(No Model.) 3 Sheets—Sheet 1.

N. HORN.

GASEOUS FUEL GENERATOR AND BURNER.

No. 481,494. Patented Aug. 23, 1892.

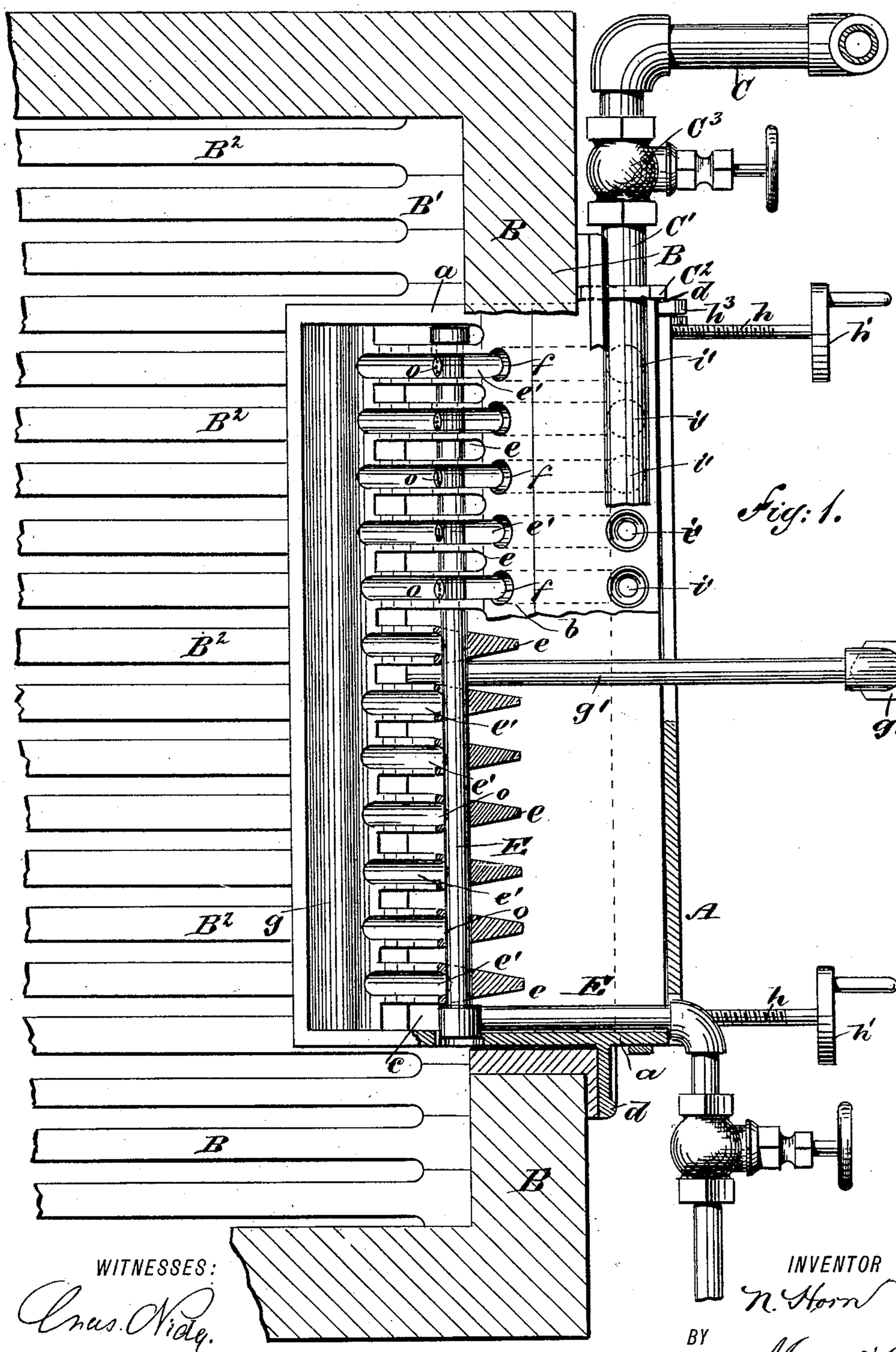

Fig. 1.

