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PATENTED MAR. 1, 1904.

G. W. BROWN.
AIR FEEDING DEVICE FOR FURNACES.

APPLICATION FILED DEC. 5, 1903.

NO MODEL.

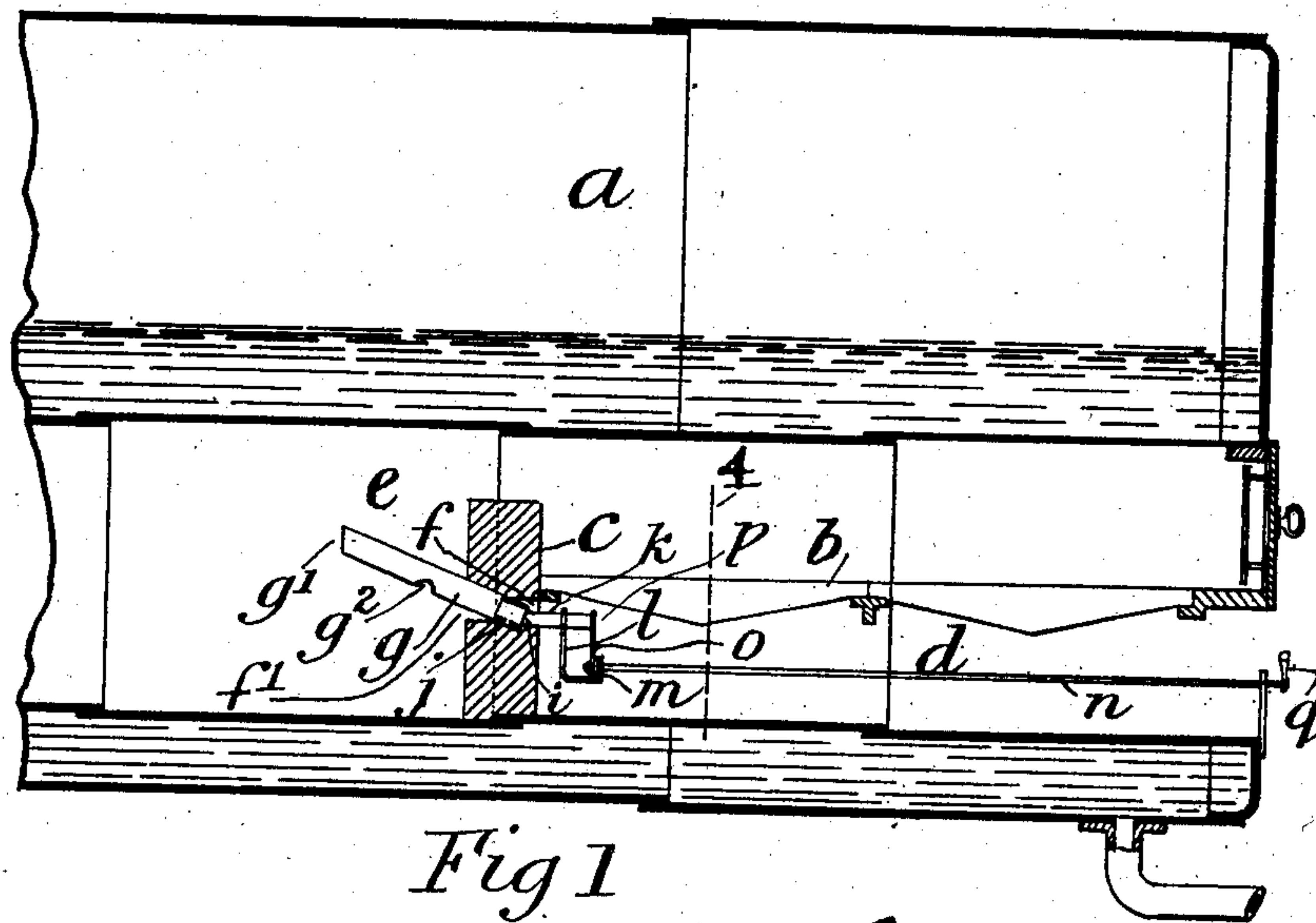


Fig 1

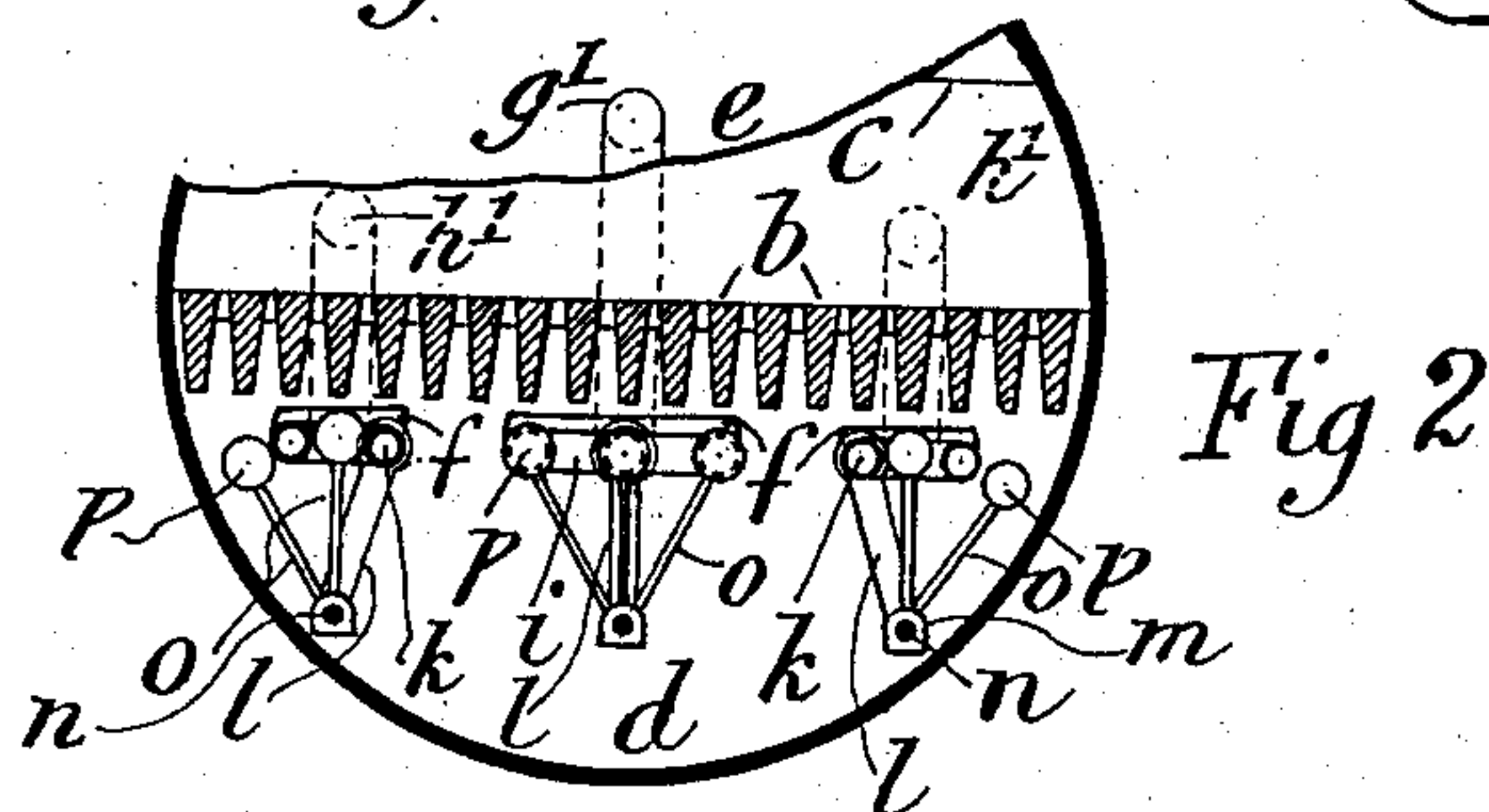
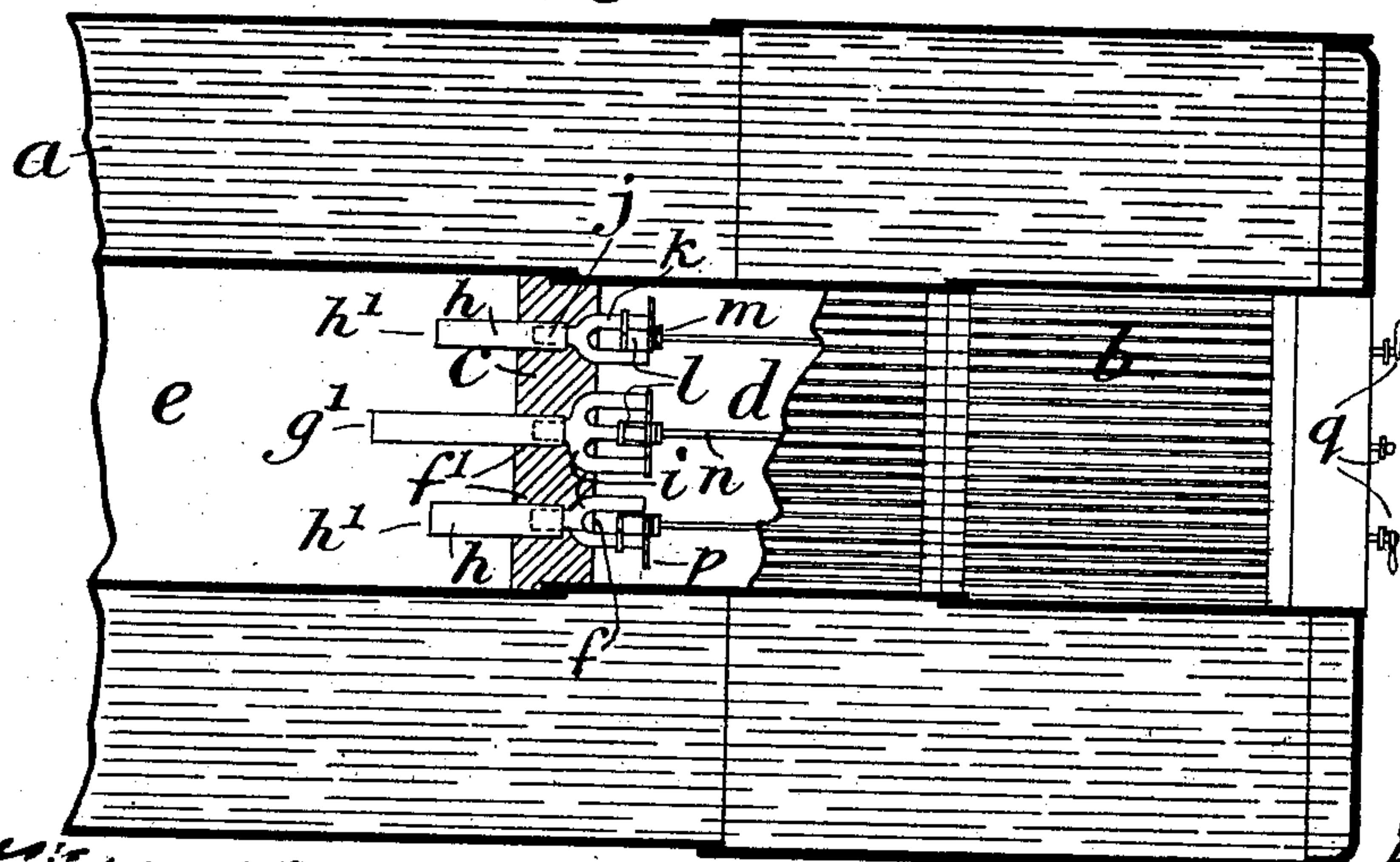


