

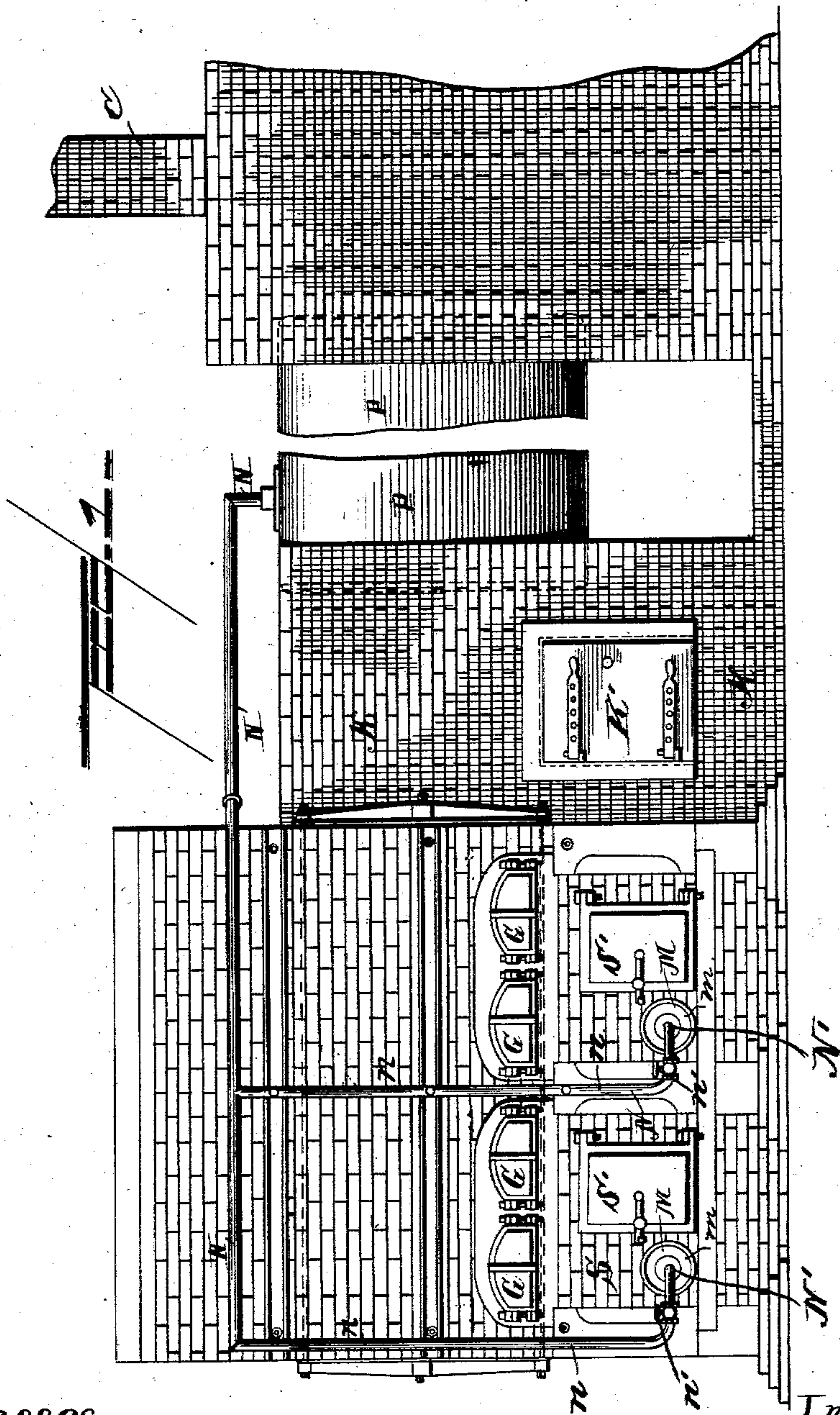
(No Model.)

3 Sheets—Sheet 1.

W. HORSFALL.
FURNACE.

No. 429,626.

Patented June 10, 1890.



Witnesses.

