(19) DANMARK

(10) **DK/EP 3354345 T3**

Patent- og Varemærkestyrelsen

(12) Oversættelse af europæisk patentskrift

(51) Int.Cl.: ***B 02 C 13/284 (2006.01)***

(45) Oversættelsen bekendtgjort den: **2022-03-28**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2021-12-29**

(86) Europæisk ansøgning nr.: **18162594.8**

(86) Europæisk indleveringsdag: **2014-04-10**

(87) Den europæiske ansøgnings publiceringsdag: **2018-08-01**

(30) Prioritet: **2013-04-11 DE 102013206449**

(62) Stamansøgningsnr: **14001315.2**

(84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

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(54) Benævnelse: **Findelingssigte til en indretning til findeling af stykgods**

(56) Fremdragne publikationer:
**DE-A1- 4 008 276**
**DE-C- 472 243**
**DE-C1- 19 713 264**
**JP-A- 2011 251 216**

## Description

The invention relates to a comminution screen according to the preamble of Claim 1 for a device for comminuting bulk material that comprises a housing with at least a first housing part and a second housing part and a rotor to which tools for comminuting the bulk material are attached. The comminution screen allows the comminuted bulk material to leave an area of action of the rotor.

Such a comminution screen is known, for example, from DE 472 243 C. This document describes an impact or hammer mill, the grinding track of which can be driven out of the housing through a door. To prevent the grinding track from coming into contact with the rotor, part of the grinding track can be lowered by actuating a screw jack.

Devices for comminuting bulk material are used in manifold ways. In many industries, for example in the chipboard industry, in the production of pellets and briquettes or the production of biomass, it is necessary to crush or comminute bulk goods, in particular timber. The material to be comminuted can consist, for example, of wood scrap, planing or milling chips or sawdust, coarse material from a triager or from green waste. Facilities known as hammer mills or hammer crushers are usually used for this purpose. These normally have a drum-shaped housing, in which a rotor is arranged, over the outer surface of which tools for comminuting the bulk material are distributed. These tools can be crushing tools, such as hammers, or cutting tools, such as blades. In the operation of the device the rotor is set in rotation, so that the tools come into contact with the bulk material to be comminuted. The bulk material is then crushed by means of the tools.

The comminuted bulk material usually leaves the area of action of the rotor through the comminution screen, which can also be a perforated plate or

similar, for example. The bulk material then moves through a discharge shaft in order then to be transported.

The area of action of the rotor is defined as the area of space in which the comminuting tools move. The area of action is generally cylindrical and has a radius which corresponds to the sum of the rotor radius and the tool length. In this area the tools perform their action and can comminute the bulk material to be crushed.

In the present case, a comminution screen is understood to mean any device by means of which it is possible to keep constituents of the crushed bulk material, whose size exceeds a maximum size, inside the housing, while constituents of the crushed bulk material, whose size is less than the maximum size, exit the device.

Both the comminution tools and the comminution screens are subject to constant wear. They must therefore be regularly replaced or serviced. In addition, it is possible that the comminution screen used will need to be replaced by another, because, for example, the comminuted bulk material is to have a different size distribution.

From the prior art, it is known to provide one or more doors or similar openings on one side of a hammer mill, through which openings access is provided to the outer surface of the rotor and the comminution tools mounted on the rotor. Maintenance and repair works can be carried out through this opening. However, after opening the doors the comminution screen must also be removed to gain access to the rotor and the tools located thereon. This is usually expensive and time-consuming, because the comminution screen is often joined to the housing of the hammer mill with a plurality of bolts.

To this end, JP 2011 251216 features a two-part screen arranged below the rotor that is designed to be curved and is screwed to the housing via

screen carriers. If the screw connection is released, the two screen carriers unfold and pivot downwards into the housing. They can be moved out of pushed out of said housing via doors provided in the housing.

