

No. 647,360.

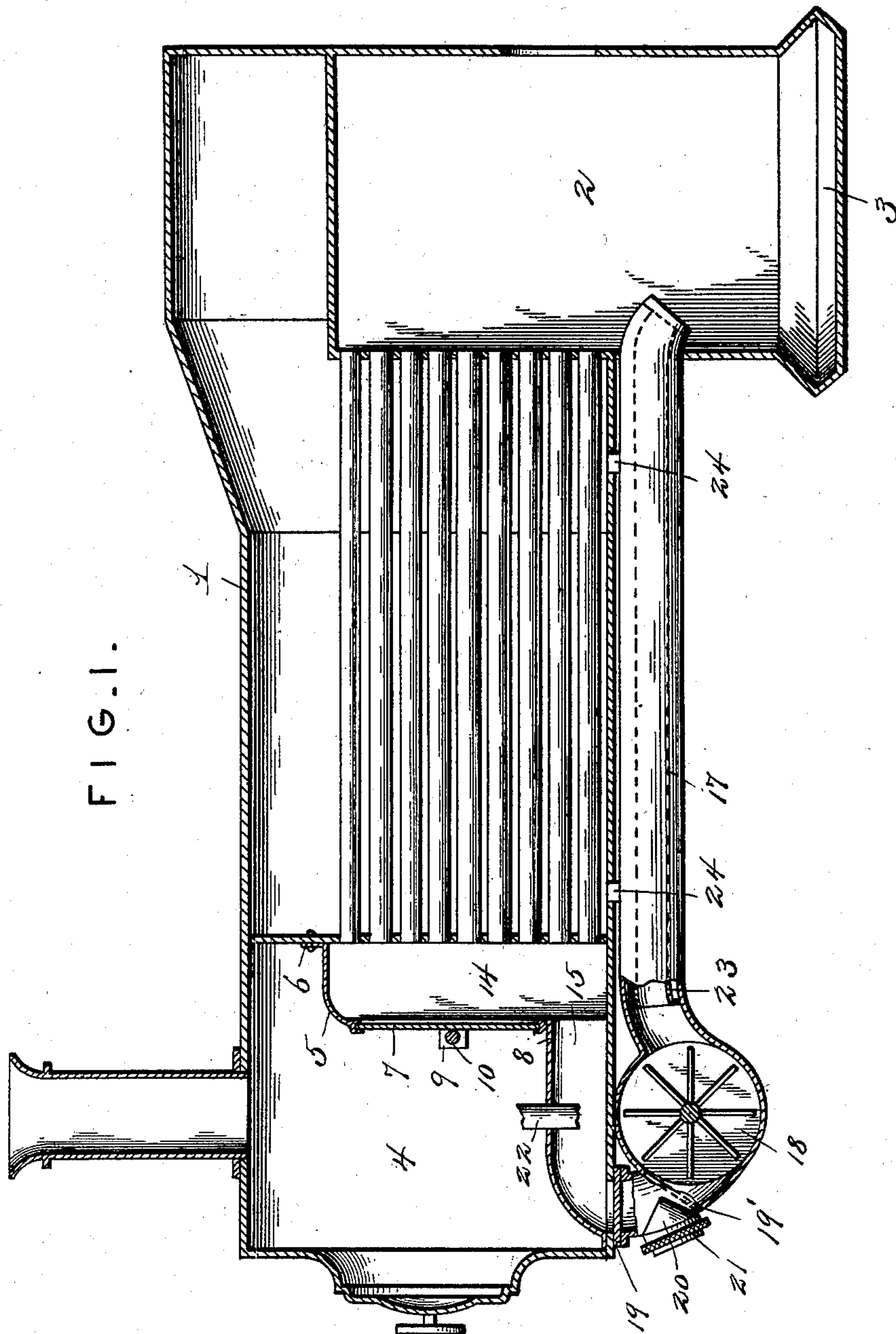
Patented Apr. 10, 1900.