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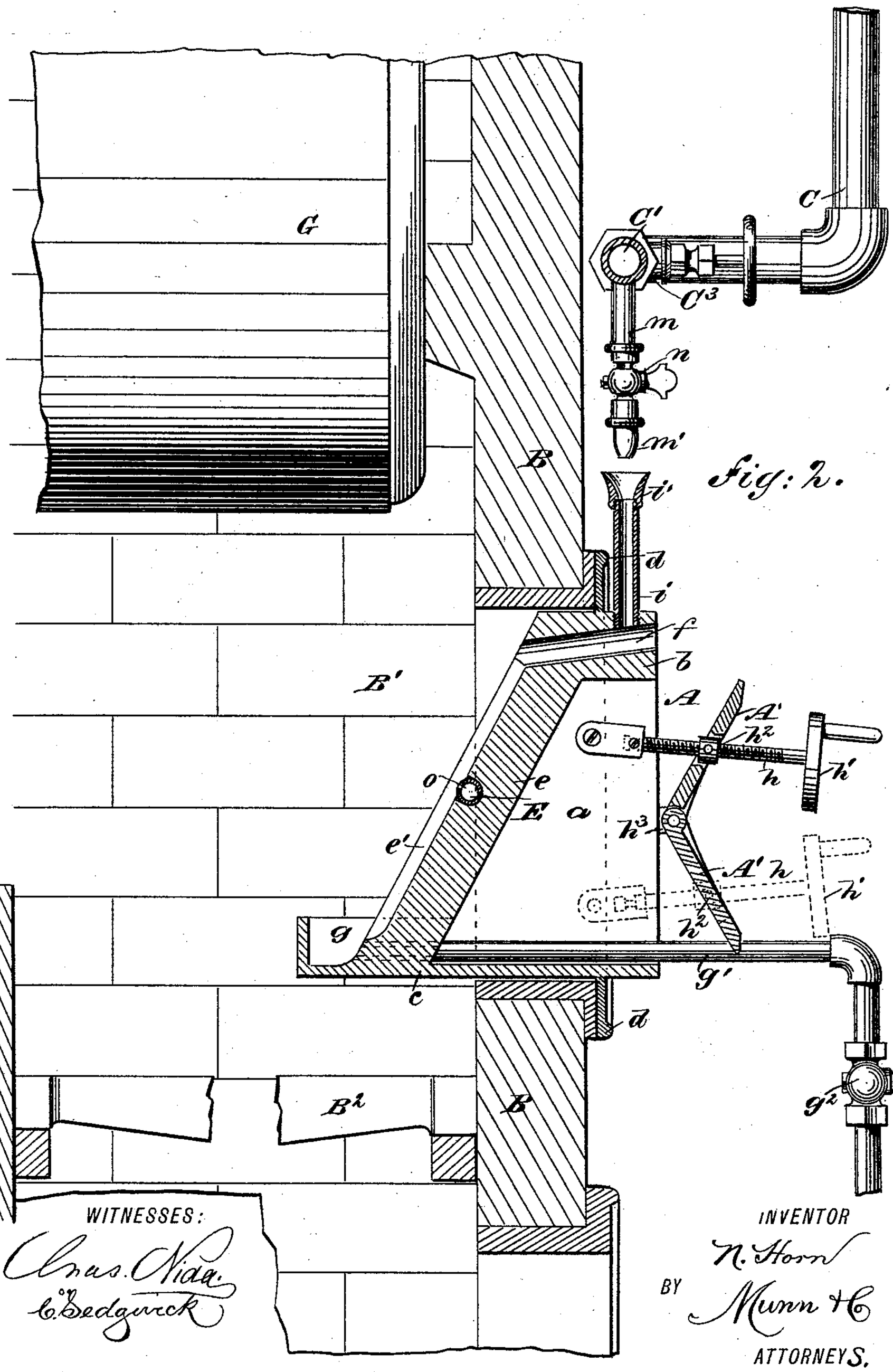

Fig: 2.

