

(No Model.)

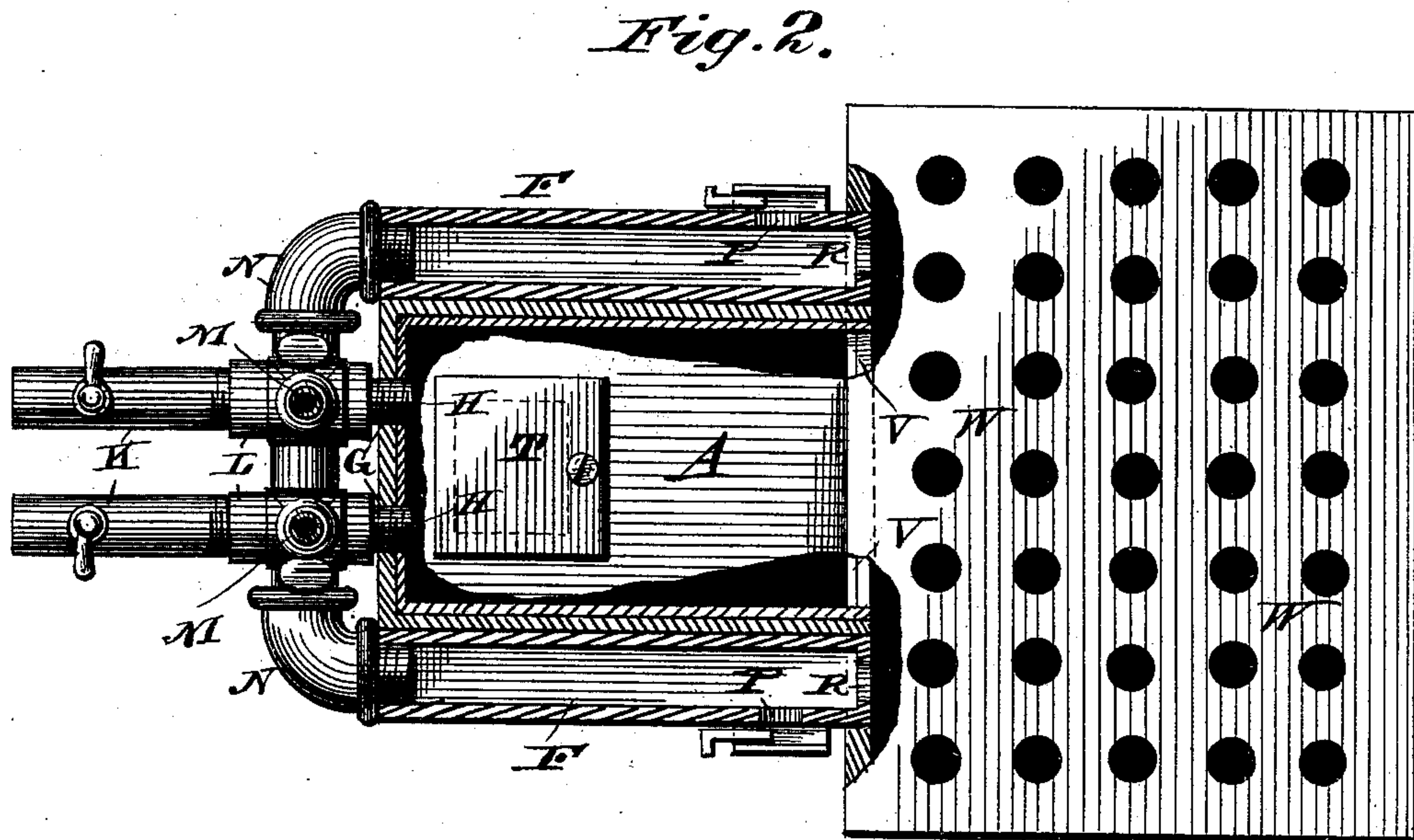