W. E. BARKSDALE & G. W. MANNING.  
SMOKE CONSUMING ATTACHMENT FOR FURNACES.

(Application filed Dec. 14, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses

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FIG. 3.

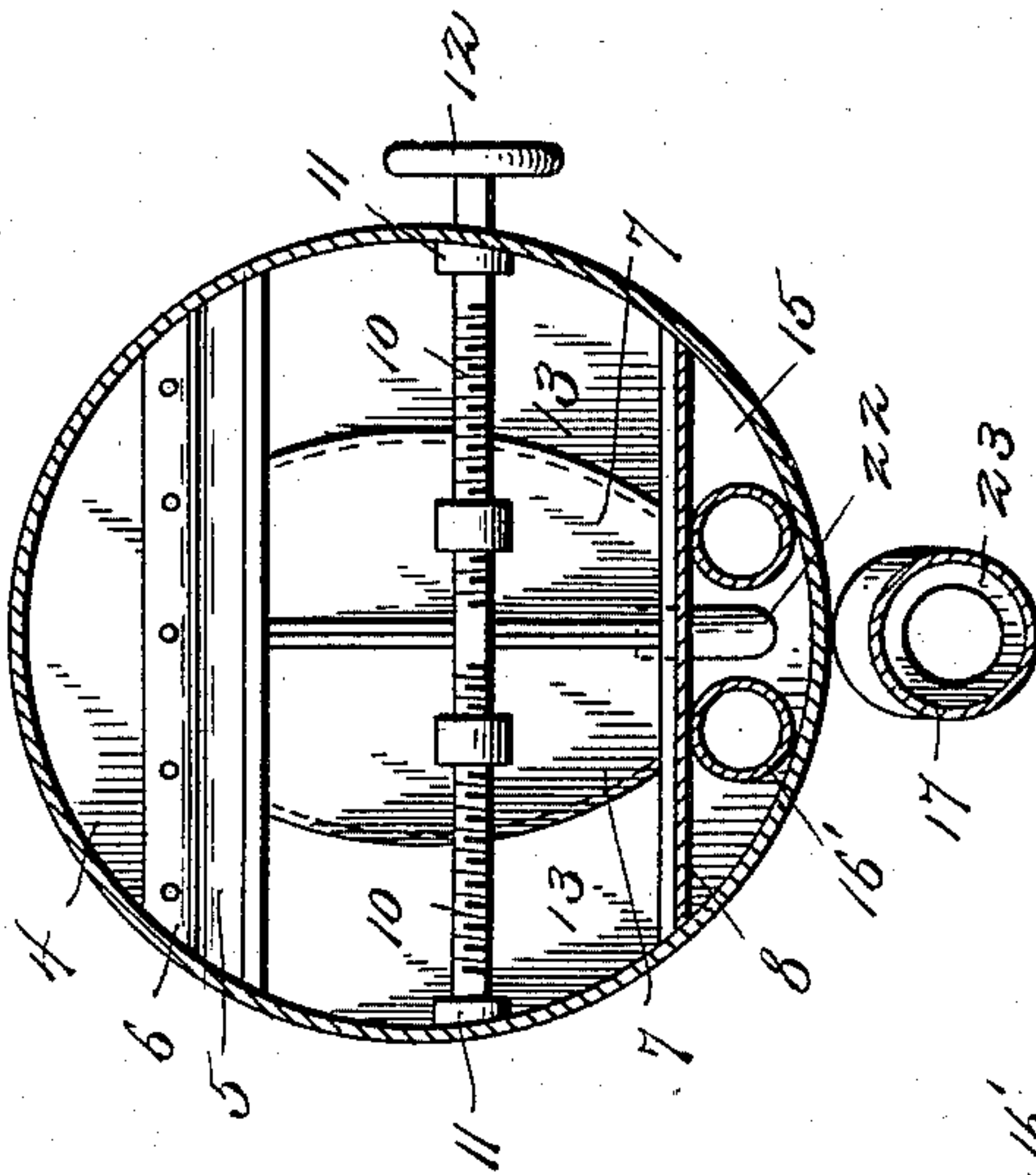


FIG. 4.

