furnace, so as to equalize the heat under the boiler from end to end of the latter, and to provide a hot-air injection into the combustion-chamber at or near the throat.

Another object of the invention is to provide in a smoke-consuming furnace a pair of bridge-walls of special construction and arrangement, a hood hanging from one wall over an interval or space between the walls and overlapping the other wall, a series of hot-air flues extending through the bridge-walls and hot-air injector on each flue positioned in said interval or space.

In the accompanying drawings, forming part of this application, Figure 1 is a central longitudinal sectional view of a furnace embodying my invention. Fig. 2 is a section on the line $x\,x$, Fig. 1. Fig. 3 is a cross-section of the fire-box. Fig. 4 is a detail section across the throat.

The same numeral references denote the same parts throughout the several views of the drawings.

The boiler 1 is of ordinary construction and arrangement, and the grate-bars 2 may be of any well-known type suitable for the purpose. The side walls 3 of the furnace have inward enlargements or projections 4, forming a contraction or throat 5 in the combustion-chamber 6 and having an inclined bridge-wall 1^a, thereby forming a draft toward the rear of the chamber, so as to equalize the heat under the boiler throughout its length. The walls 7 of the fire-box 8 and ash-pit 9 have a hot-air flue 10, provided with discharge-nozzles 11. The flue 10 extends around the fire-box, and the nozzles open thereinto at the front, and the flue is joined at each terminal to a hot-air tube 12 by couplings 13. The tubes 12 extend through the bridge-walls 14 and 15 and through the combustion-chamber to a hot-air-supply pipe 16 under pneumatic or other pressure. A central hot-air tube 17 extends from the supply-pipe 16 through the combustion-chamber and through the bridge-walls and terminates in a discharge head or nozzle 18 in the ash-pit under the grate-bars. At or near the combustion-chamber contraction the tube 17 is provided with a branch 19, having a perforated plate 20, inclined upwardly at an angle to the branch, so as to direct hot-air rearwardly in the combustion-chamber, and thereby equal the heat in the rear part of said chamber with that of the front portion.

The bridge 14 has a beveled top provided with a series of hot-air ducts 21 and the hood 23, projecting from the bridge-wall 15, to cover the interval or space 24 between the bridge-walls 14 and 15. The portion of the tubes 12 and 17 positioned in the interval or space 24 is provided with a small injector 25, which directs hot air agaist the hood 23 and through

the ducts 21 above the grate-bar. The tube 17 has a damper 22, operated by levers 26, 27, and 28.

The supply of hot air is controlled by a suitable valve in the supply-pipe operated by levers 26 and a hand-lever 27.

It will be understood that a door or opening may be made in the wall for removal of ashes or other foreign matter that may accumulate in the space between the bridge-walls 14 and 15. It will be further understood that the damper 1^a is operated to cut off hot-air blast under the grate while the furnace-doors are open without interfering with the blast from the nozzles.

It will be observed that hot air is injected into the fire-box from the front and rear thereof over the grate-bars and from the rear of the fire-box under the grate-bars, thus surrounding the fire with hot air, which reduces the particles of combustion, and is directed toward the rear of the furnace where the branch blast completes the reduction and consumes the smoke of the furnace completely.

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

1. In a smoke-consuming furnace, the combination, with a flue in the walls of the fire-box and having discharges from the front of the box over the grate-bars, tubes connecting the flue with a hot-air supply through the combustion-chamber and bridge-walls, a central tube connected to said supply and extending through the combustion-chamber and bridge-walls and terminating in a discharge-head in the rear of the fire-box under the grate-bars, of the bridge-walls having an interval or space between them, a hood on one of said walls overlapping the other wall so as to form hot-air ducts, and the injectors projecting from said tubes in the said interval or space.

2. In a smoke-consuming furnace the combination, with the tubes connected to a hot-air supply and terminating at each side of the fire-box in a flue surrounding the fire-box and opening thereinto above the grate-bars, and a tube extending from said supply and terminating in a discharge-head opposite said openings but under the grate-bars, of the bridge-walls having an interval or space between them and through which all of said tubes extend, a hood on one of the walls to overlap the other wall, and the injectors on the portion of the tubes positioned in the interval or space.

3. The combination, with the furnace-walls having an enlargement projecting into the combustion-chamber to form a throat, a flue formed in the surrounding walls of the fire-box and opening thereinto above the grate-bars, the bridge-walls having a space between them, and a hood on one bridge-wall to overlap the other so as to form hot-air ducts in communication with the interval or space, of the tubes connected to a hot-air supply and extending through said chamber, space and walls, certain of which tubes being connected with the said flue and the other terminating forward of the bridge-walls, an injector on the latter tube at or near the throat, and the injectors on the portion of the tubes positioned in the said interval or space, substantially as shown and described and for the purpose set forth.

In witness whereof I hereunto set my hand in the presence of two witnesses.

ROBERT STOKER.

Witnesses:

WM. M. COURTNEY,

HARRY E. GLENN.