Henry S. Dietrich
Thomson Cross

Inventor
William Horsfall,
per *Henry M.*
Attorney

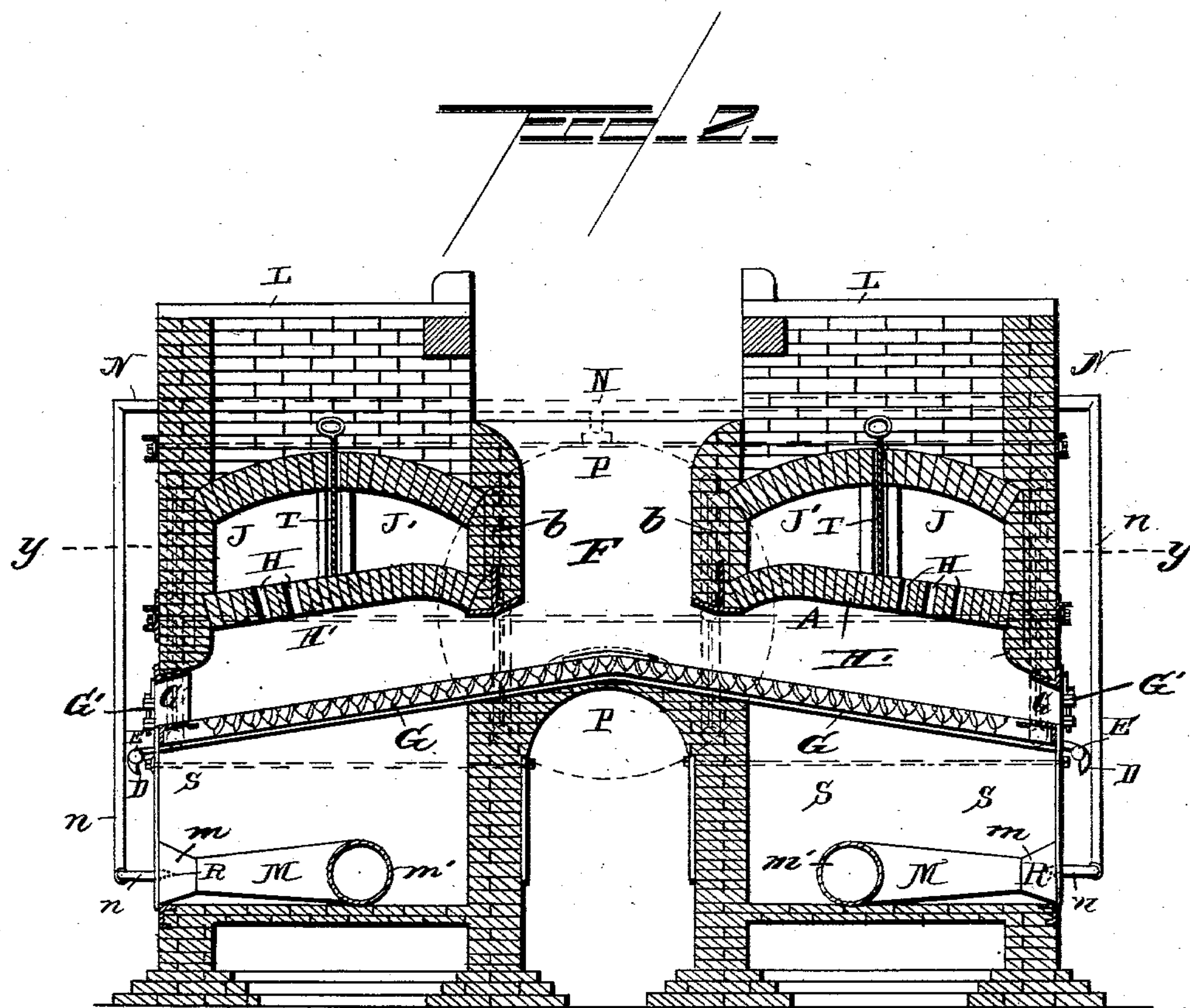
