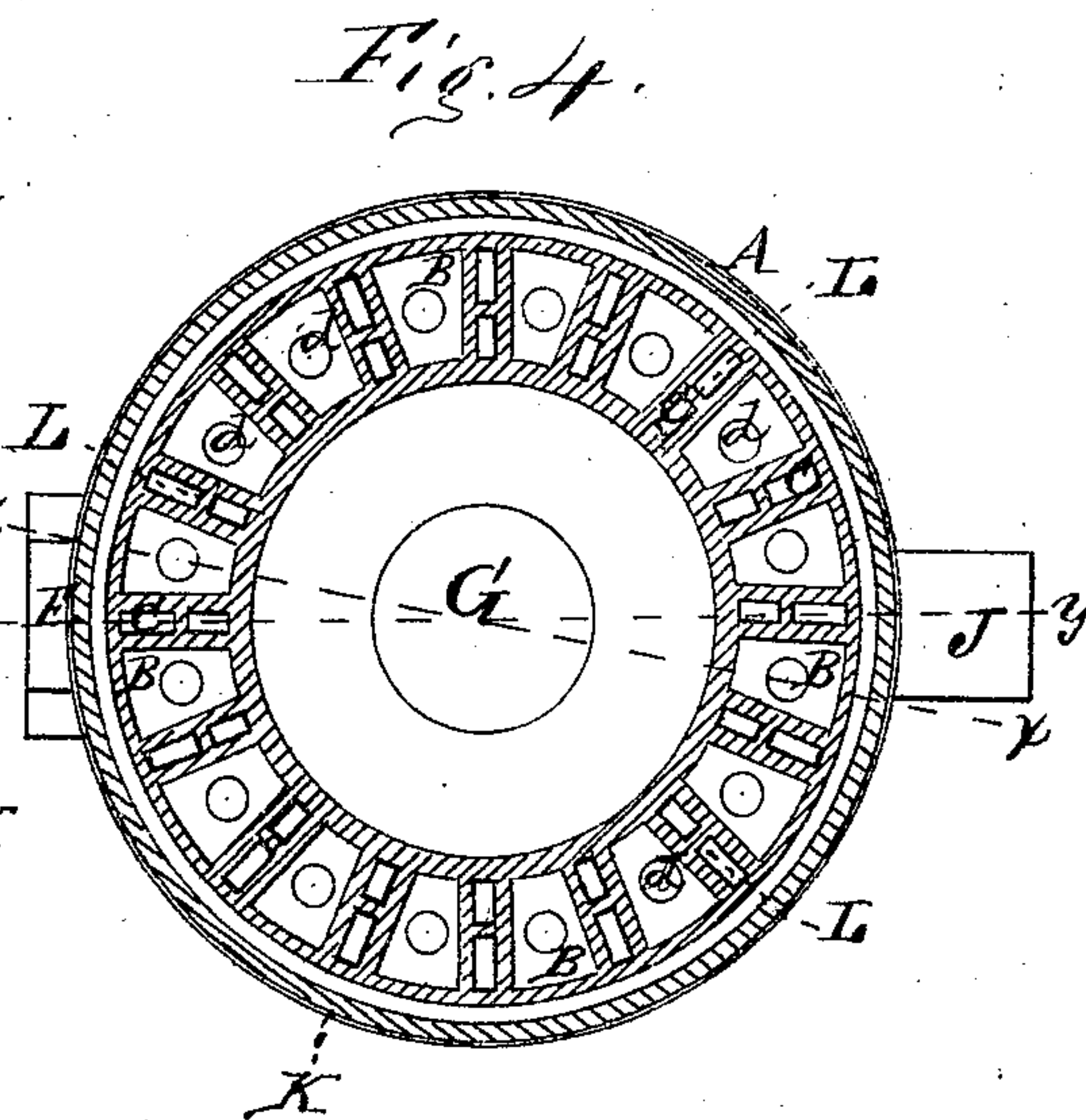
