

(No Model.)

G. Y. ALLAIRE.
SMOKE CONSUMING FURNACE.

No. 574,651.

Patented Jan. 5, 1897.

Fig. I

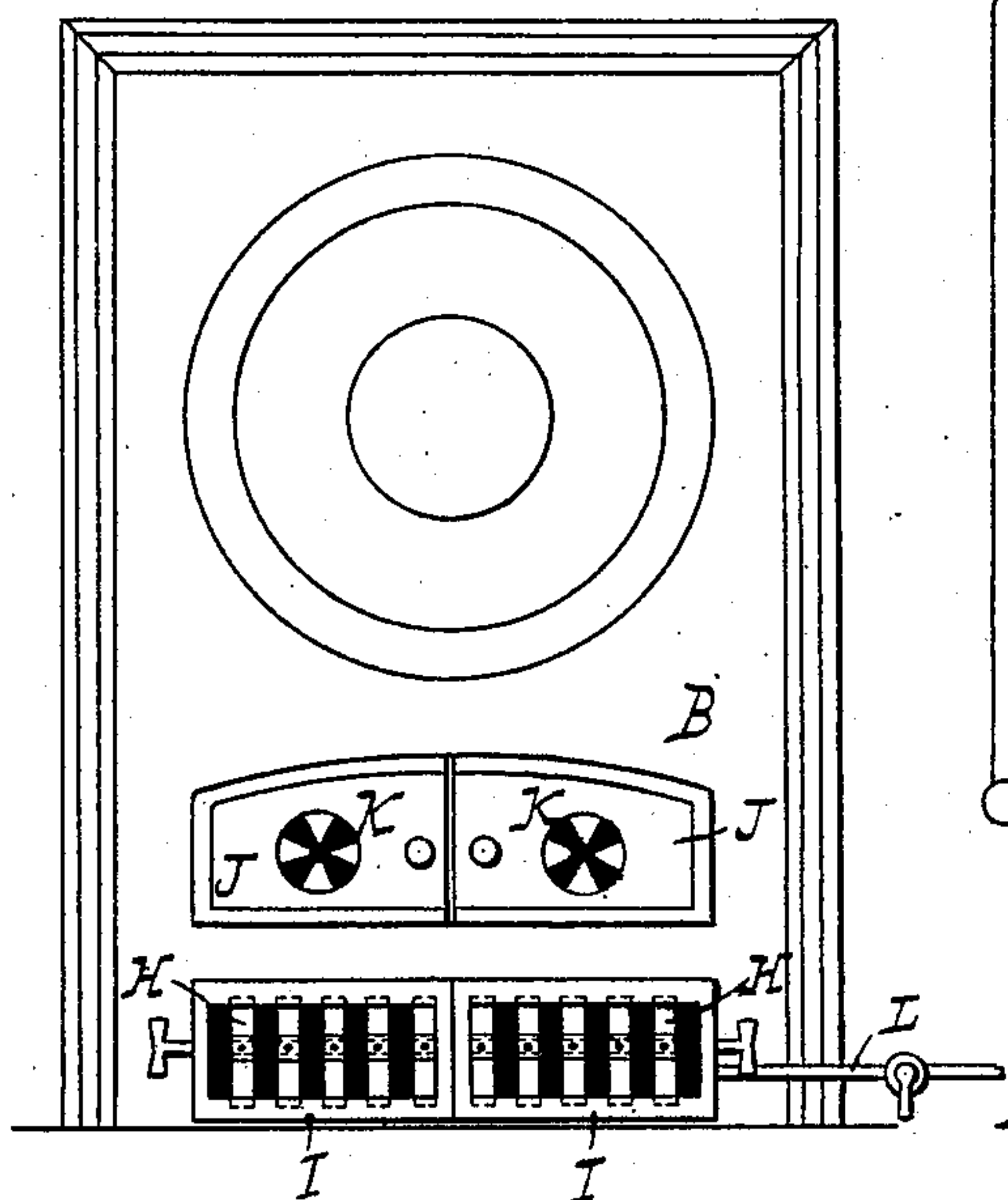


Fig. III

