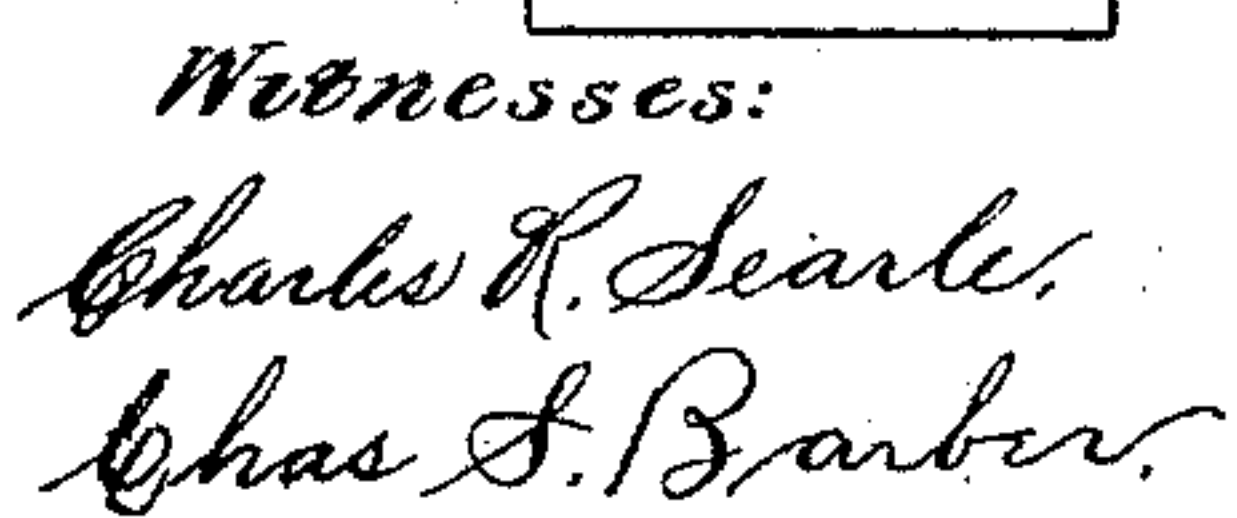


W. J. FRYER, Jr.  
CHIMNEY FLUE.

Patented Oct. 27, 1891.



*Inventor:*  
William D. Fryer, Jr.  
By his attorney  
Jas. Drew Stetson



# UNITED STATES PATENT OFFICE.

WILLIAM J. FRYER, JR., OF NEW YORK, N. Y.

## CHIMNEY-FLUE.

SPECIFICATION forming part of Letters Patent No. 462,041, dated October 27, 1891.

Application filed April 26, 1890. Serial No. 349,652. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM J. FRYER, JR., of the city and county of New York, in the State of New York, have invented a certain  
5 new and useful Improvement Relating to Chimney-Flues, of which the following is a specification.

I have in Letters Patent to me dated February 9, 1864, No. 41,498, set forth a lining-  
10 pipe made separately from the chimney and inserted in the flue in short lengths abutting together and presenting a tolerably-smooth interior. The present invention is based thereon. I have discovered that pipes for  
15 this purpose may be manufactured of cast-iron and may give the required smooth inner surface and being nearly square in cross-section utilize a large proportion of the area of the flue. I make the iron pipe with the  
20 corners rounded and with each side slightly swelled. The ends are socketed together, so as to insure their being kept exactly in line. Mortar is slushed in to fill the slight space between the exterior of the lengths of pipe  
25 and the interior of the brick-work and adheres strongly to the brick and supports the several lengths of pipe by its adhesion to the surfaces of the iron with which it comes in contact. I make the joints with flanges, which  
30 nearly fill out the corners of the flue. The main body of each pipe is as thin as it can be well cast; but a longitudinal rib extends along the mid-width of each side to receive the blows of the mason in setting it.

I provide an expanded foot which presents a flanged surface for supporting all the weight which is ever thrown on the bottom of the pipe by reason of each length of pipe bearing the whole or a portion of its weight upon the  
40 lengths below. This expanded foot also serves a useful function in receiving the smoke and gases from grates and other fires employed. Ordinarily the lengths of pipe are short and are put together in their rough finish with  
45 sufficient play to allow the expansion and contraction of the iron with heat and cold without detaching any of the lengths from their hold on the mortar surrounding them. In short, each length remains held in its place  
50 by the mortar which connects it to the inclosing brick-work, and the difference in expan-

sion with heat and contraction with cold between the metal—iron—and the earth—brick—is allowed for by the opening and closing of the loose joints at the joining ends by  
55 which the lengths socket into each other.

The accompanying drawings form a part of this specification and represent what I consider the best means of carrying out the invention.  
60

Figure 1 is a perspective view showing one length of straight pipe with its supporting-foot and the portion of the brick-work which surrounds it. Fig. 2 is a side elevation of a series of the lengths put together independ-  
65 ently of the brick-work with which it is always surrounded in use. The remaining figures are sections on a larger scale. Fig. 3 is a horizontal section at or near the mid-height of a length. Fig. 4 is a plan view of a length  
70 showing the flanged upper end with a horizontal section of the inclosing flue. Fig. 5 is a vertical section on the line  $x x$  in Fig. 4. Fig. 6 is a vertical section on the diagonal line  $y y$  in Fig. 4.  
75

Similar letters of reference indicate corresponding parts in all the figures where they appear.

A represents the brick-work, shown in Fig. 1 as having several flues, only one of which  
80 is equipped according to my invention, and the description will be confined to that flue, it being understood that the others may be similarly fitted. The flue is square and is built up around the pipe as the several lengths  
85 of the latter are applied in succession.

