Aug. 11, 1931. A. WEIGEL 1,818,661

HEATING FURNACE

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Fig.1

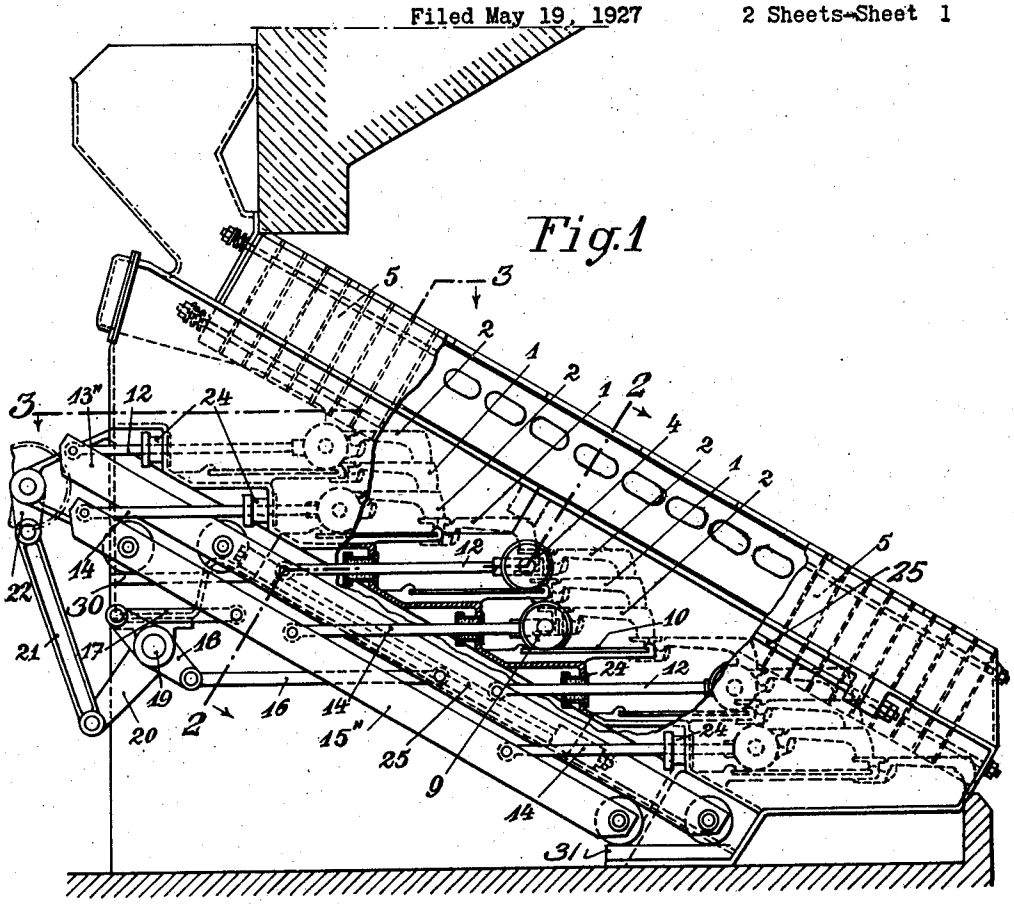
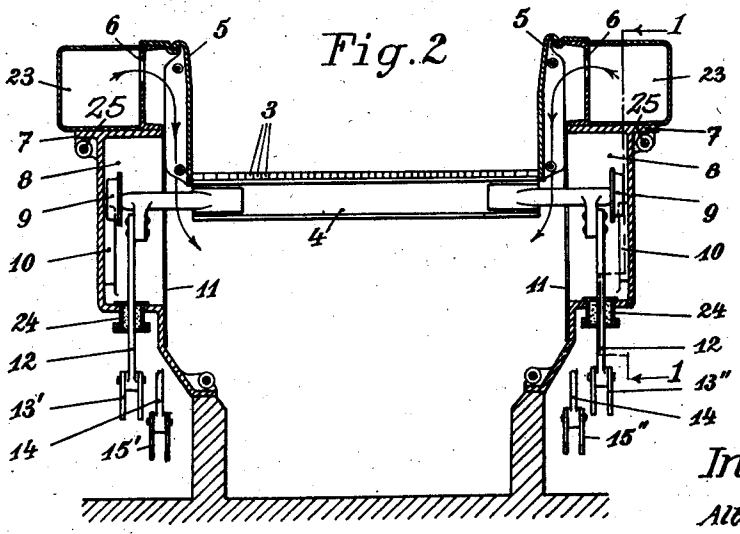