Fig 2

Fig 3



Witnesses:
J. W. Brown
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UNITED STATES PATENT OFFICE.

GEORGE WILLIAM BROWN, OF MELBOURNE, VICTORIA, AUSTRALIA,
ASSIGNOR OF ONE-HALF TO GEORGE MICHAEL NORTON, OF
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AIR-FEEDING DEVICE FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 753,664, dated March 1, 1904.

Application filed December 5, 1903. Serial No. 183,950. (No model.)

To all whom it may concern:

Be it known that I, GEORGE WILLIAM BROWN, a subject of the King of Great Britain and Ireland, residing at South Preston, Melbourne, in the State of Victoria, Commonwealth of Australia, have invented certain new and useful Improvements in Air-Feeding Devices for Furnaces; 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.

The object of this invention is to provide in combination with the fire-bridge, ash-pit, and combustion-chamber of any suitable steam-generator improved air-supply devices which will act as smoke-consumers and insure more complete combustion of the fuel. Steam may thus be more readily generated. The economy is particularly manifest when spent bark, small coal, or refuse is used as fuel. The air-supply devices which constitute these improvements comprise in part short air-inlet tubes each arranged immediately beneath a fire-bar and projecting a short distance only—for example, six or nine inches—into the ash-pit from the left and right sides of the bridge, (and, if desired, other parts,) which has recesses or the like provided in it, such that the rear of the tubes may be readily adjusted and supported in position in said recesses and be easily removed. The recesses communicate with apertures through the bridge to the combustion-chamber, into which two or more outlet-tubes, as hereinafter described, project from said recesses. Each outlet-tube receives ash-pit air from a group of two or more of the said inlet-tubes, and each group of inlets is controlled by a set of dampers ordinarily operated by a rod accessible at the front of the furnace, so that the amount of air admitted through the tubes to the combustion-chamber and the part or parts of that chamber to which it is admitted are under control and will be varied from time to time by the engineer, according to steaming requirements and the state of the fire. Other details are as hereinafter described.

In the accompanying drawings a suitable form of the invention is illustrated as applied to a Cornish boiler, though it is equally applicable to furnaces of steam-generators (land and marine) of many other kinds and though the relative position, numbers, and sizes of the parts may be modified, while preserving essential features hereinafter claimed.