B B, &c., are the several lengths of my lining-pipe, certain portions of which will be designated, when necessary, by supernumerals, as B'. I propose, for convenience and  
90 economy, to establish two or more standard sizes, making each exactly square or having such proportion of the length and breadth in plan as will conform to the majority of architects' plans or require but little alteration to  
95 adapt the plans thereto. I will make for each size four kinds of lengths, one B' straight and plain—say thirty inches or more in length—for ordinary perpendicular work; another B<sup>2</sup> of less length and provided with a circular  
100 orifice  $a$ , flanged for the junction of a stove-pipe; a third B<sup>3</sup> short but plain, and a fourth



B<sup>4</sup> curved with a deviation of twenty-three degrees from the straight line, or, in more ordinary language, an eighth bend. Each is enlarged so as to fill the entire flue, except that the extreme corners are rounded, and the pipe is made enough smaller than the flue to make an easy fit and allow for the irregularities in rough brick-work. (See Fig. 4.) One end of each is adapted to receive the opposite end of the other, (see Figs. 5 and 6,) thus making the pipe smoke and spark proof, as the object of the invention is not only to make the draft of a flue better, but to overcome the liability of sparks reaching the ends of floor-timbers that rest on the walls near the chimneys, the heat in an inclined brick flue drying up the mortar in the joints of the brick-work and resulting in the mortar crumbling away, so that heat and sparks reach the timbers, and the latter being very dry a conflagration ensues, such fires being considered mysterious to the ordinary mind. Defective flues cause one-half of the fires in this country; but from flues lined in the manner I propose no fire can result.

Smoke and hot air travel with a curling circular motion, so that a square flue lined with a pipe shaped as herein described—that is to say, the corners being rounded and the sides on the segment of a circle, so that the smoke and hot air take their natural ascending course—will carry off as much as the square flue, because the corners hold and provide down currents of cold air.

Although I provide, as before intimated, for ordinarily and mainly suspending each length of pipe independently to the brick-work which surrounds it, there is liable under some conditions to be a great load on the base of the pipe, this condition obtaining whenever any considerable number of lengths rest by gravity one upon another, and expand up and down together as the temperature becomes raised. I provide for distributing this load over a considerable surface of the masonry and at the same time attain a form which is well adapted to apply over a fireplace and to gather the products of combustion into the contracted limits required. This is the enlarged foot or throat piece C, having a flange of sufficient breadth to bear fairly on a large surface of the masonry. Its upper end is matched to the lower end of the first length B'. The several lengths are put in as required in the building of the flue, first the broad foot C and afterward the several lengths successively higher, putting in a length of the character shown by B<sup>2</sup> wherever they are liable to be required, and stopping each by a blank flange or cover until the connection of a pipe at that point shall be required. The several lengths of my pipe are inserted successively as the flue is carried up, and the space between the exterior of my pipe and the interior of the brick flue is slushed full or nearly full of mortar.

The longitudinal ribs B\* may endure as

heavy blows as may be necessary from the handle of the trowel or from any other implement to keep the several lengths in proper line as each is successively surrounded by its portion of the brick-work. The faces of the longitudinal strips B\* are at right angles with each other and match fairly to the corresponding faces of the brick-work A.

The enlargement at the junction of each length of pipe with the next performs an important function in taking a portion of the load and resting on the mortar filling the space between the pipe and the wall and adhering strongly to both. The lengths of iron pipe being put together loosely will allow each length to expand and contract independently of its neighbor.

The cross-section of the sides of the body of the pipe is made on a slight curve. The corners are more sharply rounded. Thus the hubs where the lengths meet and socket into each other are square on their side lines. The wide seats thus formed near the corners enable the lengths to meet and match with certainty, however thin the pipes may be cast.

Modifications may be made without departing from the principle or sacrificing the advantages of the invention. I can in many cases dispense with the curved portions B<sup>4</sup>. I can slush in the mortar at and near the top of each length, leaving a considerable length near the bottom of each with the space between it and the surrounding brick-work empty. Such arrangement gives increased freedom of the lower portion of the pipe to expand and contract, the upper portion only being held rigidly by the mortar which adheres to the body of the pipe and also contributes to support it mechanically under the enlargement, the socket at the upper end of the pipe to receive the next length. Ordinarily the workmen will not take such pains. The mortar may be slushed in at all stages of progress in building up the work, and it may be put in so liberally as to nearly or quite fill the whole space between the pipe and the inclosing brick-work from the top quite to the bottom of each length. My pipes may be used similarly formed and set for conveying fresh or foul air instead of smoke, and in such case the current may be downward or upward, as the conditions require.

I claim as my invention—

1. As an improved article of manufacture, the pipe described made in separate lengths of thin cast metal approximately square with rounded corners and slightly-swelled sides and having longitudinal ribs on the exterior of said swelled sides and the ends of the respective lengths being made larger to nearly fill the flue and socketed loosely together, the said longitudinal ribs extending from end to end and joining said enlarged ends, substantially as shown and described.

2. The combination, with the inclosing flue, of the pipe formed in sections loosely socketed together and formed with longitudinal



exterior ribs and enlargements, the said pipe  
being approximately square with rounded  
corners, and the intermediate slushing D, fill-  
ing the space between the flue and pipe,  
5 whereby the exterior enlargements and ribs  
serve, in connection with the slushing, to dis-  
tribute the strain upon the sections of the  
pipe, substantially as specified.

In testimony whereof I have hereunto set  
my hand, at New York city, this 21st day of 10  
April, 1890, in the presence of two subscribing  
witnesses.

WM. J. FRYER, JR.

Witnesses:

CHARLES R. SEARLE,  
H. A. JOHNSTONE.