Fig.2



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Fig. 3

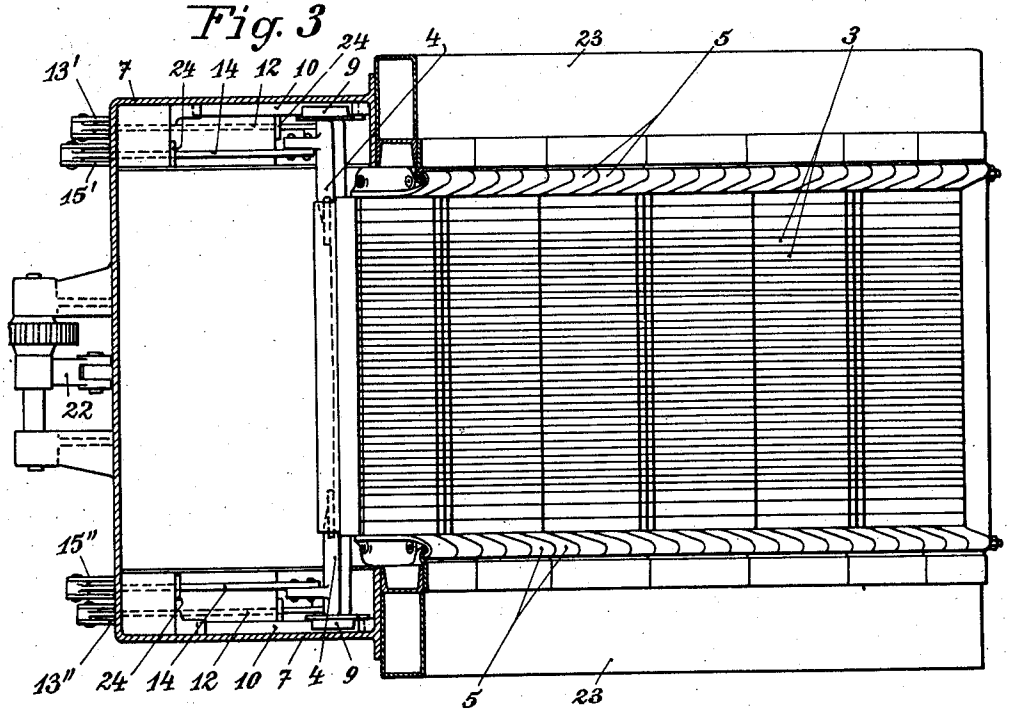
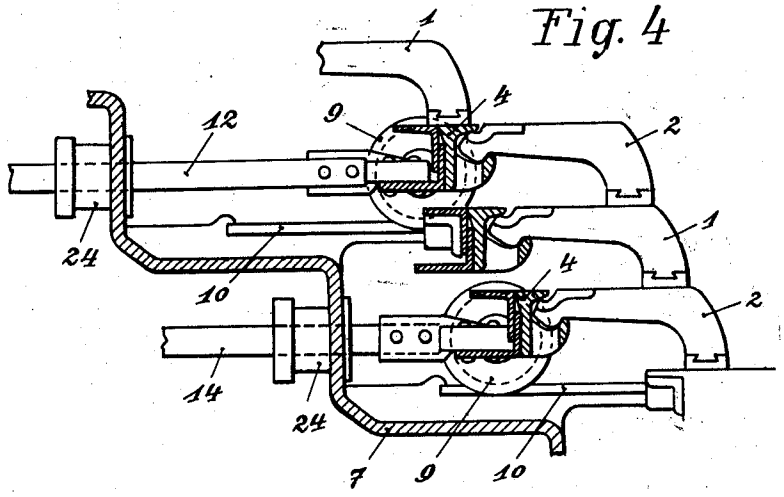


Fig. 4



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UNITED STATES PATENT OFFICE

ALBERT WEIGEL, OF MUNICH, GERMANY, ASSIGNOR TO THE FIRM: VESUVIO FEUERUNGSBAU-GESELLSCHAFT MIT BESCHRANKTER HAFTUNG, OF MUNICH, GERMANY

HEATING FURNACE

Application filed May 19, 1927, Serial No. 192,702, and in Germany September 27, 1926.