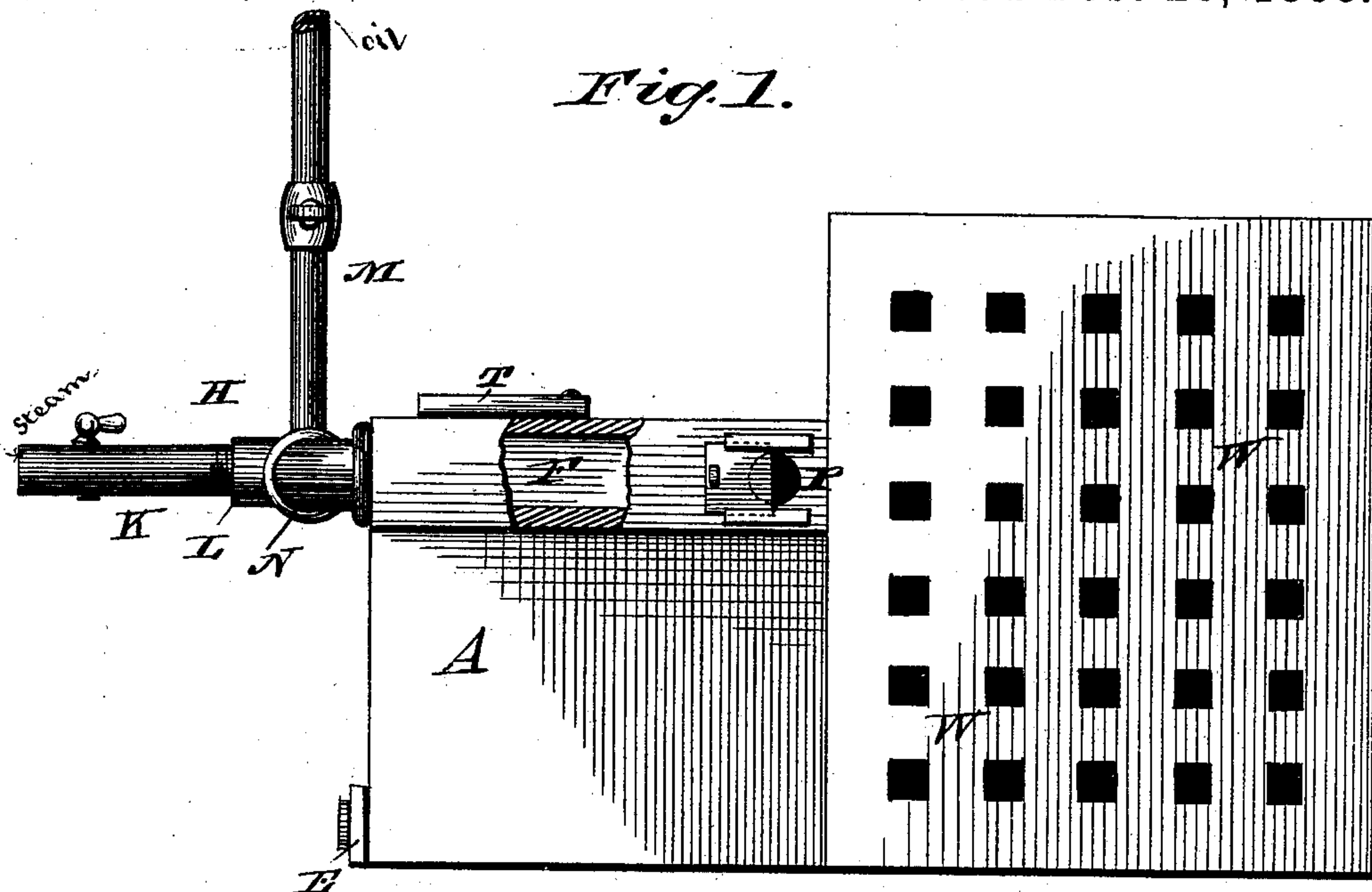
2 Sheets—Sheet 1.

