

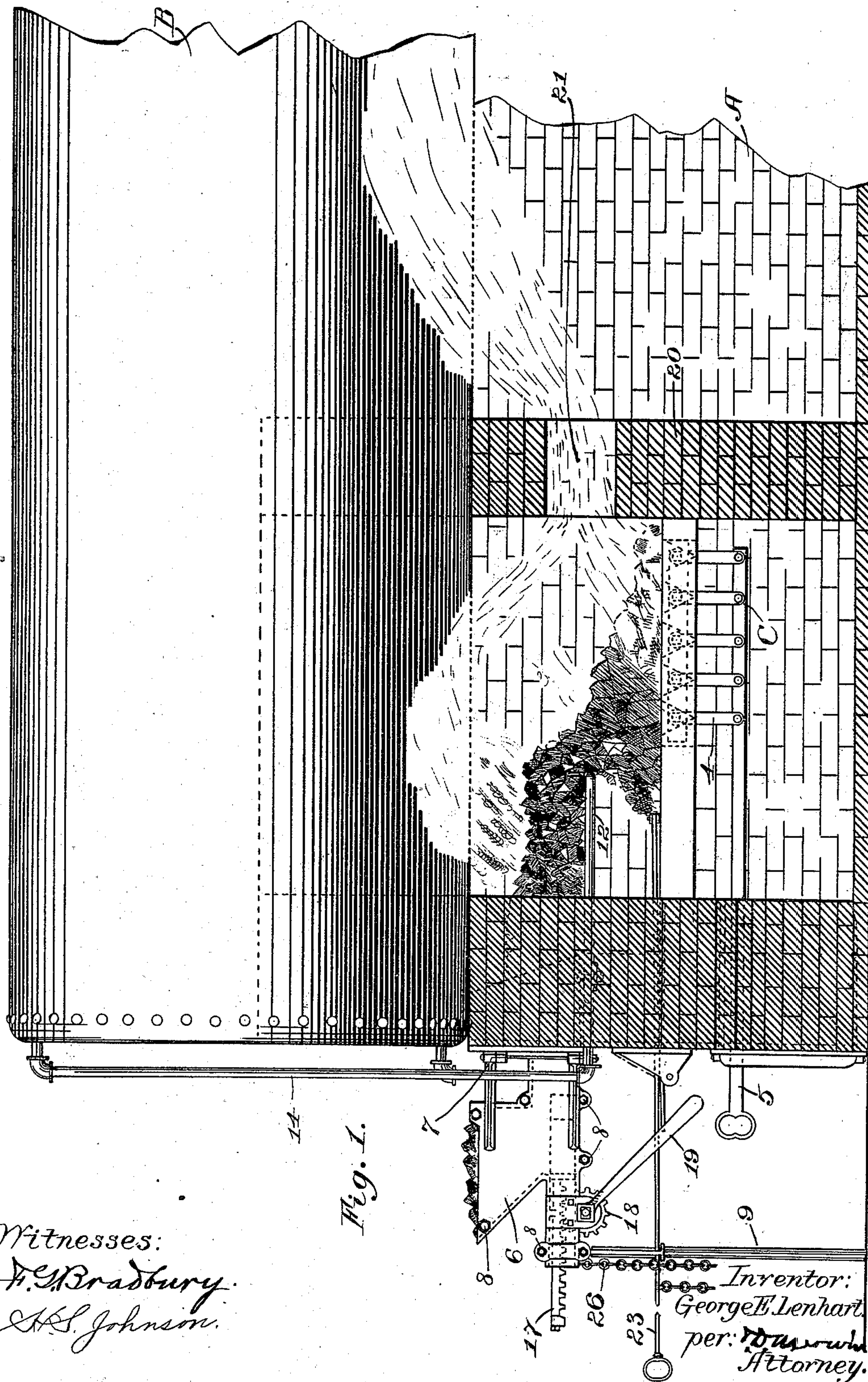
(No Model.)

3 Sheets—Sheet 1.

G. E. LENHART.  
FURNACE.

No. 560,726.

Patented May 26, 1896.



Witnesses:  
F. M. Bradbury.  
A. S. Johnson.

Inventor:  
George E. Lenhart  
per: *Andrew B. Graham*  
Attorney.