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GASEOUS FUEL GENERATOR AND BURNER.

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Fig: 3.

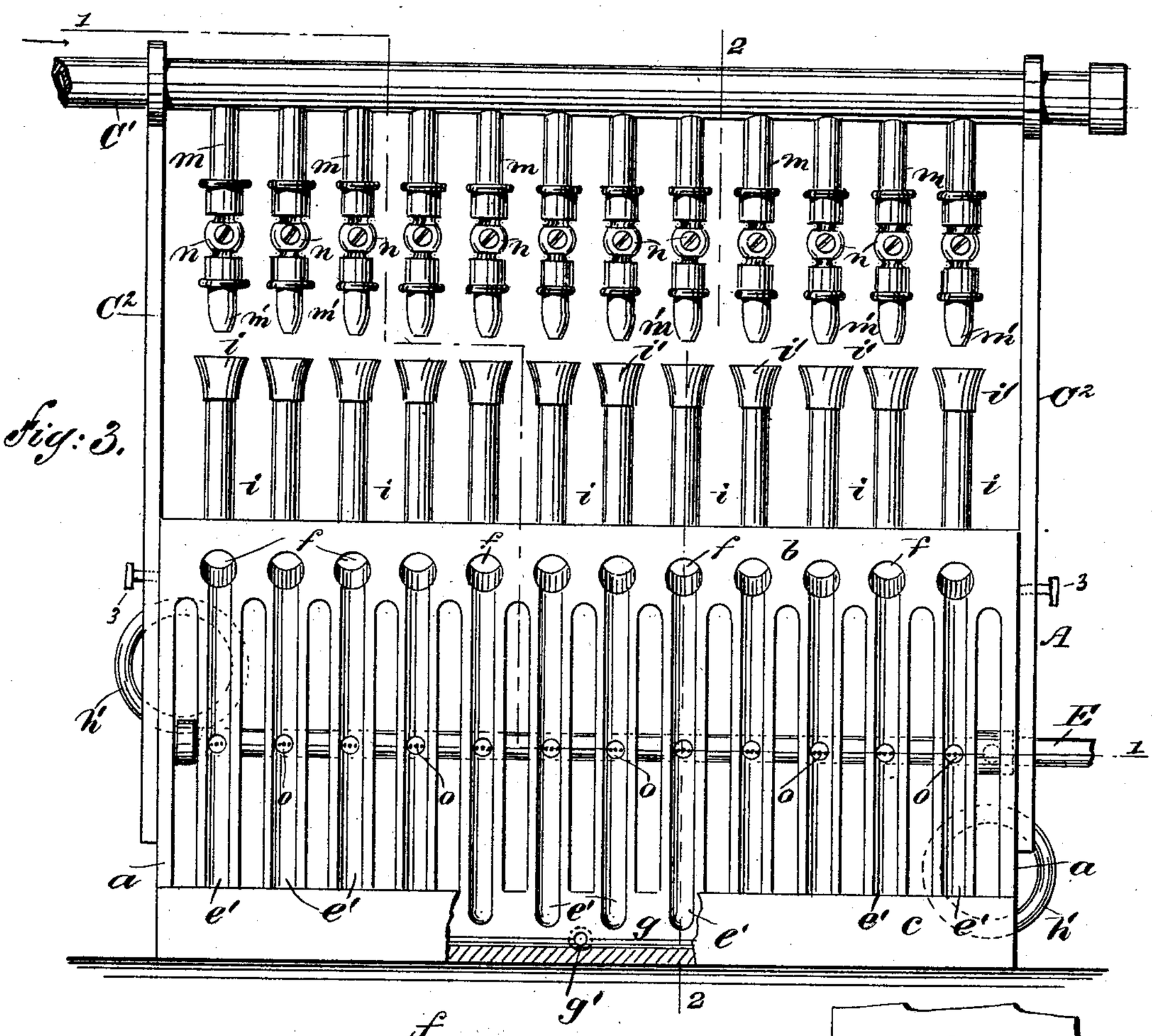


Fig: 4.

