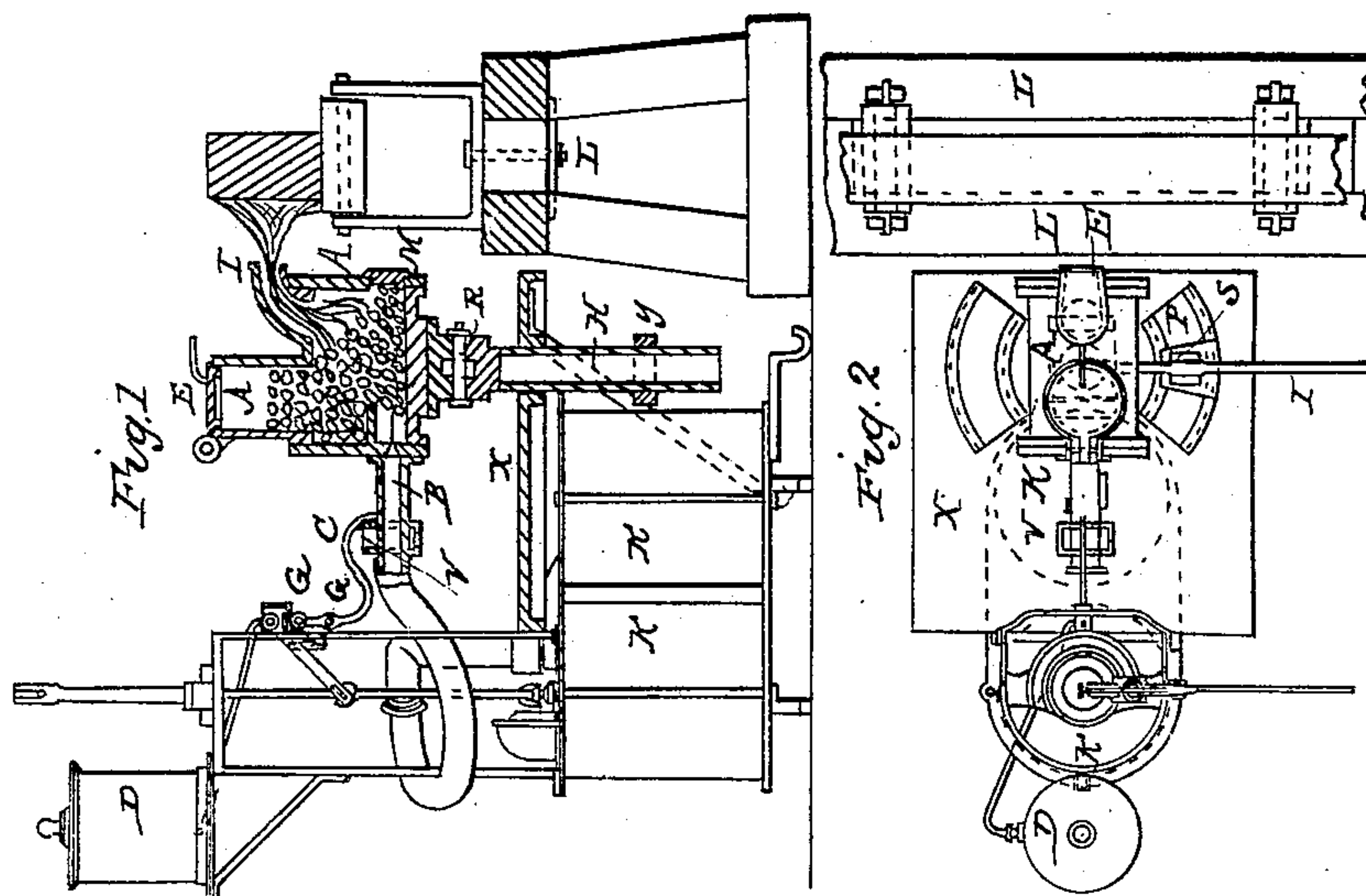