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FURNACE.

No. 378,839.

Patented Feb. 28, 1888.



WITNESSES

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(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

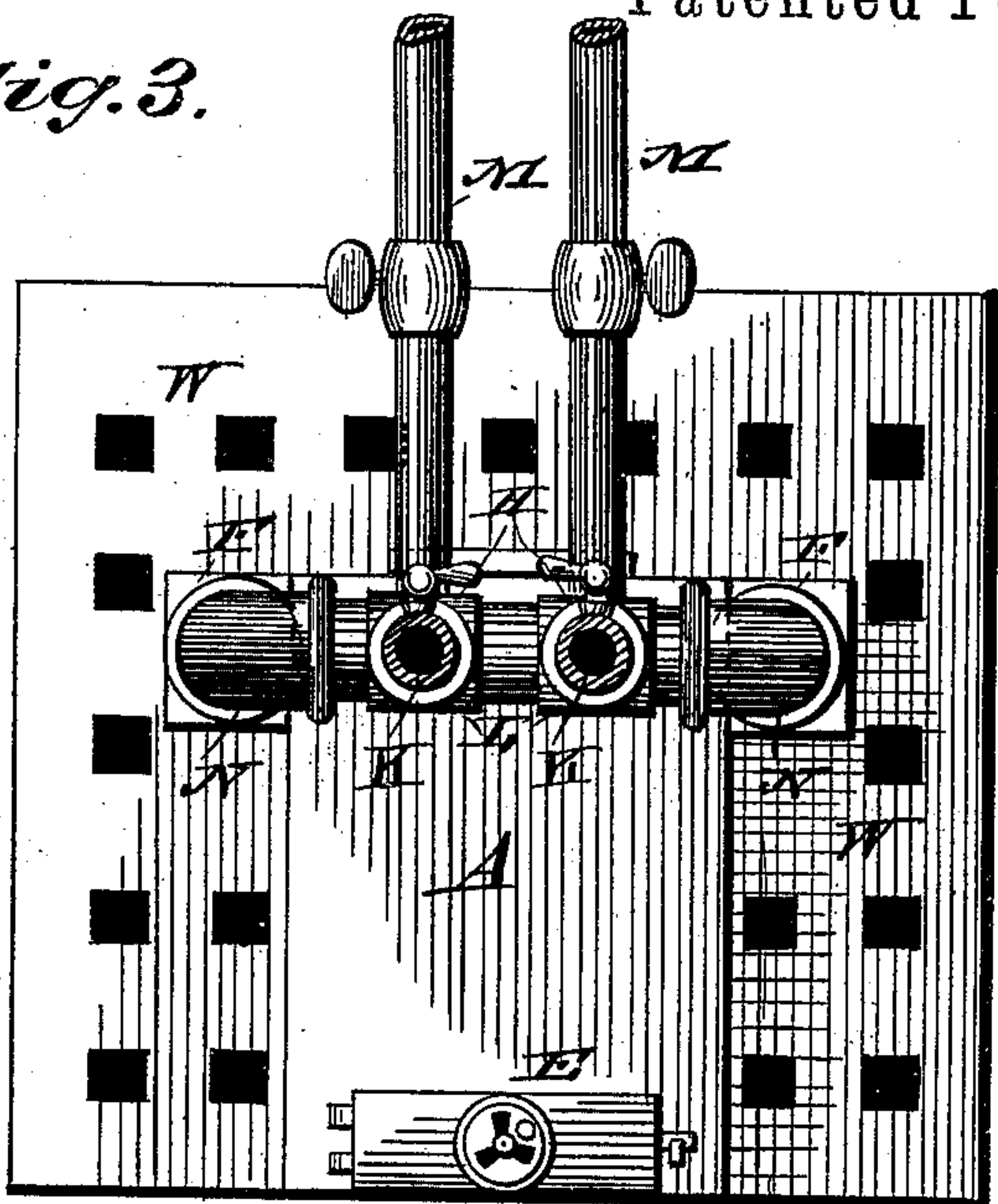


Fig. 4.

