

No. 719,394.

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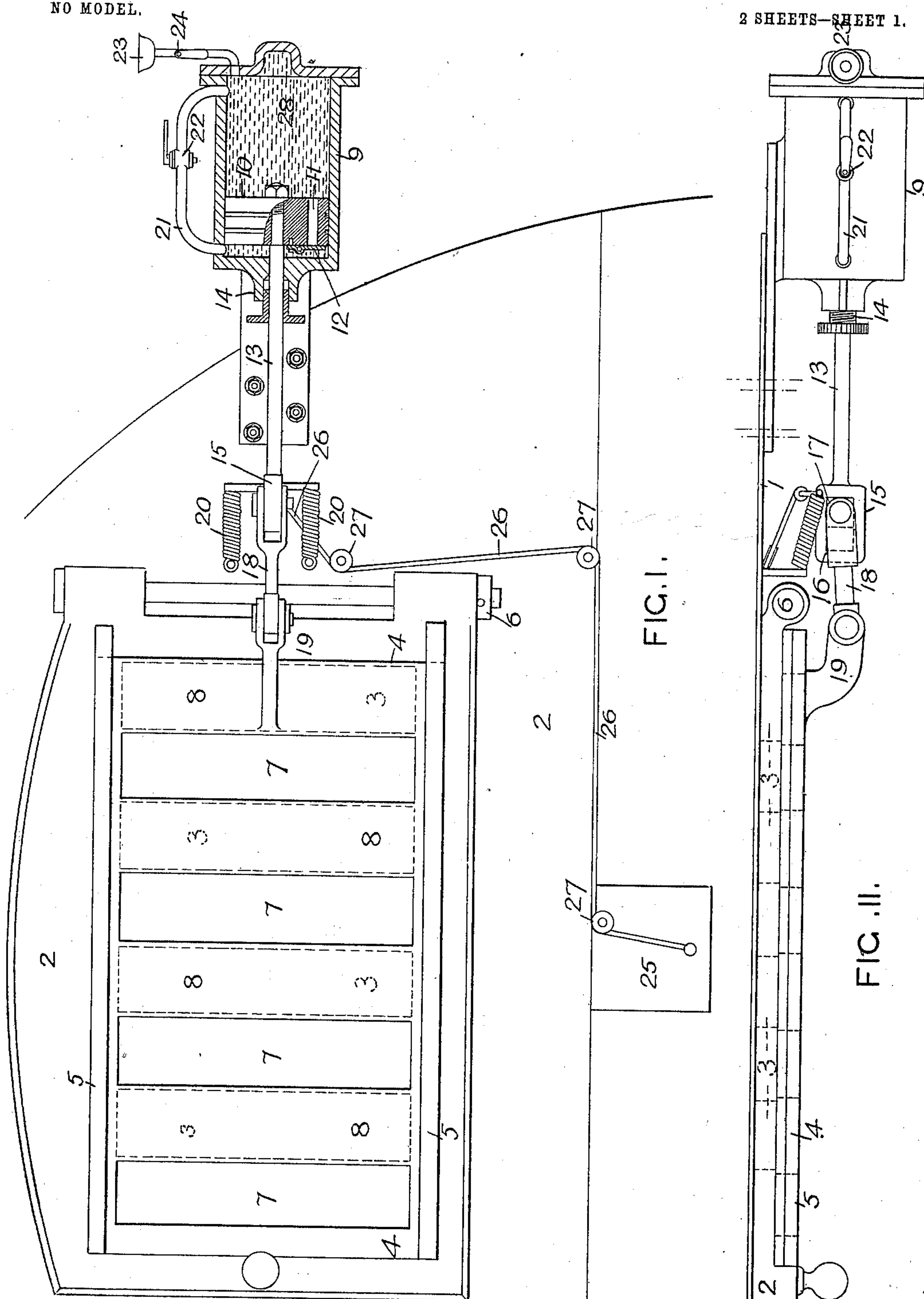
G. B. TYLER.