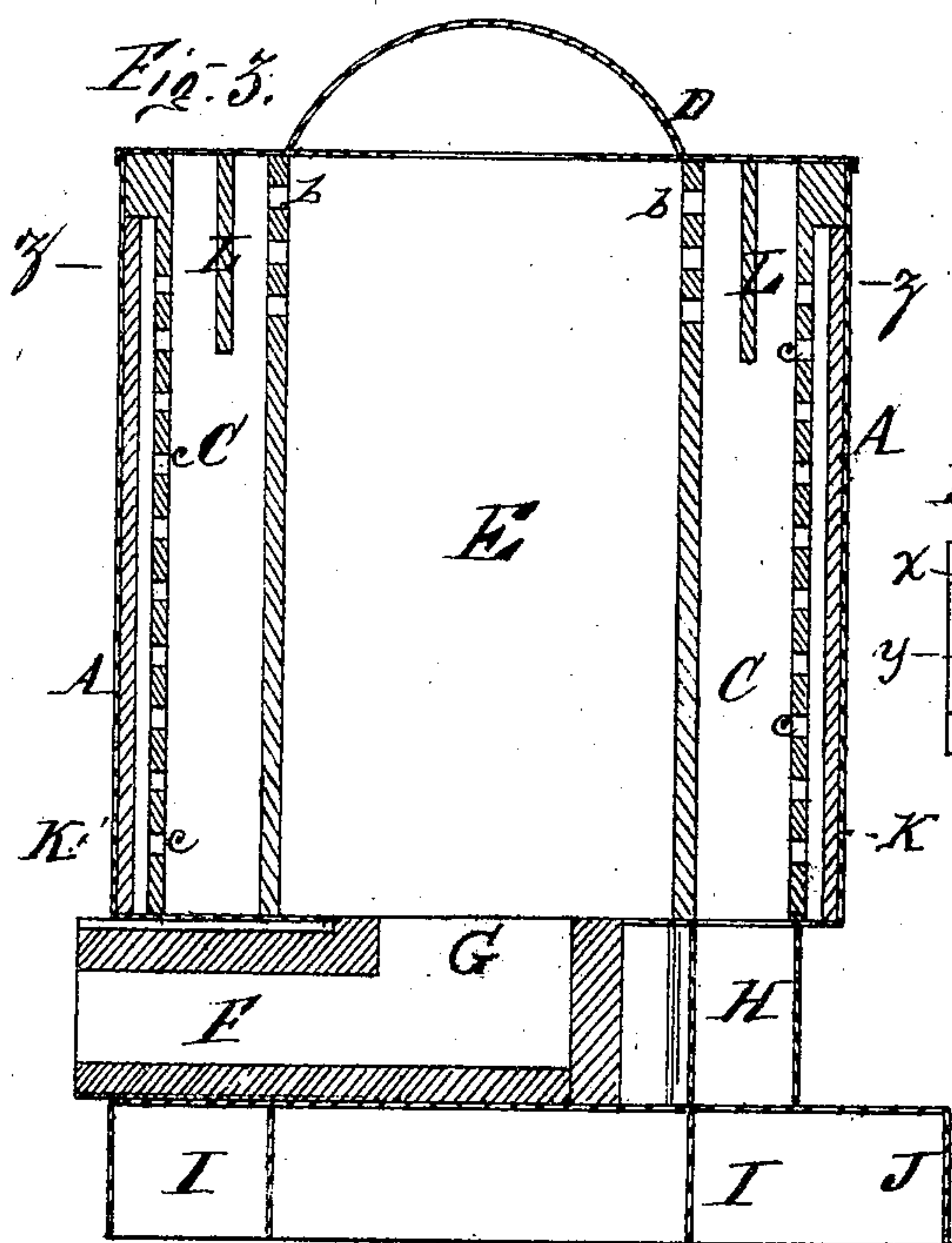
