

(No Model.)

3 Sheets—Sheet 1.

P. HODKINSON.
BOILER FURNACE.

No. 530,269:

Patented Dec. 4, 1894.

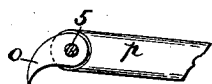
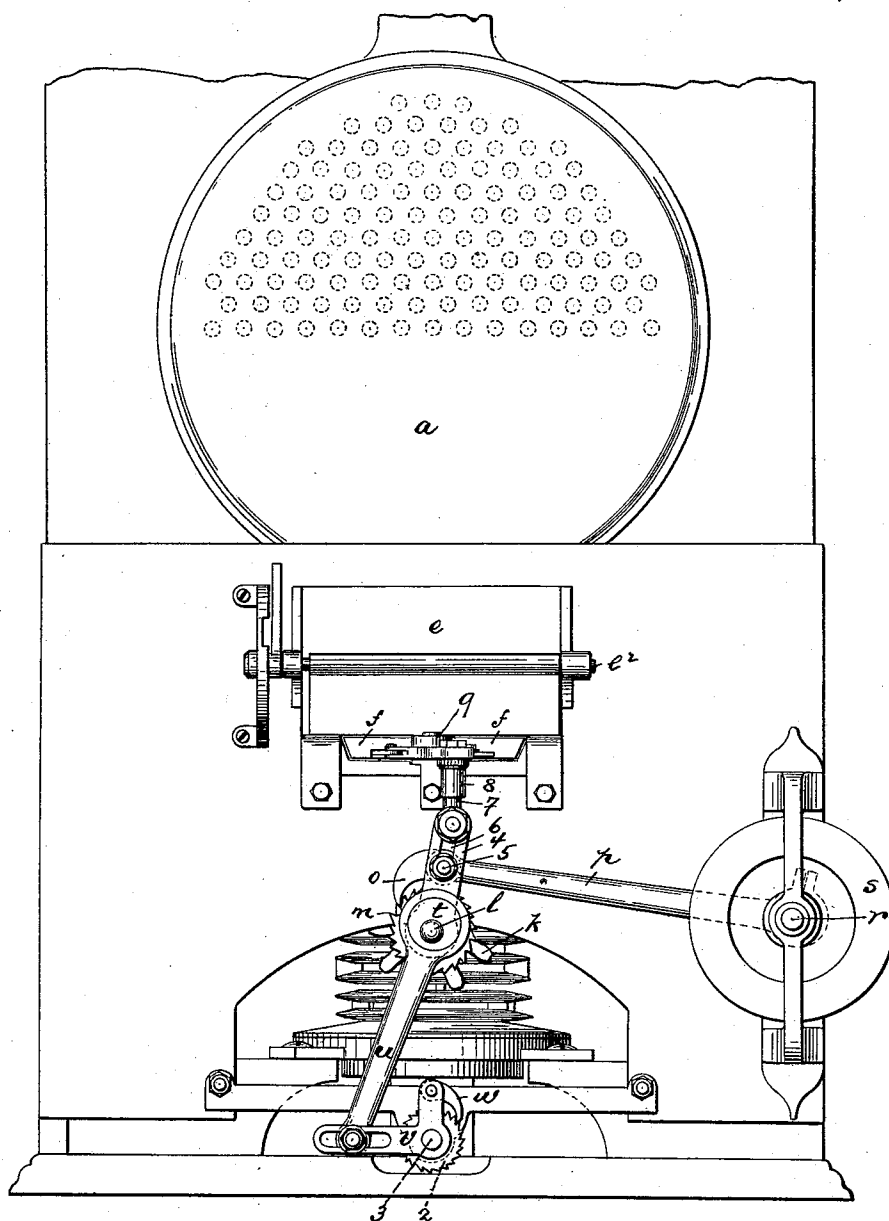


Fig. 1.

Fig. 1a.

Witnesses

Inventor

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By Draxel Co. Atty's.

