

Martin GmbH für Umwelt-
und Energietechnik
Our reference: 001/104/SI



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GRATE FURNACE

The invention relates to a grate furnace with a grate
10 consisting of grate steps composed [lacuna] grate
elements lying next to one another, of which grate
steps in each case every second grate step in the
longitudinal direction of the grate can be driven for
carrying out stoking movements and the grate steps in
15 each case lying therebetween are stationary, the drive
devices for the movable grate steps being arranged
under the grate.

Known grates of grate furnaces with alternately
20 arranged fixed and movable grate steps had a continuous
stepped beam under the grate, to which beam the grate
steps to be moved were connected and which beam had a
single drive. In this connection, it was possible to
arrange the drive device for this beam outside the
25 grate, so that this drive device was not impaired by
hot materials falling through the grate.

With the endeavor to influence the combustion process on the grate in a still better way, the approach changed to providing separate drive devices in each case for individual or grouped-together movable grate
5 steps. In a first variant, these devices were then located at the side next to the actual grate module, which complicated or made more difficult a multiple-path arrangement of these grate modules next to one another and required drive linkages which were
10 difficult to seal. When, according to a second variant, the drive devices were located under the grate, there were always disadvantageous consequences when hot materials came through the grate. If hot and perhaps sticky materials in liquid form drip onto the piston
15 rods of cylinder/piston units and solidify there, this then leads very rapidly to the piston rod seal being damaged and thus to the failure of this drive device. The consequence of the failure of a drive device is the relatively long-term shutdown of the grate furnace.

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It is an object of the invention to produce a grate furnace which both makes possible an arrangement of the drives under the grate which is as simple as possible and protected against material falling through the
25 grate, and also allows exchange of the drive devices during continuous operation.

According to the invention, this object is achieved in a grate furnace of the type described in the introduction by virtue of the fact that the drive devices are arranged under the grate, protected by
5 housings.

By virtue of this embodiment according to the invention, the drive devices are protected against everything which may enter the underblast chamber from
10 above through the grate.

In a further advantageous embodiment, a separate housing chamber, which makes possible assembly or exchange of the drive device during continuous
15 operation, is provided for each drive device.

An additional protection for the drive devices is achieved in a further embodiment of the invention by virtue of the fact that each housing is thermally
20 insulated. This proves to be advantageous especially when the primary air sweeping past the housing in the underblast chamber is very greatly preheated. In order further to increase the effect achieved by the thermal insulation, forced ventilation can be provided for each
25 housing in a development of the invention.

In order to a great extent to avoid disruption in the primary air supply in connection with an increased flow resistance, provision is advantageously made that the housing chamber is of streamlined design in the flow
5 direction of the primary air supplied for the grate furnace in at least one underblast chamber.

In order on the one hand to create favorable installation conditions for the drive device in each
10 housing chamber and on the other hand to achieve good adaptation to the grate inclination in the case of several housing chambers arranged one behind the other, provision is made in a further advantageous embodiment of the invention that successive housing chambers are
15 staggered in relation to one another in a stepped manner following the grate inclination.

Although one drive device can in principle be provided for one or more grate steps to be moved, it has been
20 found to be advantageous if a drive device is in each case assigned to two movable grate steps. A stationary grate step is then located between these two movable grate steps, in which way the smallest controllable grate unit is created.

An especially advantageous embodiment of the invention consists in that each drive device comprises at least one hydraulic cylinder/piston unit, the piston rod of which is connected to a push rod which is guided in a sealed manner through the housing wall and engages on a carriage, to which at least one grate step to be moved is connected. The use of a push rod between a carriage guided on guides and the piston rod of the drive cylinder has the advantage that the particularly finely machined surface of the piston rod always remains in the protective housing, so that there is no risk of the seal of the working cylinder being damaged by impairment of the piston rod. Damage to the seal on the housing, which may occur as a result of deposits on the push rod, do not then have any serious consequences as may occur in the event of damage to the seal of the working cylinder.

In order to compensate tolerances in the connection between the working cylinder and the carriage, which may arise as a result of the manufacture of the various parts, assembly and also thermal action, provision is made in an advantageous development of the invention that the piston rod is connected to the push rod by an articulation.

The stepped arrangement described above of the individual housings affords the prerequisite for a further advantageous embodiment of the invention, which consists in that the carriages are guided on guide
5 tracks which run parallel to the movement paths of the movable grate steps and are in each case arranged above a housing of an adjacent drive arrangement.

The invention is explained in greater detail below with
10 reference to an illustrative embodiment. In the drawing:

figure 1 shows a longitudinal section through a grate
furnace;

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figure 2 shows a section along the line II-II in
figure 1, and

figure 3 shows a part section along the line III-III
20 in figure 1.

A grate furnace according to figure 1 comprises a charging hopper 1, a charging device 3 which can move to and fro over a charging table 2, a grate 4, a
25 collecting device 5 arranged at the end of the grate

for collecting the ash, and an ash chute 6 into which the burnt ash falls.

