

(No Model.)

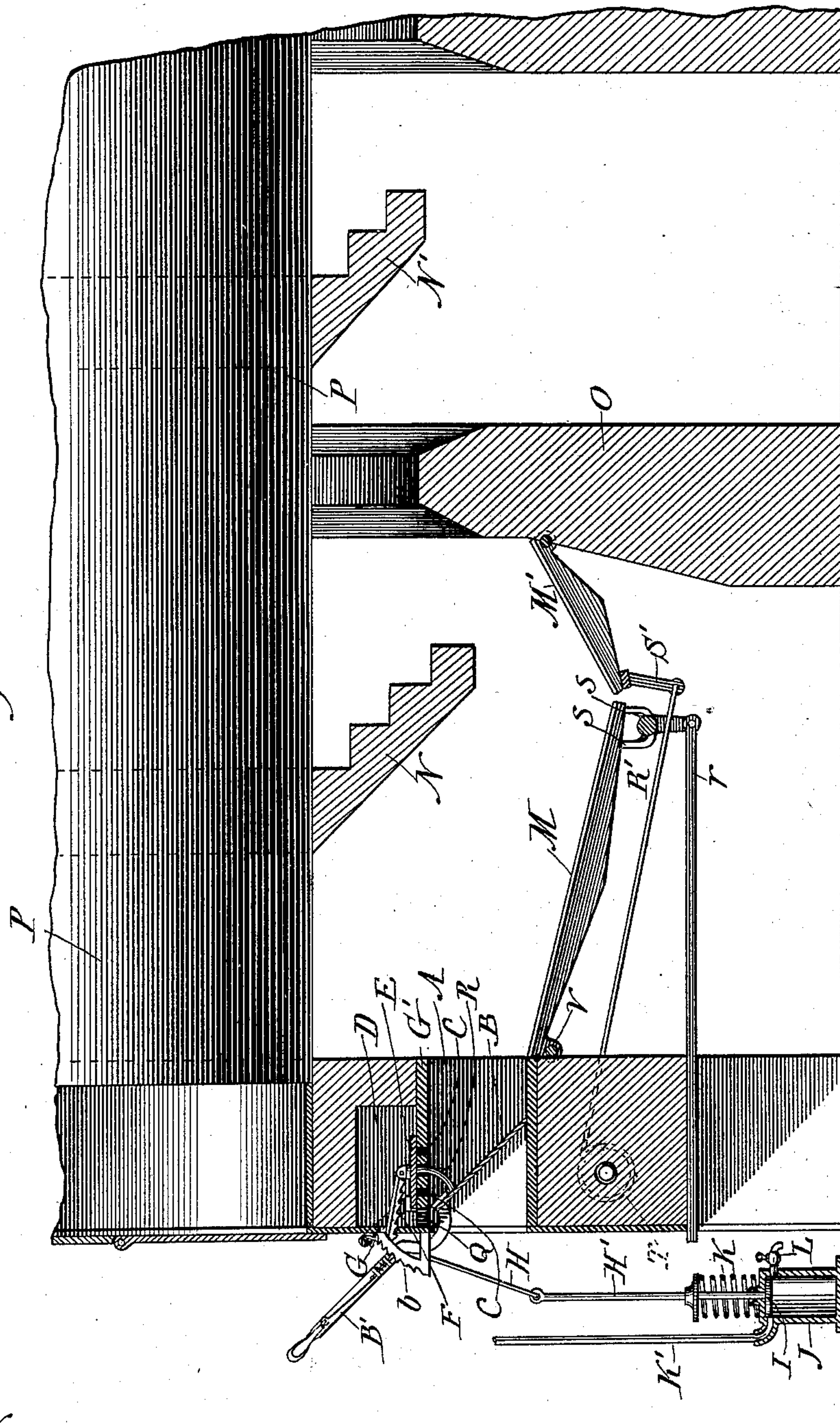
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G. McDOWELL.
SMOKE CONSUMER.

No. 406,757.

Patented July 9, 1889.

Fig. 1.



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Fig. 2.

