(No Model.)

F. O. MATTHIESSEN.

BONE BLACK KILN.

No. 303,378. Patented Aug. 12, 1884.

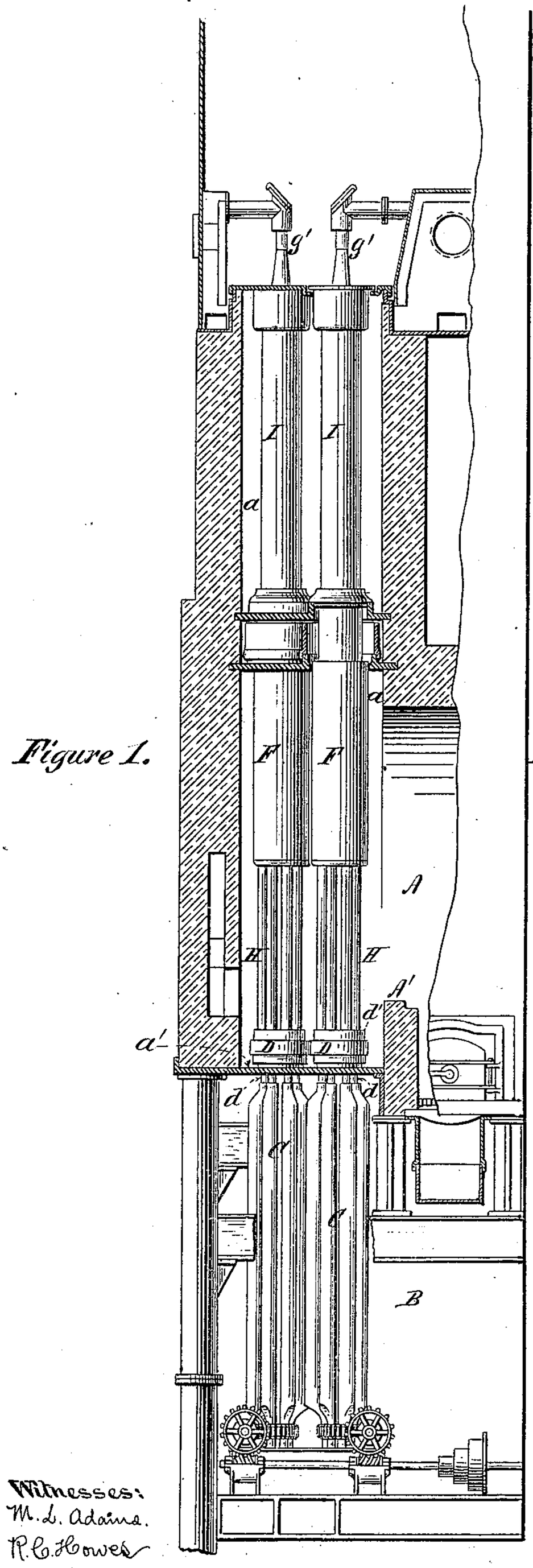

Figure 1.

