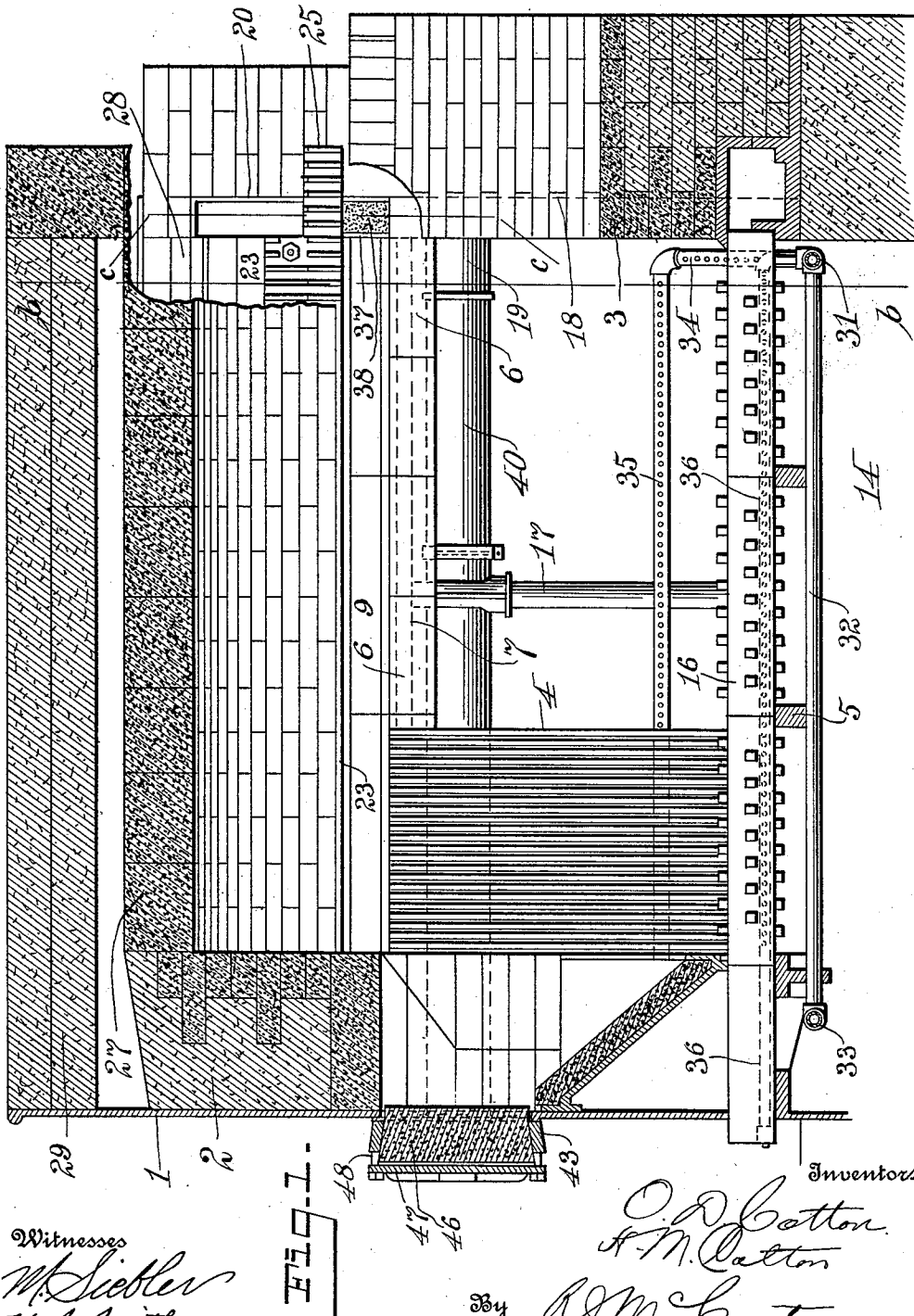


O. D. & H. M. COTTON.
FURNACE.
APPLICATION FILED FEB. 15, 1911.

1,023,817.

Patented Apr. 23, 1912.

2 SHEETS—SHEET 1.



Witnesses
M. Sieber
H. P. Smith

Fig. 1.