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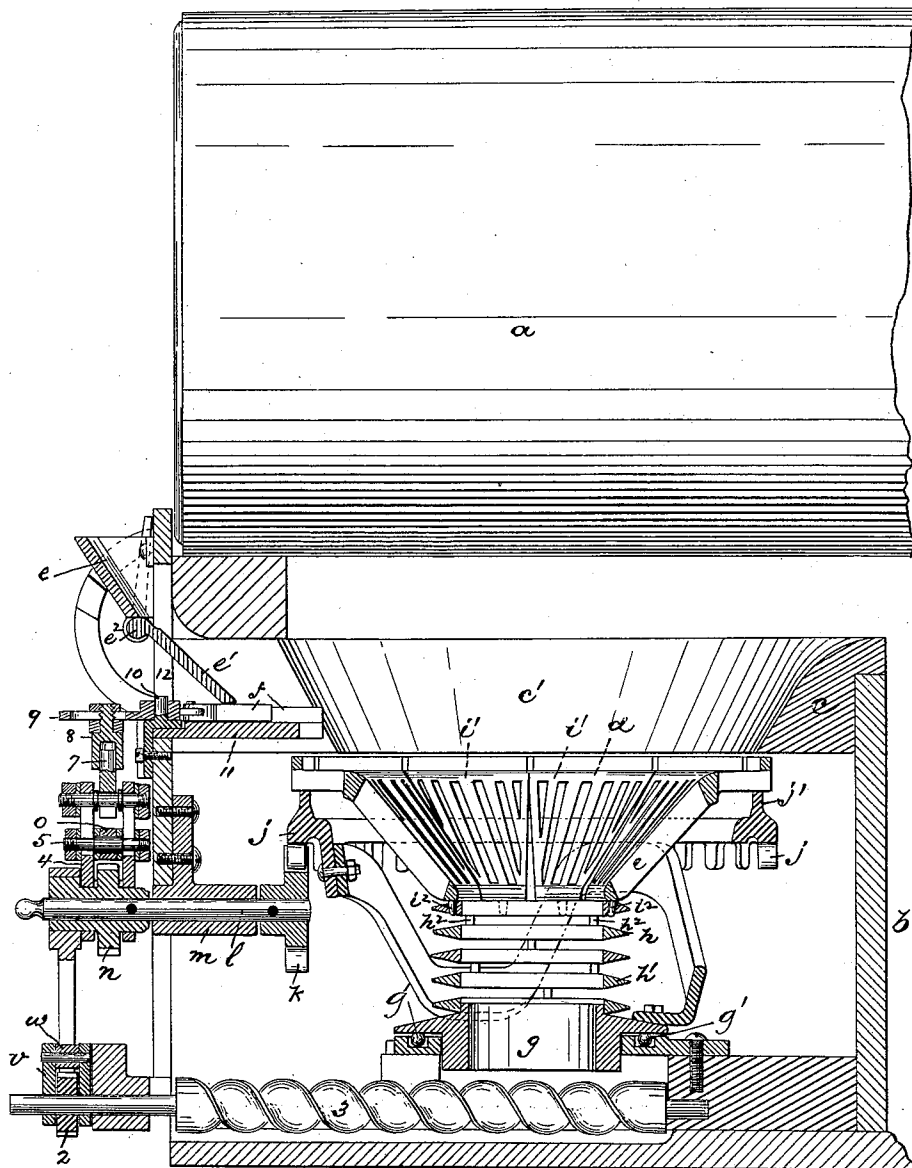


Fig. 2.