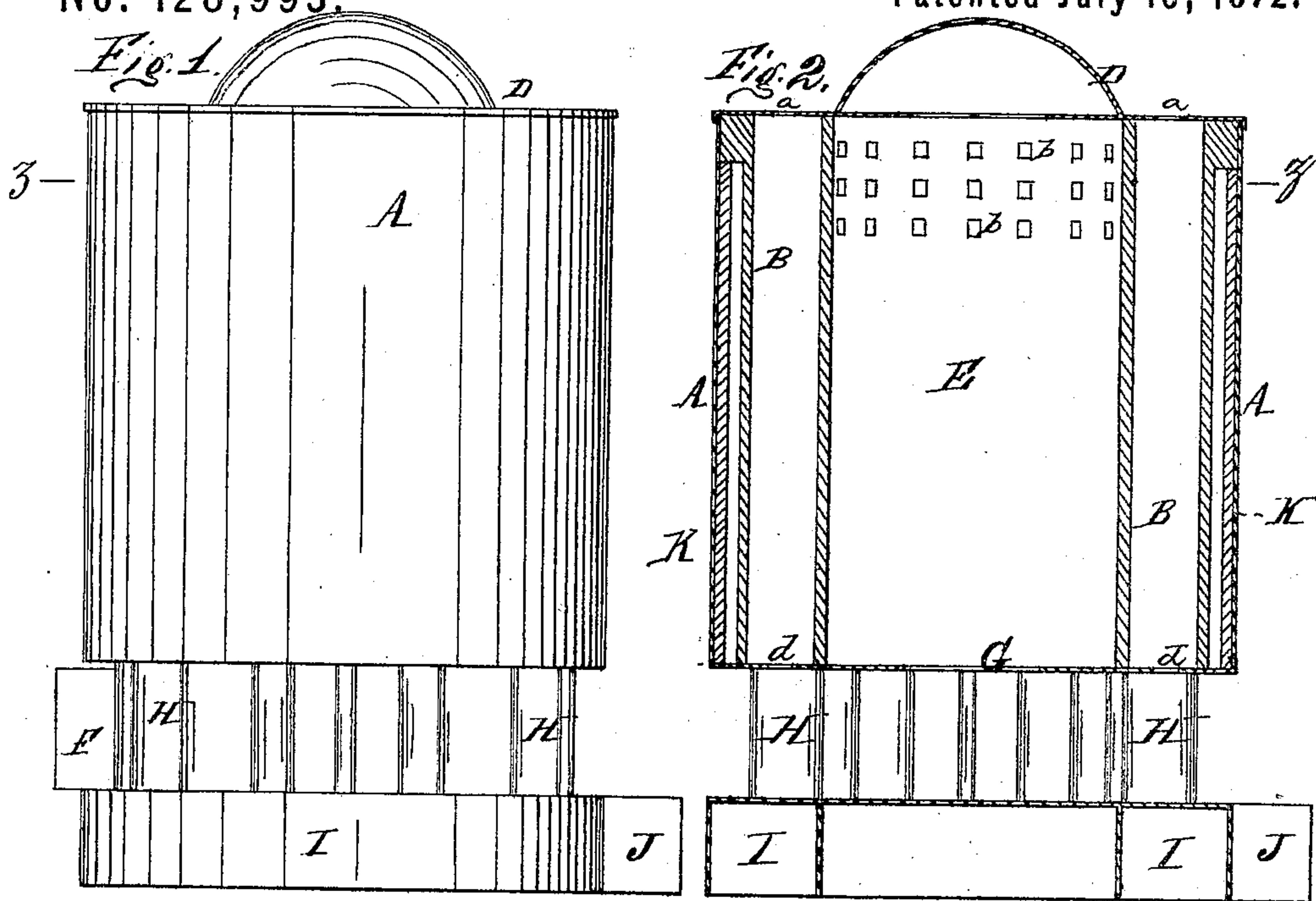


