

983,510.

J. W. McNEAL.
SMOKE CONSUMING FURNACE.
APPLICATION FILED DEC. 29, 1909.

Patented Feb. 7, 1911.

2 SHEETS-SHEET 1.

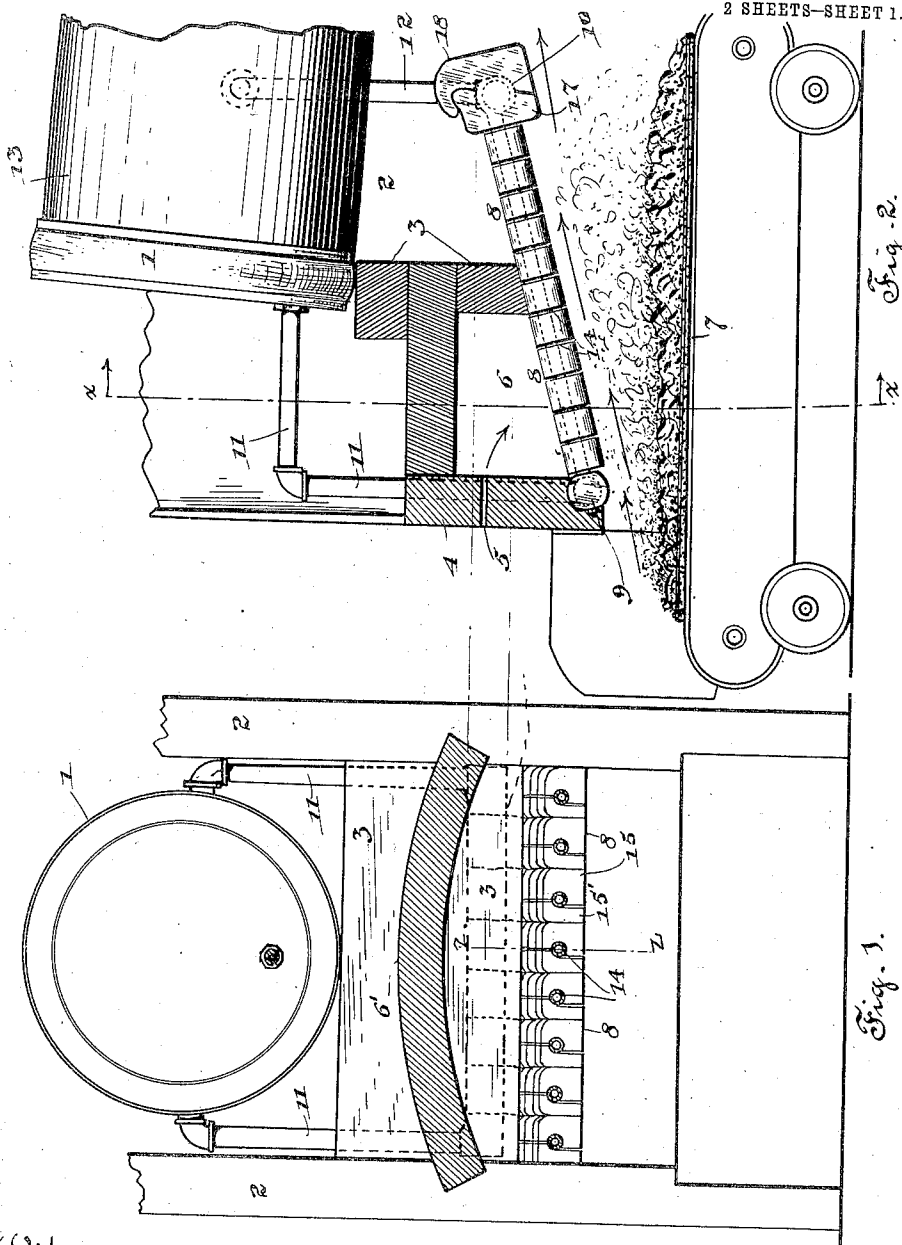


Fig. 1.

Fig. 2.

