No. 659,600. Patented Oct. 9, 1900.

J. A. BECK.

SMOKE PREVENTER OR CONSUMER.

(Application filed Dec. 29, 1899.)

(No Model.) 2 Sheets—Sheet 1.

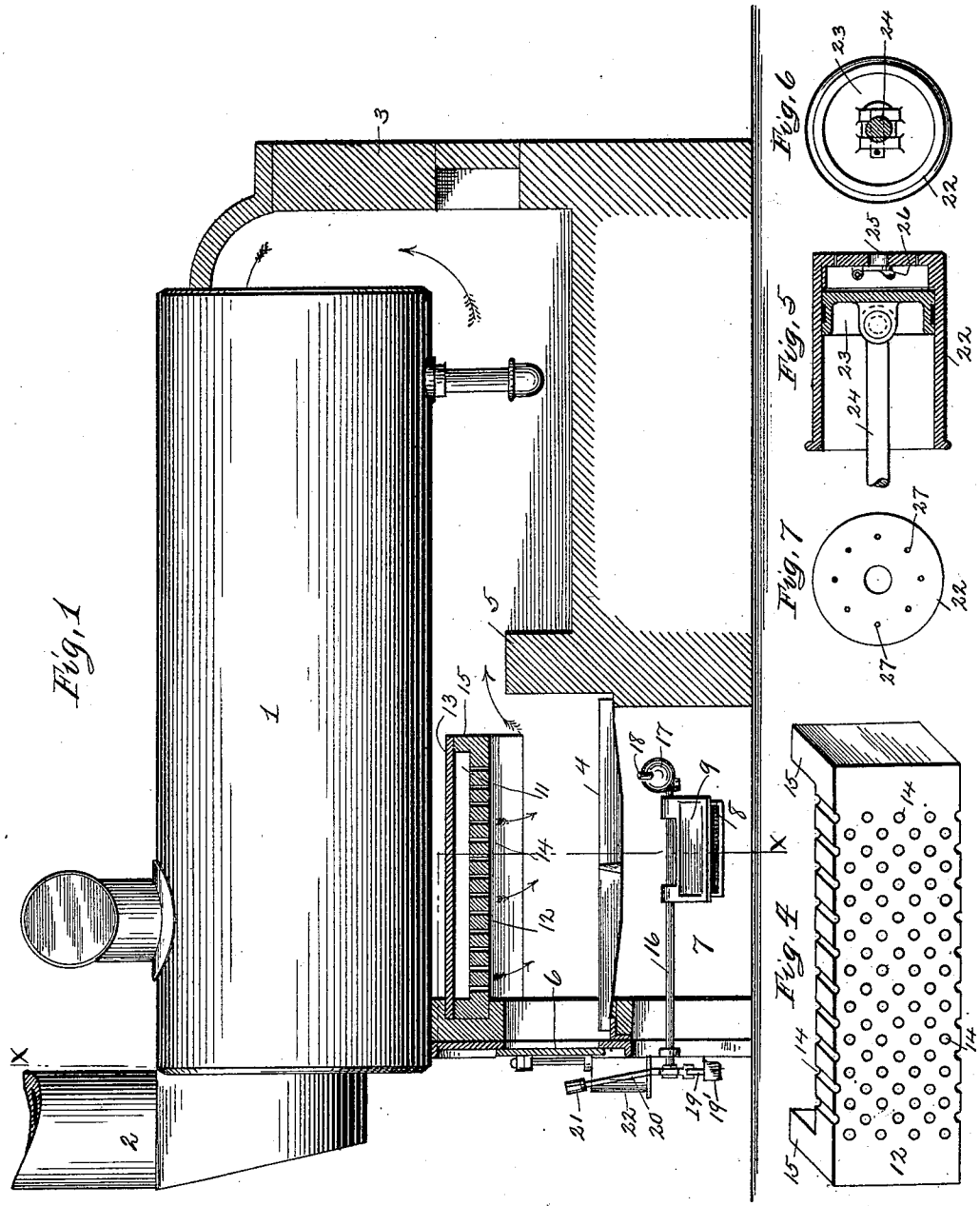

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Fig. 2

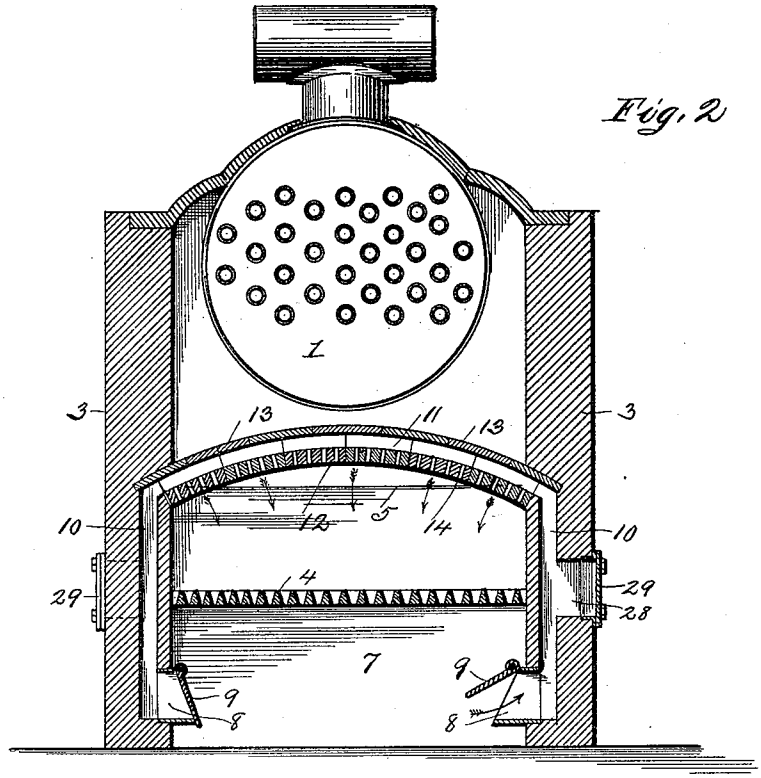
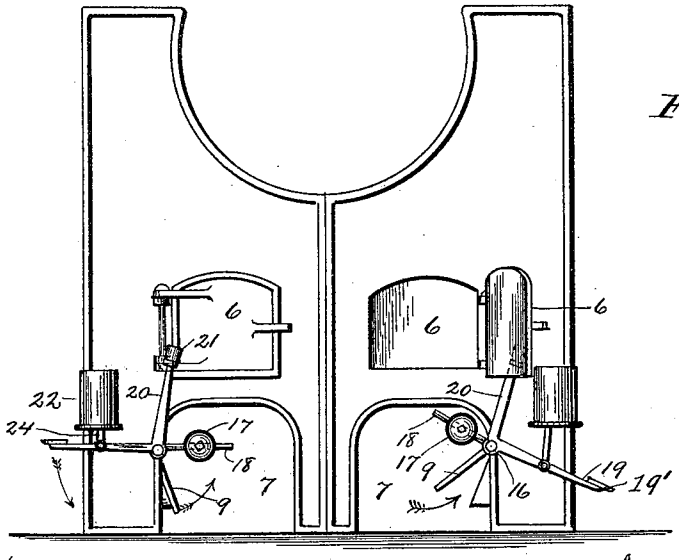


Fig. 3



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UNITED STATES PATENT OFFICE.

JOHN A. BECK, OF PITTSBURG, PENNSYLVANIA.

SMOKE PREVENTER OR CONSUMER.

SPECIFICATION forming part of Letters Patent No. 659,600, dated October 9, 1900.

Application filed December 29, 1899. Serial No. 741,939. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. BECK, a citizen of the United States of America, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Smoke Preventers or Consumers; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to an improved smoke preventer or consumer; and it consists in a means for automatically supplying air and reverberatory heat equally and evenly over the top surface of the burning fuel, thereby furnishing oxygen to consume the gases arising from freshly-introduced fuel, together with the certain details of construction and combination of parts, as will be fully described hereinafter.

In the accompanying drawings, Figure 1 is a side sectional elevation of a boiler-furnace provided with my improved smoke preventer or consumer, which is constructed and arranged in accordance with my invention. Fig. 2 is a front sectional elevation of the same, the said section being taken on the line X X of Fig. 1. Fig. 3 is a front view of the setting, showing the means for automatically opening and closing the dampers by means of the fire-doors. Fig. 4 is a perspective view of one of the arch tile forming a roof over