

No. 621,214.

Patented Mar. 14, 1899.

C. W. BROWN.

SMOKE CONSUMING DEVICE FOR FURNACES.

(Application filed Feb. 25, 1898.)

(No Model.)

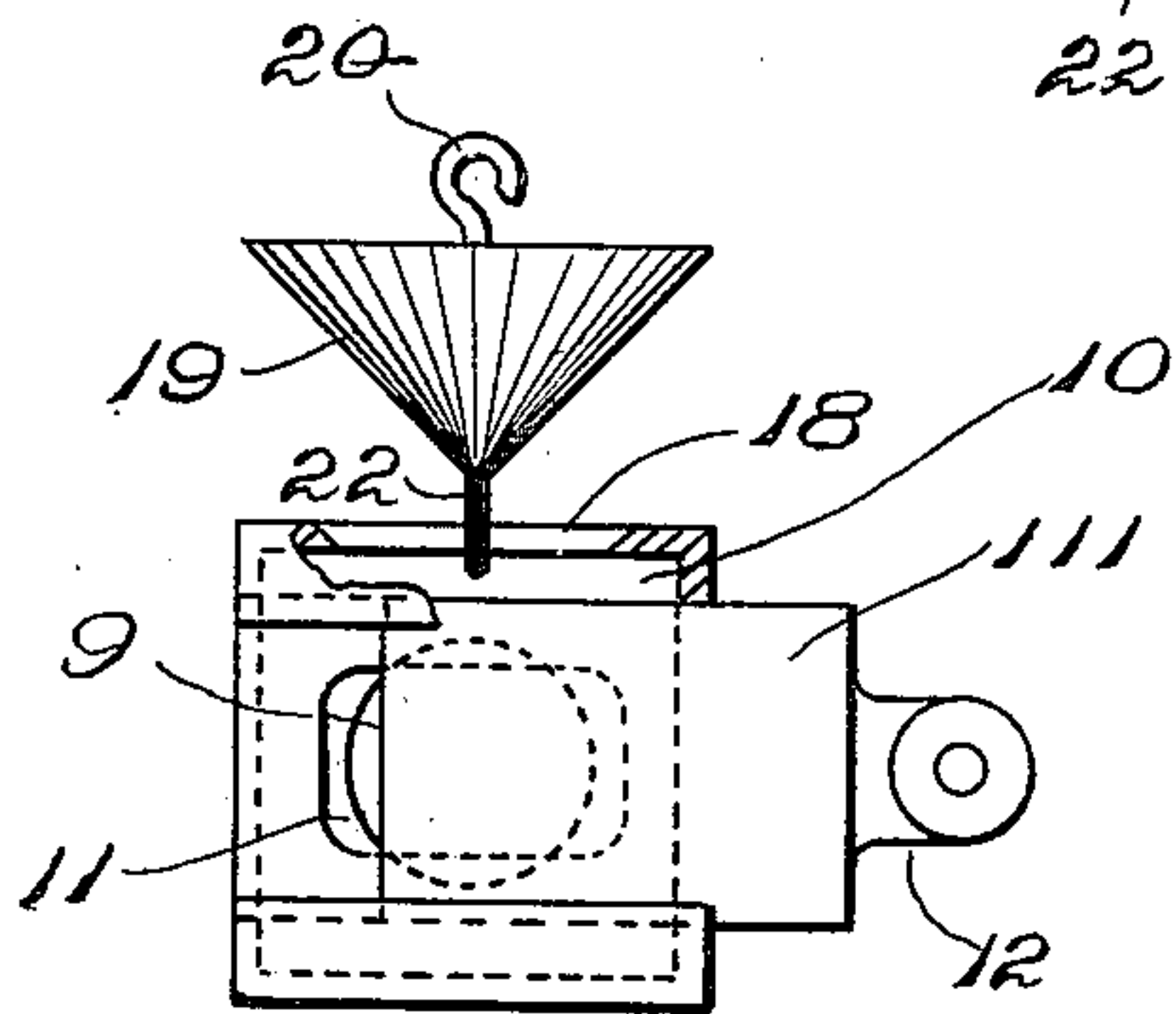
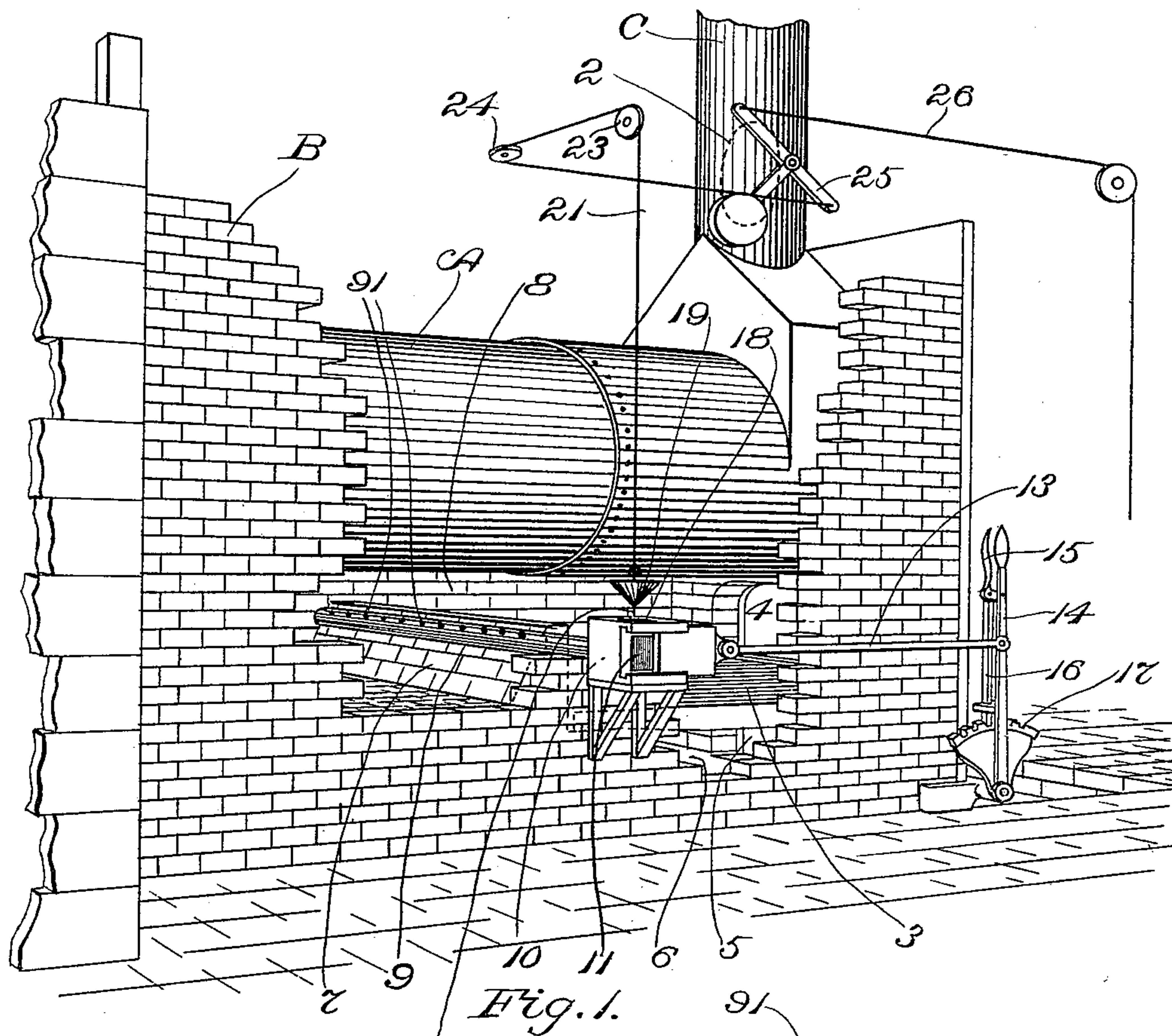