DE 40 08 276 A1 discloses a hammer mill with a radially adjustable screen jacket for comminuting cereals, long or pre-cut coarse fodder and other agricultural and food products, the screen jacket that forms the grinding chamber surrounding the rotor and being composed of two halves that are mounted in radially adjustable screen mounts that can be individually rotated. When the lower screen mount, which consists of one unit, is moved towards the middle of the rotor, the screen halves are inevitably moved towards the impact range of the beaters.

DE 19713264 C1 describes a hammer mill with two counter-rotating rotors and laterally extractable, multi-part crushing tracks. One part of the grinding track is designed to be pivotable and can be moved into a working position by sliding it into the housing.

CA 2429244 describes a comminuting device having a housing part, which can be linearly displaced together with a part of the comminution screen, so that the rotor is accessible.

The object of the invention is to improve a comminution screen in accordance with the preamble of Claim 1 so that maintenance and repair of the device or replacement of the comminution screen or parts of the device can be performed easily, quickly and safely for the parties involved.

The invention achieves the object addressed by means of a comminution screen according to Claim 1. The comminution screen has a pivoting portion mounted such that it can pivot about a pivot axis, which can be pivoted into a holding position by the first housing part and the displacement portion of the comminution screen being brought into the maintenance position, wherein the pivoting portion forms a working

platform that can be entered when in the holding position. The device for comminuting bulk material features a discharge shaft for the comminuted bulk material and the pivoting portion of the comminution screen reaches at least partly over the discharge shaft when in the holding position. By means of this design, the rotor can be exposed with a single operation and thus access can be achieved both to the rotor and the tools. In addition, the comminution screen is also accessible, so that cleaning, maintenance, repair or replacement work can be easily carried out. In this case, the comminution screen can remain in the assembled state, thereby significantly reducing the time and effort required. Of course, it is sufficient if a part of the rotor, for example, a part of its outer surface, is made accessible. The rotor is rotatably mounted, so that the entire outer surface is accessible by turning the rotor. Accessible here means that the necessary cleaning or maintenance work or repairs are possible.

The displacement of the first housing part relative to the second housing part can be effected, for example, via a set of hydraulics or a spindle drive. Of course, other drive types are also possible.

The comminution screen has a pivoting portion mounted such that it can pivot about a pivot axis, which can be pivoted into a holding position by the first housing part and the displacement portion of the comminution screen being brought into the maintenance position, wherein the pivoting portion forms a working platform that can be entered when in the holding position.

As mentioned above, in devices of this kind the housing and the rotor are usually drum-shaped or cylindrical. This cylinder usually has an extension running in the axial direction, which is too large to allow, for example, maintenance and repair work to be performed over the entire outer surface of the cylinder of the respective rotor or the comminution screen simply by reaching inside. It is therefore absolutely necessary for a person who is to perform the work to climb into the device. However, these devices typically do not have a separate working platform provided, since in the operation

of the device the distance between the tools located on the rotor and the comminution screen must be kept as small as possible. For a separate working platform that enables comfortable working during maintenance or cleaning works, there is insufficient assembly space.

As a result of the design described here however, a part of the comminution screen, namely the pivoting portion, forms a working platform and thus enables a particularly comfortable and safe working, including in the interior of the device.

Advantageously, the displacement portion and the pivoting portion of the comminution screen are connected to each other in a releasable manner by at least one locking bolt. Particularly advantageously, this connection is achieved by two locking bolts. In this way, in a particularly simple way, a pivotable connection is obtained between the displacement portion and the pivoting portion of the comminution screen, and a simple facility to release this connection is also ensured. If, for example, a comminution screen being used needs to be replaced by another comminution screen which has a different mesh size, for example, then the pivoting portion of the respective comminution screen can be removed simply by loosening the locking bolts and replacing it with the pivoting portion of the other comminution screen.

Advantageously, the device has a discharge shaft for the comminuted bulk material, wherein the pivoting portion of the comminution screen reaches at least partly over the discharge shaft when in the holding position. Conventionally, the bulk material to be comminuted is fed into the device from the top. The comminuted bulk material usually exits the device downwards under the action of gravity. It is at this point, therefore, that the discharge shaft is arranged, through which the comminuted bulk material falls and is then transported away, for example using a chain conveyor, a conveyor belt, a double conveyor screw or other conveyor devices. Therefore, a connection shaft, the so-called discharge shaft, is installed at

the output of the device, which can be a hammer mill, for example.