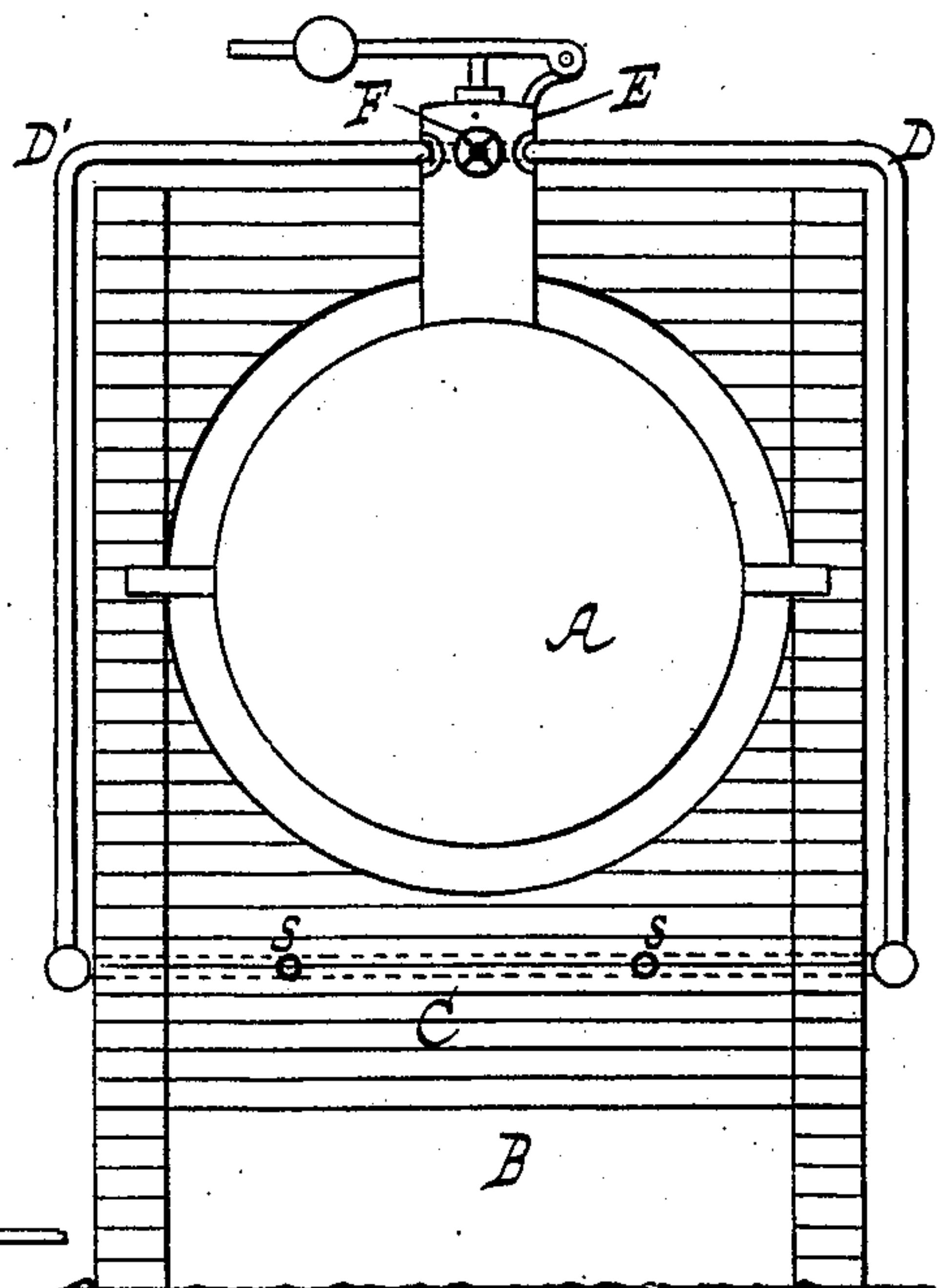
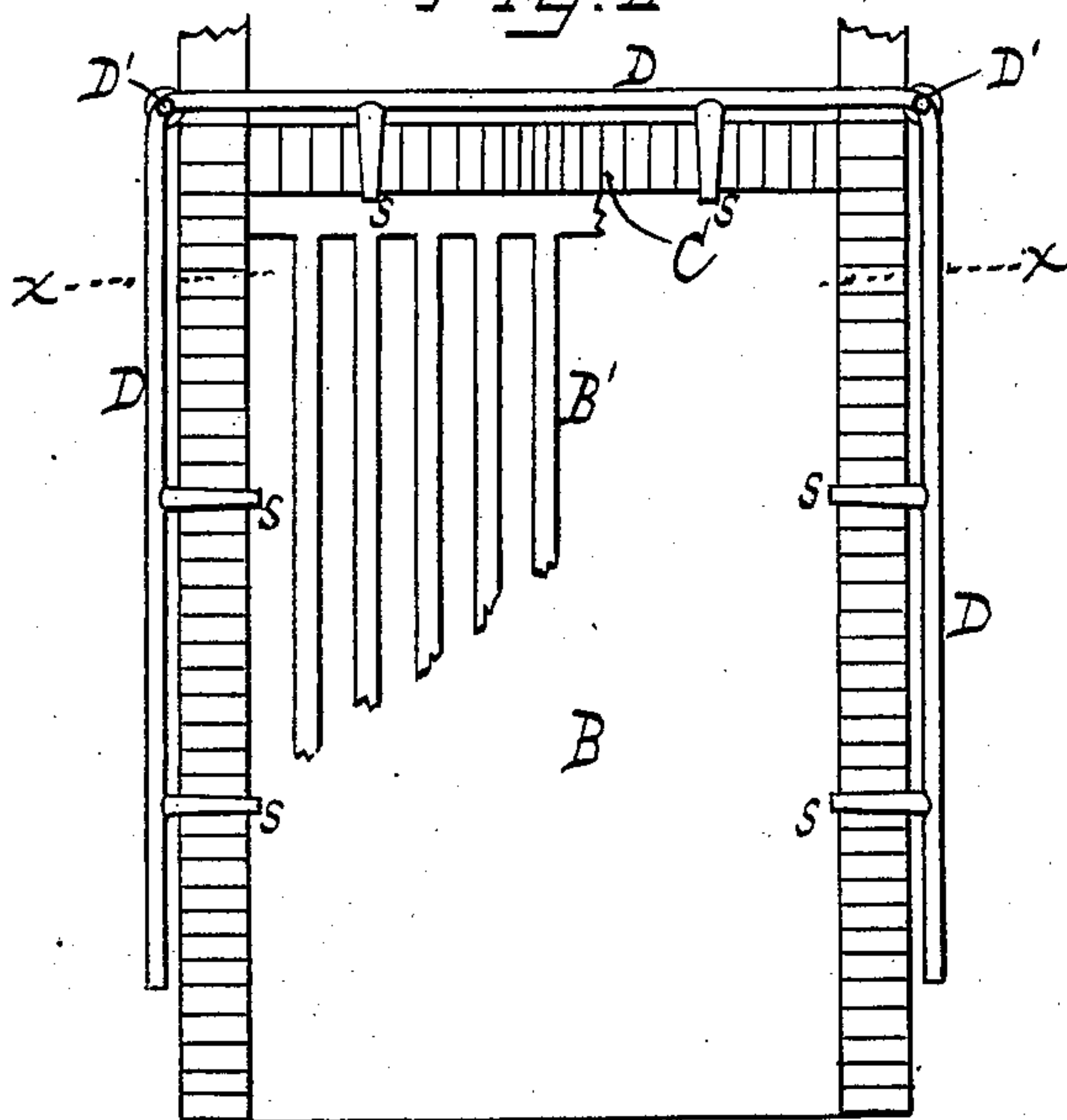


Fig. II



Witnesses
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GEORGE Y. ALLAIRE, OF CRESSKILL, NEW JERSEY, ASSIGNOR OF TWO-THIRDS TO JOHN P. STOCKTON, JR., AND RICHARD STOCKTON, OF JERSEY CITY, NEW JERSEY.

SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 574,651, dated January 5, 1897.

Application filed July 17, 1896. Serial No. 599,491. (No model.)

To all whom it may concern:

Be it known that I, GEORGE Y. ALLAIRE, a citizen of the United States, residing at Cresskill, in the county of Bergen and State of New Jersey, have invented certain new and useful improvements in consuming smoke and gaseous products of bituminous coal by burning and converting them to caloric in a furnace, thereby increasing the heating power of a given quantity of fuel; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

Heretofore numerous devices and methods have been introduced and tried to effect the purpose mentioned without wholly or regularly accomplishing the object, because some one or more of the essential means or operations were not discovered and practiced at certain stages of the combustion of the fuel, and consequently a portion of the dense cloud of smoke emitted from igniting soft coal escaped from the furnace unconsumed. This circumstance or fact seems up to the present time to have prevailed, and observation has shown that as a general rule such escape of the smoke occurs at each occasion of starting the furnace-fire and of replenishing it with fresh fuel of the kind named. After much careful examination of the causes of failure of all former attempts to convert the crude products of combustion arising from soft coal into incandescent blow or flame and the trial of many methods of effecting the object I have discovered a definite method of procedure which will accomplish the continuous conversion of the smoke and gas of bituminous coal into glowing caloric as it is being used in a furnace of any known description.

To enable others to understand and practice my invention or discovery, I will now describe the agencies I employ and set forth the series of steps or operations necessary to be observed in their certain regular order or succession.

In the accompanying drawings, forming part of this specification, Figure 1 represents a front elevation of a furnace and boiler of the usual description provided with furnace-

doors and ash-pit doors and dampers. Fig. 2 represents a plan view of the side walls of the furnace and the vertical bridge-wall of the furnace and exhibits the steam-pipe extending across the rear of the bridge-wall and along the sides of the side walls; and Fig. 3 represents a front view of the bridge-wall and a portion of the side walls, steam-feed pipes, and their appurtenances, being a vertical section at line X X of Fig. 2.

A denotes the steam-boiler, B the furnace, and B' the grate-bars; C, the bridge-wall; D, the steam-pipe; D', the steam-feed pipes connecting with the boiler-dome E, and s denotes the six steam-jet pipes that connect with the steam-pipe D and enter the furnace. The jet pipes or nozzles s are arranged equal distance apart, passing from the outside of the side walls and the bridge-wall of the furnace, as represented, and are on a plane about two feet above the level of the fuel-grate and approximately three inches below the top of the center of the bridge-wall C. The stop-cock F is to regulate the ingress of steam from the dome E to the feed-pipe D', that connects with steam-supply pipe D, from which the jet-pipes s extend through the walls and bridge. The flue above the bridge-wall is about ten inches deep.

Each of the ash-pit doors I has five sliding dampers H, and the furnace-doors J are provided with rotary dampers K. Water-pipe L, with a stop-cock, communicates with the ash-pit and connects at its opposite end with a water-tank, and by these means the quantity of ashes of some three inches in depth is constantly saturated for the purpose of producing wet steam or vapor under the grate.