the fire-chamber. Fig. 5 is a sectional elevation of the cylinder used as a means for preventing the abrupt closing of the dampers. Fig. 6 is an inverted plan view of the same. Fig. 7 is a plan view of the cylinder, showing the valve-opening and perforations, the one to admit air to the cylinder and the other to permit the same to gradually escape.

To put my invention into practice with a boiler or other furnace, the said boiler-furnace consisting of the side walls or setting 3, a fire-chamber, the grate-bars 4, the bridge-wall 5, the ash-pit 7, the boiler 1, and stack 2, and other well-known and common features not necessary to describe, I form in the side walls 3 and at either side of the fire-chamber flues 10, opening into the ash-pit 7, and the entrance 8 of each fitted with a swinging lid or damper 9. These dampers 9 are mounted upon a shaft 16, projecting outwardly to the front of the setting and the inner ends of each fitted with a lever 18, upon which an adjustable weight 17 is placed for the purpose of keeping the said dampers tightly seated to exclude the air from the flues 10.

Arranged over the fire-chamber, at a point some distance above the grate-bars 4, is an arch 12, constructed of tile, (see Fig. 4,) each of which is formed with a series of perforations 14 and each provided with upwardly-projecting flanges 15, located at either end thereof and upon which is arranged flat tile 13, thereby forming an air chamber or compartment 11, which is in communication with the side flues 10. This arch 12, above described, extends from the front wall of the setting to a point at or near the bridge-wall 5 and is adapted to receive air from the ash-pit and discharge the same through the perforations 14 upon the top of the burning fuel in the fire-chamber below.

