

(No Model.)

2 Sheets—Sheet 1.

E. F. RUSSELL.

ORE FURNACE.

No. 310,619.

Patented Jan. 13, 1885.

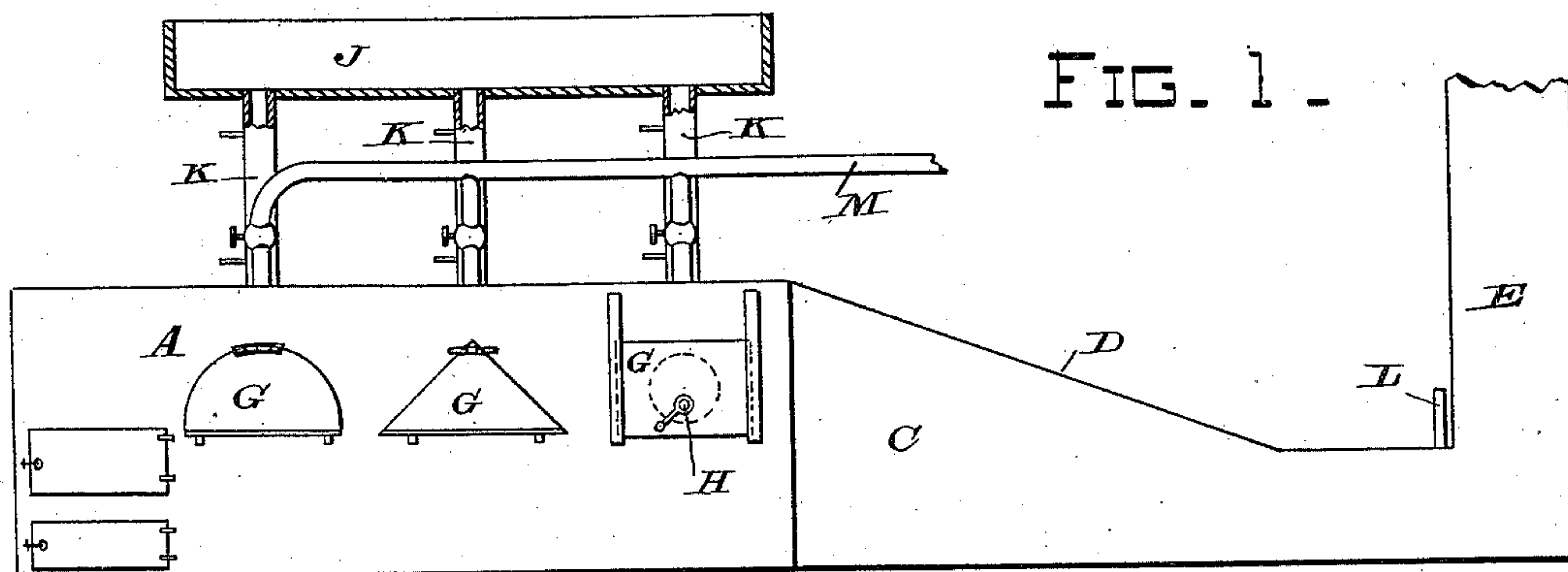


FIG. 1.