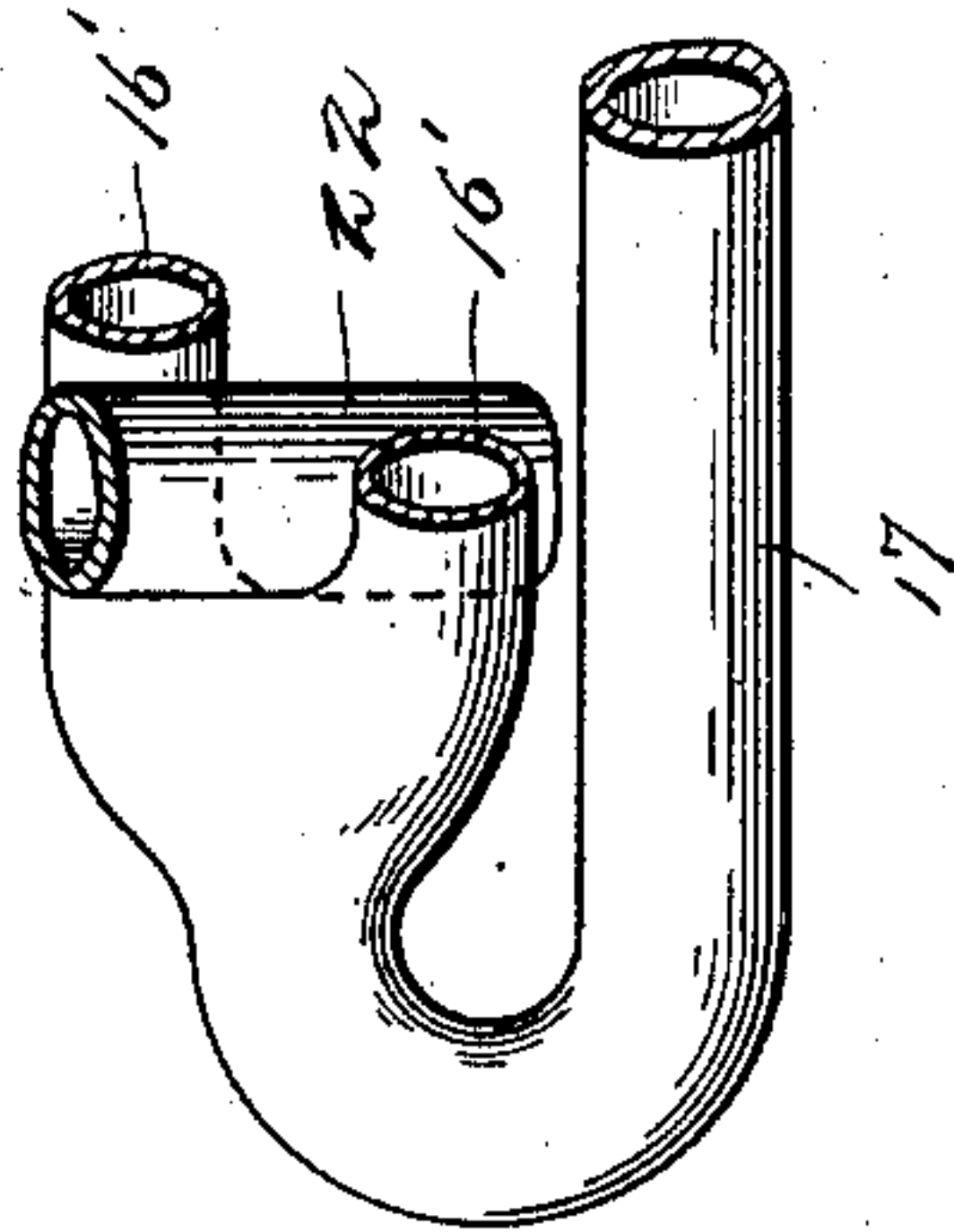