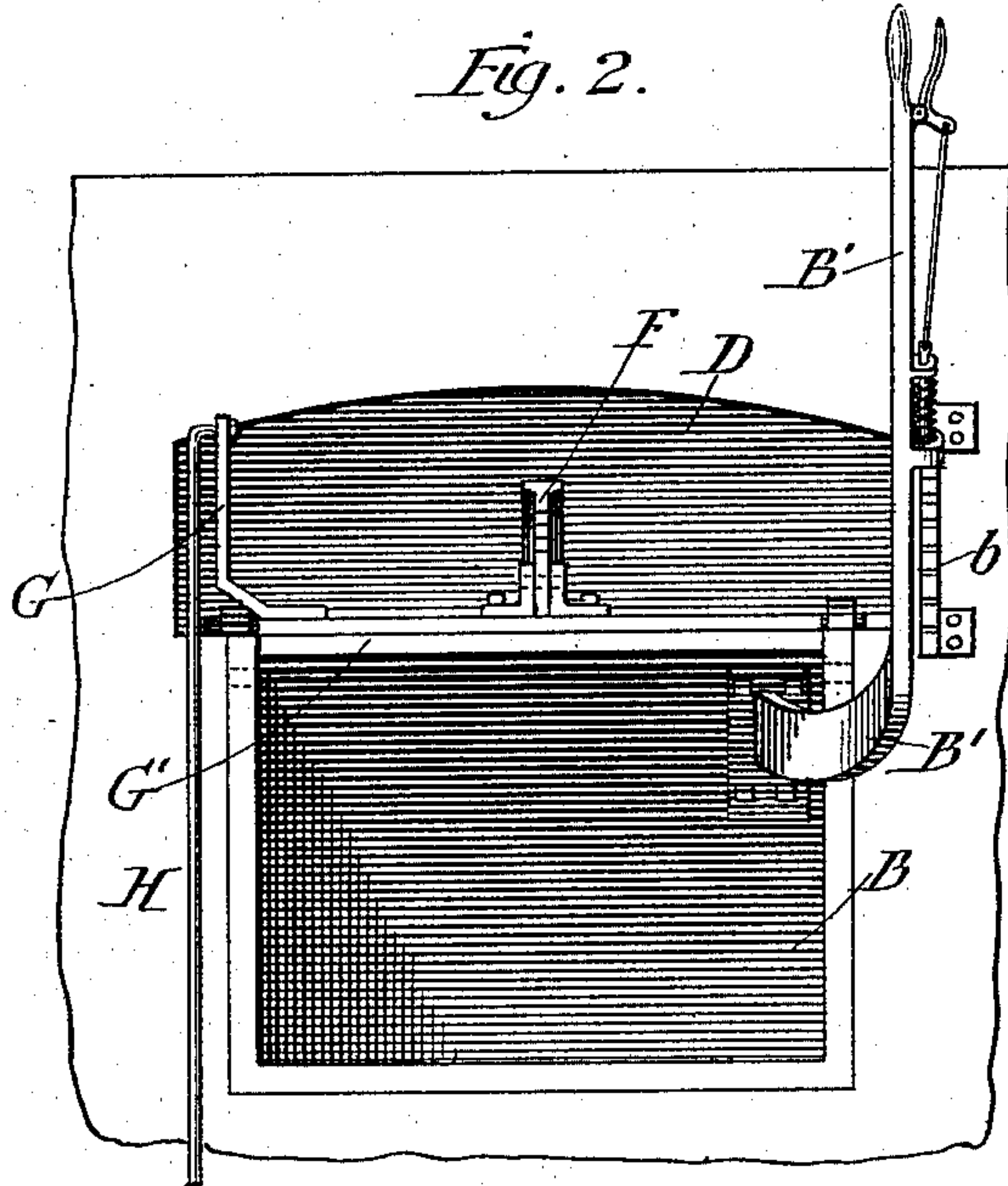