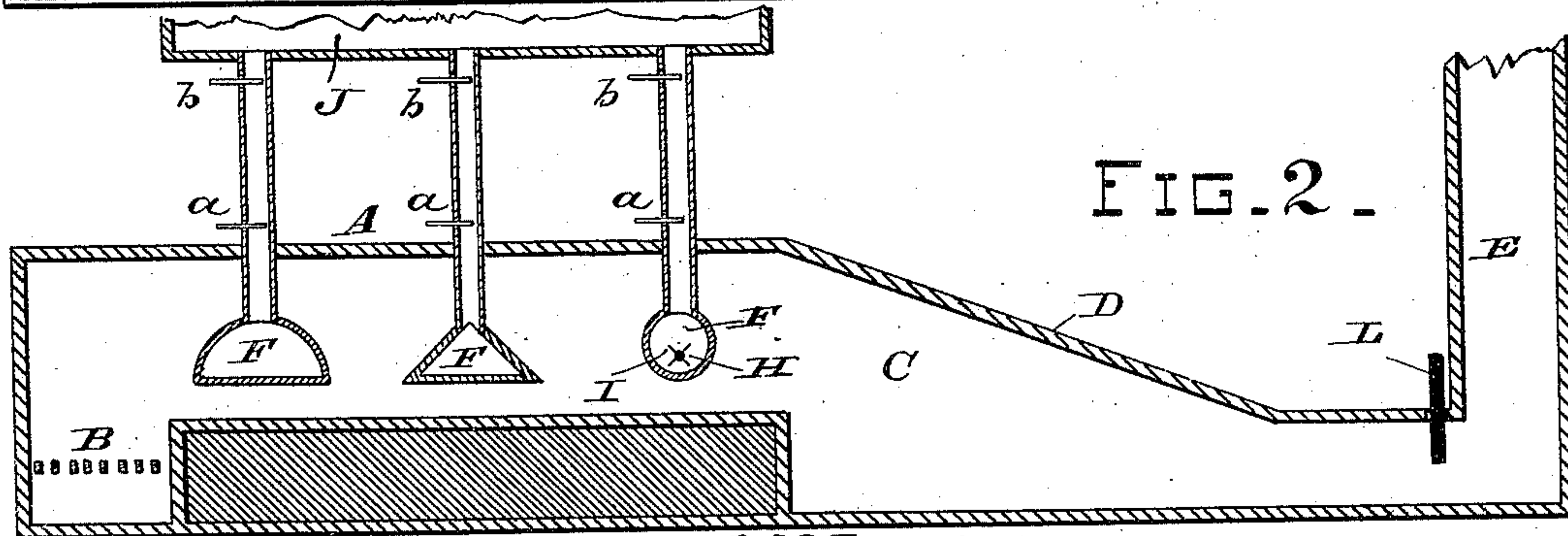


FIG. 2.