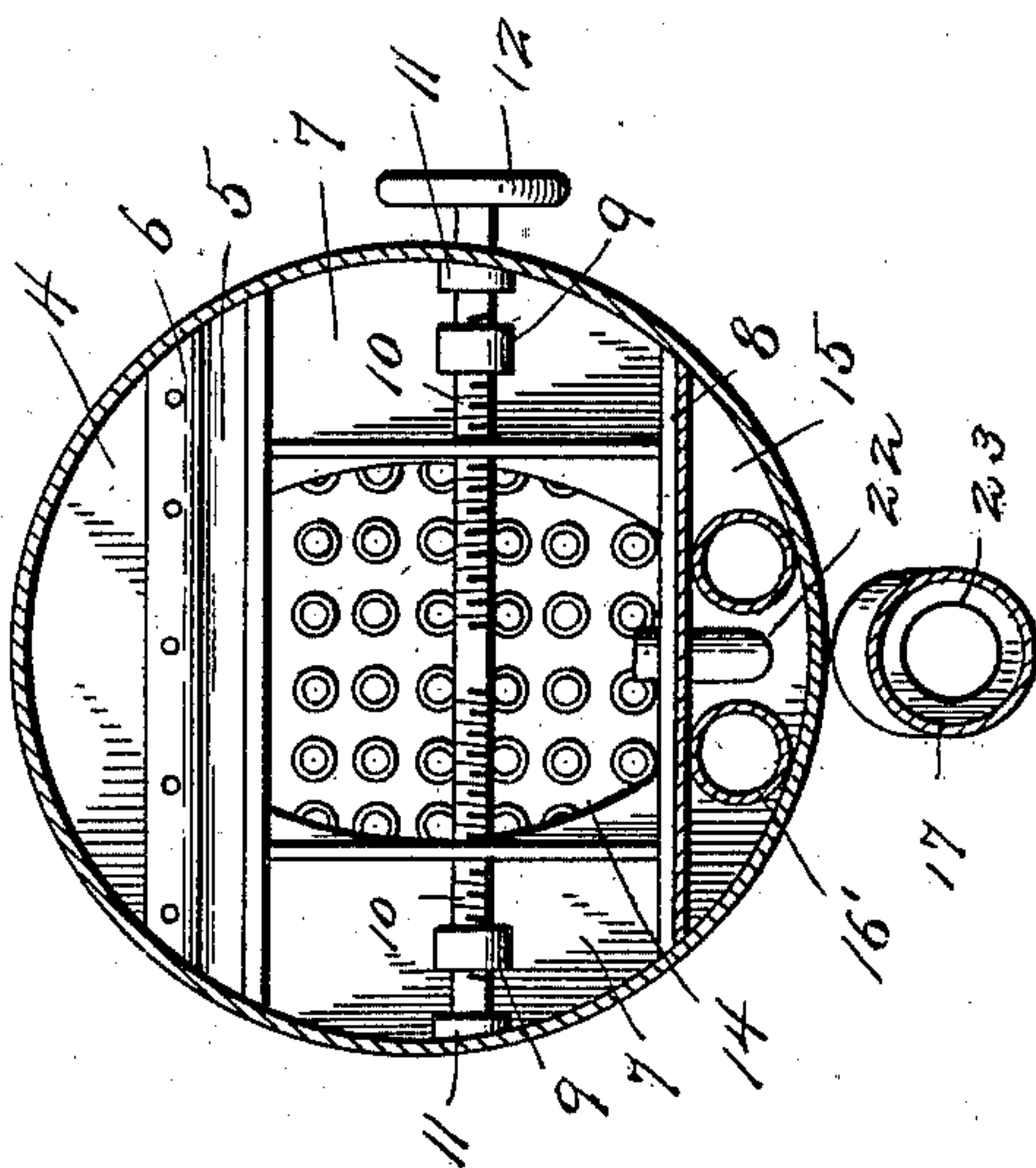