Fig. 2.

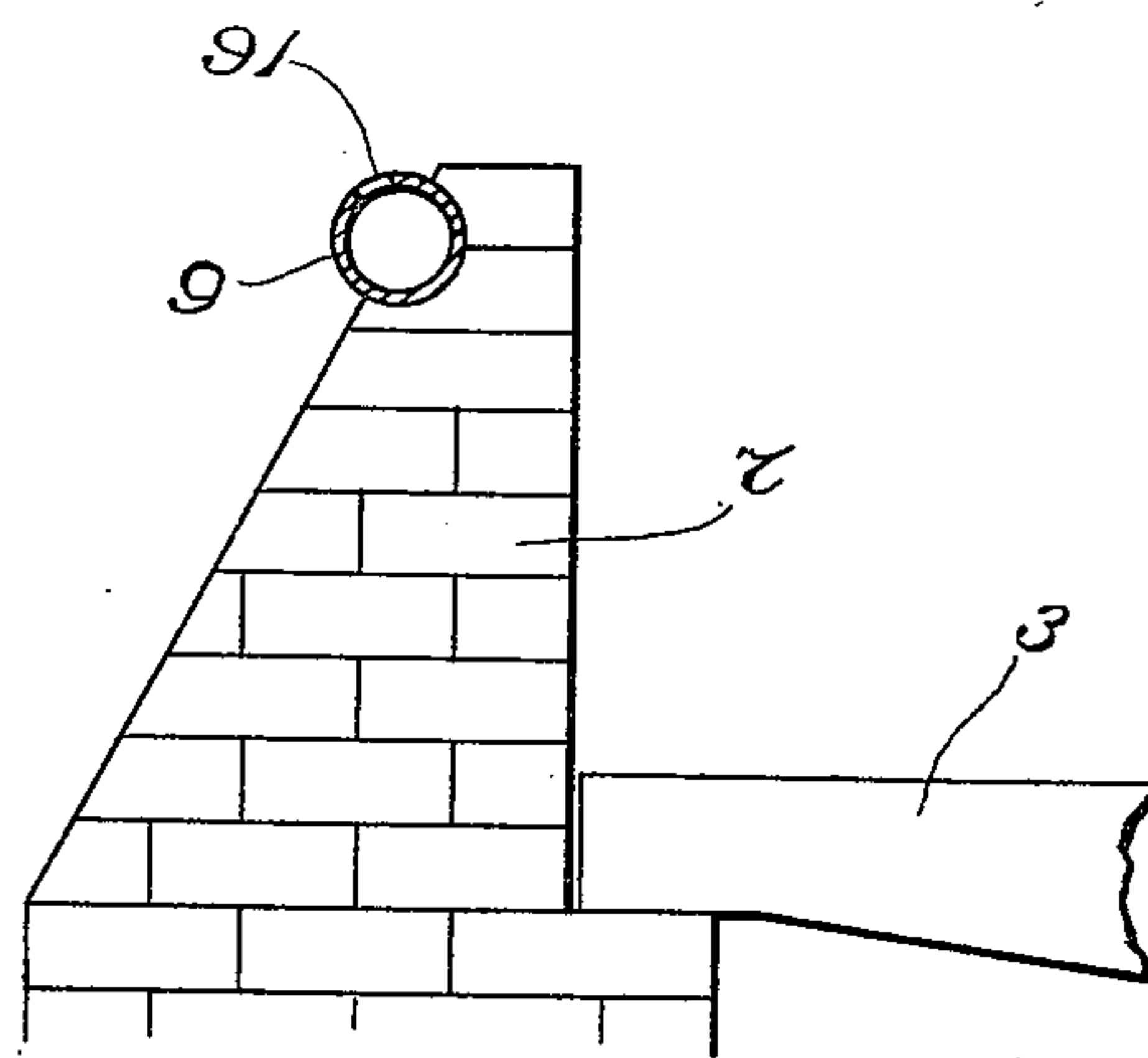


Fig. 3.

Witnesses:

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# UNITED STATES PATENT OFFICE.

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## SMOKE-CONSUMING DEVICE FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 621,214, dated March 14, 1899.

Application filed February 25, 1898. Serial No. 671,672. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES WARREN BROWN, a citizen of the United States, residing at Somerville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Smoke-Consuming Devices for Furnaces, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a perspective view of a horizontal boiler of common construction with my invention applied thereto, a portion of the brick setting being broken away to show the invention more clearly. Fig. 2 is a detail, enlarged, which is hereinafter referred to. Fig. 3 is an end elevation of the bridge-wall, showing my air-inlet pipe or flue in position thereon.

The burning of soft coal in boiler-furnaces as commonly constructed is productive of a considerable amount of black smoke, which is charged with carbon and other products of the incomplete combustion of the fuel. This smoke is objectionable, especially in thickly-populated districts, and in many places ordinances have been passed which prohibit the filling of the air with smoke and impurities above referred to. The use of soft coal is, however, desirable in many instances and is also economical. To provide for the burning of this coal in furnaces of ordinary construction, such as are now largely in use, without sending forth smoke filled with the impurities resulting from incomplete combustion is the object of my invention.

My invention is fully set forth in the following description, and the novel features thereof are pointed out and clearly defined in the claims at the close of this specification.

I have shown my invention in the accompanying drawings as applied to a furnace under a common horizontal return-flue boiler, and I will describe the same having reference thereto.

The boiler is shown at A, the brick setting at B.

C is the smoke-stack. A damper of usual construction is shown at 2 in said stack.

3 are the grate-bars.

4 is the fuel-door.

5 is the ash-pit door.

6 is the ash-pit.

7 is the bridge-wall at the rear of the ash-pit, which has a shoulder or ledge, upon which rest the rear ends of the grate-bars.