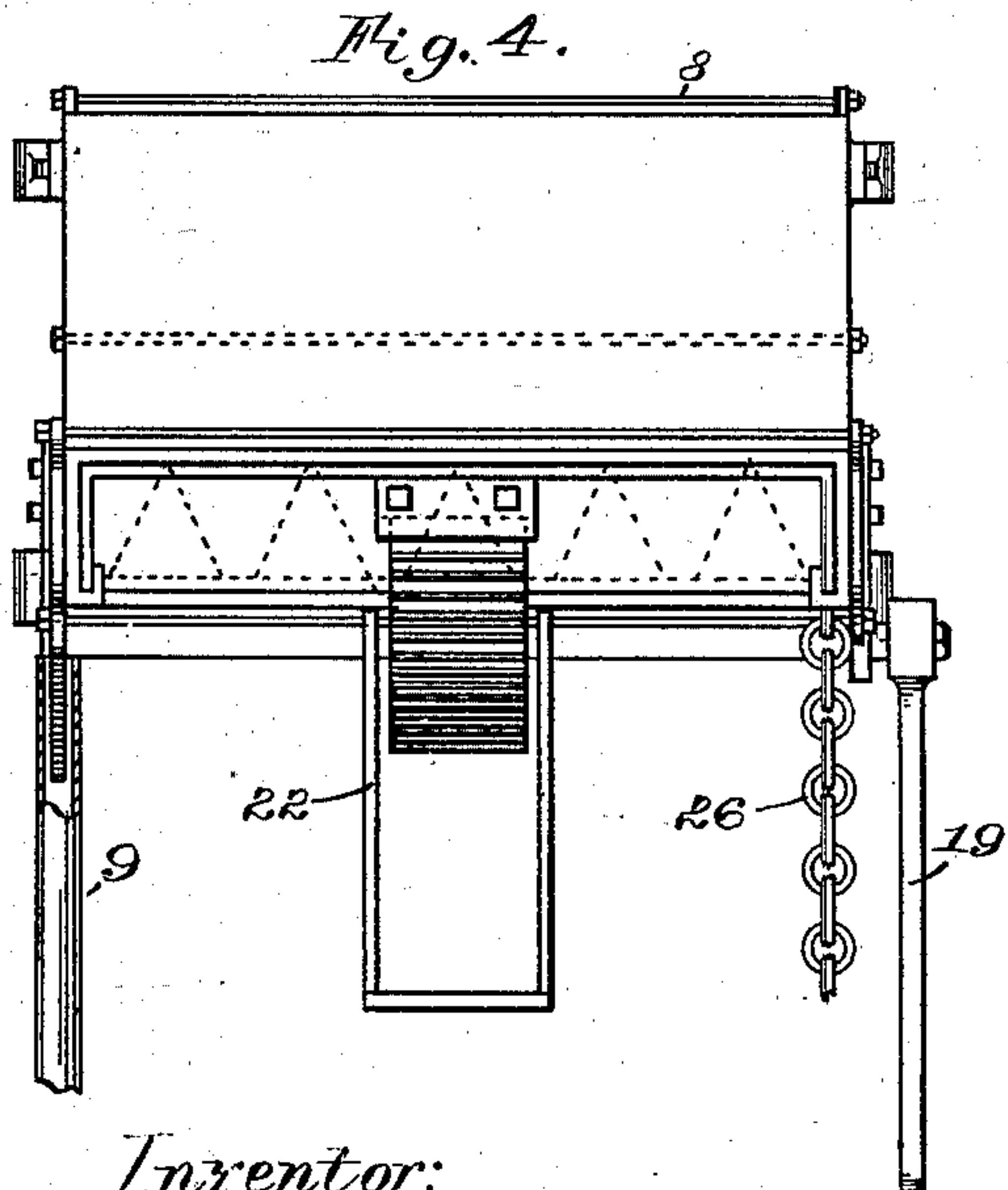
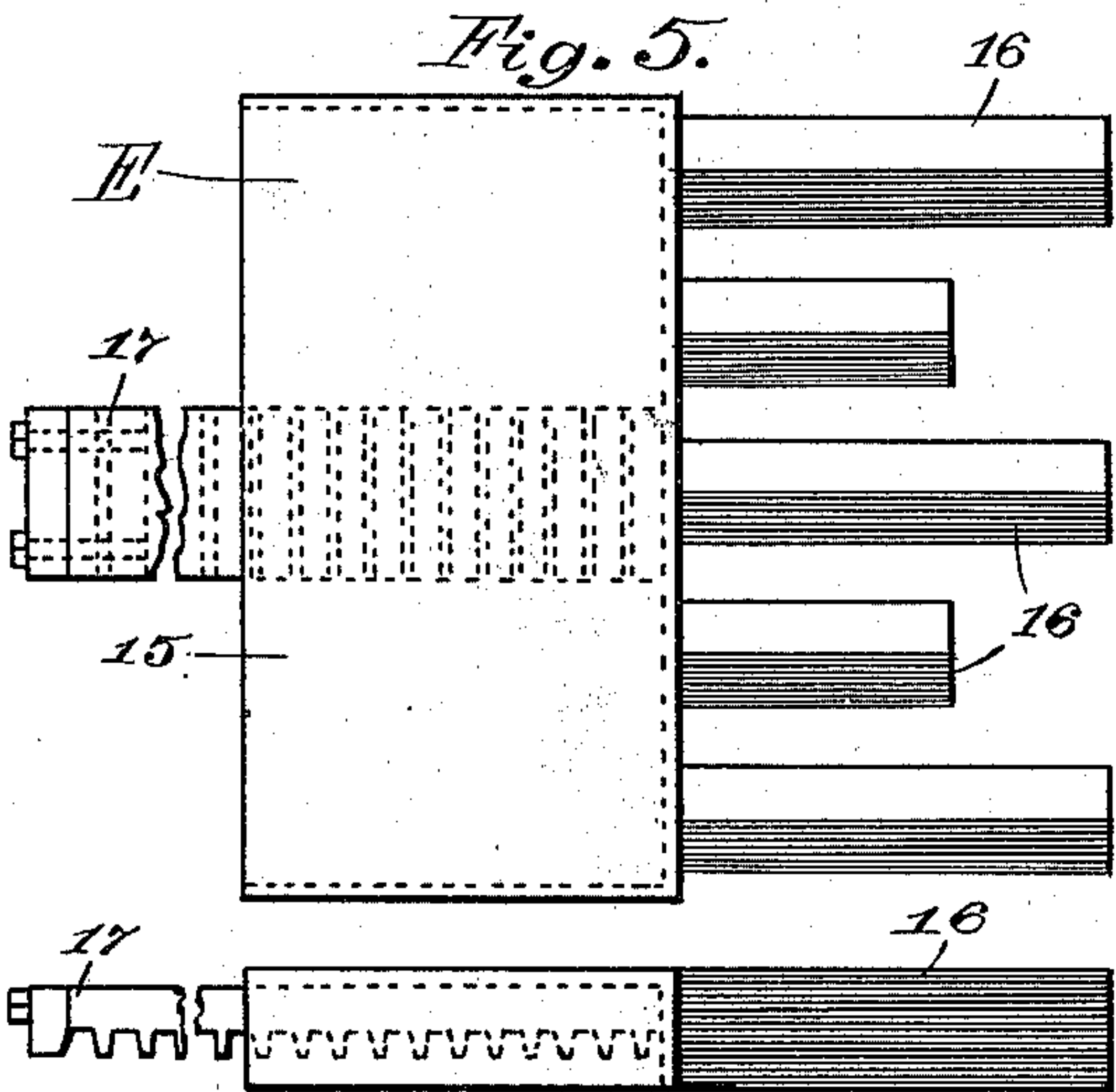