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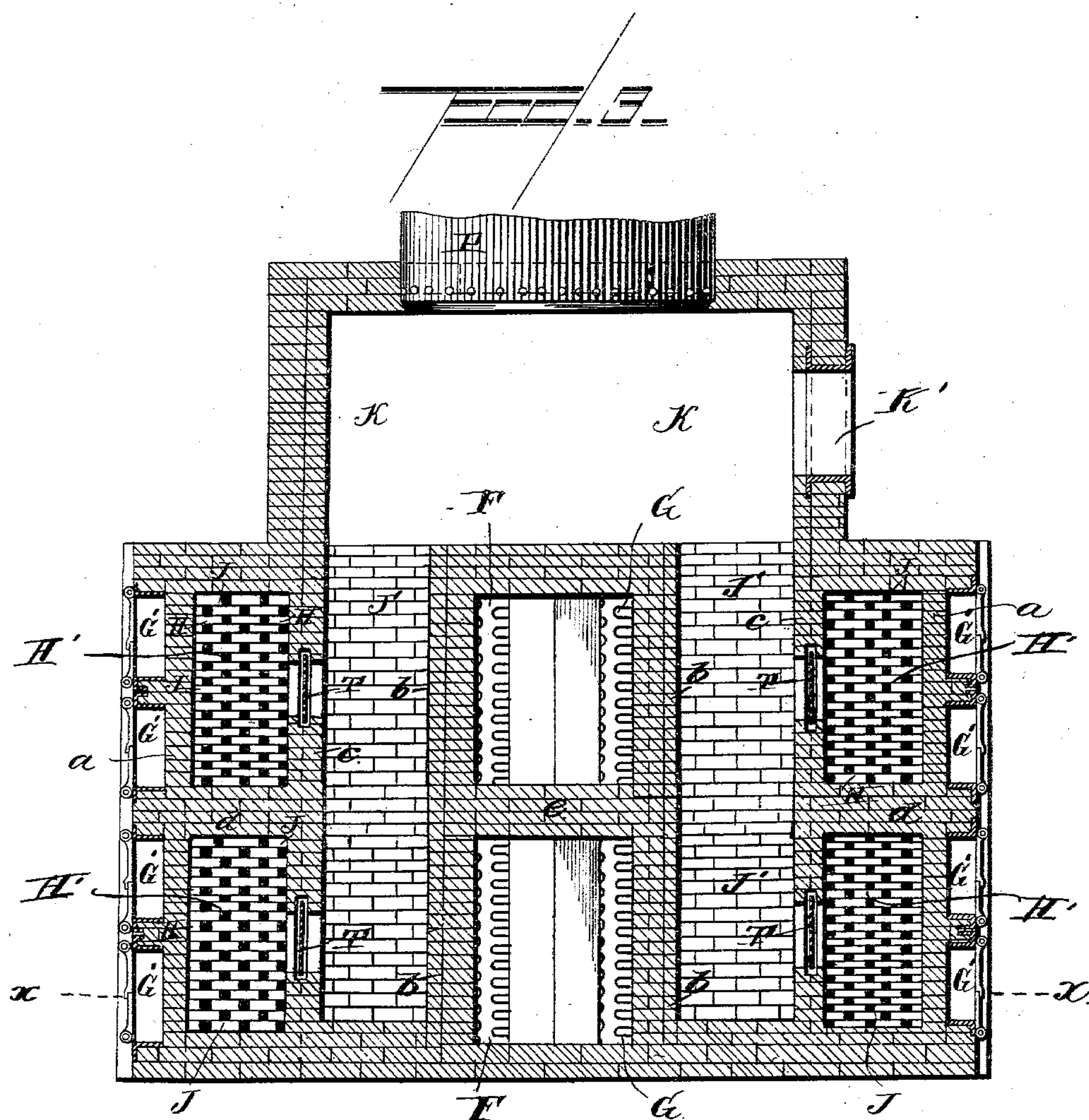
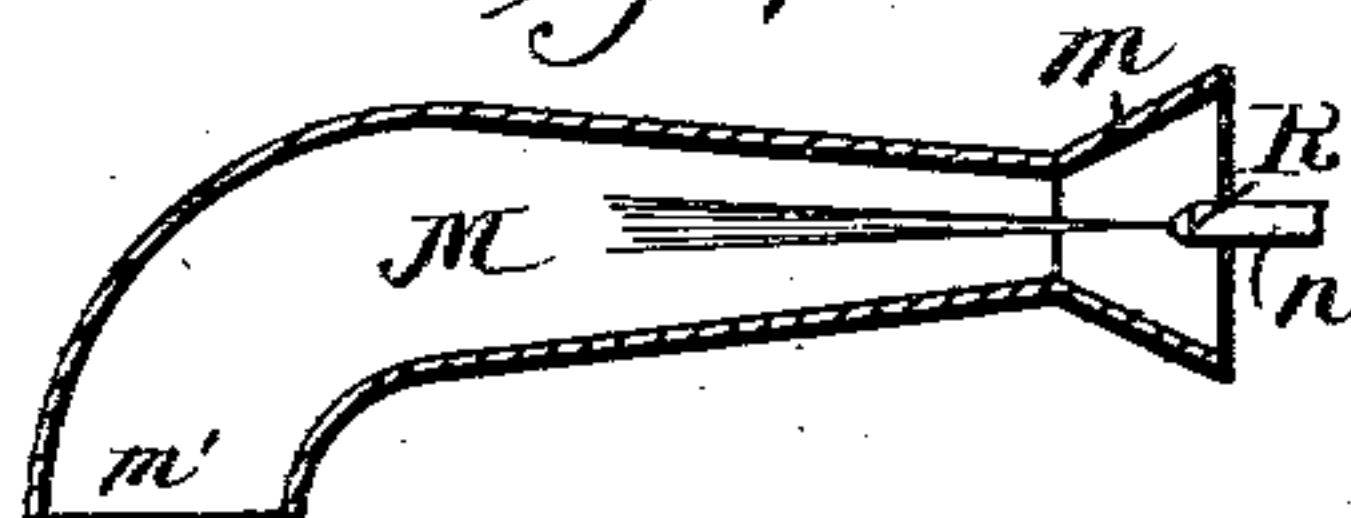