This invention has reference to furnaces for heating boilers and the like and for similar purposes and in particular to furnaces provided with stepped grates with movable steps, and among other important objects it is intended to facilitate the operation of the several steps and to increase the efficiency and operation of the furnace itself. According to the previous art it has been the usual practice to dispose the operating means for these movable steps, particularly in the case of grates with admission of air from below, in the space beneath the grate, in order to be able to enclose the grate on all sides. With this arrangement however there is the inconvenience that the space below the grate is interfered with and the free space is reduced by the operating parts and that, moreover, the operating parts are only difficultly accessible and that they are open to very heavy wear by the action of the particles of fuel and ashes dropping down from the grate. These inconveniences will be avoided by the arrangement according to this invention which, in its broad features comprises means of mounting the movable steps on beams transversely arranged with relation to the grate and which are displaceably disposed on the longitudinal walls of the furnace which is substantially closed on all sides, the operating and driving means for the grate being adapted to be reciprocated by driving means which are disposed at the outside of the furnace fire box or grate chamber.

The invention will be more particularly described by reference to the accompanying drawings showing by way of exemplification in Figure 1 a downwardly inclined stepped grate comprising alternately disposed stationary and movable steps, and shown in elevation and partly in sectional view in the drawings in the direction of the arrow along sectional line 1—1 in Figure 2. Figure 2 is a cross-section of the grate on the line 2—2 of Figure 1. Figure 3 is a longitudinal section through the grate on the line 3—3 of Figure 1. Figure 4 is a representation on an enlarged scale showing the connection of the grate bars to the cross beams.

The grate herein shown by way of example comprises stationary steps 1 and movable steps 2. The movable steps are reciprocated preferably in such a manner that each two succeeding steps are moved in opposite directions, that is to say, if one of them is projected, the other one is withdrawn and inversely. The steps are all made up in the usual manner of a plurality of bars 3 arranged side by side. These bars rest at their front edges on supporting beams 4 which are disposed transversely with relation to the fire-box, while at their rear edges the bars rest upon the particular stationary step next succeeding thereto. The fire-box of the grate is bounded by the plate shaped side portions 5 which are hollow and are suspended from the supports or beams 6 which in their turn rest upon the longitudinal supporting beams 7 of the grate. These longitudinal supporting beams 7 which serve as side walls of the space beneath the grate are provided with chamber-like cavities or hollow side walls 8 which are laterally situated with relation to the space beneath the grate. Into these cavities the extremities or extensions of the cross beams 4 project, which are provided with caster rolls or the like 9 supported upon the brackets 10 which may serve as guides or tracks for the movement of the caster rolls 9. Between the cavities 8 and the space below the grate the sheet metal walls 11 are arranged which are provided with openings in which the cross beams are free to move. The first, third and fifth cross beams 4, counting from above are connected at their ends by means of links 12 to the longitudinal beams 13′ and 13″ which are arranged on the sides at the outside of the fire box, so as to allow of movement with relation thereto. The second, fourth and sixth cross beams from above are connected by the links 14 to the longitudinal beams 15′ and 15″ which are likewise movably arranged on the outside of the fire-box. These longitudinal beams 13′, 13″ and 15′, 15″ are respectively moved on their supports or tracks 30, 31, disposed for instance at the bottom and at the upper part of the rear wall of the fire-box by reciprocating links 16 and 17 respectively pivotally secured to the rocking levers 18. These rock-

ing levers are disposed on both sides of the fire-box upon the ends of a shaft 19 adapted to be rockingly operated by a lever 20 and a pitman rod 21 from a crank drive 22. By the reciprocatory movements imparted to the longitudinal beams 13′, 13″, 15′, 15″ the transverse supports 4 are reciprocatingly moved along the tracks 10 and by this means they push the stoking steps 2 connected thereto backwards and forwards.

