

REPLACED SHEETS SG

☒ Description : paged to paged
☒ Claim(s) : paged to paged
☒ Drawing(s) : paged to paged
☒ Abstract : paged to paged

5

CHARGING DEVICE

The invention relates to a charging device for incineration and gasification plants, in which the combustible material can be introduced into the plant from a feed hopper via a feed table by means of at least one charging element.

Known charging arrangements have the function of introducing the combustible material in a metered manner into an incineration or gasification plant. For this purpose, use has previously been made of a box-shaped charging piston or a number of such charging pistons which, supported on a plane feed table, is or are moved to and fro so as to convey the combustible material onto a combustion grate or into an incinerator. However, these charging devices have the disadvantage that the piston has very large rectilinear sealing surfaces which are intended to prevent combustible material being unintentionally drawn into the region behind the charging pistons. Straight sealing faces are, however, particularly difficult to produce, above all when such a charging piston is additionally subjected to thermal loads. At the front reversing point of the piston, that is to say when the piston is located in the end position close to the combustion chamber or the gasification chamber, considerable thermal radiation occurs on the front part of the charging piston. In the case of large charging pistons, this heating leads to non-uniform heating action and thus to distortions which can lead to serious lacks of sealing. If, as a result of such distortions, combustible material penetrates behind the

9903485-2

20 JUL 1999

This Sheet Has Been Replaced



charging piston, the latter may even become mechanically blocked.

Particular difficulties always arise when the charging
5 device is also to be sealed against gases entering or
escaping. This is necessary in particular in
gasification plants in which the fuel is not reacted
completely but in which a gas mixture is produced which
is still combustible and perhaps even toxic.

10

The object of the invention is to provide a charging
device which, by virtue of the constructional design of
the charging element, makes possible simple and
reliable sealing, in particular with regard to gas
15 exchange.

According to the invention, this object is achieved in
a charging device of the type described in the
introduction in that the charging element comprises a
20 thrust part for moving the combustible material and at
least one guide part, the shape of which is circular-
cylindrical and which is guided in a guide arrangement,
and in that the guide part extends through at least one
sealing arrangement adapted to it of the charging
25 device. This embodiment ensures that at least that part
of the charging element which interacts with a seal has
a circular-cylindrical structure so that a circular
seal can be used which is not only simpler and cheaper
but also considerably more effective than seals for
30 plane surfaces.

According to a preferred embodiment of the invention,
the charging element is as a whole designed as a
circular-cylindrical piston. In such an embodiment, the
35 sealing arrangement is intended both for gastight
sealing and also to prevent the penetration of
combustible material into the space located behind the
thrust part. Not only does such an embodiment have the
advantages relating to a circular seal, but, on account



of the circular-cylindrical shape of the entire charging element, it is also possible to provide a number of such seals one behind another. Moreover, the production of such a charging element is relatively
5 simple because circular-cylindrical shapes are easier to produce than rectangular or square thrust pistons.

The thrust part of the charging element does not have to have the same shape or the same cross section as the
10 guide part which, according to the invention, must have a circular-cylindrical cross section so as to achieve the advantages striven for.

An advantageous development of the invention proposes
15 that the thrust part has a diameter which differs from the diameter of the guide part. In principle, however, it may also be advantageous for the thrust part to have a cross section which differs from the circular-cylindrical cross section. If the thrust part has a
20 smaller diameter than the guide part or a cross section which differs from the circular-cylindrical cross section, for example a rectangular cross section, separate measures must then be taken, for example in the form of scrapers, in order to prevent the
25 combustible material being displaced behind the thrust part. If, on the other hand, the circular-cylindrical cross section of the thrust part is smaller than that of the guide part, the thrust part can then also extend through a first of a number of sealing arrangements for
30 the guide part, so that a smaller space requirement can be achieved outside the feed device in the direction of movement of the charging element.