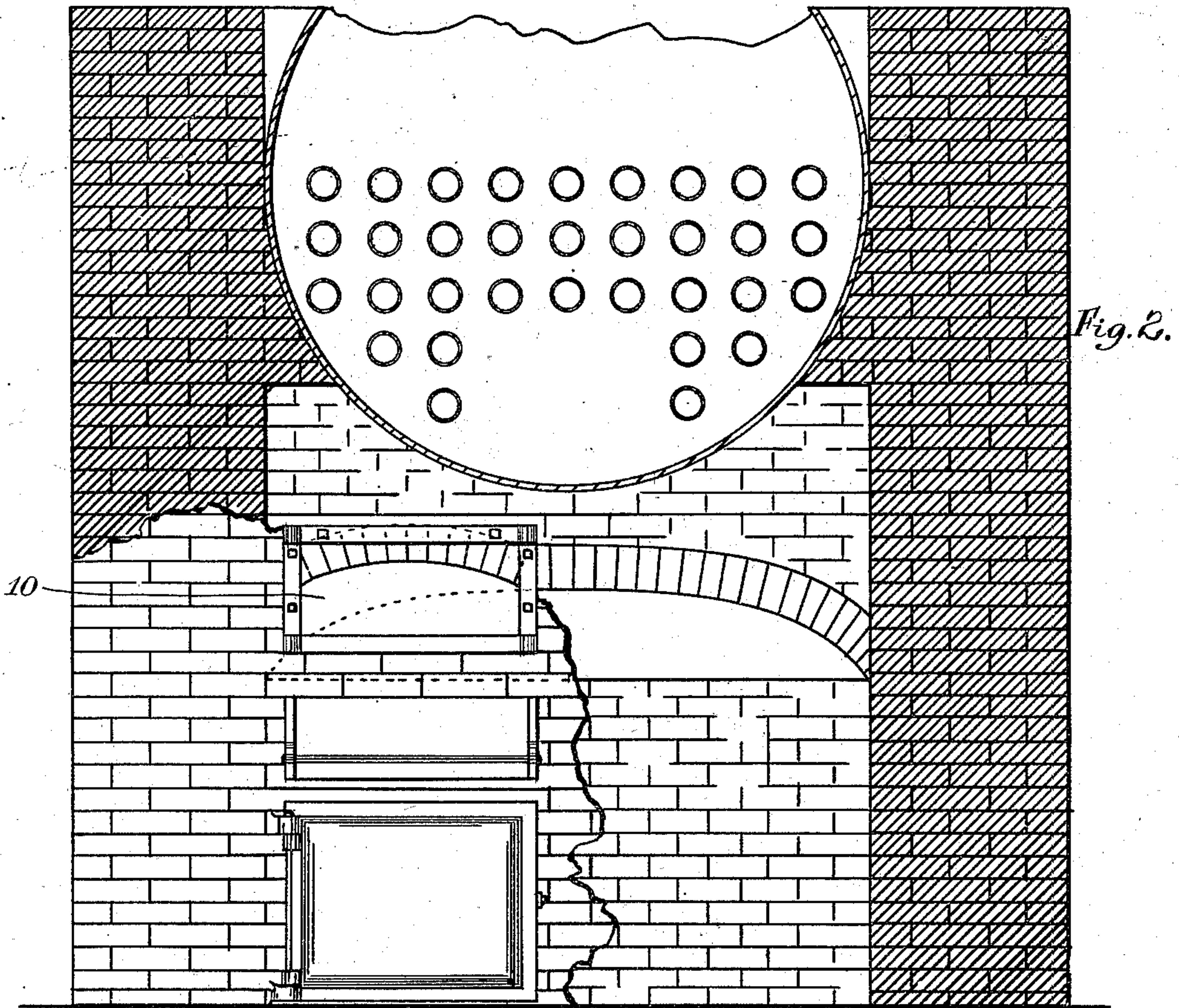
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3 Sheets—Sheet 2.