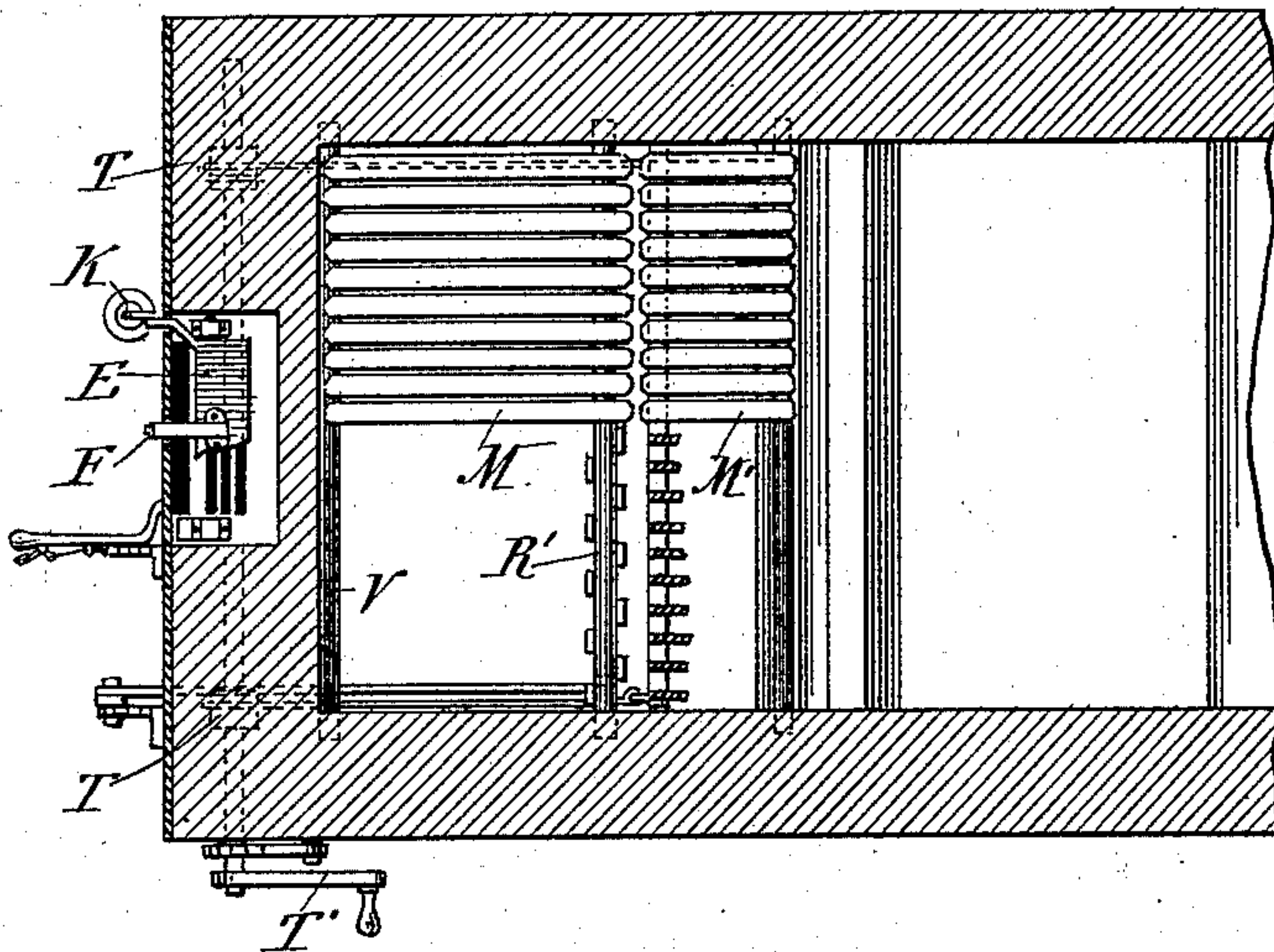