FIG. 2.



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# UNITED STATES PATENT OFFICE.

WALTER E. BARKSDALE AND GEORGE W. MANNING, OF AUGUSTA, GEORGIA.

## SMOKE-CONSUMING ATTACHMENT FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 647,360, dated April 10, 1900.

Application filed December 14, 1899. Serial No. 740,294. (No model.)

*To all whom it may concern:*

Be it known that we, WALTER E. BARKSDALE and GEORGE W. MANNING, citizens of the United States, residing at Augusta, in the county of Richmond and State of Georgia, have invented a certain new and useful Smoke-Consuming Attachment for Furnaces, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to a smoke-consuming attachment to steam-boiler furnaces, the object of which is to return the smoke and other products of combustion from the boiler extension or smoke-box to the fire-box, there to be again subjected to the action of the fire and as far as practicable consumed.

The construction and arrangement of the means by which the object stated is attained will be understood from the following description and will be specifically pointed out in the claims.

In the accompanying drawings, Figure 1 represents a vertical longitudinal section through a steam-boiler and a furnace therefor with the invention applied. Fig. 2 represents a transverse vertical section through the smoke-box or boiler extension in front of and looking toward the vertical slides or dampers with the latter withdrawn. Fig. 3 is a similar section showing the slides or dampers closed. Fig. 4 is a detail perspective view showing a modification in the receiving end of the smoke-duct.

Similar numerals of reference, wherever used, indicate the same parts in all the figures.

The numeral 1 indicates a steam-boiler of the fire-tube form, 2 the fire-box, and 3 the ash-pit for said fire-box, the said boiler, fire-box, and ash-pit being of any usual or preferred construction.

4 indicates the boiler extension or smoke-box, in which the products of combustion escaping through the fire-tubes from the fire-box are received and from which they may pass out through the smoke-stack in the usual manner. In the end of said fire-box adjacent to the tube-sheet and over the tubes penetrating said sheet is arranged a hood 5 of the curved form indicated in Fig. 1, said hood being secured to the tube-sheet by means of a foot-flange 6, riveted to said tube-

sheet. The hood 5, at its forward lower end extends across the smoke-box in a horizontal plane, as indicated in Figs. 2 and 3, and may be rabbeted or grooved, as indicated, to form a guide for the slides or dampers 7 7. The lower edges or ends of the slides 7 rest upon the forward edge of a horizontal deflector 8, adjacent to the lower side of the boiler extension, as shown, but sufficiently removed therefrom to provide for the passage under it of the products of combustion. The slides 7 are provided each with a horizontally-projecting, perforated and internally-threaded flange or nut 9, with which a screw 10 engages, said screw being provided on opposite sides of the center of its length on one side with a right-hand screw-thread and on the other side with a left-hand screw-thread, so that as the screw is rotated the slides will be simultaneously moved in opposite directions. The screw 10 has its bearings in lugs 11, attached to the sides of the smoke-box, the screw at one end penetrating one end of the smoke-box and being provided with a hand-wheel 12 or other suitable means for actuating the screw for operating the slides.

Intermediate the hood 5 and the lower horizontal deflector 8 are curved plates 13, which extend between the tube-sheet and the slides 7 for preventing the lateral escape of the products of combustion escaping through the tubes from the fire-pot. The chamber 14, formed intermediate the tube-sheet and the slides 7 and inclosed by the side plates 13, communicates at its lower end with the chamber or duct 15, formed between the deflector 8 and the lower shell of the boiler extension or smoke-box. The deflector 8 is preferably curved downward at its forward end for a purpose which will hereinafter appear. Communicating with the forward end of the duct 15 is a pipe or pipes 17, provided intermediate its ends with a fan 18, by means of which the products of combustion are drawn off from the chamber or duct 15 and forced forward into the fire-pot 2, in which the rear end of the pipe or duct 17 terminates, said pipe entering the fire-pot at any suitable point for the promotion of combustion of the products of combustion carried through said pipes to the fire-pot.