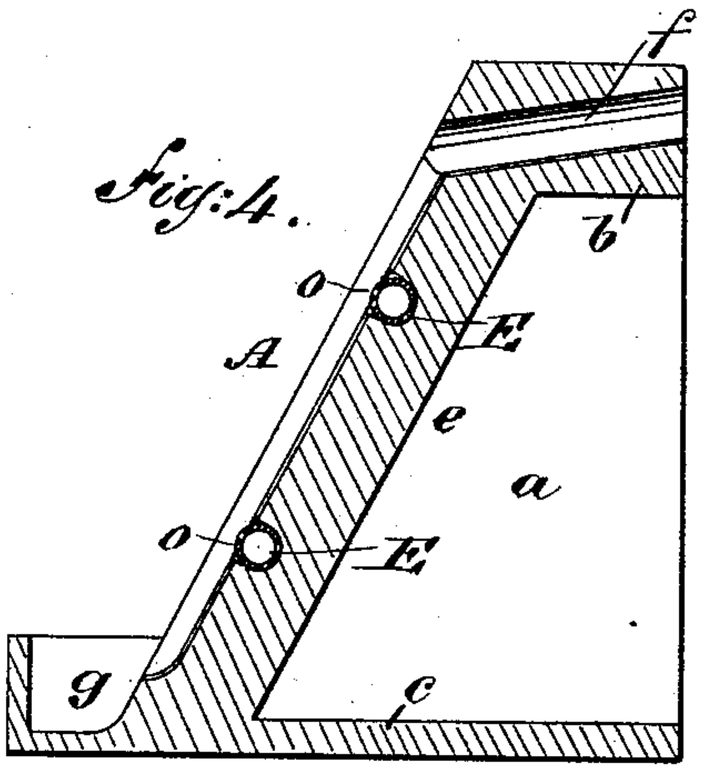
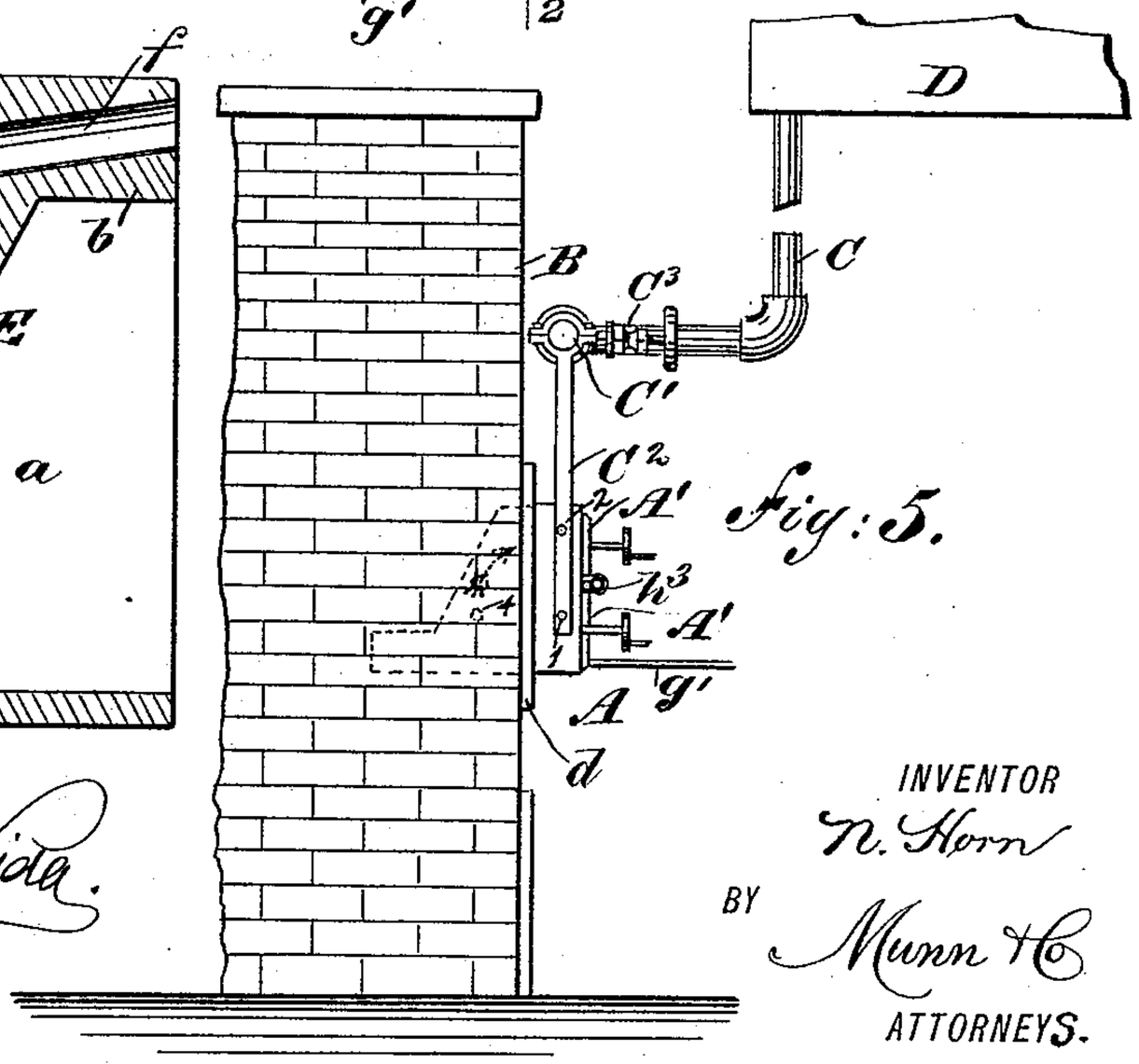