When the machine housing is opened, thus in the state in which the first housing part is in the maintenance position and therefore at least a portion of the rotor is accessible, there is a danger that people working in the interior of the device could fall through the discharge shaft and thus incur injuries. In the present case, however, the pivoting portion is pivoted into the holding position when the first housing part is moved out of the working position into the maintenance position. The pivoting portion forms not only the working platform that can be entered, but also advantageously covers at least a portion of this discharge shaft and thus also increases the level of working safety. Advantageously, the pivoting portion of the comminution screen forms approximately one third of the entire comminution screen. It is therefore advantageously possible to reach across the entire discharge shaft.

It has been shown to be advantageous if a screen carrier is arranged on the first housing part and a mating screen carrier is arranged on the second housing part, in such a way that the comminution screen can be clamped in between the screen carrier and the mating screen carrier by the first housing part being brought out of the maintenance position into the working position. By moving the first housing part and the second housing part relative to each other and towards each other, it is therefore ensured that the comminution screen is clamped in between the screen carrier and the mating screen carrier, which are arranged on the different parts of the housing. There is therefore no need for a complicated and time-consuming fixing of the comminution screen to the respective screen carrier, for example, using a plurality of screws or similar connection elements. In this way the replacement of one comminution screen by another comminution screen can be performed quickly and easily.

Since in this way the number of elements that can be easily lost, for example screws or bolts, is greatly reduced, the risk of inadequately fixed

comminution screens is also reduced. In this design, there is no longer a possibility of inadequately securing the comminution screen to the respective screen carrier, for example with an insufficient number of screws. As soon as the first housing part and the second housing are moved towards each other and the first housing part is in the working position, it is ensured at the same time that the comminution screen is properly secured at the desired designated position. This also greatly increases the working safety and greatly reduces the risk of an accident.

In an advantageous design the pivoting portion of the comminution screen, which is in particular releasably attached, is designed in the form of a grinding track, for example, a comminuting grinding track or a grater track. Due to the simple release of the pivoting portion of the displacement portion of the comminution screen, this results in a particularly simple interchangeability, so that the respective requirements on the bulk material to be comminuted can be satisfied quickly and easily.

The pivoting portion of the comminution screen can be pivoted out of the holding position into a screening position by the first housing part being brought out of the maintenance position into the working position. After the pivoting portion forms the working platform that can be entered in the holding position, it is therefore not necessary to move the pivoting portion, for example by hand or by operating an actuator, into the screening position in which the pivoting portion of the comminution screen acts as a comminution screen portion. Instead, this is already achieved by the fact that the first housing part is moved from the maintenance position into the working position. It is therefore impossible, for example, after maintenance or repair work, to forget to move the pivoting portion from the holding position into the screening position before the first housing part is moved from the maintenance position into the working position. No such separate working step is necessary.

A projection is arranged on the pivoting portion, which slides along on a

guide arranged on the second housing part, and thus ensures the pivoting of the pivoting portion when the first housing part is displaced relative to the second housing part. For example, the projection can also be designed as a roller or wheel, which rolls along the guide. In this way, both when moving apart the two housing parts from the working position into the maintenance position and on the reverse route, it is ensured that a soft and fluent movement of the pivoting portion is obtained and any wedging, falling down or tilting of the pivoting portion can be almost certainly prevented. If the pivoting portion of a comminuting screen is replaced by the pivoting portion of another comminution screen, it is only necessary to mount the projection on the designated guide. No further adjustment or alignment of the components relative to each other is necessary.