Witnesses

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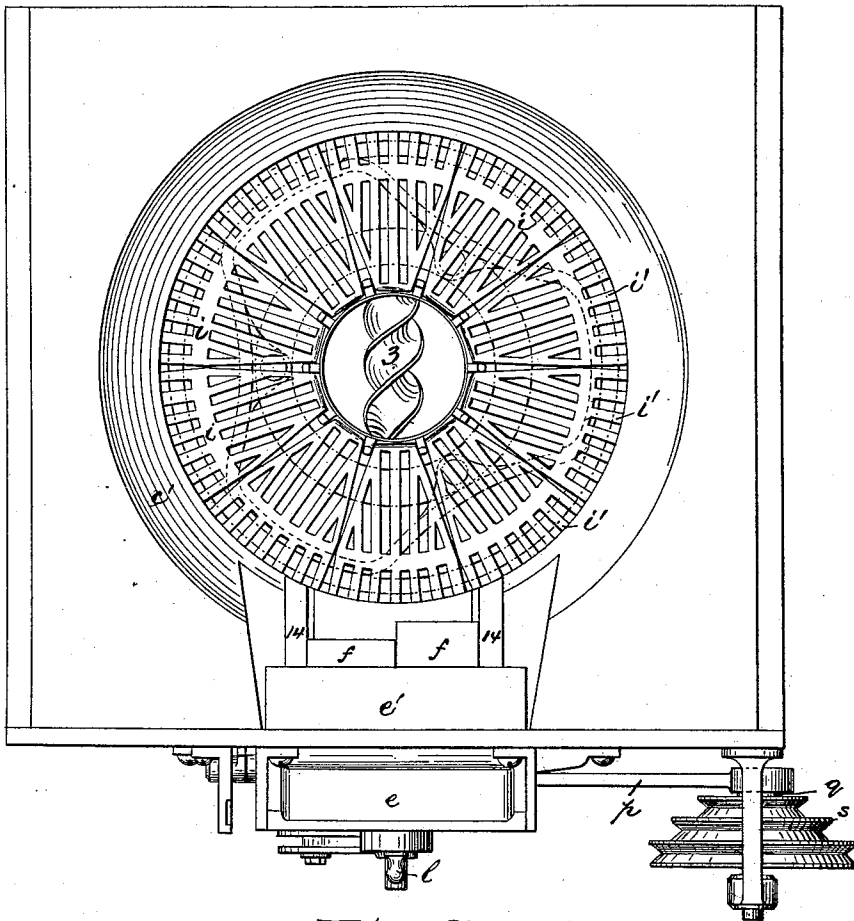
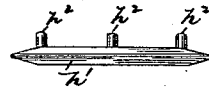
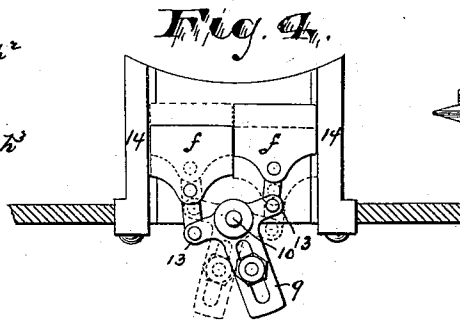
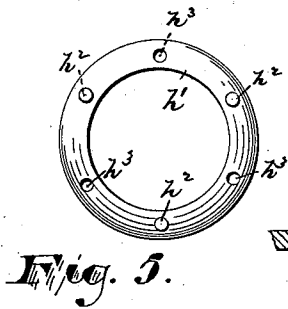


Fig. 3.

Witnesses

Inventor,

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By Drake & Co. Attys.

UNITED STATES PATENT OFFICE.

PETER HODKINSON, OF NEWARK, NEW JERSEY.

BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 530,269, dated December 4, 1894.

Application filed August 24, 1893. Serial No. 483,892. (No model.)

To all whom it may concern:

Be it known that I, PETER HODKINSON, a subject of the Queen of Great Britain, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Boiler-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, reference being had to the accompanying drawings, and to letters and figures of reference marked thereon, which form a part of this specification.

The objects of this invention are to reduce the labor involved in feeding boiler furnaces, to secure a regular and continuous supply of fuel to the fire and consequently a regular temperature and production of steam in the boiler; also to secure a uniform, continuous and automatic agitation or movement of the coals while burning and the consequent sifting of the ashes therefrom, through the grate; and, further, to secure an automatic removal of the ashes from the ash-pit, and to secure other advantages and results, hereinafter referred to.

The invention consists in the improvements herein shown and described and finally pointed out in the claims.