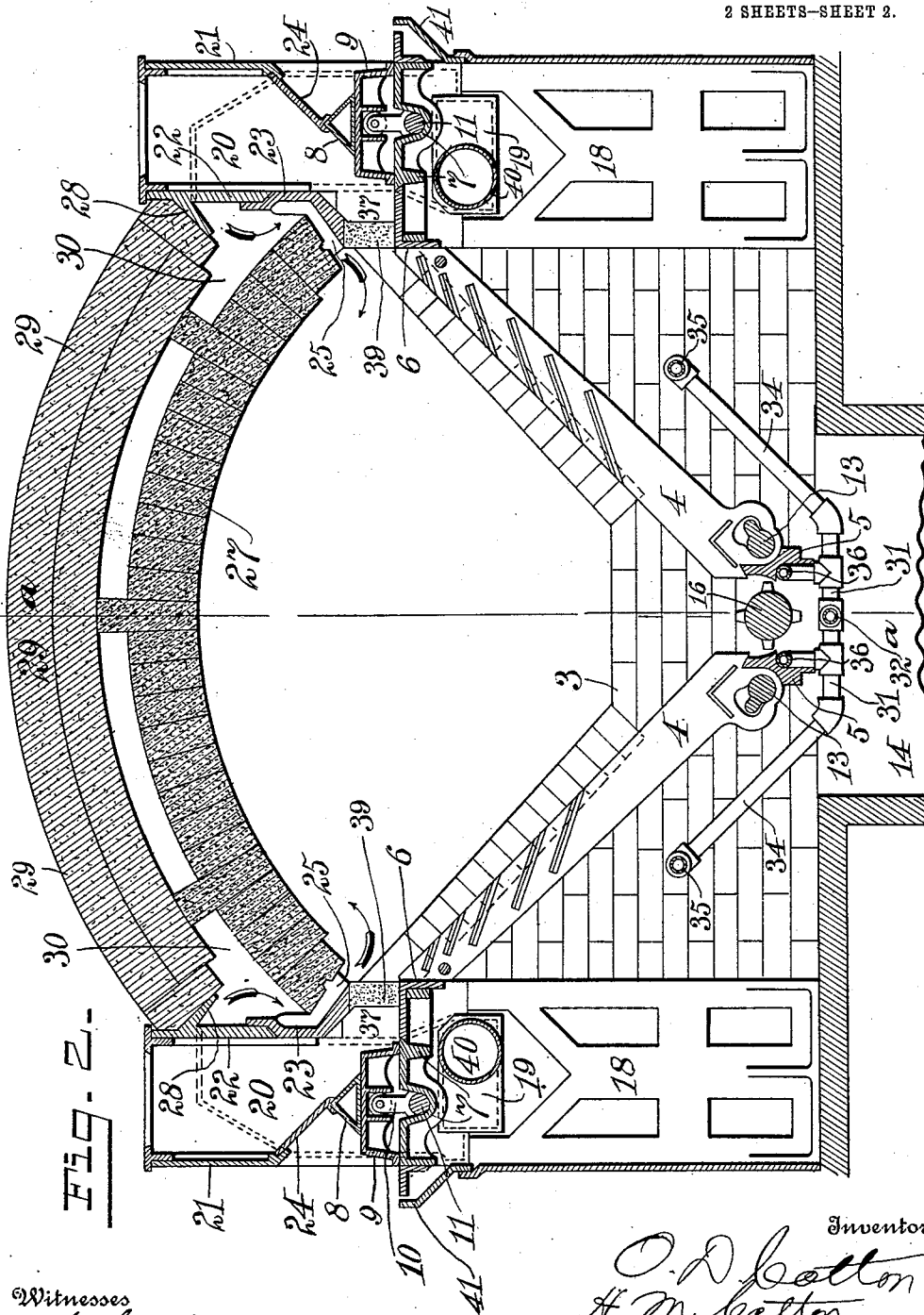
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Witnesses

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H. A. Smith

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UNITED STATES PATENT OFFICE.

ORVILLE D. COTTON AND HERBERT M. COTTON, OF DAYTON, OHIO.

FURNACE.

1,023,817.

Specification of Letters Patent.

Patented Apr. 23, 1912.

Application filed February 15, 1911. Serial No. 608,832.

To all whom it may concern:

Be it known that we, ORVILLE D. COTTON and HERBERT M. COTTON, citizens of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Furnaces; and we do 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 the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in stoker furnaces.

The object of the invention in the main is to provide a stoker furnace which is highly efficient and durable under all conditions of usage.

More specifically, the improvements comprise means for maintaining a practically continuous cleaning of the furnace to the end that the fire is kept clean, thereby giving improved combustion and increased protection to the grate and all furnace parts exposed to the heat of the fire. This is accomplished by the particular distribution of steam under the grates, as shown in the accompanying drawings; by the arrangement of the fire wall at the rear, and in the form of the clinker bar and the arrangement of the grates in relation thereto.

The practice heretofore in the distribution of steam below the grates for the purpose of rendering the clinkers more brittle so that they may be easily broken, has been to distribute the steam from the front toward the rear. In the use of the present improvements the steam is first carried to the rear and from there it is distributed across the rear end of the furnace, and from the rear end forward, substantially as is shown in the accompanying drawings. This manner of steam distribution provides the greater and most effective supply of steam under the rear portion of the furnace, and the lighter supply under the forward portion. The clinkers and slag accumulate in greater quantities in the rear portion of the furnace because of the higher temperature and greater amount of coal consumed in that portion of the furnace. It is therefore obvious that the greater and most effective supply of steam should be directed there,

and not to a part of the furnace where the accumulations of clinkers and slag are less.