Preferably, the comminution screen has a partially cylindrical shape with a screen radius, and the screen carrier and the mating screen carrier are designed to accommodate different comminution screens which have screen radii that differ from one another. To this end, for example the screen covers can be screwed into the machine housing, wherein by using, for example, different spacing liners in the device, different screen radii can be implemented and the corresponding screen covers can be changed very quickly. This is necessary, for example, to adjust the distances of the screen from the impact and/or cutting tool, which is arranged on the respective rotor, to the comminution screen if, for example, a different tool is arranged on the rotor, for example a shorter or longer one. For this purpose, adjustable lower screen holders, which for example are part of the screen carrier and the mating screen carrier, can be adjusted to a new scale. Afterwards, another comminution screen with, for example, a larger or smaller screen radius can be inserted and used. Therefore, the spacing of the screen from the impact and/or cutting tool can be fitted to the comminution screen and adjusted individually. The clamping of the comminution screen in place is again effected by the fact that after the insertion of the comminution screen into the screen carrier, the two machine bodies are moved closer to each other by means of a

hydraulic or mechanical system, so that the first housing part is moved from the maintenance position into the working position. By this measure alone, the comminution screen is clamped between the screen carrier and the mating screen carrier and fixed to the machine.

Preferably, the screen carrier and the mating screen carrier are therefore designed such that they can be adapted to different screen radii.

Preferably, the comminution screen is fixed to the screen carrier using at least one quick-release bolt. This provides an even more secure fastening of the comminution screen to the screen carrier, so that in particular when moving the two housing parts together, thus while the first housing part is being moved from the maintenance position into the working position, any slippage of the comminution screen on the screen carrier is reliably prevented.

In the following an exemplary embodiment of the present invention is explained in more detail based on a drawing. Shown are:

Figure 1: a device according to a first exemplary embodiment in the working position in a side elevation,

Figure 2: a detailed view of different components of a device in accordance with an exemplary embodiment of the present invention,

Figure 3: a device in accordance with an exemplary embodiment of the present invention in the working position and

Figure 4: the device of Figure 3 in the maintenance position.

The top part of Figure 1 shows a side view of a device 2 according to a first embodiment of the present invention. The device 2 has a first housing

part 4 and a second housing part 8, which are shown enlarged in the lower area. Between the two housing parts 4, 8, a rotor 6 is positioned.

In the lower left area of the figure the first housing part 4 is shown enlarged. A screen carrier 10 can be seen, on which a displacement portion 12 of a comminution screen is shown adjacent to it on the right. The displacement portion 12 has a partially cylindrical contour and in particular internally, has a screen radius.

On the region of the first housing part 4 opposite the screen carrier 10, a door 24 is shown, which is arranged on the first housing part 4 via hinges 22 and can be opened via a handle 26. In this way access is possible, for example, to a rear side of the displacement portion 12 of the comminution screen.

Figure 1 also shows a pivoting portion 14, which is fixed to the displacement portion 12 via locking bolts 16. For this purpose, the locking bolts 16 are guided through holders 18 on the pivoting portion 14 and through holders 20 on the displacement portion 12, and thus connect the two components 12 and 14 to each other. The displacement portion 12 and the pivoting portion 14 together form the comminution screen. The pivoting portion 14 is shown in two different positions. In slightly thicker lines the pivoting portion 14 is shown in the holding position, in which one surface 34 is accessible on foot and serves as a working platform. In slightly thinner lines and pivoted about the holders 18, the pivoting portion 14 is shown in the screening position.

In the lower right-hand area of the pivoting portion 14 a projection 36 is shown, which in the mounted condition slides smoothly along a guide 38 when the first housing part 4, and hence also the comminution screen fixed thereto, are moved from the working position into the maintenance position or vice versa. Due to the sliding of the projection 36 on the guide 38, the pivoting portion 14 is pivoted about the pivot axis, which is formed

by the holders 18, 20 and the locking bolts 16. When the first housing part 4 is in the working position, the projection 36 latches into a designated undercut 40.

Figure 2 shows an enlarged illustration of some of the components already named.

In the lower right-hand area again, the first housing part 4 is shown with the screen carrier 10, the displacement portion 12 and the pivoting portion 14. It is evident that although the pivoting portion 14 also has a screen radius, in the position shown it does not continue the radius of the displacement portion 12, however. The pivoting portion 14 is therefore located in the holding position.