# DRAFT REGULATING APPARATUS FOR FURNACES.

APPLICATION FILED MAY 2, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



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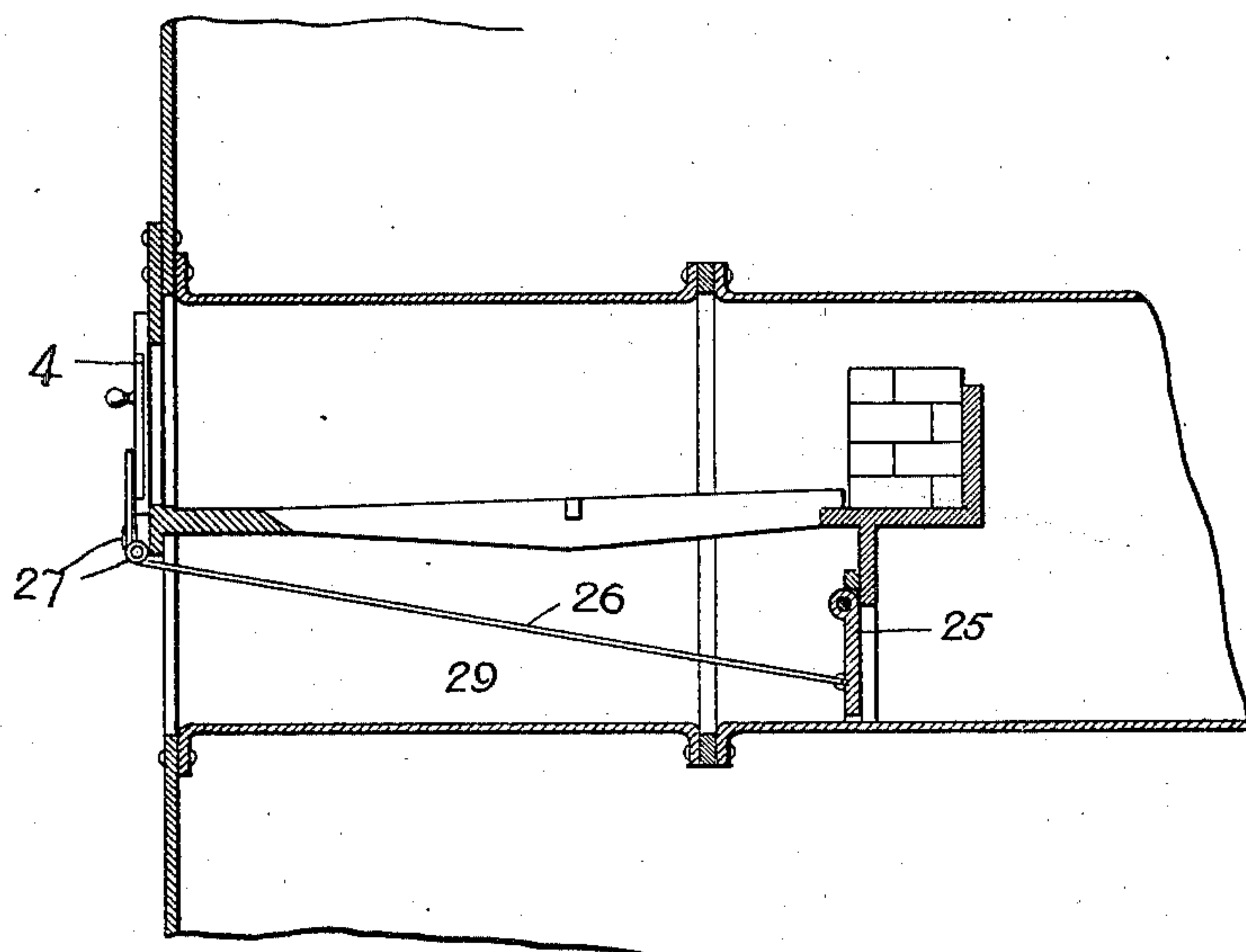


FIG. III.

*Inventor,*

*George Benjamin Tyler.*

*per,*

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*Attorney.*

*Witnesses,*  
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# UNITED STATES PATENT OFFICE.

GEORGE BENJAMIN TYLER, OF COVENTRY, ENGLAND.