Fig. 3.



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UNITED STATES PATENT OFFICE.

GORDON McDOWELL, OF EVANSTON, ILLINOIS.

SMOKE-CONSUMER.

SPECIFICATION forming part of Letters Patent No. 406,757, dated July 9, 1889.

Application filed January 3, 1889. Serial No. 295,376. (No model.)

To all whom it may concern:

Be it known that I, GORDON McDOWELL, a citizen of the United States, residing at Evanston, Cook county, Illinois, have invented
5 a new and useful Improvement in Smoke-Consumers and Fuel-Savers, of which the following is a specification.

It is the object of my invention to provide
10 a simple economical smoke-consumer, which is furthermore provided with an automatic device to regulate the closing of the door for the admission of air. As is well known, the fireman or engineer frequently neglects to regulate the opening of this door, which is es-
15 sential to the operation of this device, and this difficulty it is the object of my invention to avoid.

In the drawings, Figure 1 represents a vertical section through the center of a furnace,
20 showing my device as applied to the same; Fig. 2, a front elevation with part of the front casing removed; and Fig. 3, a sectional view of part of Fig. 1, showing the grate-bars, &c., on a slightly-reduced scale.

25 A represents the opening into the furnace; B, the door for closing such opening or fuel-door; B', the lever for opening and shutting such door; b, a notched quadrant for holding the lever B' in any desired position; C C, slots
30 or perforations connecting the furnace-entrance with the air-chamber; D, the air-chamber; E, a door for closing the slots; F, a bar provided with notches for holding the door in any desired position; G, an arm rigidly attached to the door E; H H', rods connecting
35 the arms G with the piston I; J, a cylinder in which said piston moves; K, a spiral spring inclosing the piston-rod H'; K', a water-pipe; L, a petcock; M M', the grate-bars; N N', def-
40 flectors; O, the bridge-wall, and P the boiler.

In making my improved smoke-burner I make a door B, of iron or other suitable material, and hinged at a point within the entrance to the furnace and resting, when closed,
45 preferably in an inclined position, as shown in Fig. 1. To open this door, I provide a hand-lever B', which is rigidly attached thereto. This lever is provided with a smaller spring-lever upon its side, which engages with the
50 teeth of the quadrant B, whereby the door is held in any desired position. Above the en-

trance to the furnace I construct a chamber D, of any desired dimensions, and provide an opening Q outside of the door D for the ad-
mission of air into the chamber D, which open- 55
ing is never closed. I then make in the arch separating the entrance A from the chamber D one or more slots or perforations C for the admission of air to the furnace. To close
60 these slots, I provide a door E, which preferably consists of a metallic plate pivoted at the end nearest the front of the furnace. To open this door, I provide a curved arm R, which is rigidly attached to the back of the
65 door B and passes up through one of the slots or perforations C, and comes in contact with the door E. It is evident that as the door B is opened the rod R will lift the door E, so as to open the slots or perforations gen-
70 erally covered thereby.

To provide means for automatically regulating the closing of the door E, I attach to one end of the door an arm G and connect this arm by means of the rods H H' to a piston I, sliding in a cylinder J, placed at any
75 suitable point outside of the furnace. A spiral spring K is placed around the piston-rod H' and so arranged that as the piston is forced down the spring will be compressed and tend to draw the piston up again. At
80 the upper end of the cylinder I provide a petcock and a water-pipe, at the bottom of which pipe is a check-valve. My improvement may be provided with either or both of these de-
85 vices for controlling the action of the door E.

My improved smoke-consumer is adapted to be used with any ordinary stationary furnace whether provided with fixed or rocking grate-bars, and I have shown in the drawings
90 a particular form of rocking grate which I find it advantageous to use, although I do not claim this particular construction as any part of my present invention. As will be seen from the drawings, more particularly Figs. 1 and 3, these grate-bars are arranged in two
95 sets M and M' and are set longitudinally in the furnace. The bars M incline downward from the front of the furnace and are attached at their forward ends to a bearing-rod V, upon which they rotate freely. I then
100 construct a bar R', resting in suitable bearings in the furnace-walls and rotated by a

rod *r* and a lever attached to the outer end thereof. Projecting upward from the rod *R'* are a series of radial arms *S S*, arranged upon the rod alternately, as shown in Fig. 3. The grate-bars *M* are attached to these radial arms, the first bar to the radial arm on the forward side of the rod *R'*, the next bar to the arm upon the rearward side thereof, and so on alternately, from which it results that as the bar *R'* is oscillated all of the even-numbered bars will be drawn down and the odd-numbered ones pushed upward, or vice versa, whereby the ashes are sifted out and the clinkers thrown down upon the bars *M'*. To permit of the discharge of the clinkers from these latter bars, I fasten them to a bearing-rod fixed in the bridge-wall, upon which they are free to rotate, and at the forward end of these bars I attach a lever *S'*, connecting by means of a chain with the drum *T*, adapted to be turned by means of the crank *T'*. As the chain is wound up on this drum, it will raise the bars *M'* into the position shown in Fig. 1 and hold them there; but if the drum be released and the chain allowed to unwind the bars will fall backward against the bridge-wall and the clinkers be discharged into the ash-pit. Afterward the chain may be wound up and the bars returned to their former position. The construction and mode of operation of these bars being sufficiently clear from the above description, when taken in connection with the drawings, I will give no further description of them here.