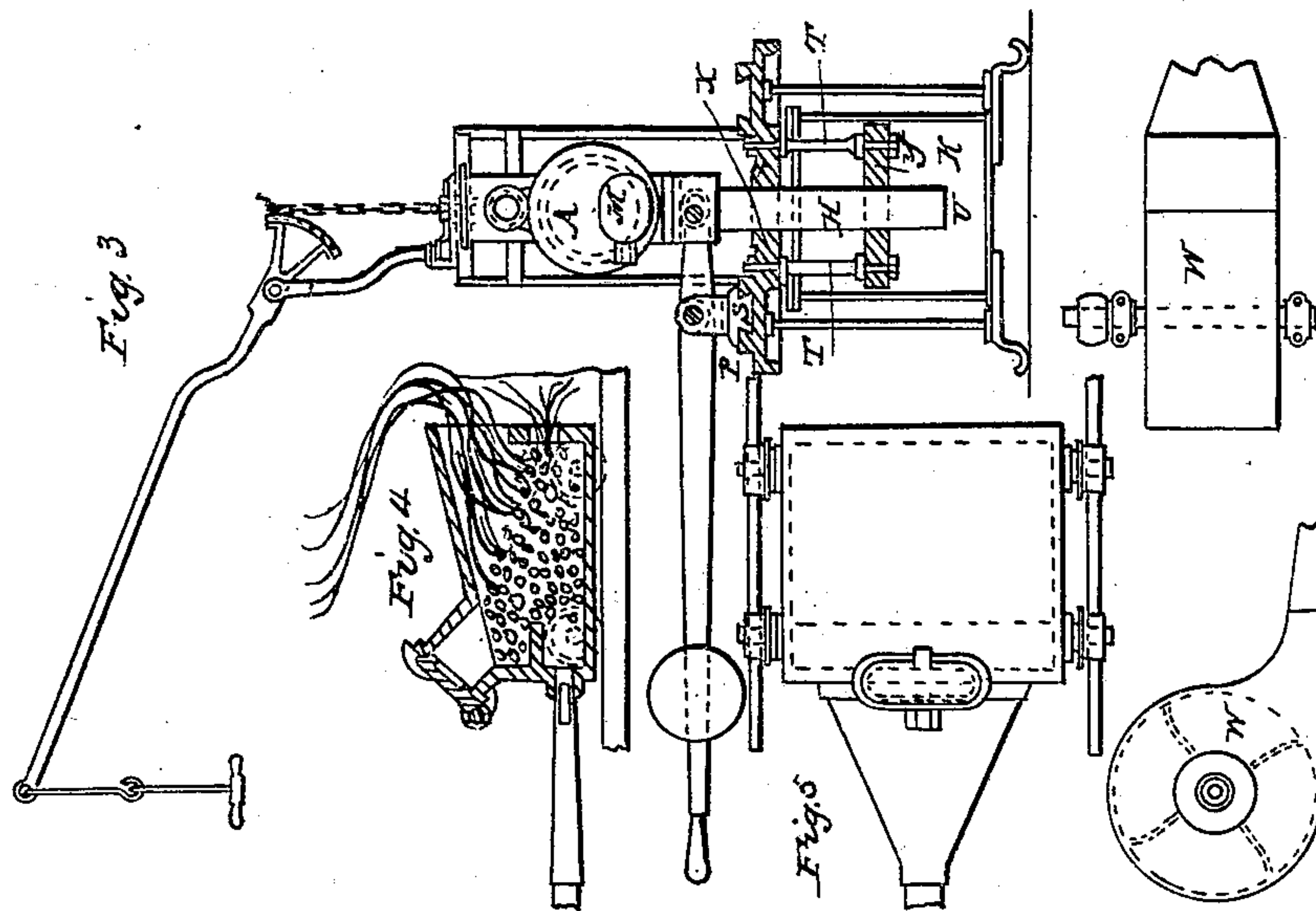