Fig: 5.



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NORBERT HORN, OF NEW YORK, N. Y.

GASEOUS-FUEL GENERATOR AND BURNER.

SPECIFICATION forming part of Letters Patent No. 481,494, dated August 23, 1892.

Application filed August 22, 1891. Serial No. 403,405. (No model.)

To all whom it may concern:

Be it known that I, NORBERT HORN, of New York, in the county and State of New York, have invented a new and useful Gaseous-Fuel Generator and Burner, of which the following is a full, clear, and exact description.

This invention relates to an improved device for the generation and combustion of gaseous fuel from fixed oils or other suitable liquid carbonaceous material and high-pressure steam, and has for its object to provide a simple, compact, and convenient apparatus which may be introduced within the door-opening of an ordinary boiler fire-chamber and by combustion of gaseous fuel evolved therein heat the contents of the boiler to produce steam or be used for other purposes.

With this end in view my invention consists in the construction and combination of parts, as is hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters and numerals of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view, partly in section, of the device in position within the door-opening of a boiler fire-chamber, shown broken away rearward, taken on the line 1 1 in Fig. 3. Fig. 2 is a side view of a boiler and fire-chamber therefor broken away rearward, with the improvement in position within the fire-door opening of said fire-chamber, shown in section, taken on the broken line 2 2 in Fig. 3. Fig. 3 is a rear elevation of the apparatus removed from the fire-chamber, partly broken away and in section, and pipe connections broken away. Fig. 4 is a transverse section of the frame of the device, showing the liquid-feeding pipes in section thereon; and Fig. 5 is a side view, reduced in dimensions, of the front portion of a boiler fire-chamber side wall, the improvement in position thereon, an elevated liquid-supply tank, and pipe connections broken between the feed-tank and the fuel generator and burner.