Fig. 4



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Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM HORSFALL, OF LEEDS, COUNTY OF YORK, ENGLAND, ASSIGNOR TO
WILLIAM GARLICK, JR., AND WILLIAM BROWNE COLVILLE, BOTH OF
CALCUTTA, INDIA.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 429,626, dated June 10, 1890.

Application filed October 16, 1889. Serial No. 327,174. (No model.) Patented in England October 13, 1888, No. 14,709.

To all whom it may concern:

Be it known that I, WILLIAM HORSFALL, engineer, a subject of the Queen of Great Britain, residing at Camp Road Mills, Leeds, in the county of York, England, have invented a certain new and useful Improved Construction of Furnaces for Burning Town or other Refuse, (for which I have obtained Letters Patent in Great Britain, dated October 13, 1888, numbered 14,709;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Referring to the drawings, Figure 1 is a side elevation; Fig. 2, a vertical transverse section on or about on line xx of Fig. 3, which latter figure is a horizontal section taken on or about on line yy of Fig. 2; and Fig. 4 is a longitudinal horizontal section of one of the conical steam-injector tubes H.

The invention has for its object to construct furnaces for burning the refuse or garbage of towns or other refuse, and to provide therein means for promoting the combustion, so that the operation may be performed without detriment to health or inconvenience to the inhabitants of the neighborhood where such furnaces may be located.

To these ends the invention consists in the construction of the furnace or furnaces and in the combination of elements therewith, as will now be fully described.

In the above-described drawings I have shown an apparatus having two reverberatory furnaces J on each side formed by the outer walls a , the inner walls c , and the cross or partition walls d . The hearths H' of these furnaces have numerous openings H for the passage of the flame and products of combustion from the material on the grate below the same, and in the inner walls c of the furnaces are formed draft-openings adapted to be closed by a valve or damper T. Along the inner side of the two furnaces J on each side of the structure extends a draft-flue J', that opens into a combustion-chamber K, herein-

after referred to. Between the inner walls b of the draft-flues J' are formed the feed hoppers or openings F, one for each pair of oppositely-arranged furnaces J, through which the material to be incinerated is fed.

The grate G is arranged below the furnaces and in such a manner as to incline toward the side walls of the structure, the apex of the grate lying in the longitudinal axis of the feed-apertures F, so that the material dumped or thrown into said apertures will be divided and fed to the grate-sections under the furnaces on opposite sides of the structure.

In order to avoid the labor of drawing the material down the inclined grate-sections toward the doors G', I preferably employ a grate that will do this work, so that the doors G' need not be opened for this purpose. To this end I preferably employ the well-known construction of the Settle rocking grate, which is fully described and illustrated in British patent granted to John Settle, and dated April 24, 1886, No. 15,482, and need, therefore, no detailed description, except to say that the connecting-rods to which the grate-bars are pivoted extend outside the side walls of the furnace and are provided with any suitable means for imparting to them a rocking motion—as, for instance, by means of a cam-shaft E and cams D—whereby both grate-sections on one side of the furnace may be operated. Below each grate-section is formed a chamber or ash-pit S, accessible through suitable openings in the side walls of the furnace, which openings are normally closed by doors S', Fig. 1. On the floor of the ash-pits is arranged an injector tube or pipe M, that has a flaring inlet-mouth m that opens into the atmosphere. From the point of least diameter of the mouth m the pipe increases in diameter to its outlet end, and has an elbow m' at that point that lies in the central longitudinal plane of the grate or approximately so, whereby the furnace may be operated by a forced draft instead of by a natural draft, by injecting steam into the cone-pipe M.