To the left of this a frontal view of the comminution screen is shown, wherein the individual holes 28 of the screen are shown. The comminution screen, and in particular the displacement portion 12 of the comminution screen shown in the bottom left of Figure 2, is fixed to the screen carrier 10 using quick-release bolts 30. This is shown enlarged in the top left of Figure 2. The quick-release bolts 30, which in the top left are shown once in the disconnected condition and once in the connected condition, are clearly visible. The quick-release bolt 30 connects the displacement portion 12 of the comminution screen to the screen carrier 10. To prevent the bolt from being pulled out, a safety clip 32 is provided. Also shown in the top right part of Figure 2 is a quick-release bolt 30.

Figure 3 shows the device 2 in the closed state. In the right-hand part of the device 2 a drive device 42 is located, by means of which the rotor 6 is set into rotation. It is apparent that the first housing part 4 and the second housing part 8 are directly adjacent to each other, so that the first housing part 4 is in the working position. The two shaded elements shown are the displacement portion 12 and the pivoting portion 14, which together form the comminution screen. On the right-hand part of the pivoting portion 14

the projection 36 can be seen, which has engaged in the undercut 40.

Underneath the rotor 6 a hydraulic piston 44 is shown, which in the state shown in Figure 3 has its minimum length. Via a rail system 46 the first housing part 4 can be displaced relative to the second housing part 8, as soon as the hydraulic piston 44 moves the two components 4, 8 apart. In particular, the displacement portion 12 is clamped between the screen carrier 10 and the mating screen carrier 48, shown for example in Figure 1.

Figure 4 shows the device 2 from Figure 3 in the opened state. It is evident that the first housing part 4 has been moved along the rail system 46 relative to the second housing part 8 and the rotor 6. The pivoting portion 14 of the comminution screen is now in the holding position and can be used as a work platform. The projection 36 has slid along the guide 38 and ensured that the pivoting portion 14 pivots relative to the displacement portion 12.

**List of reference numerals**

**[0038]**

2 - device
4 - first housing part
6 - rotor
8 - second housing part
10 - screen carrier
12 - displacement portion
14 - pivoting portion
16 - locking bolt
18 - holder
20 - holder
22 - hinge
24 - door
26 - handle
28 - holes
30 - quick-release bolts
32 - safety clip
34 - surface
36 - projection
38 - guide
40 - undercut
42 - drive device
44 - hydraulic piston
46 - rail system
48 - mating screen carrier

# PATENTKRAV

1. Findelingssigte, tilpasset til anvendelse i en indretning til findeling af stykgods, som omfatter en første husdel (4) og en anden husdel (8), med en forskydningsdel (12) med huller (28) og en drejedel (14), som kan drejes fra en sigteposition til en holdeposition, **kendetegnet ved, at** drejedelen (14) omfatter en overflade (34), som er tilgængelig i holdepositionen og kan tjene som arbejdsplatform, at drejedelen (14) ved en forskydning af forskydningsdelen (12) fra en arbejdsposition til en vedligeholdelsesposition drejer til holdepositionen, og at der på drejedelen (14) er udformet et fremspring (36), som ved drejningen fra sigtepositionen til holdepositionen kan glide langs en styring (38), som er udformet på den anden husdel (8).