I regulate the quantity of dry steam admitted by means of stop-cock F and by the use of quarter-inch jet-pipes arranged at the sides and rear of the furnace, as any excess thrown into the body of the furnace over the fire at the time the smoke is to be inflamed tends to diminish the degree of heat generated from the fuel and to check the otherwise prompt consumption of the gas and smoke, and for the more important reason that by the retention of a layer or body of wet ashes in the ash-pit regularly supplied with a quantity

of water to permeate its mass (without flooding the ash-pit) causes a constant vapor to arise up through the burning fuel and augments combustion and heat throughout the incandescent fuel. This sheet of vapor from the ash-pit continues to furnish an increased supply of oxygen throughout the fuel after the smoke has been consumed and the steam from the jet-pipes is entirely cut off. By this method of operation I unite the advantages of the use of steam diffused above the grate and burning coal with wet steam or vapor arising from below the incandescent fuel, and thus I am enabled to assure a continuous combustion of the crude products arising from burning bituminous coal even during the short interval of time when a fresh supply of fuel is being spread upon the fire in the furnace and while the steam is cut off from entering the furnace.

My new method or process of consuming the smoke, soot, and gas generated from burning bituminous coal is capable of use in furnaces of any known construction, as it is apparent that the agencies I employ may be variously modified.

The several operations necessary to be observed in their due order in practicing the invention or discovery are the following: A fire is started in a furnace with coke or wood with full draft of air through the ash-pit doors or dampers, and when the fuel has become well ignited and emits a red glow of heat the ash-pit doors and their dampers are tightly closed, and an ordinary supply of coal is spread over the burning mass of fire, and the furnace doors and dampers are also closed, so as to prevent any draft from carrying away the dense cloud of smoke generated from a fresh supply of bituminous fuel. Then steam is admitted into the body of the furnace at once through the six small jet-pipes in such quantity as the magnitude of the furnace and its burning fuel may demand. Thereupon while the smoke and products of combustion are retained in the furnace revolving above the fuel a sudden burst of a volume of flame is caused, igniting and consuming them, whereupon the dampers in the ash-pit doors are quickly opened, admitting a draft of air and vapor from the ash-pit under the grate to arise, whereby the entire emission of smoke and gas is entirely consumed and the full benefit of the fuel is utilized. As soon as the smoke and gas are aflame the steam is at once cut off and the extra supply of oxygen needed is furnished from the vapor arising from the ash-pit.

At each occasion of replenishing the fire with coal the same succession of steps and operations are followed which have been de-

scribed as performed after starting the fire in the furnace at the beginning.

The fuel, preferably coke, will be brought to a state of glowing heat in starting a fire on the grate with free air-draft through the openings of the ash-pit dampers. Meanwhile the furnace-doors and their dampers and the ash-pit doors will be entirely closed to the admission of air through them, and this may be deemed the normal condition.

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

1. The method herein described of burning and utilizing the smoke, soot and gas produced by the use of bituminous coal as fuel, consisting of the series of continuous steps or acts in succession after the fire has been started, namely, excluding air-draft below the body of fuel, supplying bituminous coal to the incandescent fuel, excluding air-draft above the fuel, thus cutting off all draft and preventing escape of smoke, producing ignition of the smoke evolved by the admission of dry steam, admitting air-draft below the fuel, supplying an ash-saturating body of water to insure a continuous emission of wet steam passing up through the burning fuel with the air-draft and cutting off ingress of steam above the body of fuel, substantially as described.

2. The method herein described of burning the smoke and combustible products emitted from the use of bituminous coal as fuel, which consists in closing off all draft of air from admission to the burning fuel when freshly supplied to the fire, and immediately admitting and diffusing a quantity of dry steam above the body of the fire, and then admitting draft of air below the fuel, supplying a body of water to the ashes of the fuel causing the same to pass continuously in the form of wet steam together with the draft of air up through the burning fuel, and at the same time cutting off ingress of steam above the body of fuel, substantially as specified.

3. The method described of burning the smoke and combustible products resulting from bituminous coal as a fuel which consists in supplying dry steam above the body of fuel after replenishing such fuel in the absence of air-draft, and subsequently causing a continuous supply of wet steam to pass up through the fuel together with an air-draft from below it, substantially as specified.

Signed and dated this 11th day of July, 1896.

GEORGE Y. ALLAIRE.

Witnesses:

H. P. K. PECK,

A. R. PECK.