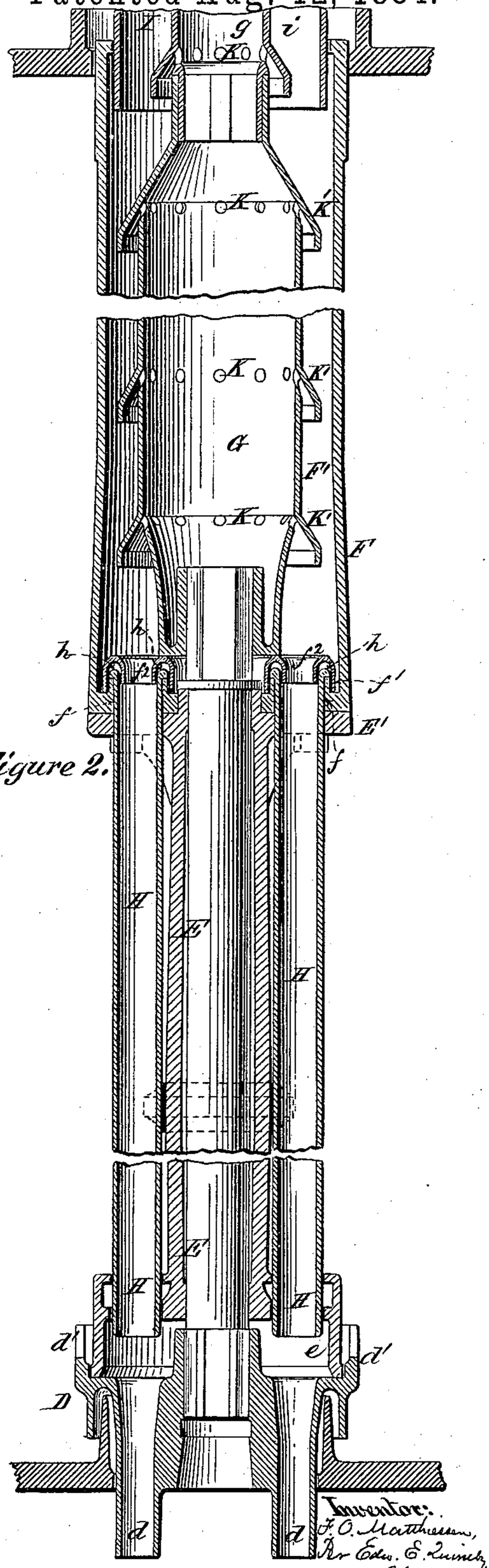

Figure 2.

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BONE-BLACK KILN.

SPECIFICATION forming part of Letters Patent No. 303,378, dated August 12, 1884.

Application filed May 3, 1884. (No model.)

To all whom it may concern:

Be it known that I, FRANZ O. MATTHIESSEN, of Irvington, New York, have invented a certain Improvement in Bone-Black Kilns, of which the following is a specification.

In the process of revivifying animal charcoal there have heretofore been used vertical cylindrical retorts provided with an interior flue having perforations at intervals for the purpose of providing for the escape of the gases and vapors driven out of the bone-black during the process of reburning it. These retorts are arranged within a furnace-chamber and are mounted upon the upper ends of a circularly-arranged group of cooling-pipes which are below the furnace-chamber. In some cases, by means of suitable gearing each group of cooling-pipes and the retort which surmounts it are made to slowly revolve upon a vertical axis, thus effecting the uniform exposure of the retort to the heat of the furnace. The bone-black introduced at the top of the retort falls through the annular space between the cylinder and the inner flue, and thence into the cooling-pipes, from the lower ends of which it is discharged. In my improvement I retain the cylindrical retort with the central ventilating-flue for performing the preliminary operation of drying the bone-black, but provide for the subjection of the bone-black, after it has been dried, to the higher degree of heat required for completing the revivifying operation by making the lower part of each retort consist of a group of circularly-arranged vertical tubes, the upper ends of which are inserted into the base of the ventilated cylinder, so that they receive the bone-black which falls through the annular space in the ventilated cylinder. By the provision of the heating-tubes the amount of heating-surface in the lower section of the retort is greatly increased, and the bone-black is divided into comparatively small masses, all sides of which are exposed to the heat.

My improvement, besides being applicable to stationary retorts, may also be applied to the class of retorts which revolve on their vertical axes, in which case the heating-tubes are arranged in alignment with and discharge their contents into the usual system of vertical cooling-pipes, which are beneath the furnace, and to which rotation is imparted by suitable gearing in the usual manner.

The accompanying drawings, representing a portion of the bone-black kiln containing my improvement, are as follows:

Figure 1 is a vertical section of a portion of the kiln, showing a portion of the furnace chamber and flue, and showing two of the rotating retorts arranged, respectively, over two groups of circularly-arranged cooling-pipes. Fig. 2 is a broken central vertical section of one of the rotating retorts, a portion of the furnace-bottom through which the lower end of the retort projects, and a portion of the floor upon which the usual non-rotating cylinder, which surmounts the retort, is supported.