G. E. LENHART.  
FURNACE.

No. 560,726.

Patented May 26, 1896.



Witnesses:

H. M. Bradbury  
W. S. Johnson.

Inventor:

George E. Lenhart.  
per: J. O. Merwin  
Attorney.



(No Model.)

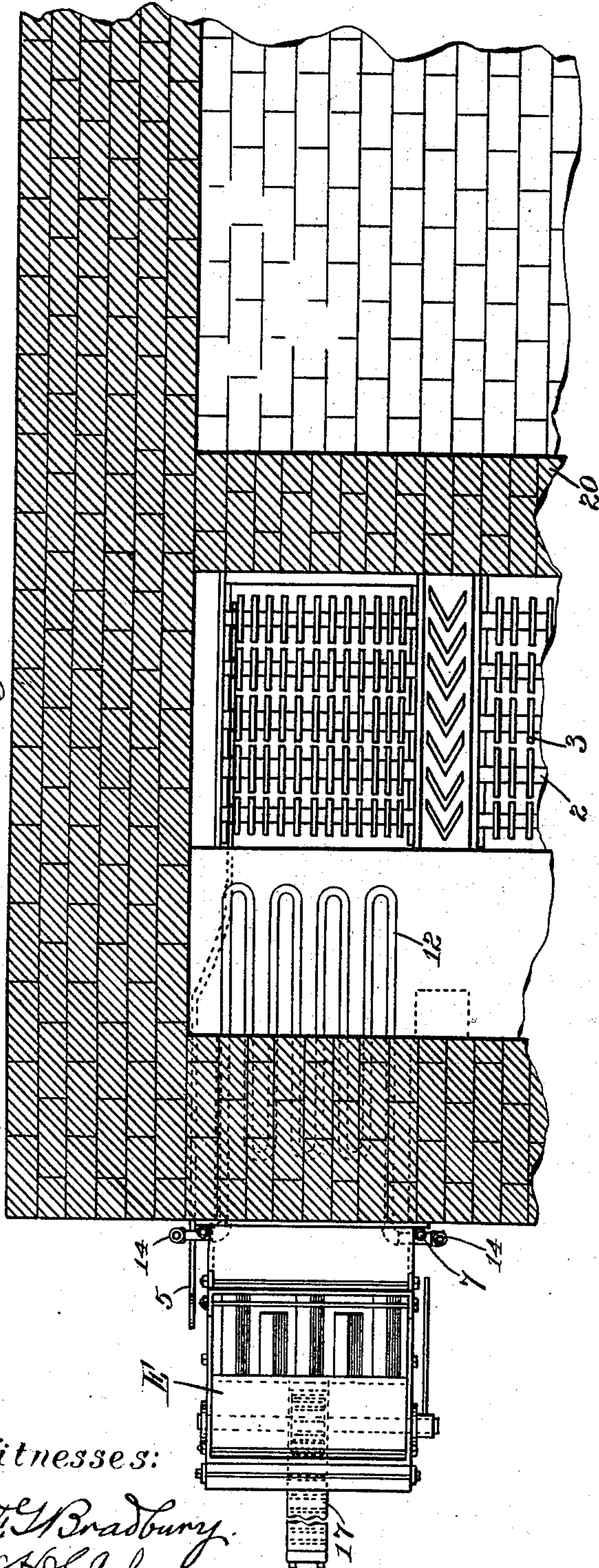
G. E. LENHART.  
FURNACE.