The furnace should be provided with a bridge-wall and one or more deflectors. Of these deflectors I prefer to use two, of the form and size and located in the positions shown in the drawings; but their form, size, number, and location may be altered to suit the circumstances of the particular case without departing from my invention.

My device operates as follows: When the door *B* is opened in the starting of the fire or for the admission of fresh charges of fuel, or at any other time desired, it operates by means of the arm *R* to raise the door *B*. As this door is raised the air will pass from the chamber *D* through the slots or perforations *C* into the fire-box in sufficient quantities to unite with the distilled gases, insuring perfect and complete combustion. The air striking against the surface of the burning fuel passes over it, and is turned downward by the first of the deflectors *N*, and then passing up over the bridge-wall and under the next deflector, being by this means kept in close contact with the fuel. As the door *E* revolves upon its bearings the arm *G* revolves with it, and by means of the rods *H H'* forces down the piston *I* toward the bottom of the cylinder against the force of the spring. The piston in passing downward opens the check-valve in the water-pipe, and that part of the cylinder above the piston becomes filled with water from any suitable sources of supply. When the door *B* is closed, the door *E* tends

by its weight to be restored to its former position, and the force of the expansion of the spring *K* tends to raise the piston, and, the check-valve in the water-pipe being closed, the water is forced out of the cylinder through the petcock *L*. It is evident that the door *E* will remain open during the time which it takes to force the water out of the cylinder, and that this time may be regulated as desired by regulating the opening of the cock. As will be readily seen, means are thus provided whereby the door shall automatically close without requiring more upon the part of the attendant than the adjusting of the cock and the opening and closing of the door *B*.

Although I have shown and described the water-cylinder, &c., as the means of controlling automatically the closing of the door *E*, I do not desire to limit myself to that precise construction, since I consider that any other mechanical means for regulating such closing would be within my invention, which consists, as to this part of it, in providing for the automatic closing of the door *E*.

I am aware of Patents No. 141,574, granted August 5, 1873, to McGinniss and Naylor, and No. 385,509, issued July 3, 1888, to Ellis and Ellis, and I do not herein claim to cover anything described in either of said patents; but

I claim—

1. A furnace provided with slots for the admission of air to the fire situated above the furnace-door, having a door for closing such slots, and means for automatically regulating the closing of such door, substantially as described.

2. The combination of a chamber situated above the entrance to the furnace and communicating therewith by means of slots or perforations, a door for closing such slots, and means for automatically regulating the closing of such door, substantially as described.

3. The combination of the fuel-door, a chamber situated above the entrance to the furnace and communicating therewith by means of slots or perforations, a door for closing such slots, and an arm secured to the fuel-door and adapted to open the slot-door, substantially as described.

4. The combination of the fuel-door, slots or perforations in the roof of the furnace-entrance, a door for closing such slots, an arm secured to the fuel-door and adapted to open the slot-door, and means for automatically regulating the closing of such door, substantially as described.

5. The combination of the fuel-door *B*, lever *B'*, for opening such door, chamber *D*, slots *C C*, door *E*, for closing such slots, arm *R*, for opening door *E*, and means for automatically regulating the closing of such door, substantially as described.

6. The combination of door *B*, having lever *B'* and arm *R*, chamber *D*, slots *C C*, and door

E, arm G, rods H H', piston I, spring K, and cylinder J, having pipe K' and cock L, substantially as described.

5 7. The combination of the fuel-door, an air-chamber situated above the entrance to the furnace and communicating therewith by means of slots or perforations for the admission of air to the fire, a door for closing such slots, an arm attached to the fuel-door for
10 opening the slot-door, and deflectors for directing the air downward toward the fire, substantially as described.

15 8. The combination of an air-chamber situated above the entrance to the furnace and communicating therewith by means of slots or perforations, a door for closing such slots, an arm attached to the fuel-door for opening

the slot-door, and means for automatically regulating the closing of such door, substantially as described.

20 9. The combination of an air-chamber situated above the entrance to the furnace and communicating therewith by means of slots or perforations, a door for closing such slots, an arm attached to the fuel-door for opening
25 the slot-door, means for automatically regulating the closing of such door, and deflectors for directing the air downward toward the fire, substantially as described.

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