

(No Model.)

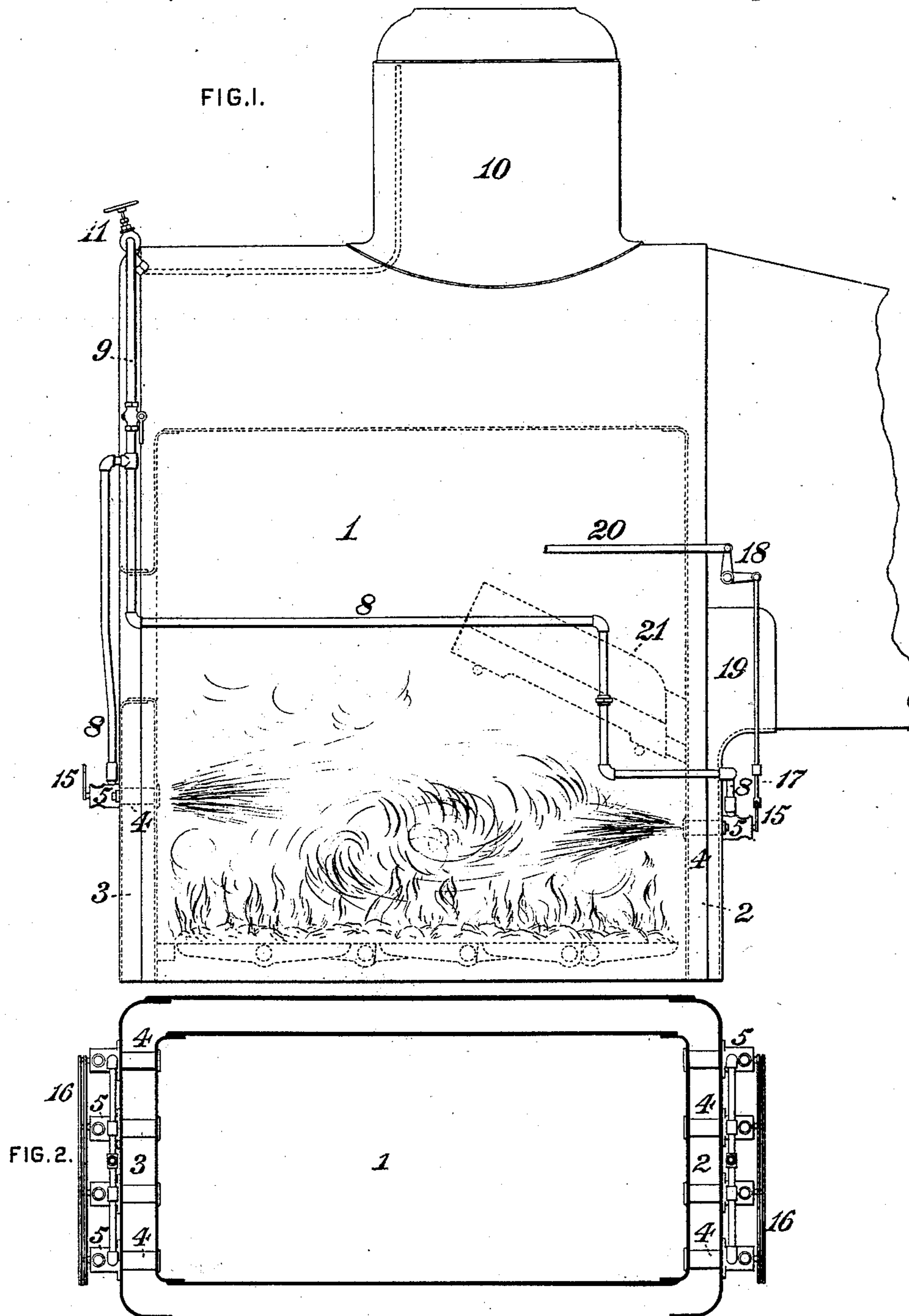
2 Sheets—Sheet 1.

G. W. CUSHING.

AIR FEEDER FOR FIRE BOXES.

No. 348,894.

Patented Sept. 7, 1886.



(No Model.)

2 Sheets—Sheet 2.

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FIG.3.