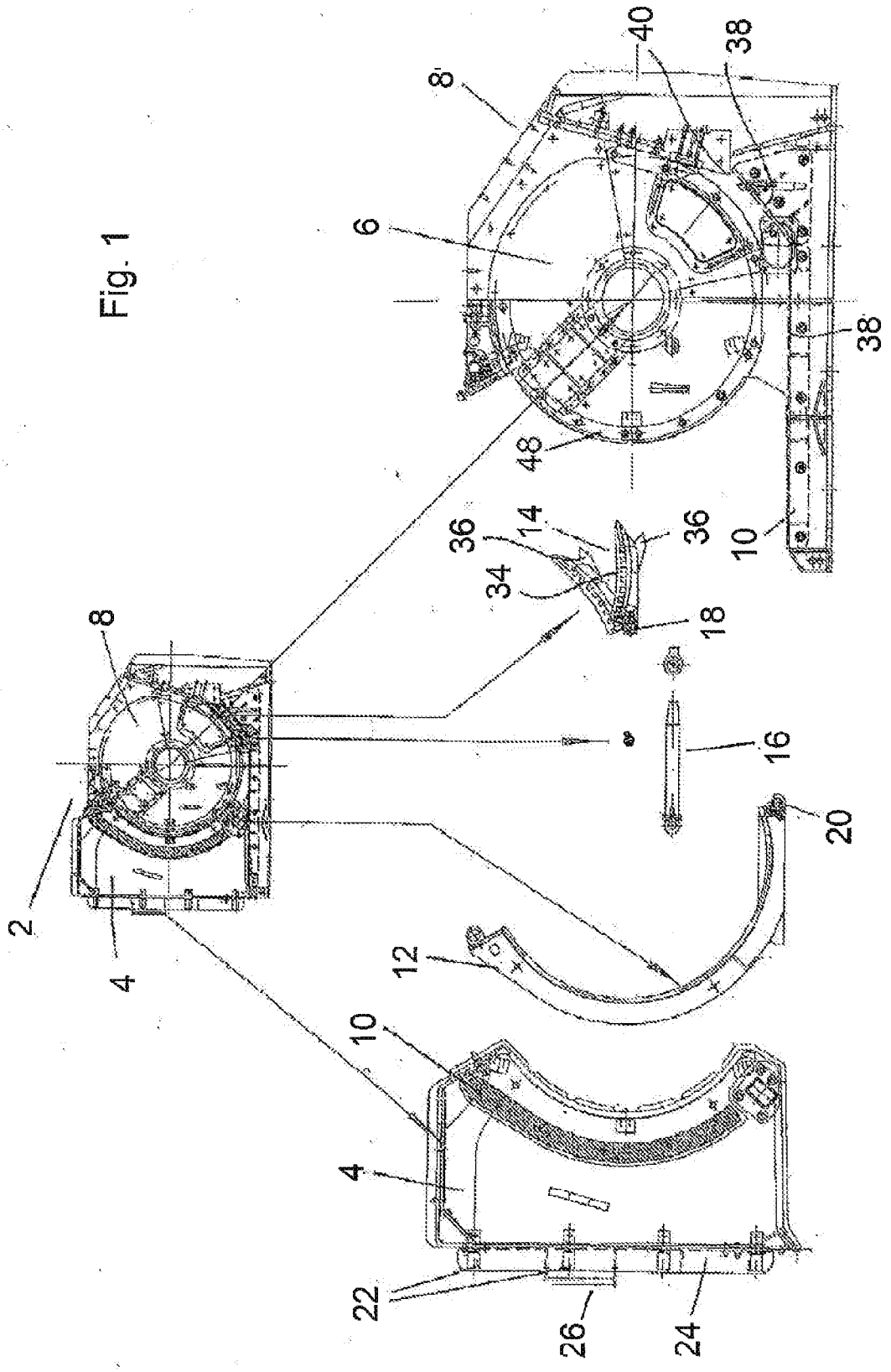
2. Findelingssigte ifølge krav 1, **kendetegnet ved, at** forskydningsdelen (12) og drejedelen (14) er forbundet løsbart med hinanden ved hjælp af mindst en låsepal (16).

3. Findelingssigte ifølge krav 1 eller 2, **kendetegnet ved, at** fremspringet (36) glider langs den på den anden husdel (8) anbragte styring (38) og således sørger for en drejning af drejedelen (14), når den første husdel (4) forskydes i forhold til den anden husdel (8).

4. Findelingssigte ifølge et af de foregående krav, **kendetegnet ved** en delvis cylinderformet facon med en sigteradius.

5. Findelingssigte ifølge et af de foregående krav, **kendetegnet ved, at** den er fastgjort på en på den første husdel anbragt sigtebærer (10) ved hjælp af mindst en hurtigspændbolt (30).