It can also prove advantageous if, in a development of
35 the invention, the thrust part has a surface structure which differs from that of the guide part. Such a different surface structure can be achieved by machining or by means of a different material. To achieve particularly good sealing, it may be necessary



to provide the guide part with a higher surface quality which is not necessary for the heavy duty of the thrust part which comes into contact with the combustible material to be fed.

5

An advantageous development of the invention consists in that the guide arrangement for the guide part comprises two sets of in each case three guide rollers, which sets are arranged at a distance from one another, at least one of these three guide rollers being adjustable radially in relation to the guide part.

15

An alternative advantageous embodiment of the charging device consists in that the guide arrangement for the guide part comprises at least one pair of rollers lying opposite one another, which are mounted rotatably on the guide part and are guided in profiled rails. These profiled rails are provided outside the sealing arrangement and receive at least one pair, preferably two pairs, of guide rollers lying opposite one another, the axes of rotation of which are arranged perpendicularly to the axis of the thrust piston and which preferably run in U-shaped guide rails.

25

These guide arrangements are constructionally simple and practically insusceptible to faults because even soiling affects the guide arrangement only slightly.

30

An especially advantageous embodiment of the invention consists in that the charging element is designed as a hollow piston and is guided with its piston skirt in a guide cylinder serving as the guide arrangement, which is fastened, by its front end in the conveying direction of the hollow piston, to that delimiting wall of the charging device facing away from the combustion or gasification chamber, and is arranged outside said wall. Such a charging element is simple to produce because drawn tubes can form the starting point for the production of the charging element, which greatly

35



simplifies the production of such a charging element. In such a charging element, it is advantageous if the guide arrangement comprises two plain bearing bushes arranged at a distance from one another in the guide
5 cylinder.

The embodiment of the charging element as a hollow piston is also a prerequisite for another advantageous embodiment of the invention which consists in that a
10 driver tube is inserted inside the hollow charging element and is, at the piston foot, connected detachably to the charging element, on the front end, projecting into the charging element, of which tube a drive device for the reciprocating movement of the
15 charging element engages. The particular advantage is that the point of engagement of the drive device can be located a long way into the hollow piston so that the space requirement at the rear end of the charging element for the arrangement of the drive device is
20 reduced. The detachable connection of the driver tube to the charging element also has the advantage that the connection between the drive device and the driver tube can be made before the latter is introduced into the charging element. This has a favourable influence on
25 the mounting of such a charging element. The advantageous embodiment is particularly favourable when, according to another embodiment of the invention, in a case where use is made of a piston/cylinder drive unit, this is, in the retracted end position, held
30 virtually completely in the driver tube. As a result, the space requirement behind the charging element is at its smallest because the connection point between the drive device and the charging element can be located very close to the front end of the latter, which
35 without such a driver tube would lead to great mounting problems.

When, in a further embodiment of the invention, the thrust part of the charging element is held in an



upwardly open guide recess of the feed table, this ensures relief of the guide arrangement in the case of long movement paths and, over and above this, a defined conveying region also. It is advisable for the
5 conveying capacity of the charging element to be adjustable as a function of a parameter depending on the course of gasification or incineration. In this way, the course and the nature of the gasification or incineration can be influenced via adjustment of the
10 quantity of the combustible material to be introduced.

The invention is described in greater detail below with reference to various exemplary embodiments.

15 In the drawing,

Figure 1 shows a longitudinal section through a diagrammatically illustrated incineration plant;

20

Figure 2 shows a partly sectioned side view of a charging device with an extended charging element;

25 Figure 3 shows a partial view of the illustration according to Figure 2 in the retracted position of the charging element;

Figure 4 shows a modified exemplary embodiment;

30

Figure 5 shows a section along the line V-V in Figure 4;

Figure 6 shows another modified exemplary embodiment;

35

Figure 7 shows a section along the line Va-Va in Figure 6;



Figure 8 shows a partial illustration of a front view of a charging device according to Figure 2;

Figure 9 shows an embodiment which has been changed in relation to Figure 8; and

Figure 10 shows a further exemplary embodiment of a charging device.