Referring to the accompanying drawings, in which similar letters and figures of reference designate corresponding parts in each of the several figures where they occur, Figure 1, represents, in front elevation a boiler, and a furnace embodying my improvements, and Fig. 1^a a detail thereof. Fig. 2, represents the boiler in side elevation, and a central vertical section of the furnace. Fig. 3, represents a plan view of the grate and adjacent parts; Fig. 4, a detail, in plan, of certain automatic stoking-shovels and co-operating parts and Figs. 5 and 6, are respectively, a plan and side elevation of one of a series of rings arranged at the center of the grate.

In said drawings, *a*, Figs. 1 and 2, indicates a boiler of any suitable construction resting upon the usual supports of iron or brick work in any ordinary manner.

b, indicates a bridge-wall of tile, brick or other material, at the forward side of which are arranged the fire-box or chamber and ash-pit to which, in connection with the means for supplying and manipulating the coals and removing the ashes, &c., my invention more particularly relates.

At the top of the fire chamber I construct, of tile, brick, or metal or a combination of the same, a horizontal plate, *c*, having a large, round opening, *c'*, at the center, beneath which is arranged a rotary grate, *d*, which receives the coal or fuel from a hopper, *e*, and stoking shovels, *f*, the grate, with its load of coal, turning or rotating, as the latter ignites and consumes; the movement of the grate serving to sift the ashes therethrough and cause the coal to properly settle therein. Said grate is of peculiar construction and consists of a carriage, *g*, arranged on ball or roller-bearings, *g'*, a vertical cylindrical cage, *h*, through which the coals gravitate, an inclined funnel-shaped grating, *i*, seated at its lower or smaller end, on said cage and at its larger end extending upwardly and outwardly, so as to receive the coals from the shovels, *f*, and an annular gearing, *j*, connected with or formed on said carriage and adapted to engage with a pinion, *k*, on a shaft, *l*, arranged in suitable bearings, *m*, at the front of the furnace, so that when said shaft is rotated the said annular gearing, the carriage, and the grating with the coal therein, will also be caused to rotate, as desired, and as will be understood upon reference to the drawings. The lower part, or cage, of said grate consists of a vertically-arranged series or pile of rings, *h'*, Figs. 5 and 6, provided with alternating spacing pins, *h''*, and sockets, *h'''*, to receive the same, said pins serving to hold the rings apart to admit a draft between them.

In the cylindrical chamber, below the grating, the burning coals, as they consume gradually settle and the ashes or residue finally falls upon a rotating screw-shaft, *3*, and is thereby automatically propelled or forced into the ash-pit, which is thus kept clear or from being choked up. The movement, how-

ever is so gaged or slow as to allow the hot ashes to render its full quota of heat.

The uppermost ring of the series provides the lower seat or support for the inclined wedge-shaped sections, *i'*, of the funnel-shaped grate; suitable dowel-pins or lugs, *i*², Fig. 2, being provided to hold the parts in proper relation while in operation but to permit of a ready separation thereof, and removal, when desired for repairs or other purpose. At their upper and wider ends, said wedge-shaped sections rest upon the upper portion, *j'*, of the gearing *j* by which rotary motion is transmitted to the grate, &c., by the pinion, *k*.

The roller-bearings, above referred to, upon which the grate rotates are protected from the ashes and permit said grate and its contents to be rotated with comparative ease.

In order to secure the desired slow movement of the several parts, I have arranged on the shaft, *l*, at the outside of the furnace, a ratchet-wheel, *n*, which engages a pawl, *o*, on a reciprocating crank-shaft, *p*, working in connection with a cam or eccentric, *q*, Figs. 1 and 3, on a driving-shaft, *r*, operated by a cone- or graduated pulley, *s*, or otherwise, as will be understood. Also, on said shaft, *l*, with the ratchet wheel, *n*, is arranged an eccentric, *t*, which receives, and gives reciprocal motion to a rod, *u*, extending downward to a slotted pawl-carrier, *v*, the pawl, *w*, of which engages a ratchet wheel 2, on the end of the screw-shaft, 3. The reciprocal action of the shaft, *p*, and pawl, *o*, imparts a slow rotary movement to the ratchet wheel, *n*, which is thus transmitted to the eccentric, *t*, and pinion, *k*.