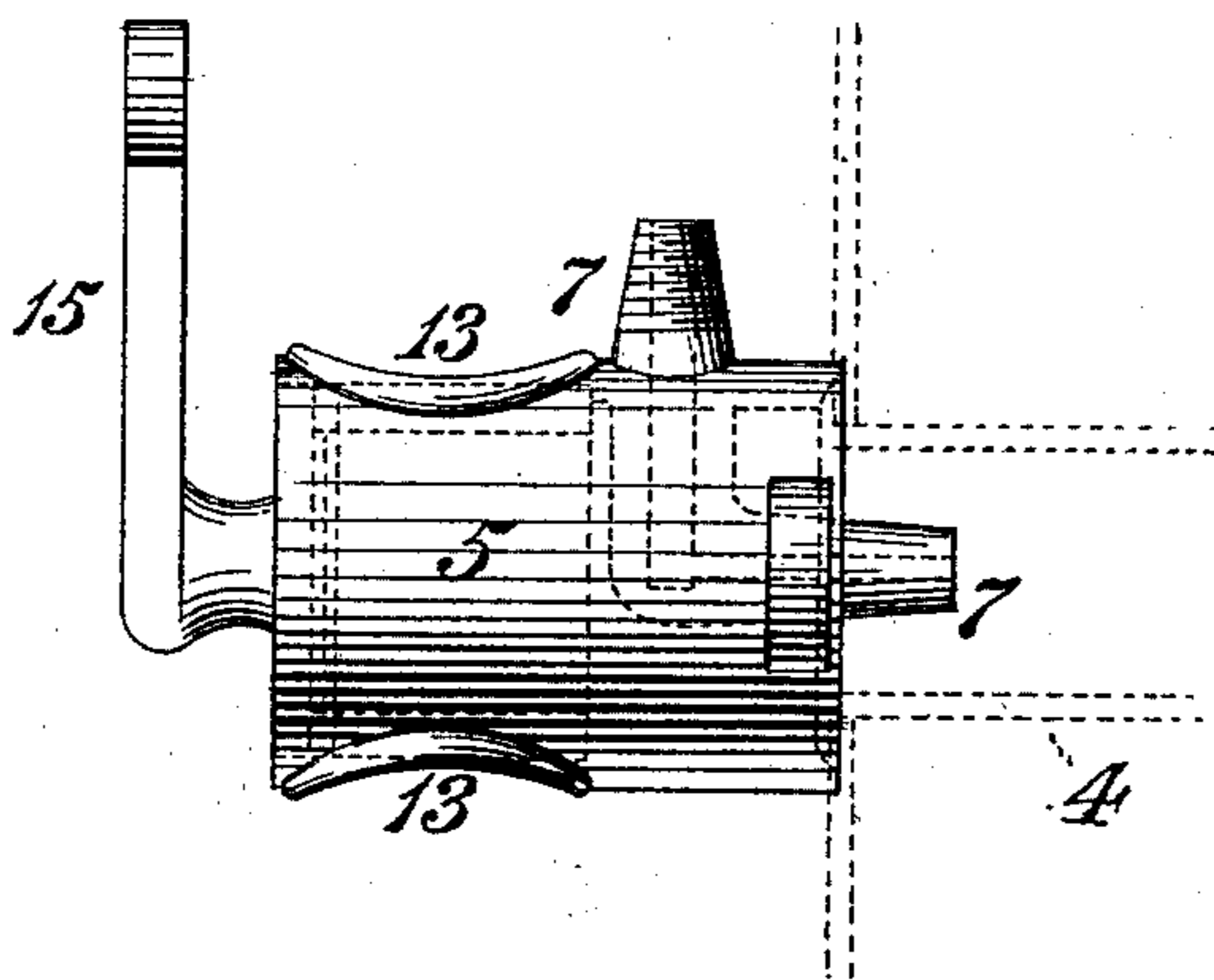


FIG.4.