3 Sheets—Sheet 3.

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Fig. 3.



Witnesses:

H. G. Bradbury.  
S. S. Johnson.

Fig. 8.



Fig. 9.

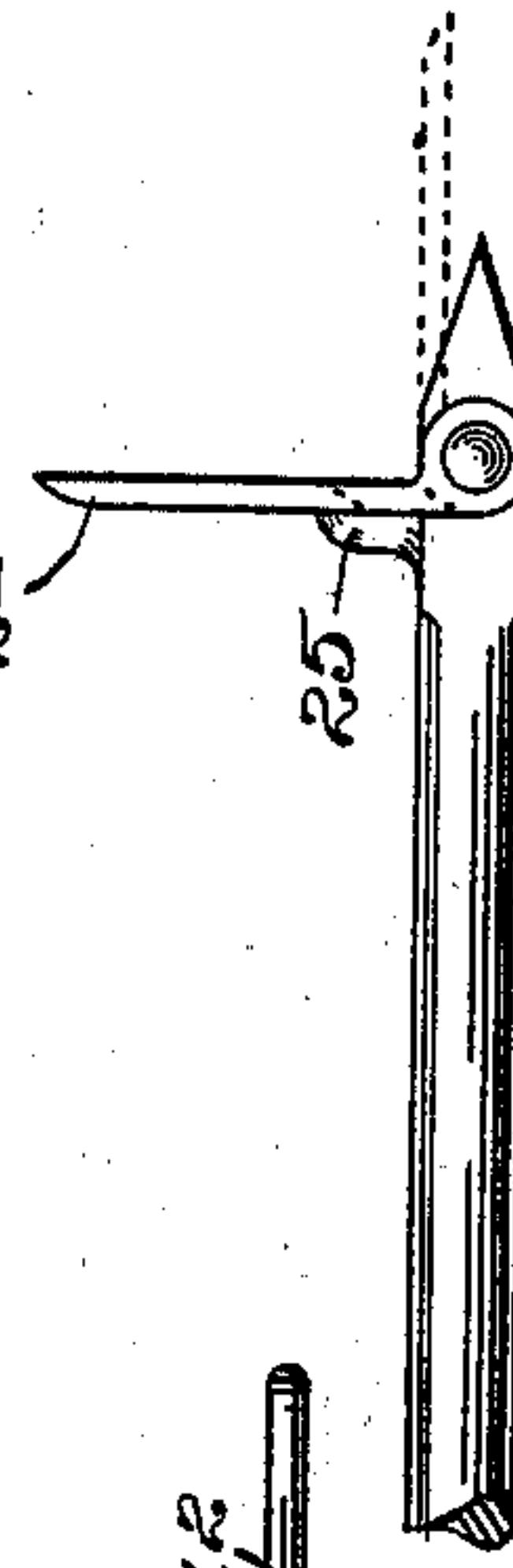
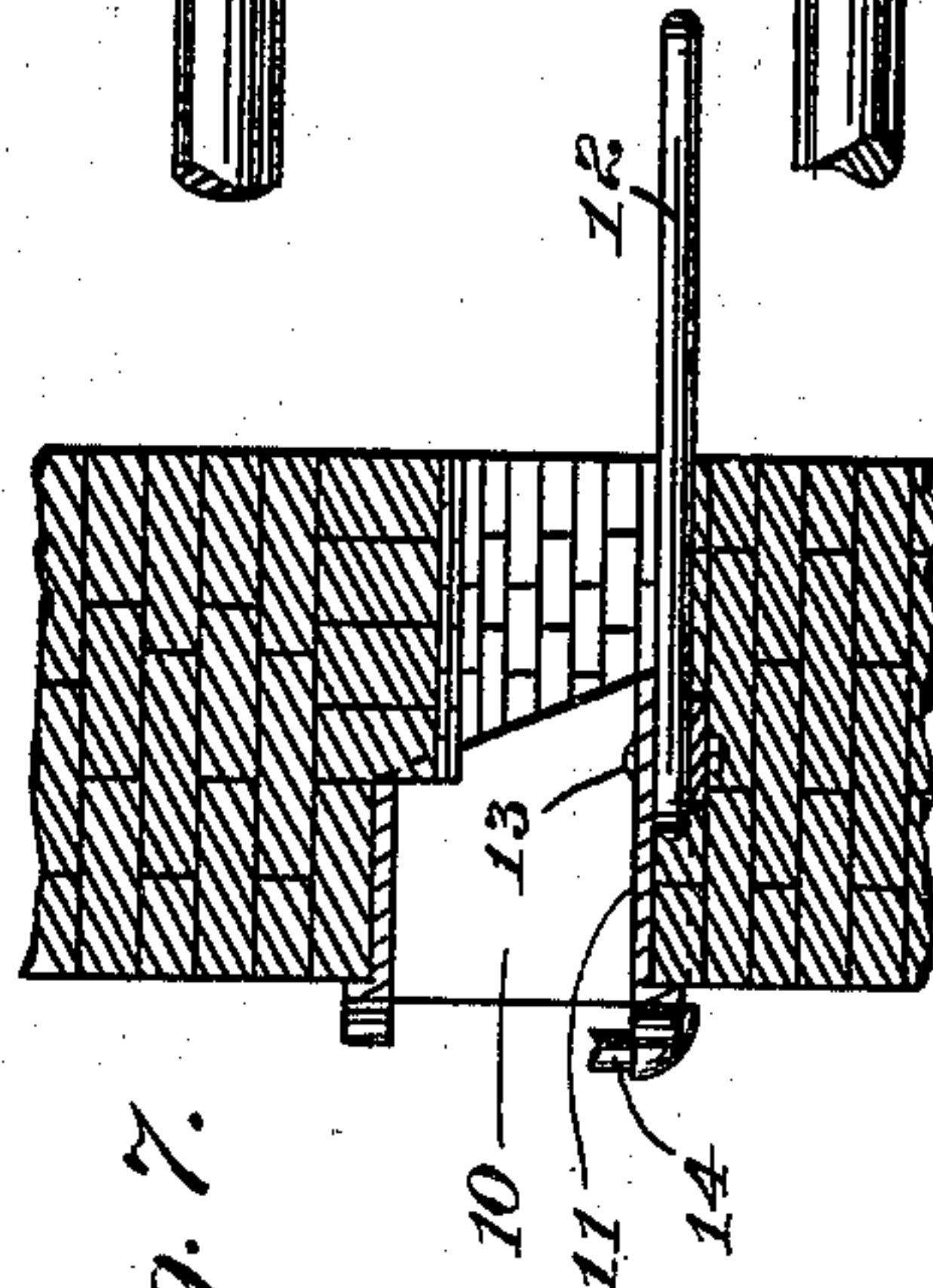


Fig. 7.



Inventor:

George E. Lenhart.  
per: T. D. Munn  
Attorney.



# UNITED STATES PATENT OFFICE.

GEORGE E. LENHART, OF ST. PAUL, MINNESOTA.

## FURNACE.

SPECIFICATION forming part of Letters Patent No. 560,726, dated May 26, 1896.

Application filed May 15, 1895. Serial No. 549,405. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE E. LENHART, of St. Paul, Ramsey county, Minnesota, have invented certain Improvements in Furnaces, of which the following is a specification.

My invention relates to improvements in furnaces, its object being to provide mechanical means for feeding the coal into the fire-box, so as to secure as perfect combustion of it as possible and avoid the emission of smoke.