P. HUGON.
Carbonizing Wood.

No. 48,882.

Patented July 18, 1865.



WITNESSES
A. H. H.
W. H. H.

INVENTOR
P. Hugon

UNITED STATES PATENT OFFICE.

PIERRE HUGON, OF PARIS, FRANCE, ASSIGNOR TO EMIL JUSTH.

IMPROVEMENT IN APPARATUS FOR CARBONIZING WOOD.

Specification forming part of Letters Patent No. 48,882, dated July 18, 1865.

To all whom it may concern:

Be it known that I, PIERRE HUGON, of Paris, in the Empire of France, have invented certain new and useful Modes of and Apparatus for Carbonizing Wood, &c.; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, which represent, in elevation, section, and plan, an apparatus constructed in accordance with this my invention, and modifications in the details thereof.

My invention has for its object to effect direct carbonization of and upon all sorts of woods by the employment of inflammable gases generated and directed by means of a movable apparatus, substantially as hereinafter described. The operation of charring or carbonizing is effected by combining in the said movable apparatus atmospheric oxygen with the gases resulting from the decomposition of water in contact with incandescent fuel. This system or mode of operation is also applicable to the reduction, roasting, heating, or fusing of many varieties of ores or metals. It is also applicable to various mining and tunneling operations, as well as to purposes of ventilation, with or without the employment of gases produced by the decomposition of water or steam in contact with ignited fuel.

In the annexed drawings I have shown, in illustration of my invention, an apparatus by the aid of which my said invention may be carried into effect.

In the said drawings, Figure 1 is an elevation, partly in section; Fig. 2, a plan view, and Fig. 3 an end view, of the said apparatus.

It is composed of a fire-chamber or furnace, A, containing the coal or other fuel, which is charged through the movable door F. A blowing apparatus is arranged at K, by means of which a current of air is forced through the fuel in the fire-chamber or furnace A. From a water vessel or reservoir, D, and conveyed by a tube, C, a fillet or fine stream of water is entered the conduit B, where the air becomes charged with moisture or water before entering the furnace.

The current of air may be intercepted or regulated by means of a valve, b, in the conduit-pipe, and a water-chamber, V, surrounding the said conduit, at or near its connection with the flexible tube which conveys the blast to the furnace, is provided to prevent the heat

from being transmitted to injuriously affect the said flexible tube, which in most cases is made of leather or india-rubber.

The pieces of wood to be carbonized are placed on rollers held in suitable brackets which are supported in a frame, L, so that the wood, while facing the nozzle E of the furnace, may with ease be advanced or receded at the pleasure of the operator. The furnace is provided also with a man-hole or door, M, through which the cinders, ashes, and other matters may be extracted from the fire-chamber.

The furnace is made movable horizontally as well as vertically in the manner as follows: The furnace is established upon a column, H, which is held and guided by means of an orifice in the platform X, and of a collar, Y, situated below the platform X, but maintained at the proper distance from the platform by means of braces T, as shown in Fig. 3. A lever, I, attached to the column by means of a strong bolt, R, carrying an adjustable weight, N, and having its pivot or point of support S movable within a circular groove, P, in the platform, allows of the counterbalancing of the furnace in any required position.

Faucets G and G' may be used to properly regulate the quantity of water to be injected into the furnace at every blast of the bellows or blowing apparatus, and the supply may be regulated by automatic means—that is to say, by transmitting the movement of the bellows or blowing apparatus to the faucets by coupling a movable part of the former with a lever operating the latter.

The following are the directions for starting the apparatus:

First. Fill the chamber or cavity near which rises the india-rubber tube that is connected with the blowing apparatus with water. The cavity must be refilled as the occasion may require, as it is destined to protect the india-rubber pipe, which might be destroyed by the heat of the furnace.

Secondly. Light kindling-wood in the furnace, leaving open the lower door in front and the upper aperture by which the fuel is heaped on.

Thirdly. When the wood is fired the front door must be closed and hermetically sealed by a coat of potter's clay, the bellows being kept at work in the meantime. By the upper aperture the fuel is heaped on in small quantities till the furnace is filled.

Fourthly. When the coal or fuel is lighted close the door of the upper aperture, and the jet of flame will rush from the bent tube placed in front of the furnace. The blast of bellows continually and regularly intensifies the heat of the jet, which is brought to bear upon the wood, and thus carbonizes it in a very short time.