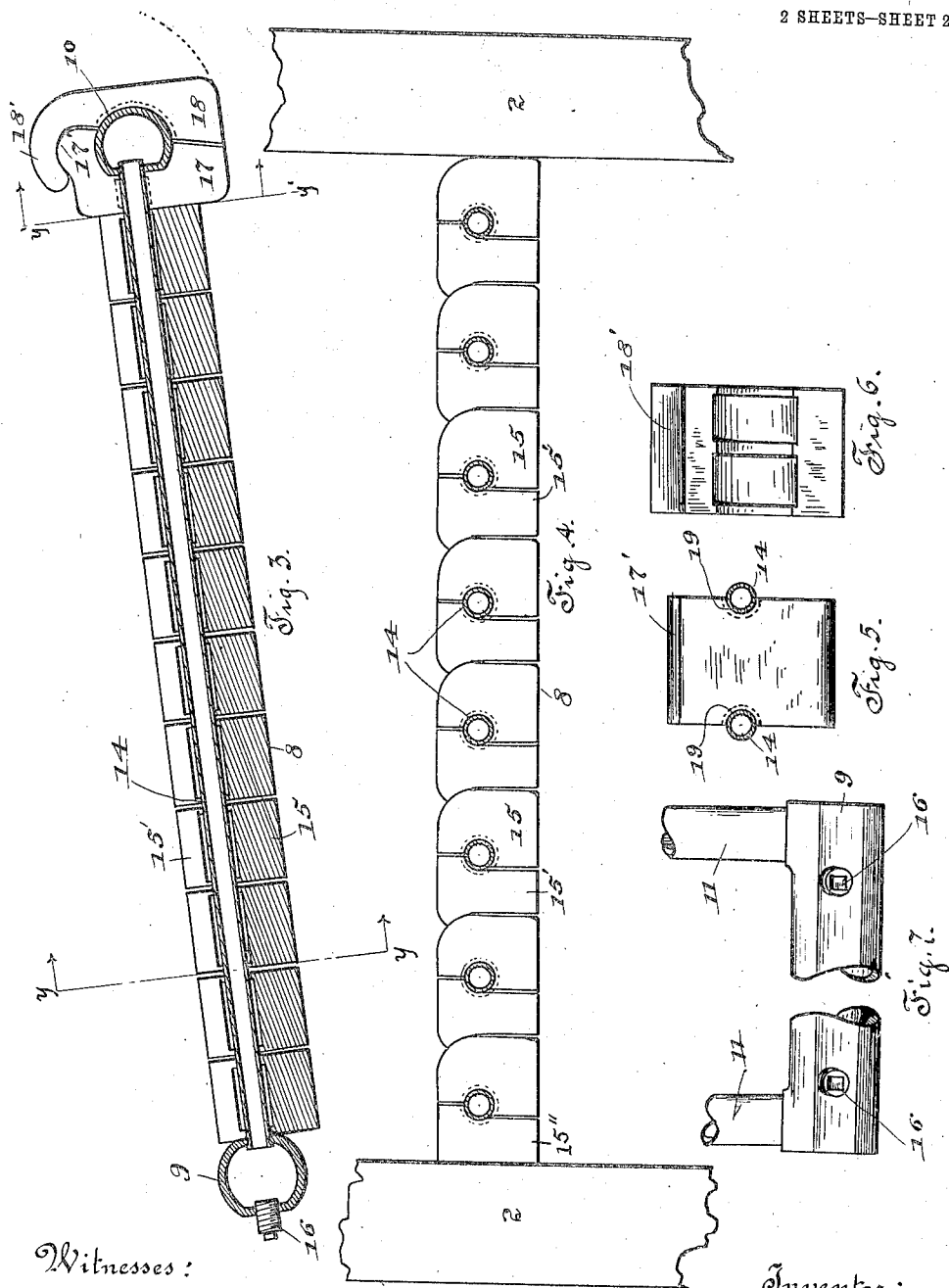
Witnesses
W. C. Smith
B. G. Richards

Inventor
John W. McNeal,
by Joshua H. Porter
his Attorney.

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Inventor:

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by Joshua R. H. Torrey
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UNITED STATES PATENT OFFICE.

JOHN W. McNEAL, OF CHICAGO, ILLINOIS.

SMOKE-CONSUMING FURNACE.

983,510.

Specification of Letters Patent.

Patented Feb. 7, 1911.

Application filed December 29, 1909. Serial No. 535,488.

To all whom it may concern:

Be it known that I, JOHN W. McNEAL, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Smoke-Consuming Furnaces, of which the following is a specification.

My invention relates to smoke consuming furnaces and more particularly to a smoke igniting arch for steam boiler furnaces, the object being to produce an improved device of this character which shall be capable of withstanding intense heat without collapsing, it being well known that ordinary igniting arches are short-lived and require frequent renewal.

A further object of my invention is to so design the arch that the fire-brick tiling used in its construction may be readily placed in position when a complete arch is being constructed or when renewals are being made in case of damaged bricks.

Other objects will appear hereinafter.

With these objects in view my invention consists in the novel construction and arrangement of parts which will be hereinafter fully described and more particularly pointed out in the appended claim.

My invention will be more readily understood by reference to the accompanying drawings forming a part of this specification, and in which,

Figure 1 is a transverse section of a boiler and furnace taken on line $x-x$ of Fig. 2, the latter being substantially a longitudinal section showing the traveling fire grate diagrammatically and the igniting arch in elevation, Fig. 3 is a vertical longitudinal section of the arch taken on line $z-z$ of Fig. 1, Fig. 4 shows a section of the arch taken on line $y-y$ of Fig. 3, Fig. 5 is a view of a fire-brick used adjacent the rear end of the arch and a section taken on line $y'-y'$ of Fig. 3, Fig. 6 is a front elevation of a rear-most fire-brick, and Fig. 7 is a detail front elevation showing the front arch manifold and supporting pipe construction.