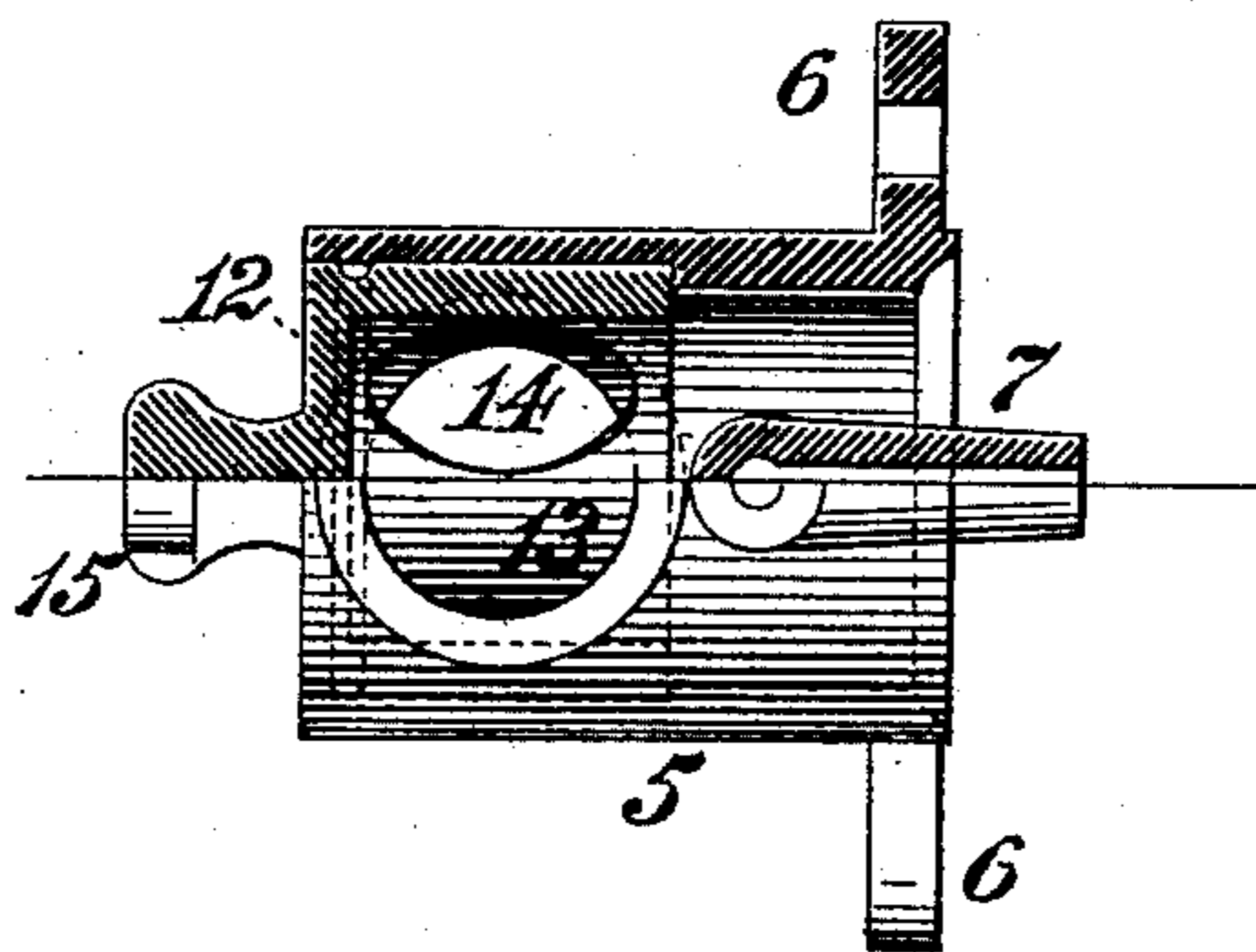
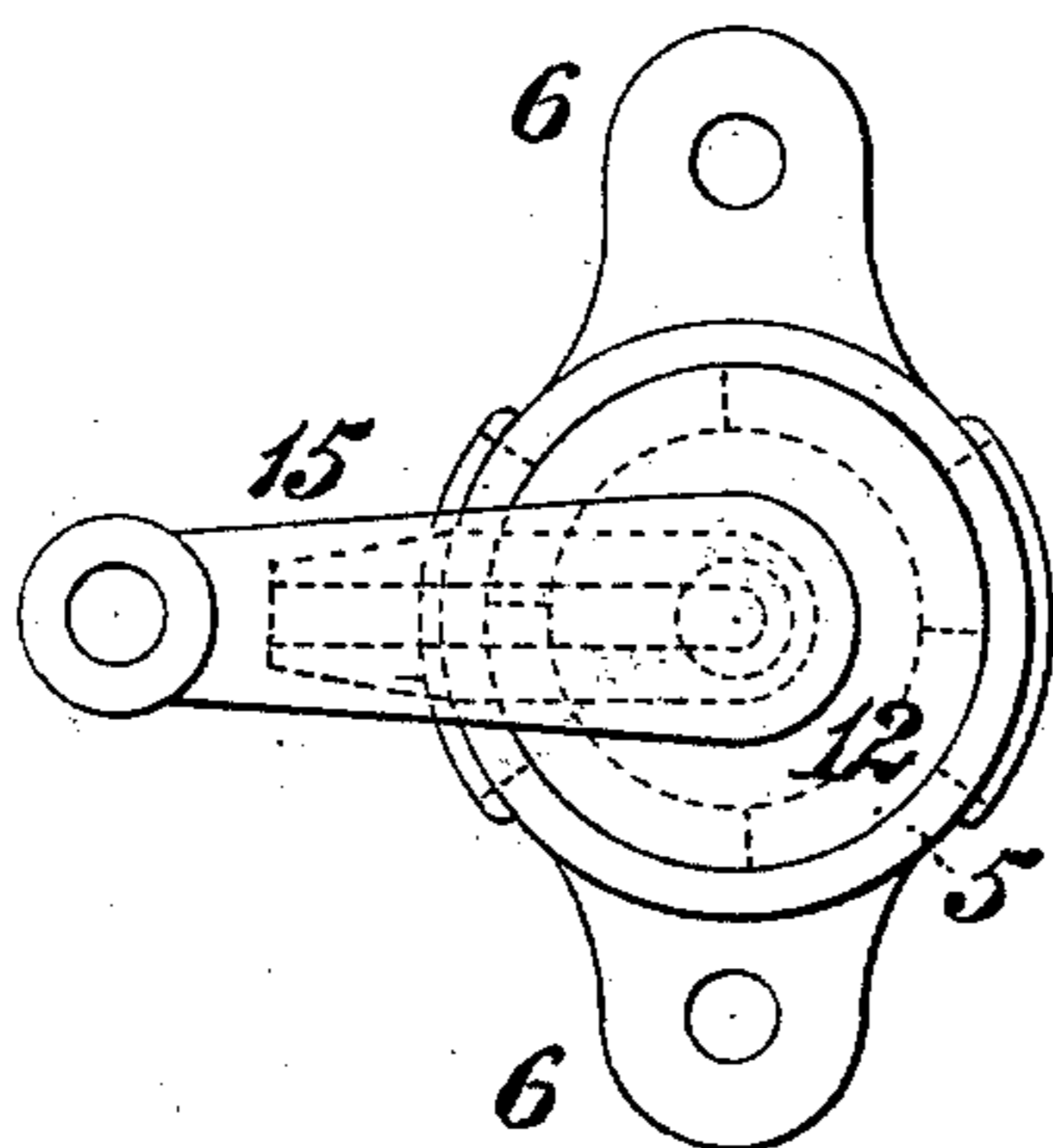