The rotary movement of the eccentric effects a reciprocal movement in the rod, *u*, carrier, *v*, and pawl, *w*, and thus produces a very slow rotary movement of the ratchet wheel, 2, and screw-shaft, 3. The said screw-shaft extends horizontally, beneath the grating, and as it rotates forces the ashes forward or out of the ash pit into a suitable receptacle which may be a wheeled vehicle, a hopper, or a chute leading to an ash-pile, or any other device or arrangement which the circumstances or conditions may render desirable.

Extending upward from the shaft, *l*, are slotted arms, 4, between which the pawl, *o*, for operating the ratchet wheel, *n*, is loosely fastened by a bolt or rod 5, which has a limited play in the slots, 6, to admit of a movement of the pawl over the ratchet teeth, and the said arms are given a vibratory pivotal movement by the said pawl acting under the power or operation of the cam or eccentric *q*, as will be understood.

Between the upper ends of the arms, 4, is secured an arm, 7, and on this is arranged another arm, 8, which has a vertical sliding or telescopic relation to the former, to admit of

an extension thereof as the arms vibrate under the action of the pawl *o*. The upper end of the arm 8, is rigidly and adjustably secured in a slotted lever or double bell-crank 9, pivoted at 10, (Figs. 2 and 4) on a dead plate, 11, at the mouth or stoking hole, 12, of the furnace.

To arms, 13, lying on opposite sides of pivot, 10, are linked the stoking shovels, *f*, before referred to, which are arranged side by side in suitable ways 14, on said plate 11, and just beneath the inclined chute *e'*, of the hopper and move reciprocally back and forth as the lever 9, moves pivotally, thus shoving the coals into the funnel-shaped grate, as will be understood.

The operation of the parts is as follows: A full and adequate supply of coals is provided at a convenient point, from which they may gravitate to and through the hopper upon or adjacent to the stoking shovels, which have a reciprocating movement. The fire being started, at the proper time power is applied to the pulley, and all further operations are automatic; fresh coal being continuously supplied to the grate, the latter being rotated and the coals evenly spread over the fire and the ashes removed; the several operations being regulated and gaged to meet the requirements of the case. Thus a single person may with easy labor attend to several furnaces where before one furnace required the constant attention of one, and frequently more than one, person. Again, the supply of fuel being furnished without opening doors, &c., no heat is lost by inlets of cold air, and an even expansion of the boiler is thus maintained.

It will be observed that the chute, *e'*, which is pivoted at *e*², may be opened or raised when desired and thereby serve as a damper.

It is manifest that various mechanical changes may be made in the construction of the parts without departing from the spirit of the invention, and I do not, therefore, wish to limit myself in these respects.

Having thus described the invention, what I claim as new is—

1. In a furnace, the combination with a rotary frame arranged on ball bearings and having gearing, *j*, at the top, a series of rings, *h'*, seated one on the other and forming a cage like structure seated on said frame, and a series of inclined wedge shaped grate sections seated on the top-most ring of said cage at their lower ends and resting on the top of the rotary frame at their upper ends, of means for rotating said gearing, substantially as set forth.

2. In combination with the rotary grate and gearing *j*, a shaft *l*, pinion *k* ratchet *u*, pawl *o*, shaft *p*, cam or eccentric *q*, and means for operating the same, and arms, 4, arranged on said shaft and having slots, 6, bolts 5, and arm 7, an arm 8, having a sliding relation to arm 7, double-crank, 9, and stoking shovels

f, the said train of gearing producing a simultaneous rotation and shoveling, as set forth.

3. In a furnace, the combination with the rotary frame and means for rotating the same of rings, *h'*, secured one upon the other and
5 forming a vertical cage and a series of inclined and wedge shaped grate sections arranged above said rings and forming a funnel-shaped grate which empties its partially

consumed coals into said cage, substantially as set forth. 10

In testimony that I claim the foregoing I have hereunto set my hand this 18th day of August, 1893.

PETER HODKINSON.

Witnesses:

CHARLES H. PELL,
OLIVER DRAKE.