Fifthly. When the apparatus is well started (some ten or fifteen minutes being required) the faucets G are used to regulate the injection of the water. This water is swept on by the current of air from the bellows, and when it comes in contact with the burning fuel is decomposed into hydrogen gas, oxide of carbon, and carbonic acid. The inflammatory gases resulting from the decomposition mingle with the oxygen as they rush forth from the furnace, thus adding intensity to the heat of the jet produced by the fuel and greatly increasing its powers of carbonization.

Sixthly. When the heat loses somewhat of its intensity stir the fuel in the furnace through the upper aperture, and make up for that which has been consumed by adding fresh fuel in small quantities. This must be done more or less frequently, as the kind of fuel will determine.

For the purposes of carbonization a mixture of coke and coal, pit-coal, charcoal, wood, and solid or liquid fuel of any kind that will produce a flame can be used. If liquid fuel be used, it should be injected into the furnace.

The apparatus is so easily managed that by attention to the preceding directions an intelligent mechanic can learn to regulate its action in a few hours.

Care should be taken to preserve the wood to be carbonized from rain and dampness, inasmuch as it is evident that the water it may imbibe must evaporate before the timber can be carbonized. Twice the time and fuel is required for the carbonization of dampened instead of dry wood.

If cross-ties or sleepers are to undergo the process, these may be easily preserved from the inclemency of the weather by means of a movable shed covering the amount of ground to be gone over in three or four days. As fast as the wood is carbonized the cover is pushed farther forward. The gases issuing at the nozzle, it will be understood, are incandescent, and are thus projected up on the pieces of timber to be carbonized.

The degree or amount of carbonization is governed by the force of the blast and the length of time to which the timber is allowed to remain exposed to the action of the jet of inflamed gases, and the nozzle may be directed so as to project the burning stream above or below or laterally along the piece of wood to be charred.

Instead of water, steam or such other liquid may be introduced, which, on coming in contact with the incandescent fuel in the fire-chamber, is decomposed into combustible elements. In many instances the auxiliary action

of the gases due to the decomposition of water or other liquids may be dispensed with, and the flame resulting from passage of atmospheric air through the burning fuel may be used.

The arrangement shown of the apparatus, it will be seen, allows of the generation at pleasure of hydrogen or carbureted-hydrogen gas; but in either case the gas thus produced would be mixed with a certain quantity of nitrogen, oxide of carbon, and carbonic acid, inasmuch as the temperature within the furnace is maintained only by the injection of atmospheric air.

The form or disposition of the furnace may be varied to suit circumstances, as it must be borne in mind that the intensity of the flame depends upon the capacity of the fire-chamber, the quantity of air that is injected, and the quantity and quality of the fuel used.

The furnace may be constructed of cast-iron or wrought-iron, of fire-bricks bound in by means of iron hoops or an iron casing, or it may be made of iron lined with fire bricks or clay.

Figs. 4 and 5 represent in section and elevation an apparatus more especially adapted to the disintegration of rocks. Instead of the nozzle, it is provided with a flare-mouthed opening in front, and is mounted upon wheels, whereby the furnace may be advanced upon rails to the face of the rock. By means of a fan-blower, W, or other mechanical blower, the flame may be projected with great force upon any given point or points of the face of the rock, the effect of which is the disintegration or bursting of the rock.

Having thus fully described my invention and the manner in which the same is or may be carried into effect, I claim—

1. The method herein described of charring or carbonizing wood, disintegrating rocks, roasting or fusing ores and metals, by direct application in the form of jet of inflammatory gases generated in and directed by a movable apparatus, substantially in the manner herein shown and set forth.

2. An apparatus for carbonizing wood, disintegrating rocks, &c., composed of a furnace or fire-chamber movable upon a stationary frame both vertically and horizontally, and provided with a nozzle in combination with a suitable blowing apparatus, substantially as set forth.

3. In combination with a movable furnace and blowing apparatus under an arrangement for operation substantially as described, an apparatus for injecting water or steam in the manner described, so as to mix with the air previous to its passage through the furnace, for the purpose set forth.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

P. HUGON.

Witnesses:

E. SHERMAN GOULD,
O. MARS.