## DRAFT-REGULATING APPARATUS FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 719,394, dated January 27, 1903.

Application filed May 2, 1902. Serial No. 105,692. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE BENJAMIN TYLER, a subject of the King of Great Britain, residing at Coventry, in the county of Warwick, England, have invented certain Improvements in Draft-Regulating Apparatus for Furnaces, of which the following is a specification.

My invention relates to draft-regulating apparatus for furnaces, and has for its object to provide automatic means for the diminution of black smoke, and hence to economize the fuel, the same to be applicable to both land and marine boilers and, while automatic, to be adjustable to suit different qualities of coal.

My invention consists, essentially, in providing the furnace-door with a draft-inlet of variable area, the said inlet being fully opened by the action of closing the door and then gradually closed by the action of a spring, weight, or the like, such closing action being retarded by a piston in a horizontal cylinder forcing liquid through an aperture of restricted and preferably adjustable area; and my invention further consists in connecting the draft-door at the back end of the ash-pit with the furnace-door, so that the said draft-door is opened by the action of opening the furnace-door and then gradually closed by its own weight, the closing being retarded by a piston in a horizontal cylinder forcing liquid through an aperture of restricted and preferably adjustable area.

In the accompanying drawings, Figure I is an elevation, partly in section, showing my invention applied to a furnace, the inlets in the door and the back end of the ash-pit being closed. Fig. II is a plan of the same. Fig. III is a longitudinal section through part of the furnace on a reduced scale.

The same numerals refer to the same parts throughout the drawings.

I provide the furnace-door 2 with a series of vertical slots 3, and in front of the said slots I mount a plate 4 in guides 5, situated at right angles to the hinge-pin 6. The plate 4 is also provided with vertical slots 7, the arrangement being such that by moving the plate 4 the two sets of slots 3 7 may be made to coincide to a greater or less extent, or the solid parts 8 of the plate may be made to eclipse the slots 3 in the door. The slotted

parts 2 and 4 are together hereinafter referred to as the "register." Means should be provided for supplying a large quantity of air or oxygen when the coal is first put on the fire, and then the quantity of air or oxygen should be gradually reduced to the normal. Hence I arrange that the closing of the furnace-door shall serve to open the register, which shall remain open for a time, being gradually closed automatically. For this purpose I employ a horizontal cylinder 9, adapted to contain oil or other suitable liquid 28. In the cylinder is arranged a piston 10, and the piston is provided with an aperture 11, one end of which is normally closed by a clack-valve 12. The piston-rod 13 passes out at one end of the cylinder through a suitable gland 14 and carries at its free end a frame 15, having a longitudinal slot 16. In the said slotted frame is mounted a block 17, to which is jointed one end of a link 18. The other end of the link is jointed to a knuckle 19, projecting from the plate 4 of the register. The axis of the knuckle-joint is parallel to and at a suitable distance from the axis of the hinge of the furnace-door. The piston-rod 13 and link 18 are arranged in substantially one horizontal plane and form a very simple and direct connection. A spring, a weight, or the like tends to draw the piston-rod forward. In the drawings I have shown a pair of tension-springs 20, connected to the frame 15 at one end and to the front of the furnace 1 at the other end. A pipe 21, provided with a suitable cock 22, connects the two ends of the cylinder 9. A filler 23, having a tap 24, may be provided for introducing the liquid into the cylinder 9.

Supposing the plate 4 to be at its extreme left-hand position—that is, the register being fully closed—the action is as follows: When the furnace-door 2 is opened, the link 18 and block 17 act on the piston-rod 13 and piston 10 so as to force the said piston from the front to the back end of the cylinder. This movement is rendered possible by the aperture 11 and valve 12 in the piston, the liquid in the cylinder passing from the back to the front of the piston as the latter moves back in the cylinder. The slot 16 in the frame 15 on the end of the piston-rod 13 and the freedom of the plate 4 relatively to the door 2 allow of the said door being shut without moving the