Referring now to the drawings 1 designates the front end of an ordinary steam boiler and 2 the usual side walls, 3 designating a transverse wall supported by the side walls and on which the boiler rests. The front wall 4 is provided with a series of horizontally extending perforations 5, only one of which is shown, through which air may flow to the chamber 6 when in-

duced by the fire draft, the object of this flow of air being explained hereinafter. A curved roof 6' of tile or other refractory material is provided which forms a top to the chamber 6, and the same is supported by the side walls 2. A traveling fire grate 7 of usual construction is provided and the same is indicated diagrammatically in the drawings as aforesaid.

Arranged above the grate 7 is my improved smoke igniting arch 8 which is formed flat as shown in preference to the more common curved form. This arch is provided with a front manifold 9 and a rear manifold 10 which are connected respectively to the supporting pipes 11 and 12 which lead to the boiler 13. Longitudinally extending pipes or tubes 14 connect the manifolds 9 and 10, as shown in Fig. 3, in order that water may circulate freely throughout the pipes in the arch and to prevent the pipes from overheating and thus rendering the same weak and liable to collapse under the weight of the fire-bricks 15 and 15' resting thereon.

The arch 8 may extend rearwardly into the boiler space any desired distance and the same preferably extends upwardly as well as rearwardly, thereby accommodating the increasing volume of gases or products of combustion at the rear of the fire. The arch 8 is formed flat as shown in the several figures in order that the same may contact with the smoke uniformly, thereby producing results which are unobtainable with a curved arch.

The fire-bricks 15 and 15' are so formed that they may be hooked over the tubes 14 and thus secured in position, and they may be spaced apart as shown in Fig. 3 to permit air to pass downwardly from the chamber 6. This air coming into contact with the smoke under the arch renders the smoke combustion more complete, it being understood that the lower surface of the arch is maintained sufficiently hot to ignite the smoke.

It will be observed that the fire bricks 15 are formed to but partially encompass tubes 14 on the top and substantially entirely encompass them on the bottom and that their outer upper corners are rounded as shown. Bricks 15' are formed to partially encompass said tubes on the top, have narrow lower portions adapted to fit between the lower portions of bricks 15 and are provided at their outer upper corners

with a rounded projection adapted to engage over the outer rounded corner of the adjacent brick 15. The brick 15'' shown at the extreme left in Fig. 4 is of the same general form as bricks 15' but has no projection at its outer upper corner, the same being squared off at a right angle as shown. By this construction the said bricks may be inserted into position on tubes 14 from below, beginning at the right of Fig. 4 and proceeding toward the left, the brick 15'' being dropped from above between the last tube on the left and furnace wall 2, thus serving to lock all bricks in position. Likewise, all bricks may be readily removed after brick 15'' has been removed from above.

The pipes 14 may be secured in the manifolds 9 and 10 in any suitable manner, the plugs 16 being provided in order to allow the replacement of a single pipe when necessary. The fire-bricks 17 and 18 are specially formed, each of the latter having a curved hook 18' to engage the curved projection 17' provided on each of the former. Each brick 17 is provided with two lateral recesses 19 to receive the pipes 14, and each brick 15 is provided with a single lateral recess for the same purpose, the bricks 15' being shaped to conform to a portion of a pipe 14 and to a portion of brick 15, as clearly shown in Fig. 4, which construction facilitates the assembling of the bricks in the arch.

It will be noted that the roof 6' cooperates with the arch 8 in preventing heat from distorting the tube-sheet or front of the boiler and that in case of failure of the arch that said roof would serve as a temporary protection preventing serious damage.

While I have shown what I deem to be the preferable form of my improved smoke consuming furnace, I do not wish to be limited thereto as there might be various changes made in the details of construction and arrangement of parts described without departing from my invention and hence I desire to avail myself of such changes and modifications as fairly fall within the spirit and scope of the appended claim.

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

A fire arch consisting of a series of water tubes; a series of larger fire bricks formed to partially encompass a tube at the top, substantially entirely encompass it at the bottom and having their outer upper corners rounded; a series of smaller fire bricks having narrow lower portions adapted to fit between the lower portions of said larger bricks and upper portions partially encompassing the tops of said tubes at one side and having projections at the upper corners of their other sides adapted to engage the rounded corners of said larger bricks; and a terminal brick similar to said smaller bricks except that its outer upper corner is squared off at right angles, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN W. McNEAL.

Witnesses:

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