FIG.5.



WITNESSES:

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INVENTOR,

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UNITED STATES PATENT OFFICE.

GEORGE W. CUSHING, OF ST. PAUL, MINNESOTA.

AIR-FEEDER FOR FIRE-BOXES.

SPECIFICATION forming part of Letters Patent No. 348,894, dated September 7, 1886.

Application filed July 10, 1886. Serial No. 207,656. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. CUSHING, of St. Paul, in the county of Ramsay and State of Minnesota, have invented certain new and useful Improvements in Air-Feeders for Fire-Boxes, of which improvements the following is a specification.

My invention relates to devices for promoting and perfecting combustion in fire-boxes by increasing the draft therein and preventing the formation of smoke through the introduction of steam-induced currents of air; and its object is to provide effective and desirable means for combining the currents of air and steam, and simultaneously regulating to any required degree, or entirely shutting off, as desired, the air admission through a series of supply-nozzles.

To this end my invention, generally stated, consists in the combination of an air and steam supply chamber or casing having an open end, which is flanged or otherwise adapted to be fitted over the outer end of a fire-box supply-tube or hollow stay, and provided with a steam-jet pipe or nozzle leading into its open end, and a regulating-valve closing the outer end of the casing and governing air-admission openings therein; also, in the combination, with a fire-box, of a series of air and steam supply tubes passing through the walls of the fire-box above the grate-level, a series of chambers or casings closing the outer ends of the supply-tubes, each being provided with a central steam-jet pipe or nozzle, a series of valves, each fitting in one of said casings and governing air-admission openings therein, and connections by which said valves are coupled, to coincidentally and uniformly regulate the degree of air admission through the several supply-tubes.

The improvements claimed are hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a side view in elevation of a locomotive fire-box, illustrating the application of my invention; Fig. 2, a horizontal section through the same; Fig. 3, a side view, in elevation and on an enlarged scale, of one of the supply-chambers; Fig. 4, a view, half in elevation and half in longitudinal central section, of the same, and Fig. 5 an outer end view of the same.