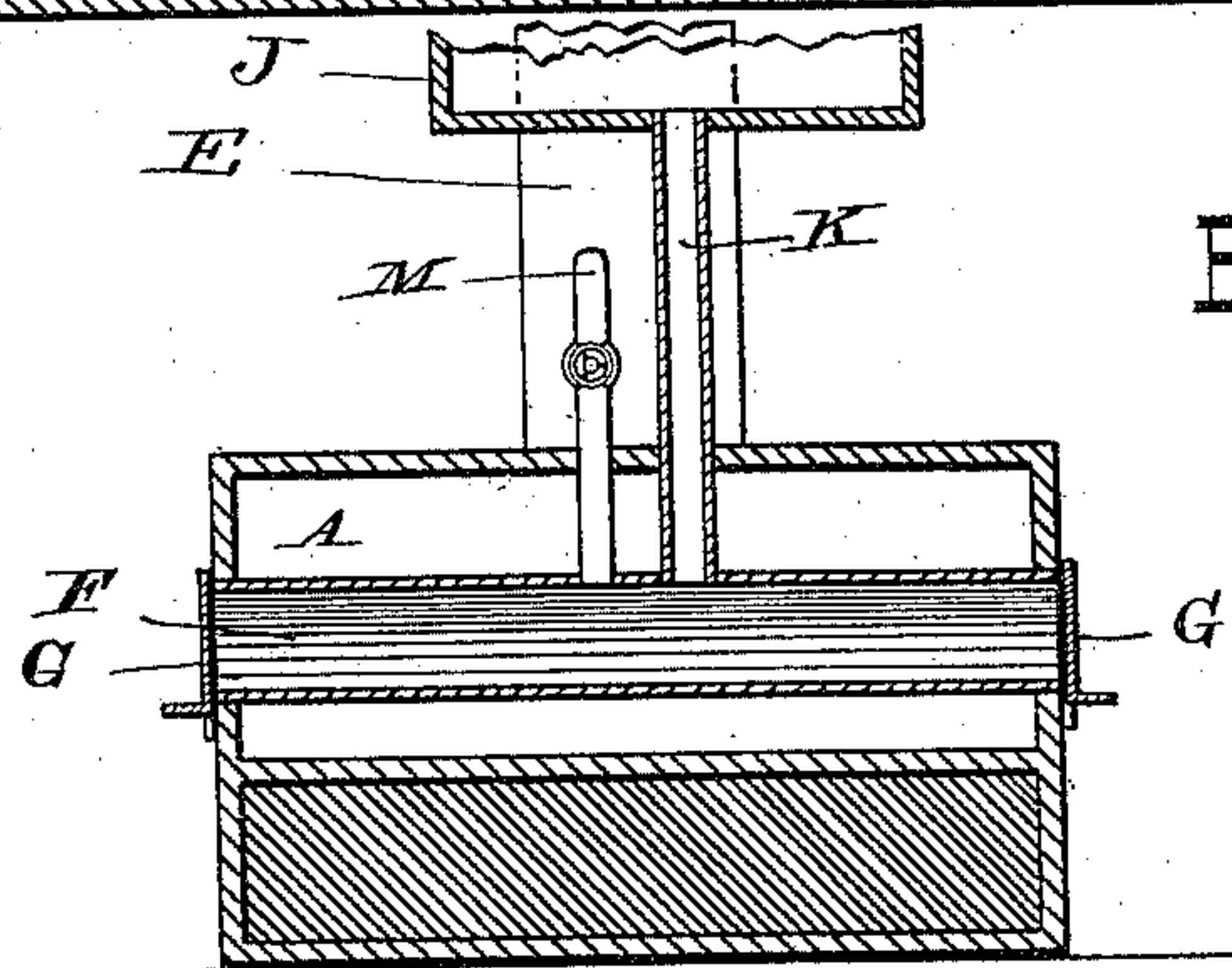


FIG. 3.

WITNESSES.

Wilbur Bradford
Joseph Cooney

INVENTOR.

Eli F. Russell
By L. M. Smith
Attorney

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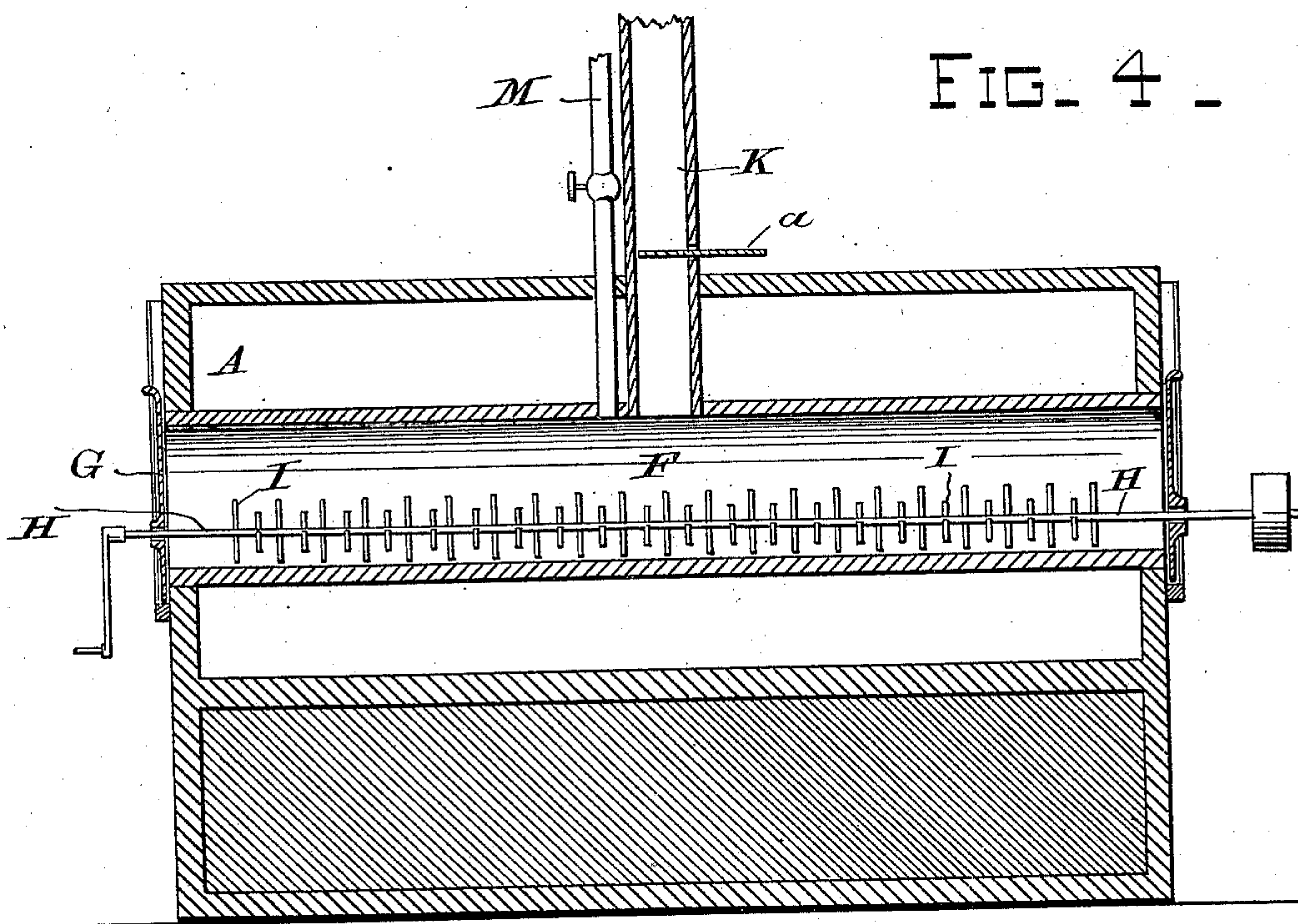
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INVENTOR.