The drawings represent retorts of the class which, either in whole or in part, are made to rotate upon their vertical axes.

It will be understood that the mechanism for rotating the retort may be omitted, and that my improvement applies equally, whether the retort be of the stationary or the rotating type.

The kiln is constructed with the usual fire-chamber, A, and vertical heating-chambers are arranged therein, one of which, *a*, is shown in Fig. 1. Beneath the floor *a'* of the heating-chamber is the cooling-chamber B. The rotation of the vertical retorts is effected by the usual worm-gearing. (Shown in Fig. 1.) Each rotating system consists of the usual group, C, of cooling-pipes, into the upper ends of which respectively are inserted the nozzles *d*, extending downward from the base D of the retort. The base D has around its upper edge the usual vertical flange, *d'*. The lower open end of the hollow foot *e* of the central pillar, E, sets within the flange *d'* and rests upon the top of the base D. At its upper end the pillar E is provided with the laterally-projecting collar E', the surface of which affords an annular bearing for the lower end of the ventilated cylinder F, inclosing the usual central flue, G, the lower end of which is supported upon the top of the pillar E. The collar E' and the top of the foot *e* have, respectively, like series of equidistant holes formed through

them, for the reception of the opposite ends, respectively, of the heating-pipes H. The lower end of the cylinder F is centrally perforated to admit the upper end of the pillar E, and also has an annular series of perforations, *f*, corresponding with the perforations through the collar E′, to admit the upper ends of the pipes H. These pipes are provided at their upper ends with the outwardly-projecting flanges *h*, which bear upon the flanges *f*′, formed around the upper edges of the holes *f*. The upper end of each of the pipes H, and the flange upon which it is supported, are inclosed by the annularly-grooved centrally-perforated shield f^2.

The retort shown in the drawings is composed of what may be called "three sections," the lower section composed of the group of heating-pipes H, the middle section consisting of the cylinder F, and the upper section composed of the cylinder I, the cylinder F inclosing the ventilating-flue G, and the cylinder I inclosing the smaller ventilating-flue *g*. The cylinder I, composing the upper section of the retort, need not necessarily revolve. It is preferred, however, that the upper section, *g*, of the flue shall be supported upon and revolve with the lower section, G. The vapors and gases driven out of the bone-black rise through the flues G *g*, and are carried off through the usual exhaust-pipes, G′, the lower ends of which loosely inclose the upper ends of the rotating flues *g*, respectively. The annular space *i*, between the shell of the upper cylinder, I, and the upper section, *g*, of the ventilating-flue, is, it will be seen, larger than the corresponding space, F′, in the middle section of the retort. This construction, however, is not unusual. The ventilating-flues G *g* are provided with horizontal rows of holes K. Each row of holes is provided with the usual external hood, K′, so that the bone-black will be prevented from falling into the flue. Bone-black is introduced in the usual way into the upper end of the annular space *i*, and falls through that space into the narrower annular space F′, and in so falling becomes dry by the time it reaches the lower end of the middle section, F, of the retort, where it enters the heating-pipes H. In this space it is exposed to the highest degree of heat while being kept from contact with the air. From the pipes H it falls through the nozzles *d* into the cooling devices, which may consist of the ordinary cooling pipes, C, or any other suitable cooling apparatus.

By the use of the group of pipes H, composing the lower section of the retort, the area of the heating-surface of the lower section of the retort is greatly increased, and the bone-black in falling through this lower section can therefore be more effectually heated.

I claim as my invention—

1. A retort for a bone-black kiln, composed, essentially, of an upper section, which is ventilated for the purpose of carrying off the vapors and gases driven out of the bone-black by preliminary application of heat, and a lower section composed of a group of vertical pipes, in which the bone-black is subjected to a higher degree of heat, and is at the same time kept from contact with the air.

2. In apparatus for revivifying bone-black, a series of retorts, each consisting of the ventilated section F, surmounting a heating-section composed of the group H of vertical pipes contained within a suitable heating-chamber, in combination with the similarly-arranged group of cooling-pipes C beneath the heating-chamber.

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