Attached to the forward end of each of the damper-shafts 16 is a double or angular lever, the one arm 20 arranged in a vertical position and within reach of the fire-door 6 when open and is adapted to be moved about its pivotal point by the movement of the said door, thereby opening the damper 9. The upper ends of each of these vertical levers 20 are provided with a roller 21 to reduce the friction between the parts during contact with the fire-door 6. The horizontal arm 19 of the angular levers is provided with a tread 19', by means of which the operator may open the dampers 9 independent of the levers 20.

To provide a means whereby the dampers 9 are made to close a short time after the fire-door 6, a cylinder 22 is arranged above each of the levers 19, in which are pistons 23, (see Figs. 5, 6, and 7,) the said pistons being connected by rods 24 to the levers 19. The lower end of each of these cylinders 22 is open and the upper ends closed, and the said upper ends formed with openings 25, provided with flap-valves 26, and with a series of small perforations 27. Upon the opening of the dampers 9 the piston 23 is moved downward, the valve 25 opening to fill the cylinder with air, and when the pressure of the fire-door 6 is removed from the lever 20 the weight 17 will force the piston 23 upward, slowly ex-

pelling the air through the small perforations 27, thereby keeping the damper open a short time after the fire-door 6 has been closed to furnish air to fresh fuel thrown into the furnace.

At each side of the fire-chamber and in communication with the air-flues 10 are openings 28, fitted with doors 29, which may be used to supply air to the compartment 11 in place of the entrance 8, if it is so desired.

The arch 12 over the fire-chamber may be of any size or form and located at a convenient distance above the grate-bars 4.

On the opening of the fire-door 6 the same is brought in contact with the lever 20, moving the same backward, thereby opening the damper 9. The fuel is now thrown in and the fire-door 6 closed. The damper being still open will admit air to the compartment 11 and the draft from the stack 2 draw the same forcibly downward through the perforations 14, mingling with the smoke and gases arising from the freshly-introduced fuel, and, aided by the reverberatory heat reflected from the arch 12, consume any products of combustion and entirely eliminate any smoke. The time occupied in the closing of the dampers 9 is regulated by the size of the furnace, and consequently the quantity of fuel added to the fire. By thus introducing air upon the top of the fire sufficient oxygen is introduced to consume the smoke, and before the dampers are closed a crust or coke is formed over the top of the fire which confines and burns the smoke particles.

Various changes may be made in the general details of construction without departing from the spirit of the invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a furnace, the combination, with the combustion-chamber having a perforated cover and an air-space above said cover communicating with the ash-pit beneath the combustion-chamber at opposite sides thereof, of a pair of shafts arranged in the ash-pit, a swinging damper mounted on each of said shafts for closing the inlets to the air-space, an angular lever mounted on each of said shafts with its one arm arranged in a vertical position to be engaged by the fire-door of the furnace and its other arm extending normally in a horizontal position, cylinders mounted at the front of the furnace, pistons operating in said cylinders with their rods connected to the horizontal arms of the angular levers, and means whereby said pistons are operated in a manner to obtain a gradual closing of the dampers, as and for the purpose set forth and described.

2. In a furnace, the combination, with the combustion-chamber having an arched perforated cover with an air-space above the same and extending downwardly in the side walls of the furnace and communicating with the ash-pit beneath the combustion-chamber, of the shafts journaled within the ash-pit on opposite sides thereof, dampers mounted on said shafts for closing the inlets to the air-space, means mounted on the inner ends of said shafts for closing and retaining the dampers in the closed position, angular levers mounted on the outer ends of said shafts with one arm arranged vertically in proximity to the fire-doors and the other arm extending normally in a horizontal manner, rollers mounted on said vertical arms and adapted to be engaged by the fire-doors when the latter are opened, cylinders mounted at the front of the furnace, pistons operating in said cylinders with their rods connected to the horizontal arms of the angular levers, and means whereby said pistons are gradually operated when the fire-doors are closed to permit a gradual closing of the dampers, substantially as described.

3. In combination, in a furnace, a combustion-chamber having a perforated cover and an air-space above said cover and in the side walls of the furnace communicating with the ash-pit underneath the combustion-chamber, shafts arranged within the ash-pit on opposite sides thereof, dampers mounted on the said shafts for closing the inlets to the air-space, weights mounted on the inner ends of said shafts for closing and retaining the dampers in the closed position, means mounted on the outer ends of the shafts and adapted to contact with the fire-doors of the furnace for automatically opening the dampers as the fire-doors are opened, and means connected to said shafts for resisting the pressure of their weights when the fire-doors are closed to cause a gradual closing of the dampers, as and for the purpose described and set forth.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

JOHN A. BECK.

Witnesses:
JOHN GROETZINGER,
M. E. HARRISON.