To this end my invention consists, essentially, in arranging at the front of the furnace a suitable storage receptacle for the coal and a mechanically-operated reciprocating carrier or plunger for carrying the coal which lies at the bottom of the receptacle and close to the fire forward onto the grate-bars, the parts being so arranged that the coal which is thus fed into the fire-box has been previously partially coked by proximity to the fire, so that there is very little smoke thrown off from the same, the smoke which is thrown off from the coal during coking passing over the burning coke in the fire-box and the contained gases and particles of carbon consumed.

My invention further consists in the improved features of construction hereinafter more particularly described and claimed.

In the accompanying drawings, forming part of this specification, Figure 1 is a sectional side elevation of a furnace shown fitted with my improved attachments. Fig. 2 is a partial front elevation of the same with the coal-receptacle removed. Fig. 3 is a sectional plan view of the same. Fig. 4 is a front elevation of the storage receptacle. Figs. 5 and 6 are details of the form of plunger or carrier used therewith. Fig. 7 is a detail of the opening from the coal-receptacle into the fire-box, and Figs. 8 and 9 are details of the coal-poker.

In the drawings, A represents the fire-box of the furnace, and B the boiler, arranged above the same in the ordinary manner. At the bottom of the fire-box is arranged the rock-grate C. This grate is made up of the series of rock-shafts 2, having transverse ribs 3, which serve as grate-bars. These shafts are connected by means of links 4 with the operating-rod 5, projecting out through the front of the furnace, by means of which the shafts 2 are rocked, so as to dislodge the ashes.

Upon the front of the structure and cover-

ing the fire-box doorway is the storage receptacle 6, supported by means of the hinges 7, connecting its sides to the wall of the furnace, the sides being bolted by means of bolts 8 to the bottom and ends of the receptacle. The receptacle can thus be taken apart when desired and the sides turned back upon their hinges against the furnace and out of the way, or the pintle-rod of either hinge can be removed and the receptacle, together with the contained coal, turned upon the other hinge away from the fire-box opening to allow of access thereto. The receptacle is further supported by means of the hinged support 9, normally resting upon the ground.

The doorway 10 has a platform 11 extending a suitable distance into the fire-box, and secured underneath this platform is the coking-grate 12, consisting of a series of water-pipes, which are supported against the platform by means of bolts or equivalent means 13, the pipes projecting partially into the furnace and serving as a support for the coal when first carried into the fire-box, whereby it becomes thoroughly heated and partially coked. These water-pipes are connected in any suitable manner, as by means of the pipe 14, to the boiler, whereby circulation of water is always maintained through them, thus protecting them from destruction by the intense heat of the fire, the water being vaporized in the coiled pipes and passing as steam back into the boiler. At the bottom of the receptacle 6 is arranged a plunger E for feeding the coal therefrom into the fire-box. This is made up of the false bottom or platform 15, to the forward end of which are secured angle-iron fingers 16, which serve to break up the mass of coal and assist in the operation of the device. This plunger is provided with the rack 17, with which engages a pinion 18, operated by means of the lever 19. The plunger is arranged, preferably, so that it will normally stand entirely within the receptacle, and when thrust forward into the fire-box to its limit the fingers 16 will project slightly over the inner edge of the platform 11, forcing the coked coal upon the grate 12 onto the fire and fresh coal from behind to take its place.

As shown in Figs. 1 and 3, the fire-box is provided with a bridge-wall 20 at the rear of the grate C. This wall is formed with an



opening 21 immediately above the grate, so that the smoke from the coal upon the pipes 12 must pass downward and out over the burning coke upon the grate C, so that the  
5 contained gases and particles of carbon are consumed.

Passing through the front of the furnace and supported by the bracket 22, projecting downward from the coal-receptacle, is the  
10 poker 23. This, as shown, rests upon the grate and is provided upon its inner end with the dog or flap 24, adapted when the poker is thrust inward to be turned backward at right angles to the poker by the engaging coal,  
15 where it rests against the lug 25, and when the poker is withdrawn the dog returns to the dotted-line position, as shown in detail, Fig. 9. The poker, as shown, is permanently connected to the coal-receptacle by means of a  
20 chain 26.