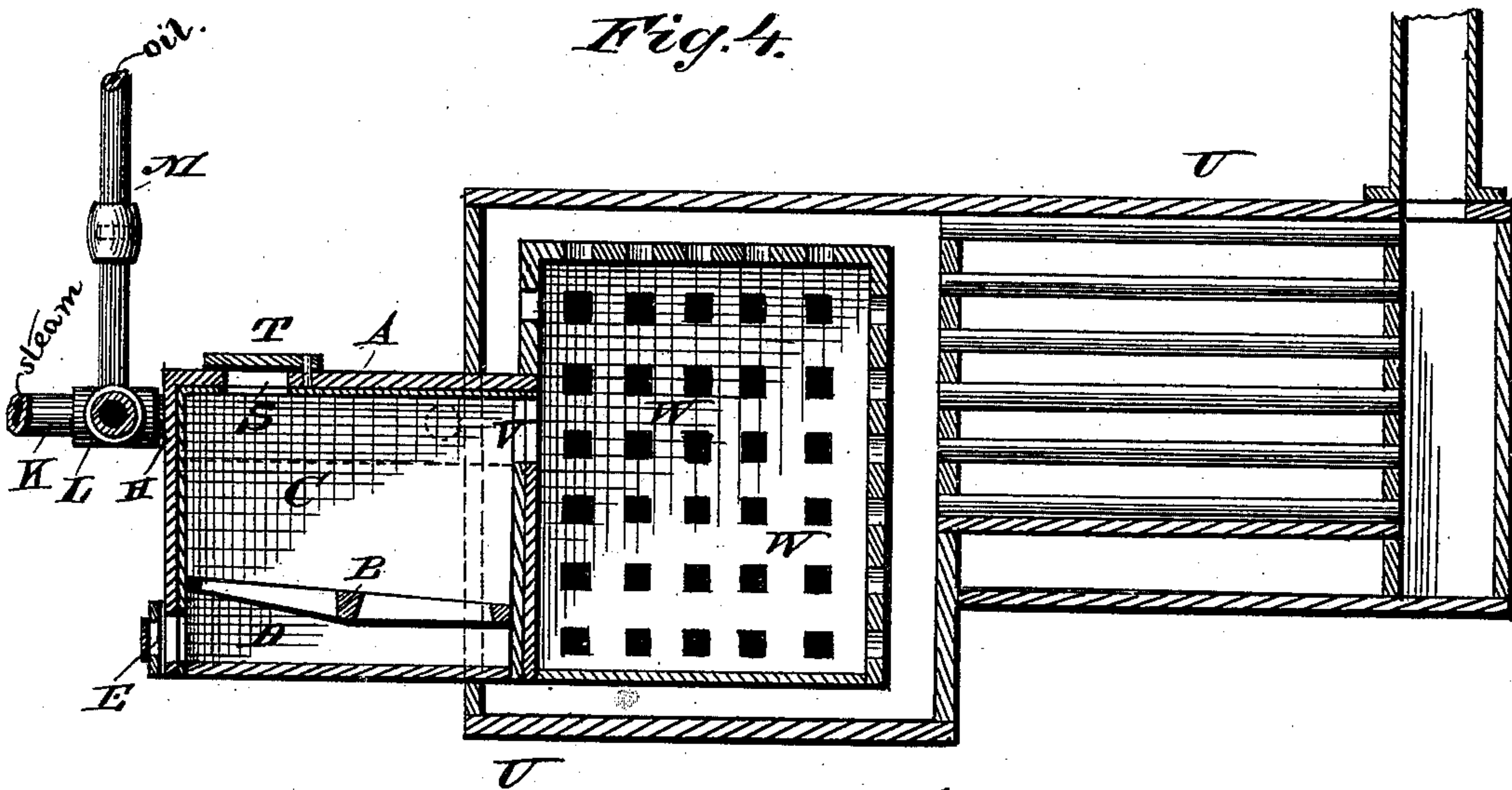