J. WILSON.
Improvement in Furnaces for Reducing Iron-Ores.
 No. 128,993. Patented July 16, 1872.



Witnesses
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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN FURNACES FOR REDUCING IRON ORES.

Specification forming part of Letters Patent No. 128,993, dated July 16, 1872.

Specification of certain Improvements in Furnaces for Reducing Iron Ores, invented by JOEL WILSON, of Dover, in the county of Morris and State of New Jersey.

Nature and Object of the Invention.

This invention relates to a furnace adapted to accomplish the deoxidation of iron ores by cementation preparatory to their being worked into manufactured iron; and consists in the constructions, combinations, and arrangements embodied in the said furnace, and hereinafter more fully set forth, by which the said result is more satisfactorily and economically accomplished than has heretofore been done.

Description of the Accompanying Drawing.

Figure 1 is a side elevation of a furnace constructed according to my invention. Fig. 2 is a vertical central section of the same upon the plane indicated by the line *x x* drawn across Fig. 4, certain parts of the furnace being removed. Fig. 3 is a vertical central section of the same upon the plane indicated by the line *y y* drawn across Fig. 4. Fig. 4 is a horizontal section of the same, showing the parts below the line *z z* drawn across Figs. 1, 2, and 3.

General Description.

A is the shell of the furnace, which shell incloses the circular series of vertical retorts B B, which are made of fire-clay or some other suitable refractory material, and the series so constructed as to form flues C C intervening between said retorts, as shown in the drawing. D is the top or cover of the furnace, which cover is made with openings *a a*, immediately over the retorts B B, to allow the carbonic-acid gas formed in the process of cementation to escape, and also to allow additional material to be supplied to the retorts, as occasion may require. The construction of the series of retorts B B and intervening flues C C is such as to form and surround a cylindrical chamber, E, into which heat to carry on the process of cementation and reduction of the ore is received through the flue F from a balling-furnace, in connection with which this furnace is designed to be worked, the heat passing from the flue F into the well-hole G, and thence ascending into the internal chamber E. To supply this necessary heat for operating this fur-

nace the heat and products of combustion which escape from the balling-furnace and would otherwise pass into the chimney are turned into the flue F, and, rising into the internal chamber, impart a portion of their heat through the inner walls of the retorts B B to the materials contained in the said retorts, and, as the retorts are arranged in a circle surrounding the internal chamber, the heat is very equally distributed among all the retorts of the series. The products of combustion from the internal chamber E are allowed to pass through the openings *b b* in the upper part of the chamber E in the flues C C, through which flues the products of combustion descend into the flues H H, and through the latter are discharged into an annular or collecting chamber, I, from whence they pass through the pipe J to the chimney. To at least prevent the escape of heat through the outer walls of retorts B B the casing A is lined with, or it is formed into, a hollow cylindrical wall or casing, K, which should be of fire-clay or brick, or some other material which is a bad conductor of heat, and should be of sufficient internal diameter to leave a thin annular flue-space between it and the outer wall of the retorts B B, as shown in the drawing; and into this annular flue-space openings *c c* are made from the flues C C, to allow the heat and products of combustion to circulate freely between this casing K and the outer walls of the retorts B B, and thereby at least prevent the loss of heat through the outer walls of said retorts, and perhaps add somewhat through the said outer walls to the heat on the materials contained in the retorts. L L are partitions in the upper ends of the flues C C, to give an immediate downward direction to the heated products of combustion as they enter these flues, and prevent too much of the heat being expended at the upper ends of the retorts. *d d* are apertures in the bottoms of retorts B B for the withdrawal of the iron or the ore after it has been subjected to the process of cementation. These apertures may be closed when not in use by means of sliding doors, or by any other suitable device.

Operation.

This furnace having been constructed as hereinbefore described, the ore to be reduced should be pulverized or crushed and intimate-

ly mixed with a sufficient quantity of coal-dust or other deoxidizing material to remove the oxygen from the ore to be treated, and the retorts B B filled with this mixture. The waste heat from the balling or other furnace should then be turned into the pipe F and allowed to pass continually through this furnace in the manner already described, and sufficient in quantity and intensity to keep the material in the retorts B B at a red heat, or at a sufficient heat to cause the carbon in the coal-dust or other deoxidizing material to combine with the oxygen in the ore and expel it therefrom. As the ore becomes sufficiently deoxidized to be worked it may be removed from the retorts through the apertures *d d* and taken to the balling-furnace, where it is worked into balls, and it is afterward treated in the usual manner. As the retorts become partially emptied, either from the withdrawal of the ore, as above stated, or from the burning out of the carbonaceous material, they should be filled up with an additional supply of the mixture of ore and deoxidizing material, and the process may be thus continued indefinitely.

Having thus described a furnace embodying my improvements in the mode in which I have practically used them, I declare that I am aware that furnaces with upright retorts for the calcining of bones and for other purposes have long been known in the arts, and therefore I do not claim, broadly, the use of such retorts, nor the arrangement of them in connection with a furnace for heating them.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The arrangement and combination, substantially as above set forth, of the circular series of upright retorts and intervening flues, the internal chamber within said series for the products of combustion, and the collecting-chamber for receiving said products after they have traversed the intervening flues.

2. The arrangement and combination, substantially as before set forth, of the said internal chamber, the circular series of upright retorts surrounding that chamber, and the flue for delivering the products of combustion from the balling-furnace.

3. The arrangement and combination, substantially as before set forth, of the internal chamber, the circular series of upright retorts surrounding that chamber, the flues intervening between the said retorts, and the external annular flue-space surrounding said retorts.

4. The arrangement and combination, substantially as before set forth, of the internal chamber, the circular series of upright retorts surrounding said chamber, the flues intervening between said retorts, the annular flue-space surrounding said retorts, and the partitions at the upper ends of said flues.

Witness my hand this 23d day of February, A. D. 1872.

JOEL WILSON.

Witnesses:

SAML. W. TUTTLE,
E. S. RENWICK.