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Attorney

UNITED STATES PATENT OFFICE.

ELI F. RUSSELL, OF SAN FRANCISCO, CALIFORNIA.

ORE-FURNACE.

SPECIFICATION forming part of Letters Patent No. 310,619, dated January 13, 1885.

Application filed December 19, 1883. (No model.)

To all whom it may concern:

Be it known that I, ELI F. RUSSELL, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented an Improved Ore-Furnace, of which the following is a specification.

The invention consists in the construction and combination of parts, as hereinafter specifically described and claimed.

Figure 1 is a side view of my improved furnace. Fig. 2 is a central longitudinal section through the furnace. Fig. 3 is a transverse section through the furnace. Fig. 4 is a transverse section through the furnace showing the agitator in position within one of the ore-chambers.

Similar letters of reference are used to indicate like parts throughout the several views.

Let A represent the body of a furnace. This furnace I construct of brick with a fireplace, B, at one end and with a horizontal flue extending along through the furnace to a large combustion-chamber, C, at its opposite end.

The body of the furnace may be extended as long as desired, as will be hereinafter more fully described.

The combustion-chamber C, I prefer to make with an inclined top or roof, D, which gradually descends from the top of the furnace at its rear end downward toward the lower end of the stack or chimney E, with which it connects; but it can be made in any desired form as long as it has sufficient capacity; but in any case it will connect with the chimney or stack E at or near a level with the bottom of the furnace, so that the draft will draw the heat and products of combustion from the lowest point possible. This arrangement provides a still-chamber or eddy above the line of draft, thus retaining the heated vapors and products of combustion as long as possible before allowing them to escape up the chimney.

Across the heat-passage or main flue, which extends through the body of the furnace, I secure the ore-chambers F F F, so that their open ends pass through the walls of the furnace on each side. I use as many of these ore-chambers as the length of the furnace will

permit by placing them about four inches apart and parallel with each other. These ore-chambers can be made of any desired shape, either square, circular, semicircular, or triangular in cross-section. In the present instance I have represented three different forms in the same furnace. These chambers pass across the flue or heat chamber at a point about midway between its bottom and top, so that the heat and products of combustion can pass all around them, leaving sufficient space above and below them to avoid impeding the draft. The ends of these chambers, as above stated, pass through the side walls of the furnace and are open, so that a rake can be introduced into one end and the contents of the chamber forced out through the opposite end or drawn out through the end into which the rake is introduced.