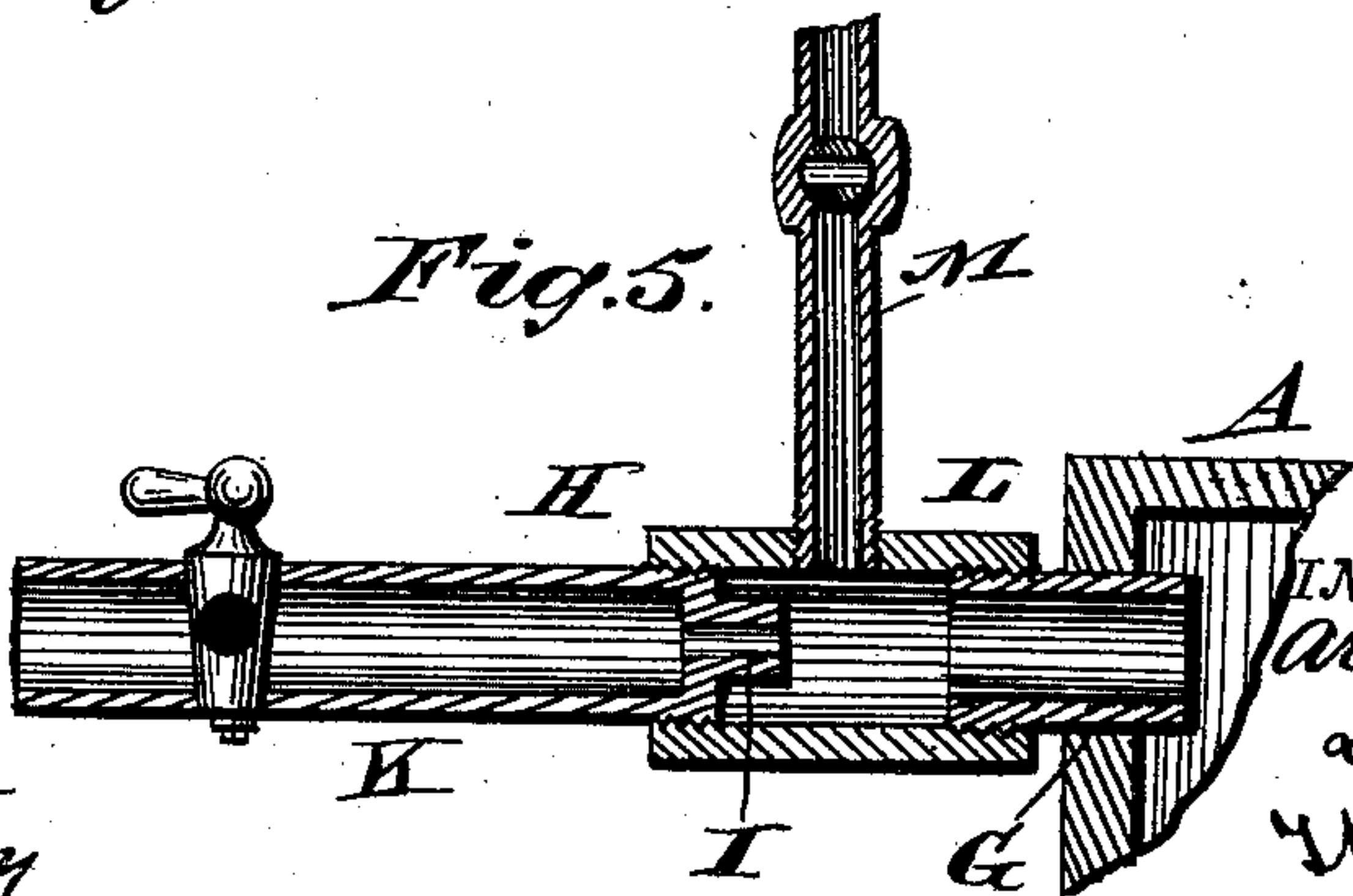