Situated under the grate 4 are four mutually separate
5 underblast chambers 7.1, 7.2, 7.3 and 7.4. These
underblast chambers each have connections 8.1 to 8.4
for the separate supply of primary air, which is blown
toward the grate 4 from the underside and through the
grate into the fuel lying on the grate, for example
10 refuse.

The underblast chambers are arranged in a stepped
staggered manner in relation to one another following
the inclined grate 4. Arranged above each underblast
15 chamber is a carriage 9.1 to 9.4 which, as can be seen
in connection with Figure 3 in particular, is in each
case provided with two roller pairs 10 and 11 which are
guided in guide tracks 12. Arranged on each carriage
are drivers 13 and 14, each of which is in engagement
20 with a movable grate step 15 and, respectively, 16. The
furnace grate is composed of in each case alternately
movable and stationary grate steps, a stationary grate
step 17 being provided in each case between two movable
grate steps 15 and 16. A carriage 9 is therefore
25 provided for the motive drive of two movable grate
steps. The guide tracks 12 are aligned parallel to the

movement direction of the movable grate steps 15 and 16.

A drive device designated as a whole by reference
5 number 18, which comprises a working cylinder 19, a
piston (not shown in the drawing) which is movable in
the working cylinder, and a piston rod 20, serves for
displacing each carriage 9 and the grate steps 15 and
16 connected thereto. The working cylinder 19 is
10 fastened to a transverse beam 22 by means of an
articulation arrangement 21, while the piston rod 20 is
connected via an articulation 23 to a push rod 24 which
extends through a seal 35 of a housing to be described
below.

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Each drive device, with the exception of the drive
device 18.4 which serves for the drive of the last two
movable grate steps just before the ash chute, are
[sic] arranged in a housing 25 which is continuous in
20 the illustrative embodiment and is divided into housing
chambers which are designated by reference numbers 25.2
to 25.4 below. These housing chambers 25, which can be
seen from Figures 2 and 3 in particular, surround the
drive devices 18.1, 18.2 and 18.3 in a protective
25 manner. The drive arrangement 18.4 is situated under a
feed hopper 26 for the ash chute 6 and is consequently

located outside the grate region, for which reason a housing chamber is not provided for this drive.

As can be seen from figure 2, the grate furnace
5 illustrated in the drawing has two grate paths next to one another, which are designated by reference numbers 4a and 4b. The grate paths concerned are situated between lateral pressing plates 27 which are loaded by spring arrangements 28 in order to be capable of
10 compensating lateral thermal expansion of the grate paths. The housing chambers 25 for accommodating the drive devices 18 have thermal insulation 29 and forced ventilation, the corresponding ducts for the forced ventilation not being shown in the drawing. Flaps 31
15 articulated by means of an articulation 30 make possible assembly and maintenance of the drive devices 18.

As can be seen from figures 2 and 3, the housings 25
20 concerned are of streamlined design and configured and arranged in such a manner that an essentially constant flow cross section 32 remains in each case between the inner wall 33 of an underblast chamber 7 and the outer wall 34 of the housing 25.

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PATENT CLAIMS

1. A grate furnace with a grate consisting of grate
steps composed [lacuna] grate elements lying next to
10 one another, of which grate steps in each case every
second grate step in the longitudinal direction of the
grate can be driven for carrying out stoking movements
and the grate steps in each case lying therebetween are
stationary, the drive devices for the movable grate
15 steps being arranged under the grate, wherein the drive
devices (18) are arranged under the grate (4),
protected by housings (25).

2. The grate furnace as claimed in claim 1, wherein a
20 separate housing chamber (25) is provided for each
drive device (18).

3. The grate furnace as claimed in claim 1 or 2,
wherein each housing chamber (25) is thermally
25 insulated.

4. The grate furnace as claimed in one of claims 1 to 3, wherein forced ventilation is provided for each housing chamber (25).

5 5. The grate furnace as claimed in one of claims 1 to 4, wherein the housing (25) is of streamlined design in the flow direction of the primary air supplied for the grate furnace in at least one underblast chamber (7).

10 6. The grate furnace as claimed in one of claims 1 to 5, wherein successive housing chambers (25) are staggered in relation to one another in a stepped manner following the grate inclination.

15 7. The grate furnace as claimed in one of claims 1 to 6, wherein a drive device (18) is in each case assigned to two movable grate steps (15, 16).

8. The grate furnace as claimed in one of claims 1 to 20 7, wherein each drive device (18) comprises at least one hydraulic cylinder/piston unit (19, 20), the piston rod (20) of which is connected to a push rod (24) which is guided in a sealed manner through the housing wall and engages on a carriage (9), to which at least one 25 grate step (15, 16) to be moved is connected.

9. The grate furnace as claimed in claim 8, wherein the piston rod (20) is connected to the push rod (24) by an articulation (23).

5 10. The grate furnace as claimed in claim 8 or 9, wherein the carriages (9) are guided on guide tracks (12) which run parallel to the movement paths of the movable grate steps (15, 16) and are in each case arranged above a housing chamber (25) of an adjacent
10 drive device (18).