I provide suitable heads or doors, G, for closing the ends of the ore-chambers, so that each chamber can be sealed up when desired. If deemed preferable, these doors can be weighted and hinged at the top, so as to render them self-closing.

When the ore-chambers are circular in form, I pass a shaft, H, through the chamber, so that the ends of the said shaft pass through and have their bearings in the heads or doors, which in this case should be set in vertical slides in order that the doors may be raised upward when a charge is to be withdrawn.

On the shaft H, I secure, spirally or otherwise, projecting arms or stirrers I, which can be revolved so as to stir the ore in the chamber by rotating the shaft without opening the end doors. This stirring arrangement will only be required in roasting certain classes of ore, while some ores are better treated or roasted without stirring. In this latter case the stirrers need not be used.

To charge the chambers, I connect a large bin, J, above the furnace with each chamber by a square pipe, K, which passes down through the top of the furnace and into each chamber. This pipe must be made of refractory material for a short distance above the furnace, so that it will not be affected by the heat.

To regulate the charge of ore, I employ two gates, a b, which pass across the pipe and cut

off the communication, and can be drawn out when the chamber is to be charged. One of these gates is just above the top of the furnace while the other is farther up toward the bin, 5 so that the ore contained in the pipe between them is just sufficient to form a charge. The upper gate is first drawn to fill the pipe above the lower gate. It is then closed and the lower gate is drawn, so as to let the charge descend 10 into the chamber. The lower gate is then closed, so as to prevent the fumes from the roasting ore from ascending into the pipe.

If the fumes from the roasting ore are to be condensed, I connect the chambers with a con- 15 denser by a pipe, M, having suitable branches and provided with valves or gates, as shown.

The ore to be roasted is first broken and crushed to the desired degree of fineness, and in this condition it is charged into the cham- 20 bers. The heat and products of combustion from the fire-place will then pass through the flue or heat-passage and entirely surround each chamber without coming in contact with the ore, and each of the chambers will be 25 heated and the ore inside of them roasted after a short exposure. The quantity of ore in each chamber is small; but I use a large number of chambers, so that the ore is quickly roasted with a small amount of fuel, and the 30 aggregate quantity roasted is comparatively large, thus accomplishing the roasting in a very economical and thorough manner.

It should here be remarked that the draft of the furnace is controlled by a slide or damp- 35 er, L, placed across the end of the combustion-chamber, as shown; or it may be placed within the chimney.

I am aware that it is a common practice to roast ore without its being brought in contact 40 with the products of combustion, and many forms of apparatus have been devised for this purpose.

Heretofore a series of transverse tubular ore chambers or retorts, alternately connected 45 at their opposite ends, have been arranged in

a furnace, each retort containing a screw-con- veyer, by means of which the ore is passed from one retort into the adjoining one. The ore is fed into the retort farthest from the fire, and is passed successively through the several 50 retorts to the one nearest the fire, whence it escapes into a suitable receptacle. In my invention, however, the ore is fed into each retort separately.

Sometimes the retorts heretofore used have 55 been placed in a vertical or an inclined position instead of horizontal, and they have been arranged in connection with various devices for feeding the ore.

I am also aware that open-ended retorts have 60 heretofore been employed, and that the roof and walls of the furnace are sometimes inclined. These forms of apparatus I do not broadly claim.

I am not aware that an ore-furnace has here- 65 tofore been built so as to combine the advantages and the peculiarities of construction hereinbefore set forth, and shown in the annexed drawings; and therefore

What I claim as my invention is— 70

An ore-roasting apparatus consisting of the furnace A, having a fire-place, B, at one end that communicates with a combustion-cham- ber, C, by a long heat-passage in which are 75 located the transverse open-ended ore-cham- bers F F F, the chimney E, communicating with the end of the combustion-chamber on a level with the bottom of the furnace, and hav- ing a valve, L, and the ore-bin J, located above the furnace and connected to each ore-cham- 80 ber by a pipe, K, having gates *a b*, all com- bined substantially as and for the purpose specified.

In testimony that I claim the foregoing I have hereunto set my hand and seal.

ELI F. RUSSELL. [L. S.]

Witnesses:

WILMER BRADFORD,
CHAS. E. KELLY.