Fig. 5.



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FURNACE.

SPECIFICATION forming part of Letters Patent No. 378,839, dated February 28, 1888.

Application filed May 24, 1887. Serial No. 239,218. (No model.)

To all whom it may concern:

Be it known that we, ARTHUR C. HUIDEKOPER and LUC HOUZE, of Meadville, in the county of Crawford and State of Pennsylvania, have invented certain new and useful Improvements in Furnaces; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

This invention relates to certain improvements in furnaces; and it has for its objects to provide for the generation of combustible gases from the liquid hydrocarbons and the combustible gases derived from the mutual decomposition of steam and said liquid hydrocarbons, and for burning said gases in connection with heated air in the fire-box or combustion-chamber of a boiler-furnace, whereby the gases are thoroughly consumed and the intense heat generated absorbed, stored, and utilized, thus economizing fuel and securing its full effective heating capacity, as more fully hereinafter specified. These objects we attain by the means illustrated in the accompanying drawings, in which—

Figure 1 represents a side elevation of our improved generator and heat storing and absorbing furnace. Fig. 2 represents a top or plan view of the same. Fig. 3 is a front elevation of the same. Fig. 4 represents a longitudinal vertical sectional view showing our invention applied to a locomotive or other boiler. Fig. 5 is a longitudinal sectional view of one of the steam and hydrocarbon injectors.

The letter A indicates the fire-box, which consists of a rectangular shell or furnace lined with fire-bricks and provided with a grate, B, above which is a fire or generating chamber, C, and below it an inclosed ash-pit, D, having a door, E, in front provided with a suitable damper, through which a regulated supply of air may be admitted below the grate-bars. The top of the shell at each side is provided with rectangular or other shaped flues F, which are preferably cast with it, and between said flues, over the top of the fire-chamber, is set a covering or top of fire-brick or tiles, which are adapted to resist the heat of the decomposing gases and confine it to said cham-

ber. The forward portion of the chamber near its top is provided with apertures G, into which extend the pipes H, which are connected with a suitable steam-generator or air-blast, or both, whereby a blast of steam or air, or both combined, can be injected into the upper part of the fire-chamber in spraying jets, for which purpose the said pipes are made in sections K L, the sections K of which have contracted injecting-nozzles I entering the sections L, which form chambers, into which the hydrocarbon liquid to be decomposed is conducted in proper quantities by the upright pipes M, leading from a suitable tank or reservoir to said chambers. From the said sections or chambers L extend laterally the elbow-pipes N, which connect with openings in front of the air-flues F, before mentioned, at each side of the fire-chamber. The air-chambers at each side and at their rear ends are provided with openings P R, through which air may be taken in and injected into the combustion and heat-storing chamber. These openings may be provided with valves, so as to supply air in regulated quantities to the said structure, so as to insure the perfect combustion of the gases passing from the fire-chamber into the same.

It will be observed that by the arrangement of pipes and tubing the air or steam from the blast is jetted through the pipes H H into the fire-chamber, where it supports combustion, and the blast-supply, being greater in volume than the jets through tubes H H, will diverge and pass through elbows N N to flues F F, and thence to the combustion or storage chamber.

The fire-chamber is provided with an opening, S, at the forward part of its top, through which coal or other solid fuel may be supplied to the same, the said opening being provided with a cover or cap, T, by means of which it may be closed.

The heat absorbing or storage chamber is composed of fire-brick, tiles, or other refractory material built up or arranged in the fire-box or combustion-chamber U of a locomotive or other boiler furnace, as indicated. The said chamber is so built or constructed as to have a series of flues, W, opening from the interior through the top and all sides, so as to

permit the free escape of the burning gases and products of combustion from the interior to the outside of the same. The rear end of the fire-chamber A projects into the front of the heat-absorbing chamber and communicates with the same by a main flue or opening, V, through which the heated gases generated pass to be consumed and utilized.