The generator and burner-frame A has two parallel end walls *a*, held spaced apart by a narrow top plate or wall *b* and a wider bottom plate *c*, which produces a rectangular frame that may be of various dimensions to suit the aperture in the front wall B of a boiler fire-chamber B′, which the frame is designed to occupy, a border flange *d* on said frame limiting its insertion within the front wall named and also closing the crevice between the frame and marginal wall of the aperture it enters.

A series of inclined ribs *e* are formed integral with or are attached to the top and bottom walls *b c* of the frame A, which ribs are evenly spaced apart and have a channel *e′* formed in the rear face of each, which extends from a point near the top wall *b* to a point near the lower wall *c*. These channels are each intersected at their upper ends by transverse tubular passages *f*, which passages are formed in the top wall of the frame and incline from the outer side inwardly and downwardly, so as to deliver any liquid entering them into the channels *e′*. Along the lower ends of the ribs *e* a horizontal trough *g* is formed, which extends across the lower part of the frame A, which trough is designed to receive any surplus liquid traversing the channels *e′*, as will be further mentioned, and near the center of width of the frame A a waste-pipe *g′* is made to intersect the trough and extend forwardly beyond the boiler-front, and may then be conducted to any point of discharge below the trough it taps, a valve g^2 sealing the pipe, if desired. The waste-pipe *g′* is inserted into the frame of the burner in such a way as to enable it to readily be removed. The arrangement shown in the drawings is sufficient for this purpose.

The front wall of the frame A preferably consists of two doors A′, (see Fig. 2,) which are provided with adjusting-screws *h*, that are attached by swivel connections to the sides of the frame, so as to permit said screws to be rotated at their outer ends by a manipulation of the hand-wheels *h′*, each screw having a threaded engagement with its respective nut h^2, which nuts are loosely secured in apertures of the doors. The doors A′ being hinged at adjacent edges of the same upon ears h^3, which project from the side walls *a* of the frame A near their vertical centers, it will be seen that a manipulation of the screws *h* will graduate the size of the draft-opening in the frame, so as to accurately proportion the amount of air introduced into the fire-

chamber B′ between the ribs *e*. The portion of the top wall *b* that projects outside of the border flange *d* is vertically perforated at spaced intervals, each hole intersecting one of the inclined tubular passages *f*. All the perforations mentioned are tapped to receive the threaded ends of a series of drip-pipes *i*, that are each provided with a funnel-top *i′*.

Directly above the pipes *i* a mating series of feed-pipes *m* are held so as to deliver carbonaceous liquid through their nozzles *m′* into the funnels *i′*. The series of feed-pipes *m* are depending attachments of a horizontal supply-pipe C′, that extends above the frame A of a proper length, engaging the uprights C^2 and forming a portion of a tubular conduit C, which conducts carbonaceous liquid from an elevated tank D or other adequate source of supply that may feed by gravity or applied pressure, as may be preferred. Each of the feed-pipes *m* is furnished with a regulating-valve *n*, whereby the feed of carbonaceous liquid may be graduated independently, and the flow into said pipes is regulated by the globe-valve C^3. The uprights C^2 are pivotally supported on the supply-pipe C′ and in a like manner secured to the frame A of the burner, as at 1, Fig. 5. By this arrangement the burner can be swung in and out of the door of the furnace at will. The uprights C^2 are provided with holes 2, Fig. 5, through which pins 3, Fig. 3, can be inserted, and corresponding holes 4, which can be made in the body of the burner. The object of this arrangement is to enable the entire frame to be withdrawn from the furnace-door, swung on its pivot until the hole 4 aligns with the hole 2, and when so suspended the frame can be moved on the fulcra C′ of the uprights, so as to clear the furnace-door, and being held thus removed from the boiler the boiler can be used in the ordinary way with coal as fuel without hinderance on the part of the burner. Any other means for suspending the burner can be used; but I prefer a construction wherein the connections are pivotal. If the available space for suspending the burner should require the point of support to be located farther away from the front of the boiler than that shown in Fig. 5, the connections could be slotted so as to allow extra movement of the parts. During the operation of swinging out the burner the waste-pipe *g′* can be removed, as before set forth.