Just below the connection of the pipe 17



with the shell of the boiler extension said pipe is provided with a slide or damper 19, by means of which the communication of the duct 15 with the pipe 17 may be cut off when required or when the duct 17 and fan 18 for any reason fail to operate. Just below the slide or damper 19 the pipe 17 is provided with an angular extension and opening 20, forming a hand-hole, covered in ordinary use by means of a screw-cap 21, which when access to the pipe is desired for removing obstructing matter can be removed for permitting the withdrawal of such matter as may have accumulated in the pipe 17 at that point.

The fan 18 may be operated from any suitable motor, whether attached to the boiler or any engine or motor connected therewith or independent thereof. When the duct or pipe 17 and fan 18 are in operation, the slides 7 will be thrown together, as shown in Fig. 3, thereby closing the chamber 14 or shutting off the same from the smoke-box proper and compelling the products of combustion to pass downward into the duct 15, thence in and through the duct or pipe 17, and to the fire-box in a manner which will be readily understood. When for any reason the fan and duct or pipe 17 fail to operate satisfactorily, the dampers or slides 7 will be thrown open, as shown in Fig. 2, leaving the products of combustion free to pass into the smoke-box proper and thence out into the smoke-stack in the ordinary manner.

In Fig. 4 the pipe or duct 17 is shown with its forward end recurved to extend underneath the deflector 8 and has its receiving end bifurcated, as shown at 16', to cause the arms to straddle the steam-exhaust pipe or nozzle 22, the latter being applied to the fire-box under any usual or well-known arrangement.

The deflector 8 is perforated to permit the passage through it of the steam pipe or nozzle, as shown in Fig. 1.

By the construction and arrangement of the parts as shown and described it will be seen that the smoke and other products of combustion are readily returned from the chamber 14 to the fire-pot, where they may be again and again subjected to the action of the fire for consuming them in a manner that will be readily understood. For the purpose of kindling or starting the fire in the furnace the slides or dampers 7 will be withdrawn, thereby giving a direct draft to the fire through the smoke-box and the smoke-stack thereto, and said slides may also be withdrawn when it is desired to overhaul, repair, or cleanse the tube or duct 17.

Where the receiving end of the pipe is recurved, as shown in Fig. 4 and as indicated also in Figs 2 and 3, the slide or damper will be located, as shown in Fig 1, in the part of said pipe just below its entrance into the duct

15, or, if preferred, the cut-off may be located below the spark box or chamber 20, as indicated by dotted lines at 19', and where the smoke-duct is arranged in close proximity with the boiler it is preferred to provide the same with a water-jacket, covering, either wholly or in part, as indicated at 23, and to connect said jacket with the boiler or by short pipes 24.

It will be apparent that this smoke-consuming attachment may be applied to any suitable construction of furnace other than that shown in the drawings without departing from the invention.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. The combination with a steam-boiler and furnace therefor, of a hood arranged between the boiler and smoke-stack and forming a smoke-compartment, a smoke-pipe connecting said compartment with the fire-box and provided at an intermediate point with a fan, a sectional and divided damper affording communication between the smoke-box and smoke-compartment, and means for reciprocating the damper-sections simultaneously in opposite directions, substantially as described.

2. The combination with a furnace and a boiler connected therewith and having a smoke-box extension, of a hood in said extension forming a smoke-compartment adjacent to the boiler-tube sheet, a horizontal deflecting-plate extending from the bottom of the hood to the front of the smoke-box and having the steam-exhaust pipe passed there-through, a sliding damper for opening and closing communication between said compartment and the smoke-box proper, and one or more valves for closing said smoke-pipe, the latter being provided intermediate its ends with a fan-blower, substantially as specified.

3. The combination with a furnace and a fire-tube boiler connected therewith and having a smoke-box extension, of a smoke-compartment in said box adjacent to the boiler-tube sheet, a sliding damper for opening and closing communication between said compartment and the smoke-box proper, a smoke-duct connecting said compartment with the fire pot or box, a valve for closing said duct, the latter being provided intermediate its ends with a fan-blower and having its receiving end which enters the smoke-compartment, bifurcated, to straddle the steam-exhaust pipe or nozzle, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

WALTER E. BARKSDALE.

GEORGE W. MANNING.

Witnesses:

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