Figure 1 represents a vertical longitudinal section through part of an ordinary Cornish boiler. Fig. 2 is, on a larger scale, a transverse section on line 4 of Fig. 1, multiple air-inlets being shown in three groups, the central group being shown closed by dampers, the side inlets being shown fully open. Fig. 3 is a plan in horizontal section of parts in Fig. 1, the ends of fire-bars near the bridge being omitted, so as to exhibit the ash-pit.

a shows a boiler with fire-bars *b*, a bridge *c*, (of any suitable material,) ash-pit *d*, and combustion-chamber *e*.

f shows two or more laterally-extending recesses in (or supporting-shelves at the face of) the bridge. When there are less than three, these are respectively at or near the left and right sides of the bridge and not central. From each of these recesses on its inner side a perforation *f'* extends to the combustion-chamber, the end of an outlet-tube of suitable material fitting into said perforation, three tubes being shown—namely, *h* at the left and right of the bridge, and *g* at the center—the latter projecting a greater distance into combustion-chamber *e*, but all projecting well beyond the bridge itself and at an upward angle, with the end outlet of the tubes at about or not materially below the level of the bridge top. Into chamber *e*, through ends *g'* *h'* of these tubes, air from the ash-pit passes. Ash-pit air is also (by the construction of tubes *g* *h* usually adopted) allowed to enter the combustion-chamber nearer the bridge, as by one or more openings *g''*. These openings are not on the upper side of the tubes, but below, and do not allow the air to escape therethrough so freely as if they were on the upper side, to which part the flow of heated air rising through the tube

more strongly tends. Consequently the tubes do not under any circumstances fail to divide the air entering them between the different outlets—that is, at different distances from the bridge. Under-side holes, as g^2 , also make the tubes self-cleaning as to dust and soot to a great extent. There is a trunk i common to each group of inlet-tubes, (marked k ,) and each trunk i rests or fits securely into the bridge recess f or the like in such manner that it can be removed or replaced when desired, and when removed will allow of tubes h or g and h being also readily removed, if desired. Each trunk i has an outlet j of cross-sectional area not substantially less than the combined areas of the inlets of its group, and the said outlets j fit into or communicate with tubes h or g and h , according to whether two only or more are used.

l shows brackets, one of which is supported by each group of tubes k , and the front end m of which is bent into position and perforated to act as the support or pivot of a damper-actuating rod n , having any suitable external handle q . The damper-rod has damper-arms o fixed to or integral with it, and the groups of dampers attached thereto, which fit over the respective inlets of tubes k , are marked p . It has been found by actual trial that side tubes h , with outlets at h' only and with ash-pit-air inlets situated close to and below the fire-bars not at but at a distance of at least six inches from the bridge have an excellent effect without using central tube g or a central inlet.

In a furnace which previously formed clinkers strongly adhering on the fire-bars and in which tubes h and inlets thereto, as last described, were adopted the clinkering trouble thereafter ceased, the fire-bars were found easy to keep clean, and a notable economy of fuel—nearly fifty per cent.—resulted.

It will be understood that the outlet and inlet tubes might be constructed integral with one another.

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

1. In an air-feeding device for furnaces, the

combination of the bridge-wall provided with openings below the grate-bars, air-inlet tubes located beneath said grate-bars, and outlet-tubes connected with said inlet-tubes leading into the combustion-chamber, substantially as described.

2. In an air-feeding device for furnaces, the combination of a bridge-wall provided with openings located below the grate-bars, upwardly-inclined tubes extending from said openings into the combustion-chamber to approximately the level of the bridge-wall, and groups of short inlet-tubes having a common trunk extending into said first-named tubes and located underneath the grate-bars, substantially as described.

3. In an air-feeding device for furnaces, the combination of the grate-bars, the bridge-wall, provided with openings, tubes in said openings inclined upwardly into the combustion-chamber and having outlets at the end and under side only, and groups of short inlet-tubes communicating therewith and located under the grate-bars, substantially as described.

4. In an air-feeding device for furnaces, the combination of the bridge-wall provided with openings, groups of air-inlet tubes located in said openings, a damper-rod for each group, a group of dampers mounted on each damper-rod, and brackets mounted on said tubes and supporting one end of said damper-rods, substantially as described.

5. In an air-feeding device for furnaces, the combination of the bridge-wall provided with openings, tubes in said openings inclined upwardly into the combustion-chamber, having outlets at the end and under side only, groups of short inlet-tubes having trunks communicating therewith, brackets supported by said inlet-tubes, a damper-actuating rod pivoted in each of said brackets, a group of damper-arms connected to each damper-rod, and a damper on each arm, substantially as described.

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

GEORGE WILLIAM BROWN.

Witnesses:

G. G. TURRI,

A. M. HOLL.