8 is the combustion-chamber. If air is admitted into the combustion-chamber when the furnace is in use and is discharged directly into said chamber when it is filled with the products of incomplete combustion of the fuel on the grate, these products will be in large part burned, a saving of the fuel thereby being effected, while the gaseous residue which passes through the smoke-stack will be comparatively free from impurities, and its emission into the surrounding atmosphere will be comparatively unobjectionable. For the purpose of supplying a fresh current of air directly to the combustion-chamber I provide a pipe or other suitable flue 9, which is provided with a series of perforations 91, so that the air in said pipe or flue may pass freely through the perforations into the combustion-chamber. The flue 9 is preferably an iron pipe of suitable capacity, which I preferably locate near the top in the rear side of the bridge-wall. This pipe may be suitably covered inside the furnace with clay, cement, or other heat-resisting and protecting material and is preferably so located at the rear of the bridge-wall as to be in large part protected from the fiercest heat of the furnace. One end of this pipe extends through the setting-wall, and the other end may simply butt up against the inside of the setting-wall on the other side of the furnace. The escape of a certain amount of air at the end of the pipe will do no harm. At the outer end of said pipe 9 outside the setting-wall I provide a box-shaped structure 10, which is set on the end of the pipe and which may be of wood, sheet-iron, or other suitable material. The box 10 is provided at one side with an opening 11 of about the same capacity as the pipe or flue 9, and this opening may be covered by means of a slide-damper 111, which has pivoted to an ear 12 at one edge thereof

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the inner end of a rod 13, which extends to the front of the furnace, so that the fireman or operator may conveniently grasp it to open or close the opening 11 in the box 10, and thus regulate the inflow of air through said opening. If desirable, the outer end of the rod 13 may be pivotally secured to a flexible lever-arm 14, having at the upper end thereof a handle 15 and provided with a clutch device 115, of common construction, which actuates a dog 16, the lower end of which engages with notches in a rack 17. By this contrivance the slide 111 may be conveniently moved and set in any desired position. There is, however, no tendency on the part of the slide 111 to change its position, and I do not therefore consider the lever-arm 14 and dog 16 as essential. It is sufficient if the end of the rod 13 projects in front of the furnace and is suitably supported. If the side of the furnace at which the box 10 is placed is conveniently accessible, a simple catch or handle on the slide 111 is all that is required. A contrivance like the rod 13, which projects to the front of the furnace, is, however, a convenience. On top of the box 10 I provide an opening 18, preferably circular and with beveling edges, said opening having a capacity substantially equal to that of the flue 9. The opening 18 is closed by means of what I term a "bob" 19, which is a funnel-shaped structure, preferably of sheet-iron, provided with a hook 20 on top, by means of which it may be secured to a flexible connection 21. At the bottom of the bob 19 I provide a spindle 22, which projects downwardly into the opening 18 and serves to prevent the bob from becoming displaced or swinging out of position over the opening 18. The flexible connection 21 may be a small chain or cord and is passed upwardly over a guide wheel or pulley 23 and thence around another guide-pulley 24 and thence to the lower end of the damper-lever 25, where it is secured. The upper end of the damper-lever 25 has attached thereto a flexible connection 26, which may pass to an automatic damper-regulator such as is in common use. By this arrangement when the damper 2 in the smoke-stack is closed or partially closed by the movement of the upper end of lever 25 toward the right the bob 19 will be correspondingly lowered into the opening 18 and will serve to close or partially close the same. In this way the influx of air into the pipe or flue 9 is diminished automatically as the outlet through the smoke-stack is diminished, which is desirable. The whole device may therefore be readily rendered automatic in its operation.

The guide-pulleys 23 and 24, it will be understood, are properly supported from convenient fixed supports, which are not shown.

By means of my device the smoke emitted from a furnace burning soft coal is very largely freed from its objectionable qualities, while a considerable saving is effected in the fuel used. By providing two inlets through the box 10 to the tube or flue 9 a more accurate and satisfactory adjustment of the air admitted into the combustion-chamber is obtained.

My device is simple and relatively inexpensive and may be applied to almost any style of furnace in use. I do not desire to limit myself to the precise location of the flue or pipe which admits the fresh air into the combustion-chamber through the box 10, as the air may be supplied to said chamber at different points and the substantial advantages of my invention obtained. I prefer, however, to construct and apply my device as shown and as above described.

By the use of a rod or poker having a point projecting at right angles to the stem portion thereof the perforations or openings in the flue 9 may be cleared from accumulations of ashes or the like, and by means of a hoe-shaped blade on the rod the flue 9 may be easily cleaned. This rod may be passed into the flue through the opening 11 in the box 10 and should be long enough to extend to the inner end of the said flue.

What I claim is—

1. A furnace having within the combustion-chamber a supplementary flue or air-passage with a series of openings therein for admitting air into the combustion-chamber the said flue having an air-inlet therefor and means whereby said inlet may be opened or closed automatically as the damper in the stack is opened or closed, substantially as described.

2. A furnace having a supplementary flue or air-passage for admitting air to the combustion-chamber, said flue or passage having outside the said furnace two inlets, one of which is automatically opened or closed from the damper in the stack and the other of which is provided with a slide for governing the inflow of air therethrough, substantially as described.

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

CHARLES W. BROWN.

Witnesses:

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