On the opposite side of the frame A from that on which the conduit-pipe C is located a steam-supply pipe E is introduced through a notch in one of the draft-controlling doors A′, and thence extended inwardly and across the ribs *e*, the portion which is in contact with the ribs being embedded therein, as shown in Figs. 1 and 3, so that the parts of the pipe E that lie in the ribs will have exposure and be adapted to deliver fine jets of steam through minute perforations *o* therein upon liquid that may trickle down the channels in the ribs *e*. The steam-supply pipe E may be extended to any steam-generator that is convenient, which may be supplementary to the steam-boiler G that is to be heated, and a branch of said pipe (not shown) may tap the boiler G, so as to be available when steam under proper pressure is contained therein. In Fig. 4 the steam-pipe E is shown duplicated, so as to permit steam-action at two points in each channel of the ribs *e*, which may be preferred when very heavy oil is used that does not volatilize quickly.

In service the apparatus is supplied, preferably, with tar-oil, or crude molasses may be utilized to furnish the carbonaceous supply, which material is fed in proper quantity from the elevated tank D and through the pipes *m* into the passages *f* and thence into the channels *e′*. The inclination of the ribs *e* will cause the liquid to traverse the channels *e′* in thin streams, and when these reach the steam-jet holes *o*, through which steam is made to escape simultaneously with the flow of oil, the oil and steam will blend, and the oil will be minutely subdivided, assimilating with the steam, so as to produce a gaseous fuel in vapor form.

The volume of flame resulting from combustion of the crude vaporous mixture specified when it is ignited will fill the upper part of the fire-chamber B′, which may have its grate-bars B^2 protected by asbestus board or other means, it being understood that should the apparatus be applied to a steam-generator already erected and adapted to burn coal or other like fuel the doors of the ash-pit under the grate must be closed, so as to prevent air from entering the fire-chamber at this point.

When by continual operation the ribs *e* of the frame A are heated to redness, the operation of fuel-gas evolution becomes more perfect, as the carbonaceous liquid will then be heated before the steam strikes it, and the steam will be superheated in the part of its conduit that lies in the frame, so that crude oxyhydrocarbon gas is evolved, owing to the affinity the vaporized carbon of the oil has for the hydrogen and oxygen of the steam that is dissociated thereby, all combining to form a gaseous mixture that is highly inflammable and when supplied with a proper admixture of atmospheric air will burn fiercely with a blue smokeless flame.

Owing to the small proportion of oil or other carbonaceous liquid needed to produce the proper volume of gaseous fuel as compared to the steam used the device, by its substitution when in use, provides a fuel that is cleanly and economical and also greatly lessens the labor of attendance.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A gaseous-fuel generator and burner which embrace devices contained therein adapted to produce combustible vapor and

burn it as evolved and integral means for regulating the ingress of air to the combustion-chamber of boiler or furnace, which generator is adapted to be inserted and held within the usual door-opening of the combustion-chamber to close the same and removable therefrom, substantially as described.

2. A vapor-fuel producer and burner comprising a metal frame having a series of spaced ribs that incline from a vertical plane, are grooved longitudinally on one face, and are transversely intersected by a steam-jet for each rib, and have a carbonaceous-liquid supply above each steam-jet, substantially as described.