10 The incineration plant illustrated in Figure 1 comprises a combustion grate 1, a charging device 2 and a combustion chamber 3 with adjoining gas flue 4, to which other gas flues and units downstream of the incineration plant, in particular steam-generating and
15 waste-gas cleaning units, are connected, which are here not illustrated or described in greater detail.

The combustion grate 1 comprises individual grate steps 5, each second one of which is connected to a drive
20 which is designated as a whole by 6 and makes it possible to adjust the stoking rate. Provided below the combustion grate are underblast chambers 7.1 to 7.5 which are subdivided in both the longitudinal and transverse direction and have primary air admitted to
25 them separately via individual lines 8.1 to 8.5. At the end of the combustion grate, the burnt-out ash is discharged by means of an ash-discharging device, in the exemplary embodiment illustrated an ash roller 9, into an ash chute 10, from where the ash falls into an
30 ash-remover (not shown).

The charging device 2 comprises a feed hopper 11, a feed chute 12, a feed table 13 and at least one charging element 14 which pushes the refuse sliding
35 down in the feed chute 12 over a charging edge 13' of the feed table 13 into the combustion chamber 3 and onto the combustion grate 1.



Fundamentally, a charging element 14 consists of a thrust part 15 and a guide part 16. These can have different shapes, as emerges from the various exemplary embodiments.

5

In the exemplary embodiments illustrated in Figures 2 to 8, the charging element 14 as a whole consists of a one-piece hollow piston, the front, thrust part of which, which comes into contact with the combustible
10 material 17 to be conveyed, is designated by 15 and the remaining guide part of which is designated by 16, and which, even when it is in the furthest forward position according to Figure 2, always remains in a guide cylinder 18, in which the guide part 16 is guided by
15 means of plain bearings 19 and 20. 21 and 22 indicate seals for achieving gastight sealing of the charging element. If the thrust part 15 differs from the guide part 16 with regard to its surface quality or surface nature, the front seal 21 can serve primarily as a
20 scraper, through which the thrust part 15 extends, while the rear seal 22, interacting with the guide part 16 which has a smoother surface, constitutes better sealing against gases which could either escape from the combustion chamber or could be sucked into the
25 combustion chamber in the form of ambient air or secondary air.

Provided inside the charging element 14 is a driver tube 23 which is fastened detachably to the rear end 24
30 of the charging element 14 and consequently to its piston foot facing away from the combustion chamber. Provided at the front end of the driver tube 23 is an articulation part 25 for fastening the piston rod 26 of a drive unit 27 which, in the retracted state of the
35 charging element 14, as emerges from Figure 3, is held virtually completely in the driver tube 23. In the pushed-forward end position according to Figure 2, the cylinder arrangement of the drive unit 27 lies virtually completely outside the driver tube 23. It can



be seen from this that this driver tube makes it possible to reduce the necessary space requirement to the rear for the arrangement of the rear articulation part 28 and, over and above this, the driver tube
5 allows the mounting of the front articulation part 25, which in the case of direct fastening of this articulation part to the thrust part, in a position lying so far forward, would lead to considerable mounting problems.

10

Figures 4 and 5 illustrate a modified embodiment of the guide and sealing arrangement for the charging element 14. In this embodiment, three guide rollers 29 aligned in the radial direction are provided, at least one of
15 which, in Figure 5 the top one, can be adjusted in the direction of the double arrow 30. Provided on the rear wall 31 of the feed chute 12, for sealing the charging element 14, is a sealing arrangement 32 which surrounds the guide part sealingly and is fastened to the wall.

20

Figures 6 and 7 show another embodiment of the guide arrangement of the charging element 14, in which laterally arranged axial rollers 33 are in each case guided in a rail 34. In this case, the sealing 32
25 corresponds to that in Figure 4.

When the charging element as a whole is designed as a piston of circular-cylindrical shape, it is necessary to provide a number of such charging elements 14 next
30 to one another, as emerges from Figures 8 and 9. In this case, the charging elements are held in guide recesses 35.