The admission of air to the grate is effected by means of the air channels 23 from which the air will pass through the hollow side portions 5 and into the space below the grate and thence through the grate itself and into the mass of fuel thereon. The fire-box is closed substantially air-tight on all sides. The connecting links 12 and 14 between the cross beams 4 and the longitudinal beams 13′ 13″ and 15′, 15″ respectively pass through the side walls 7 and are guided in the stuffing boxes 24, so as to avoid leakage of air.

The particular manner of movement of the movable steps 2 of the grate may be employed with all kinds of stepped grates independently of the degree of inclination of the grate and irrespective of its consisting of stationary and movable or only of movable steps. By this means a perfectly free space is obtained below the grate which may be partitioned into chambers for the purpose of differentially providing the several portions of the grate with air. The driving means of the movable stoking steps are arranged outside of the fire-box so as to avoid contamination and clogging thereof by particles of fuel and ashes. All these driving means are readily accessible from the outside. The longitudinal walls 7 of the furnace which may be utilized for the mounting of the cross beams 4 may be subdivided into three parts as shown for instance in Figure 1 of the drawings.

In accordance with this invention it is possible to employ the same terminal operating parts for all sizes of grates, it being only necessary to make the central portions of different lengths in accordance with the size of the grate, so as to effect an important saving in patterns. The several parts of the longitudinal walls are connected and secured against displacement by fastening bolts or the like 25, and may likewise have their middle portions interchangeable.

The invention has been described and shown in its broad features only and it should be understood that it is susceptible of changes and modifications to facilitate its operation and to the better adapt it to different forms of application, without thereby deviating from the spirit and scope of the invention, as defined in the appended claims.

I claim:

1. In a stepped grate in combination, a fire-box, a plurality of resectively stationary and reciprocatingly movable grate steps in parallelism with each other, and alternatingly disposed in the fire-box, side chambers in the fire-box walls, laterally bordering the grate steps and extending lengthwise of the fire-box, supporting means for the grate steps extending into said side chambers, and means in said side chambers for actuating the movable grate steps.

2. In a stepped grate in combination, a fire-box, a plurality of respectively stationary and reciprocatingly movable grate steps, each step except the lowest having one of its edges supported on the next step below, and alternatingly disposed in the fire-box, side chambers in the fire-box walls, laterally bordering the grate steps, and extending substantially lengthwise of the fire-box walls, supporting means for the other edges of the grate steps extending into said side chambers, and means in the side chambers for actuating the movable steps and operatively connected thereto.

3. In a stepped grate in combination, a fire-box, a plurality of respectively stationary and movable grate steps in parallelism with each other and alternatingly disposed in stepped relation to one another, side chambers in the fire-box walls, supporting means for the grate steps, laterally engaging said steps and extending into said side chambers, means in the side chambers, engaging the movable grate steps and causing them to move along in engagement with the adjacent stationary grate steps, and air admitting channels connected to the side chambers.

4. In a stepped grate in combination, a fire-box, a plurality of respectively stationary and movable grate steps in said fire-box, each of the movable grate steps being supported at one edge on the adjacent stationary step, side-chambers in the fire-box walls laterally bordering the grate steps and extending substantially lengthwise of the fire box, supporting means for the grate steps extending into said side chambers, air admitting means communicating with said side chambers and with the grate steps, and means in said side chambers for actuating the movable grate steps, and operating means outside of the fire-box, connected to the step actuating means.

5. In a stepped grate in combination, a fire-box, a plurality of substantially horizontal, respectively stationary and movable, parallel grate steps in said fire-box, side chambers in the fire-box walls laterally bordering the grate steps and extending lengthwise of the fire-box, supporting beams connected to the grate steps, and extending into the side chambers, guiding tracks in said side chambers, engaging the supporting beams, and actuating means in the side chambers, engaging the supporting beams of the movable grate steps.

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