Operation: In use the coal is shoveled or otherwise delivered into the receptacle 6, which is kept filled, and is carried therefrom by throwing the lever 19 so as to operate the  
25 plunger E. The coal resting upon the platform and pipes is subjected to a high degree of heat from proximity to the fire and is more or less completely coked, and is carried inward and onto the fire by the operation of  
30 the plunger in forcing fresh coal from behind to take its place. By this means the gases and particles of carbon, which would otherwise pass off in smoke, are gradually thrown off by the coal while lying upon the platform  
35 11 and pipes 12 and carried over the grate, where they are consumed by the intense heat of the burning coke. The constricted passage in the bridge immediately above the grate makes it necessary for the smoke in  
40 order to escape from the fire-box to pass directly over the burning coke at a point where the heat is most intense. The coal itself when forced off from the coking-grate and onto the fire is in condition to ignite without  
45 throwing off smoke in any appreciable or considerable degree, so that practically all the smoke to be consumed is that which passes off from the coal upon the grate 12. I thus am enabled to handle the fires in ordinary  
50 furnaces in such manner as to prevent the emission of smoke and secure free and complete combustion of the fuel, and consequently a very much higher degree of heat with a given amount of fuel and grate-surface.  
55 face.

I claim—

1. In a furnace of the class described, the combination with the fire-box having a substantially horizontal fuel-opening through its  
60 front wall, of the storage receptacle arranged upon the front of said wall, and having a lateral conduit communicating with said fuel-opening, the reciprocating carrier arranged in the bottom of said receptacle, and adapted  
65 to work in said lateral conduit and fuel-opening, said carrier having a solid, false bottom or platform upon which the coal in the re-

ceptacle normally rests, and the hinge connection between said receptacle and furnace-wall, whereby the same, together with its  
70 contained carrier and load of coal, may be turned away from said opening.

2. In a furnace of the class described, the combination with the fire-box having a fuel-opening through the front wall, of the storage receptacle hinged to the front of said wall,  
75 and having a lateral opening or conduit registering with the opening in said wall, and the reciprocating carrier working in the bottom of said receptacle and said lateral opening and substantially filling the same so as  
80 to prevent the dropping of the coal out of said receptacle when the same is turned upon its hinges away from the opening in the furnace-wall.  
85

3. In a furnace of the class described, the combination with the fire-box having a fuel-opening through its front wall, of the exterior coal-receptacle arranged on the outside of  
90 said front wall adjacent said opening, and having a lateral conduit normally registering therewith, the reciprocating carrier provided with forwardly-projecting fingers, said carrier serving as a false bottom for the body of the receptacle, and projecting into its lateral  
95 conduit, and the hinge connection between the side of the receptacle and the front wall of the furnace, whereby the same may be turned away from the fuel-opening in the furnace-wall, and the carrier projecting into the  
100 lateral conduit of the receptacle will prevent the contained coal from dropping out.

4. In combination with a furnace and its grate-bars, of the bracket or stirrup secured to the outside of said furnace, the poker supported in and working through said bracket,  
105 and provided with a pivoted dog or flap, and stops permitting said flap to lie in line with the poker or to be turned at right angles therewith.  
110

5. In combination with a furnace and its grate-bars, of the poker having a dog or flap pivoted at or near its point and adapted to be turned at right angles with the body of the  
115 poker, or to lie extended in line therewith.

6. In a furnace of the class described, the combination with the fire-box having a substantially horizontal fuel-opening through its front wall, and the fuel-receptacle hinged to  
120 said wall and having a lateral conduit connecting with said fuel-opening, of a reciprocating carrier arranged in the bottom of said receptacle and adapted to work in said conduit and fuel-opening, having a solid false bottom or platform, and the series of parallel  
125 inwardly-projecting angular fingers of varying lengths, said platform serving as a false bottom for the receptacle, and as a carrier for the fuel thereon, and said fingers to break up and disintegrate the mass of partially-coked  
130 fuel in front thereof.

7. In a horizontal boiler-furnace having the exposed head of the boiler substantially in line with the face of its supporting-wall, the



combination with the fire-box having a horizontal fuel-opening through said outer wall, the coking-grate made up of the connected series of water-pipes arranged in the bottom of said opening and projecting into the fire-box, the platform serving as a bottom for said opening and extending partly over said pipes, of the fuel-receptacle hinged to said wall beneath the boiler-head, and having a side opening registering with said wall-opening, a reciprocating carrier arranged in said receptacle and having a platform serving as a false

bottom therefor, the series of inwardly-projecting fingers of varying length upon said carrier for breaking up and disintegrating the fuel in the path thereof, and the rack and pinion for operating said carrier.

In testimony whereof I affix my signature in presence of two witnesses.

GEO. E. LENHART.

Witnesses:

H. S. JOHNSON,

MINNIE L. THAUWALD.