Figure 10 shows an exemplary embodiment in which the
35 charging element consists of a thrust part 36 of rectangular cross section and two guide parts 37 of circular-cylindrical cross section which are held in plain bearings 38. Sealing arrangements are indicated by 39. The guide parts 37 can be designed as piston



rods of hydraulic piston/cylinder arrangements (not shown in full) in order to move the thrust part 36 of known construction type. In order that no combustible material can penetrate behind the thrust part 36, a
5 scraper 40 is provided.

The charging elements can - as illustrated - be arranged in a horizontal position, or it is also possible to arrange these obliquely upwards or
10 obliquely downwards at a certain angle.

The common underlying idea of all the embodiments is to design the charging element in such a manner that it comprises a thrust part and a guide part, the guide
15 part serving to guide the thrust part and seal the charging element, so that gases produced in the incineration or gasification plant cannot escape to the outside and secondary air cannot be sucked into the incineration plant, which can have an unfavourable
20 influence on the course of combustion and in particular an unfavourable influence on a gasification process.

This Sheet Has Been Replaced





5

PATENT CLAIMS

1. Charging device for incineration and
gasification plants, in which the combustible
10 material can be introduced into the plant from
a feed hopper via a feed table by means of at
least one charging element, characterized in
that the charging element (14) comprises a
15 thrust part (15) for moving the combustible
material and at least one guide part (16), the
shape of which is circular-cylindrical and
which is guided in a guide arrangement (18, 19,
20), and in that the guide part (16) extends
20 through at least one sealing arrangement (21,
22) adapted to it of the charging device.
2. Charging device according to Claim 1,
characterized in that the charging element (14)
is as a whole designed as a circular-
25 cylindrical piston (15, 16).
3. Charging device according to Claim 2,
characterized in that the thrust part (15) has
a diameter which differs from the diameter of
30 the guide part (16).
4. Charging device according to Claim 1,
characterized in that the thrust part (15) has
a cross section which differs from the
35 circular-cylindrical cross section.
5. Charging device according to one of Claims 1 to
4, characterized in that the thrust part (15;



36) has a surface structure which differs from that of the guide part (16; 37).

- 5 6. Charging device according to one of Claims 1 to 5, characterized in that the guide arrangement for the guide part (16) comprises two sets of in each case three guide rollers (29), which sets are arranged at a distance from one another, at least one of these three guide rollers being adjustable radially in relation to the guide part (16).
- 10
- 15 7. Charging device according to one of Claims 1 to 5, characterized in that the guide arrangement for the guide part (16) comprises at least one pair of rollers (33) lying opposite one another, which are mounted rotatably on the charging element (14) and are guided in profiled rails (34).
- 20
- 25 8. Charging device according to one of Claims 1 to 5, characterized in that the charging element (14) is designed as a hollow piston and is guided with its piston skirt in a guide cylinder (18) serving as the guide arrangement, which is fastened, by its front end in the conveying direction of the charging element (14), to that delimiting wall (31) of the charging device facing away from the combustion or gasification chamber, and is arranged outside said wall.
- 30
- 35 9. Charging device according to Claim 8, characterized in that the guide arrangement comprises two plain bearing bushes (19, 20) arranged at a distance from one another in the guide cylinder (18).



10. Charging device according to Claim 8 or 9, characterized in that a driver tube (23) is inserted inside the hollow charging element (14) and is, at the piston foot (24), connected detachably to the charging element (14), on the front end, projecting into the charging element (14), of which tube a drive device (27) for the reciprocating movement of the charging element (14) engages.
11. Charging device according to Claim 10, characterized in that, in a case where use is made of a piston/cylinder drive unit (27), this is, in the retracted end position, held virtually completely in the driver tube (23).
12. Charging device according to one of Claims 1 to 11, characterized in that the thrust part (15) of the charging element (14) is held in an upwardly open guide recess (35) of the feed table (13).
13. Charging device according to one of Claims 1 to 12, characterized in that the conveying capacity of the charging element (14) is adjustable as a function of a parameter depending on the course of gasification or incineration.

This Sheet Has Been Replaced



* C L M S *