3. In a vapor-fuel producer and burner, the combination, with a frame having channeled ribs that incline from a vertical plane, of a graduating carbonaceous-liquid-feeding device for each rib connected to a supply and a steam-jet for each rib intersecting its channel, substantially as described.

4. In a vapor-fuel producer and burner, the combination, with a frame that is insertible in the door-opening of a fire-chamber, having channeled ribs that incline from a vertical plane, each channel intersecting an inclined perforation or passage above in the frame, of a graduated carbonaceous-liquid-feeding device for each inclined passage, and a steam-conduit below on the frame, which supplies steam-jets that intersect the channels in the ribs, substantially as described.

5. In a vapor-fuel producer and burner, the combination, with a fire-chamber front wall that has a door-opening therein, of a vapor-fuel-generator frame which will enter and fill said opening, a series of spaced ribs thereon, each inclined from a horizontal plane and longitudinally channeled on its rear face, a carbonaceous-liquid-feed pipe for each rib, means to connect the feed-pipes with the channels, a transverse steam-conduit perforated at each rib to provide steam-jets therefor, a steam-supply, a carbonaceous-liquid supply, and controlling devices for said supplies, substantially as described.

6. In a vapor-fuel producer and burner, the combination, with a fire-chamber front wall provided with an opening, a boiler above, a vapor-fuel-generator frame in the front wall opening, a series of spaced channeled ribs on the frame, which incline from a vertical plane and are intersected above by downwardly-inclined tubular carbonaceous-liquid passages formed in the top wall of the frame, a feed-pipe for each liquid-passage, a drip-pipe intersecting each liquid-passage below the feed-pipes, a valve for each feed-pipe, and a liquid-supply connected thereto, of a steam-conduit pipe extended from a steam-supply and entering the frame, having a transverse branch that is perforated opposite each channel in the ribs, and a valve for the steam-supply pipe, substantially as described.

7. A hydrocarbon-burner adapted to be inserted or removed from the door-opening of a furnace containing a series of open ribs and ducts thereon for conveying hydrocarbon oil from without the boiler to the point of combustion and devices for controlling the admission of air from without and through the openings in the ribs, said devices forming part of said burner, substantially as described.

8. A hydrocarbon-burner adapted to be inserted or removed from the door-opening of a furnace, a series of ribs on the furnace side of the burner, troughs on the ribs having openings between the ribs, a series of steam-jets opening into the troughs, an independent source of supply of combustible liquid, and means for connecting each troughed rib with the source of supply independently of the others, substantially as described.

9. A hydrocarbon-burner adapted to be inserted or removed from the door-opening of a furnace, a series of ribs on the furnace side of the burner, troughs on the ribs, openings between the ribs, devices for controlling the admission of air from without and through the openings in the ribs, an independent source of supply of combustible liquid, and means for connecting each troughed rib with a source of supply independently of the others, substantially as described.

10. The combination, in a burner of the class described, having integral devices for producing combustion, comprising a series of independent ducts or troughs, a source of supply of combustible material, devices for connecting said independent ducts with the source of supply, devices for regulating admission of air forming part of the burner, and means for pivotally supporting said burner, substantially as described.

11. The combination, in a burner of the class described, having integral devices for producing combustion, said burner being pivoted at 1 upon uprights C^2, with fulcra C' for pivotally supporting the uprights, the frame A, and the uprights C^2, having holes 4 and 2, respectively, at points equidistant from the pivots 1, substantially as described.

12. A hydrocarbon-burner comprising a rectangular frame, having at one side a sloping wall, which wall is provided with a series of troughed ribs *e*, having slots or openings between the ribs, means for feeding a liquid to the ribs, and devices for controlling the passage of air through said slots, comprising the hinged door-sections a' a', having connected nuts h^2, a screw-threaded rod *h*, passing through said nuts, provided at one end with a crank and secured at the other end to the wall of the burner by a movable block in which said rod can turn, substantially as described.

NORBERT HORN.

Witnesses:
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WM. P. PATTON.