The combustion and storing chamber, as shown in Fig. 4, will be of such size and shape with respect to the interior of the fire-box or combustion-chamber of the boiler-furnace that there will be a space left between the exterior walls of the absorbing-chamber and interior walls of the combustion-chamber, so that the burning gases and heated products of combustion will have a free passage of escape to the educt-flues of the boiler through such space.

It is evident that the form of fire-box and combustion or storing chamber may be varied according to the particular style of furnace to which our invention is to be applied and the location of the fire-box and combustion-chamber with respect to the boiler or furnace may be changed to suit circumstances without altering the character of our invention.

The operation of our invention is as follows: Ordinary fuel is applied to the fire-box and a fire is started in the usual manner, coal or other solid fuel being supplied through the opening at the top until the said fuel and the interior of the fire-chamber are sufficiently heated to mutually decompose the steam and hydrocarbon to supply the gaseous fuel. When this condition has been attained, the steam is admitted through the jet-pipes, passing into the fire-chamber in forcible jets. The liquid hydrocarbon is then admitted through the pipes leading from the reservoir, meeting the jets of steam, by which it is carried into the fire-chamber, where the intense heat causes the steam and the hydrocarbon to mutually decompose. The air admitted with the steam is so regulated as to supply just sufficient oxygen to keep up the combustion in the upper part of the fire-box, but not sufficient to permit the combustible gases to be consumed, and the highly-heated gases and products of combustion pass from the fire-box to the combustion and storing or absorbing chamber, where they are met by the incoming air delivered through the side flues at the top of the fire-chamber, whereby the gases are thoroughly consumed, creating intense heat, which is mostly absorbed and stored by the walls of the storage-chamber to be given off for the generation of steam in the boiler. The heat carried off by the final products of combustion passing through the interstices of the walls of the storage-chamber finds its way through the ordinary flues of the boiler, and is imparted to the water therein, and thus utilized, so that comparatively

little heat finally escapes, thus utilizing nearly all the heating power of the fuel.

It should be understood that the fire-chamber is entirely independent of the fire-box proper of the furnace to which our invention is applied, and that the storage-chamber is to occupy the fire-box of the furnace, as shown in Fig. 4. In other words, we employ an auxiliary fire-chamber for combustion of fuel and production of hydrocarbon gases, the products of combustion and gases being delivered into a receptacle or storage-chamber built up within the fire-box of the furnace, and ignited and consumed in said storage-chamber, the heat escaping thence to the flues of the boiler for generating steam therein. By the employment of said storage-chamber the walls of the furnace proper are protected from the injurious effects of immediate contact with the hydrocarbon gases at the moment of their combustion. It will further be observed that the invention is applicable to all the ordinary forms of furnaces.

Having described our invention, we claim—

1. In a hydrocarbon-furnace, the combination, with a furnace having a fire-box, of a combustion and heat-storing chamber occupying said fire-box, and an auxiliary fire-chamber located outside said fire-box, having a grate and communicating with said combustion-chamber, and a series of hydrocarbon-supply pipes and steam-jet pipes, all substantially as and for the purpose described.

2. The combination, with a furnace having a fire-box and a combustion and heat-storing chamber located in said fire-box, of a fire-chamber provided with a grate and steam and oil injecting pipes, and air-flues communicating at one end with the steam and oil pipes and at the other end with the combustion-chamber, substantially as and for the purpose described.

3. The combination, with the fire-box of a boiler-furnace and an auxiliary fire-chamber having a grate located outside said box, and oil, steam, and air supply pipes therefor, of a combustion and heat-storing chamber located in said fire-box, wherein the gases from the fire-chamber are consumed, so as to absorb and store the heat and supply it to the combustion-chamber of a boiler-furnace, and the air-pipes communicating with said combustion-chamber, substantially as and for the purpose described.

In testimony that we claim the foregoing as our own we affix our signatures in presence of two witnesses.

ARTHUR C. HUIDEKOPER.
LUC HOUZE.

Witnesses:

WIN S. ROSE,
JULIUS STAFF.