Referring in general terms to the accompanying drawings, Figure 1 is a longitudinal, vertical, sectional elevation of our improved furnace on the line *a-a* of Fig. 2, parts being broken away; Fig. 2 is a lateral, vertical section on the line *b-b* of Fig. 1.

Throughout the specification and drawings, similar reference characters indicate corresponding parts.

Referring to the drawings, 1 designates a face plate in the rear of which is the brick work 2. The rear of the furnace is provided with a fire wall 3 between which and the front brick work 2, the grates 4 are located. These grates are of a well known form, and are arranged in the form of an incline from the side down to the central part, the lower ends resting on a bearing frame 5 and the upper ends resting against feed plates 6 mounted on magazine bed plate 7. The coal is fed from the magazines on each side of the furnace, over the feed plates 6 onto the grates 4 by stoker boxes 9 actuated by arms 10 on rock shafts 11 journaled in the bed plates 7. The coal falls on the plates 6 by gravity when the stokers are in an outer position, and is delivered to the grates 4 when the stokers are moved inwardly. Each alternate grate is pivoted at its upper end, and their lower ends are adapted to be actuated by rock bars or shafts 13. When the alternate movable grates are actuated, the coal thereon will move downwardly thereon, and their movements are so timed, that, by the time the coal reaches the lower ends of said grates, it has become entirely consumed. The ashes resulting from the consumption of the coal are discharged from the furnace into an ash pit 14 by the movement of the alternate grates and a slowly rotating clinker bar 16 provided with spurs, and mounted in the bearing between the lower ends of the grates. The stoker rock shafts 11, the grate rock shafts 13 and the clinker bar 16 may be actuated manually or by any of the well known means driven from a stoker engine. (Not shown.)

The bed plates 7 are supported on the front plate 1 and rear frames 18, and support the magazines and air boxes 19. The intermediate portions of said bed plates 7 are held by supports 17. Above the air

boxes 19, and communicating therewith, are air flues 20 which are formed on the rear ends of the magazines. The outer sides of the magazines are formed by plates 21, while the inner sides are formed by plates 22 and arch plates 23. The lower portions of the magazines consist of inclined plates 24 which join the upper edges of guide bars 8 mounted directly above the stokers 9. The guide bars 8 hold the stokers in position. The arch plates 23 are provided with ribs 25 which form air passageways between the ribs, and the lower portions of these arch plates 23 are placed at an angle, thereby forming supports for an arch 27 directly above the furnace grates. The plates 22 are provided with angular members 28 which support brick-work 29, which, in connection with the arch 27, forms air passageways 30 leading to the air ducts between the ribs 25. The brick-work 29 may be formed in an arch, as is shown in the drawings, or the passageways 30 may be formed by separate tile.

In a furnace the consumed coal or ashes, under certain conditions, form clinkers or slag which prevent the free passage of air through the grates and interfere with the operation of the grates and the combustion of the fuel. This accumulation of slag is greatest at the rear portion of the furnace. To break up this slag, etc., and to effect its discharge from the furnace, the exhaust steam from the stoker engine, or other source of steam supply, is utilized as follows: Mounted at the rear of the furnace, under the lower ends of the grates 4 and adjacent to the fire wall 3, is a manifold 31. Connected to this manifold is a non-perforated pipe 32, which extends forward under the clinker bar 16 where it is connected by a pipe 33 to the exhaust of the stoker engine or to other steam supply in any suitable manner. Extending from each side of the manifold 31 are inclined perforated pipes 34, which lie adjacent to the fire wall 3 under the grates 4 and approximately parallel thereto. Attached to the upper ends of the pipes 34 are longitudinal perforated pipes 35 which extend forwardly under the grates. The perforations in the pipes 34 and 35 are so placed as to direct the steam escaping therefrom. All of the heat from the furnace passes over the rear wall 3, therefore the heat at this point will be the most intense, and the accumulation of the slag will be the greatest; but owing to the pipe 32 being non-perforated, the perforations in the pipes 34 will eject the steam, at its maximum pressure, where it is most needed. Also extending from the manifold 31 are perforated steam pipes 36 which lie parallel with the clinker bar 16. The steam discharged from these pipes to the clinkers, slag, etc., has the effect of cooling and mak-

ing the said clinkers, slag, etc., brittle, preparatory to being discharged by the clinker bar. The pipes 36 extend out through the face plate 1 where they are provided with plugs easily removed to facilitate their cleaning.