My invention is herein shown as applied to a locomotive fire-box, 1, of the present standard type, in the front and back water-legs, 2 3, of which are inserted, at such level as to be above the fuel carried on the grate, a series of supply-tubes, 4, which are open at both ends, at which they are secured to the sheets of the inner and outer fire-box in any approved manner, as by being screwed thereinto and riveted over. The supply-tubes are preferably located in different horizontal planes on the front and back ends of the fire-box, respectively, as shown in Fig. 1, to prevent interference of the forward and backward currents of air and steam, and to enable the same to be more thoroughly commingled with the gases evolved in the combustion of the fuel. An air-and-steam chamber or casing, 5, is secured by bolts passing through lugs or flanges 6 on its inner end to the outer shell of the fire-box in line axially with each of the supply-tubes 4, the inner end of the chamber, which is open, communicating directly with the supply-tube. A steam-jet pipe or nozzle, 7, having its outer end threaded or otherwise suitably adapted to be connected to a steam-pipe, is cast upon each of the chambers 5, said jet-pipes being bent at right angles, so that their inner ends shall be central with the chambers and supply-tubes, and having their discharge ends projecting a short distance beyond the inner ends of the chambers, so as to deliver steam into the supply-tubes. The jet-pipes 7 are connected by pipes 8 with a steam-supply pipe, 9, leading from the dome 10 or other suitable portion of the steam-space of the boiler, and provided with a regulating-valve, 11, for governing the admission of steam therefrom. A hollow or tubular cylindrical air-valve, 12, is fitted, with the capacity of axial movement, in the outer end of each of the chambers 5, the outer ends of which are closed by said valves. Air-supply inlets or openings 13 (one or more) are formed in that portion of the shells of the chambers which incloses the valves, and corresponding openings, 14, are formed in the valve in the same longitudinal plane as the openings 13 of the chambers, so as to be adapted to register therewith when the valves are rotated into position therefor.

It will be seen from the above construction

that the admission of air to the chambers and supply-tubes may be regulated to any desired degree or entirely stopped, as desired, by proper movements of the air-valves. An arm, 5 15, is fixed upon the outer end of each of the air-valves 12, and the arms 15 of each series of valves—to wit, those on the front and the back of the fire-box, as well as those on the sides, if such are employed—are coupled by 10 rods or links 16, so as to be moved simultaneously in opening or closing the air-admission inlets. The links 16 are in turn connected by bell-crank levers 17 18 and links 19 with operating-rods 20, which extend to any convenient position within reach of the engine man 15 on the foot-board.

My improvements are herein shown as applied only to the front and rear of the fire-box, and such application will usually be found 20 sufficient. It will be obvious, however, that, if desired, similar series of supply-tubes and their accessories may be employed upon the sides as well as the ends of the fire-box. I have developed, in practice, highly satisfactory 25 results in the prevention of smoke and increase of draft by the use of my improvements, and have further found them specially desirable and effective in connection with a brick arch, 21, in the fire-box of the construction set forth 30 in my Letters Patent No. 333,202, December 29, 1885.

I am aware that devices of various constructions for injecting air and steam into furnaces have long been known in the art, and am likewise aware that the coincident regulation of 35 a series of air-admission openings by a perforated slide or gate is not new. Apparatus embodying such last-recited feature of construction I therefore disclaim.

I claim as my invention and desire to secure 40 by Letters Patent—

1. The combination, with a fire-box, of a series of supply-tubes opening thereinto, a series of air and steam feeding chambers or nozzles communicating with said tubes, a series of valves, each governing the admission 45 of air to one of said chambers, and a lever-and-link system, whereby said valves are coupled for simultaneous operation, substantially as set forth.

2. The combination of a chamber or casing 50 having a steam-jet pipe discharging centrally at or near one of its ends, a series of peripheral air-admission openings in its shell or body adjacent to its opposite end, and an air-valve 55 fitting in said chamber and controlling the air-admission openings thereof, substantially as set forth.

3. The combination of a chamber or casing 60 open at one end, which is flanged or otherwise adapted to be secured to the shell of a fire-box, and provided with air-admission openings adjacent to its opposite end, a steam-jet pipe leading laterally into the chamber, and having 65 its discharge end projecting centrally from the open end thereof, and a tubular closed ended cylindrical valve fitting and working freely in the opposite end of the chamber, and having openings adapted to register with the air-admission openings thereof, substantially as set 70 forth.

GEORGE W. CUSHING.

Witnesses:

CHAS. E. CRAIG,
O. N. PARMELEE.