In rear of the furnaces J and flues J' is built a chamber K, into which the flues J' open, and to which access may be had through

a door K', Figs. 1 and 3. The rear wall of this chamber serves as a support for one end of a steam-boiler P, the other end of which is connected with a chimney C. A pipe N, leading from the steam-space of the boiler P, is connected with branch pipes *n* that terminate in injector-nozzles N', which project axially into the flaring mouth *m* of the injector-pipes M, each of said branches *n* being provided with a stop-cock *n'*, for obvious reasons.

Above the furnace is a platform L, onto which the refuse to be burned may be dumped and then fed into the feed-hoppers F onto grate G, or cars may be run onto the platform and the contents thereof dumped into said hoppers.

The operation may be briefly described as follows: In starting the apparatus, and when the material to be consumed is of such a nature as not to readily burn, a fire is built on the grates and the material gradually fed thereto, the doors S' and dampers T being open and the hoppers F closed or choked with the material. The heat and products of combustion will pass through the passages H in the hearths H' of the furnaces into the latter, thence through the valved passages in the partition-wall *c* into flues J', chamber K, through the boiler-flues to chimney C and the atmosphere. Light bulky material—such as straw, paper, shavings, &c.—and metallic substances are fed to chamber K, to be therein burned. After the apparatus is once started and sufficient steam generated in the boiler the doors S' may be closed and the operation continued by a forced draft through the medium of the injectors N' and injector-pipes M. The reverberatory furnaces J and flues J' will in a short time become intensely hot, so that all noxious gases and unconsumed matter coming in contact with the intensely-heated furnace-walls are completely consumed or deodorized, and I may say sterilized, when such vapors or gases may contain disease-germs. The heat in chamber K resulting from the combustion of the refuse materials is sufficient to reduce all such metallic substances that will melt at a temperature not exceeding 1,500° Fahrenheit to a fluid state, and such metals may thereafter be run out or otherwise removed from the said chamber.

By constructing the furnace as described repairs in one of them may be undertaken without interrupting the operation of the other, the dampers T being closed.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an apparatus for burning refuse, the combination of a plurality of reverberatory combustion-chambers or furnaces arranged opposite one another, a draft-flue extending along the inner side of said furnaces, a combustion-chamber K in rear of said draft-flues and forming a continuation thereof, and a

tubular steam-generator, one end of the tubes of which open into the said chamber K and the other into a chimney, said boiler-tubes and chimney forming the terminal of the draft-flues, substantially as and for the purposes specified.

2. In an apparatus for burning refuse, the combination, with a plurality of reverberatory combustion-chambers or furnaces arranged opposite one another, a draft-flue extending along the inner side of said furnaces, a combustion-chamber K in rear of said draft-flues and forming a continuation thereof, and a tubular boiler having one end of its tubes in communication with the combustion-chamber K and the other with a chimney, said boiler-tubes and chimney constituting the terminal of the draft-flues, of the cone-pipes N in the ash-pit of the furnaces, an injector arranged axially in the inlet of the cone-pipes, and a connection between the injectors and the steam-space of the boiler, substantially as and for the purposes specified.

3. In an apparatus for burning refuse, the combination of a plurality of reverberatory furnaces or combustion-chambers arranged opposite one another, a draft-flue extending along the inner side of said furnaces, valved passages connecting the furnaces with the draft-flues, a feed-hopper, and a reversely-inclined grate for each pair of furnaces, said feed-hoppers being arranged between the draft-flues, and said grates having their apices in the axial plane of the feed-hoppers, substantially as and for the purposes specified.

4. In an apparatus for burning refuse, the combination, with a plurality of reverberatory furnaces or combustion-chambers arranged opposite one another, a draft-flue extending along the inner side of said furnaces, valved passages connecting the furnaces with the draft-flues, a feed-hopper, and a reversely-inclined grate for each pair of furnaces, said feed-hoppers being arranged between the draft-flues, and said grates having their apices in the axial plane of the feed-hoppers, a combustion-chamber K in rear of the draft-flues and forming a continuation thereof, and a tubular boiler having one end of its tubes in communication with the combustion-chamber K and the other end with a chimney, of the cone-tubes M, and the injectors M', connected with the steam-space of the boiler, substantially as and for the purposes specified.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM HORSFALL.

Witnesses:

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GEORGE MOUNTIER,
Accountant, Devonshire Road, Merton, Surrey.