The air passageways 30 which lead to the air ducts between the ribs 25, communicate with the air boxes 20. To protect the rear ends of the magazine parts, against the intense heat, these air boxes are constructed as follows. The edge toward the fire of the lower portion of said rear ends is provided with a recess formed by side walls 37. The rear feed plates 6 extend along the inner edges of the air boxes 20, and mounted within the recess formed by the walls 37, and above the feed plates 6, are fire bricks 38, in front of which are fire bricks 39, which lie adjacent to and are held in place by the upper course of brick of the rear wall 3. By this construction the intense heat at the rear wall is insulated from the iron work of the rear end of the magazines, and the same is protected from the heat. The magazine parts are therefore prevented from deteriorating, and as the bricks 38 are held within a recess, they will be prevented from becoming displaced. Should the bricks 39 become displaced, the bricks 38 will remain intact and give protection to the metal parts.

The features described immediately above are included in the subject matter of our co-pending application, Serial No. 623,240, filed April 25, 1911.

The air flues 20 receive air from the boxes 19, which are provided with air flues or pipes 40 extending beneath the bed plates 7 from the boxes 19, to the front wall of the furnace, where they communicate with the atmosphere through openings in the face plate 1. The flues 40 are made of thin sheet metal, and are so placed as to prevent contact with heat. This provides for a free circulation of air around the exterior of said flues 40. The said air pipes 40 are supported at their front ends by the face plate 1, and at their rear ends by the air boxes 19. By thus mounting these air conductors, the air passing therethrough is maintained at a minimum temperature, and has a cooling effect on the air flues 20 when it enters the same. This cooling action of the air will aid in preventing the heat of the furnace warping or otherwise damaging the surrounding metal.

The above described air boxes and flues are included in the subject-matter of our co-pending application before referred to.

In furnaces of this type it is impracticable to maintain tight joints, therefore some of the finer coal will necessarily sift through the joints onto the bed plates. To prevent the coal siftings falling at the outside of the

furnace and littering the floor, there are mounted along the upper outer edges of the bed plates 7, longitudinal bars 41, the upper edges of which are removed from the edges of said bed plates 7. During the outward reciprocation of the stoker boxes 9, the coal siftings which have sifted through the joints, will be pushed off the bed plates 7, and will be caught by the bars 41 and directed to the interior beneath the bed plates 7 where said siftings may be recovered through suitable doors in the face plate 1.

The face plate 1 supports a furnace door consisting of a rectangular frame 43 inclosing fire brick 46 held in position by a plate 47 attached to said frame by means of stud bolts 48.

Having described our invention, we claim:

1. In a stoker furnace, the combination with a furnace including grates, a rear wall and coal magazines, of a main non-perforate steam-distribution pipe adapted to deliver steam at a point adjacent to said rear wall, a series of laterally extending perforated pipes adjacent to said rear wall and adapted to receive the steam from said main pipe and initially distribute it below the furnace grates adjacent to said rear wall, and to act on the slag tending to overhang said wall, and a longitudinal series of perforated steam distribution pipes extending forwardly below the grates and adapted to receive the steam from said laterally extending distribution pipes and to distribute it forwardly to the grates, whereby a steam distribution system is provided for effecting an initial delivery of steam at the rear wall below the grates, from which point it is distributed to the grates and wall at the rear portion of the furnace and thence forwardly underneath the surface of the grates, substantially as and for the purposes specified.

2. In a stoker furnace, the combination with a furnace including a rear wall, grate bearing, coal magazines, and a clinker bar,

of a main steam feed pipe extending below said grates and adjacent to said rear wall, lateral extending perforated steam-distribution pipes lying below the grates and adjacent to said rear wall, said laterally extending perforated steam-distribution pipes lying below the grates and adjacent to said rear wall, said laterally extending pipes adapted to receive steam from said main feed pipe and initially distribute it at the rear of the furnace, outer perforated steam-distribution pipes extending longitudinally of the furnace below the grate bars, and perforated steam-distribution pipes inside of longitudinal grate bearing extending longitudinally of the furnace below the grates, said outer and inner longitudinally extending perforated pipes being adapted to distribute the steam to the clinker bar and grates forwardly of the point of its initial distribution, substantially as and for the purpose specified.

3. In a stoker furnace, the combination with a furnace having as component parts, a rear wall and grates, of a main steam-feed pipe adapted to deliver steam at a point adjacent to the rear wall, a laterally extending perforated pipe having its extended ends lying on inclines, said laterally extended pipe being adapted to receive steam from the main feed pipe, and initially distribute it below the grates adjacent to the rear wall, and a plurality of perforated steam pipes communicating with said initial distribution pipe and adapted to distribute the steam to the grates forwardly from the rear point of initial distribution, substantially as and for the purposes specified.

In testimony whereof we affix our signatures, in presence of two witnesses.

ORVILLE D. COTTON.
HERBERT M. COTTON.

Witnesses:

R. J. McCARTY,
HOWARD S. SMITH.