piston 10; but the action of shutting the door 2 first causes the link 18 to draw the block 17 to the other end of the slot 16. Continuance of the action causes the plate 4 to drag and  
 5 slide relatively to the door and opens the register. The forcing back of the piston 10 has put the springs 20 in tension, and these springs now tend to return the piston to its forward position. The action, however, is retarded by  
 10 the liquid, which, owing to the automatic closing of the valve 12, cannot return through the aperture 11 in the piston. The liquid therefore has to pass through the pipe 21, connecting the two ends of the cylinder, and its  
 15 passage is more or less obstructed by the cock 22, which may be adjusted to regulate the flow of the liquid therethrough, and hence to time the closing of the register. As the piston 10 is gradually drawn forward the piston-  
 20 rod 13 acts upon the block 17 and link 18, and hence upon the plate 4, drawing all these parts forward, and thus causing the solid parts 8 of the plate to gradually cover the slots 3 in the furnace-door. The piston-rod 13 may also be  
 25 coupled up to the draft-door 25 at the back of the ash-pit 29, as by the wire 26, passing over the pulleys 27, so that the said draft-door 25 is opened when the furnace-door 2 is opened and is gradually closed as the register is closed.  
 30 As the hydrocarbon is burned so the register and ash-pit draft-door close automatically, the carbon being burned by the air passing up through the fire-bars. No unnecessary air is allowed to pass into the furnace or flues. The  
 35 air that passes through the fire-door is heated by mixing with the hydrocarbon, and the passage of cold air through the flues is thus prevented. The closing of the register is so timed as to regulate the amount of air required to  
 40 prevent the hydrocarbon passing through the flues without being burned. My apparatus also prevents the back draft which so often occurs when fresh coal is thrown on the fire if the fire-doors are closed. It thus prevents acci-  
 45 dents arising from flame and ashes being blown through the fire-door onto the stoker. I find also that it prevents clinkers forming and caking on the fire-bars, and this entails the great advantage that the passage of air  
 50 through the fire-bars does not become obstructed. A good heat is kept up in the fire and all the carbon is consumed, only pure ash being left. The more perfect combustion of the hydrocarbon necessarily results in econ-  
 55 omy of the fuel.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In draft-regulating apparatus for furnaces, the combination with the furnace of, a door having slots, a plate having slots and  
 60 adapted to cover and uncover the slots in the door, a horizontal cylinder adapted to contain a liquid, a piston having an aperture therethrough, and adapted to move in the said cylinder, a valve adapted to close the  
 65 said aperture, a piston-rod having a slotted frame, a block adapted to move in the said slotted frame, a knuckle on the said plate, a link adapted to connect the said knuckle to the said block, means for drawing the said  
 70 piston toward the said door, a pipe connecting the two ends of the said cylinder, and a cock in the said pipe.

2. In draft-regulating apparatus for furnaces, the combination with the furnace-door  
 75 and ash-pit back door of, a horizontal cylinder adapted to contain a liquid, a piston having an aperture therethrough and adapted to move in the said cylinder, a valve adapted to close the said aperture, a piston-rod having a  
 80 slotted frame, a block adapted to move in the said slotted frame, a pipe connecting the two ends of the said cylinder, a cock in the said pipe and means for connecting the said ash-pit back door to the said block.  
 85

3. In draft-regulating apparatus for furnaces, the combination with the furnace of, a door having slots, a plate having slots and adapted to cover and uncover the slots in the door, guides for the said plate, a cylinder  
 90 adapted to contain a liquid, a piston having an aperture therethrough and adapted to move in the said cylinder, a valve adapted to close the said aperture, a piston-rod having a slotted frame, a block adapted to move in the said  
 95 slotted frame, a knuckle on the said plate, a link adapted to connect the said knuckle to the said block, a spring adapted to draw the said piston toward the said door, a pipe connecting the two ends of the said cylinder, a  
 100 cock in the said pipe, an ash-pit back door and means for connecting the said ash-pit back door to the said block.

In testimony whereof I have signed my name to this specification in the presence of  
 105 two subscribing witnesses.

GEORGE BENJAMIN TYLER.

Witnesses:

JOHN T. FAZAKARLEY,  
 FRANK GAWTHORP.