Fig. 1



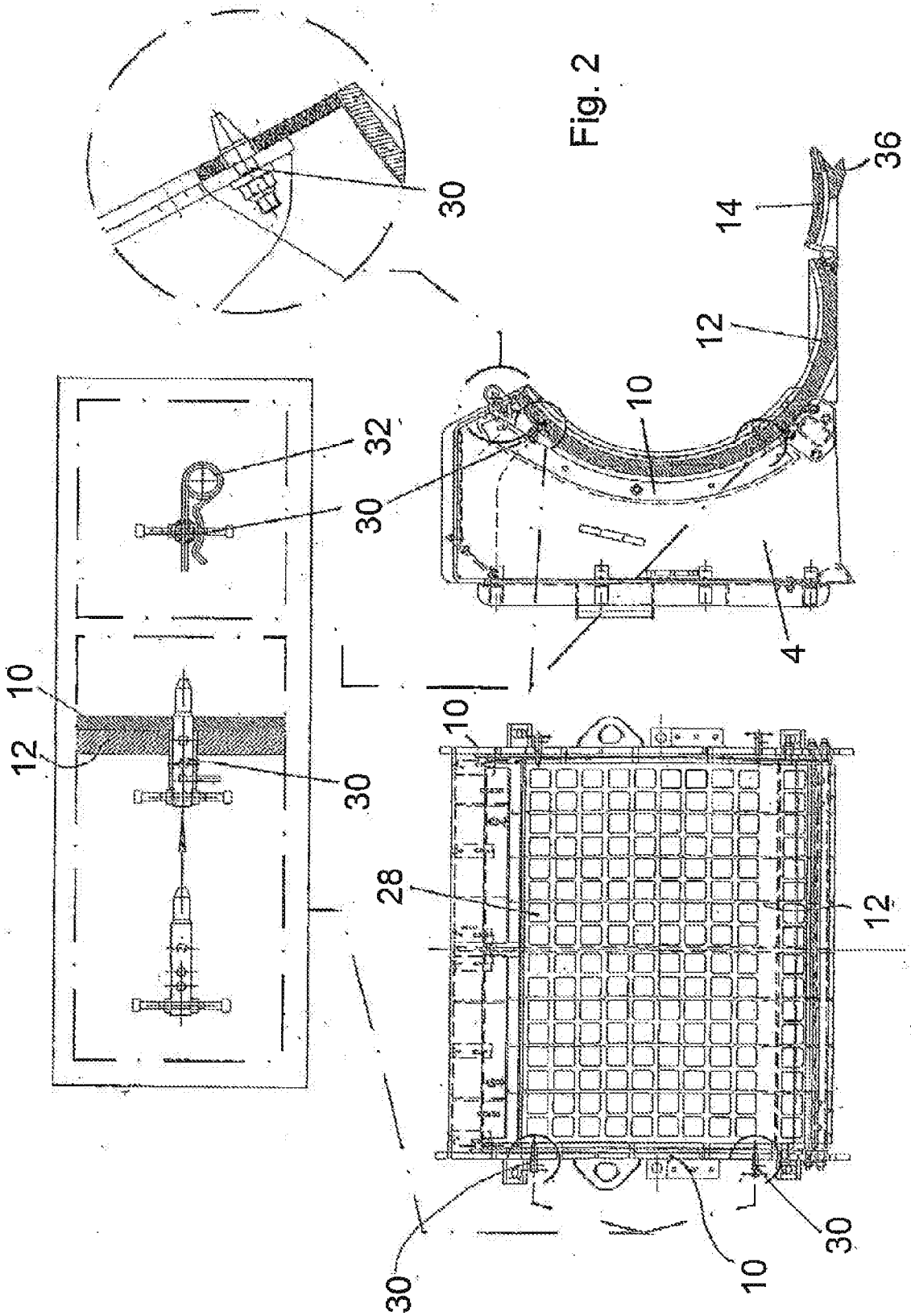



Fig. 2

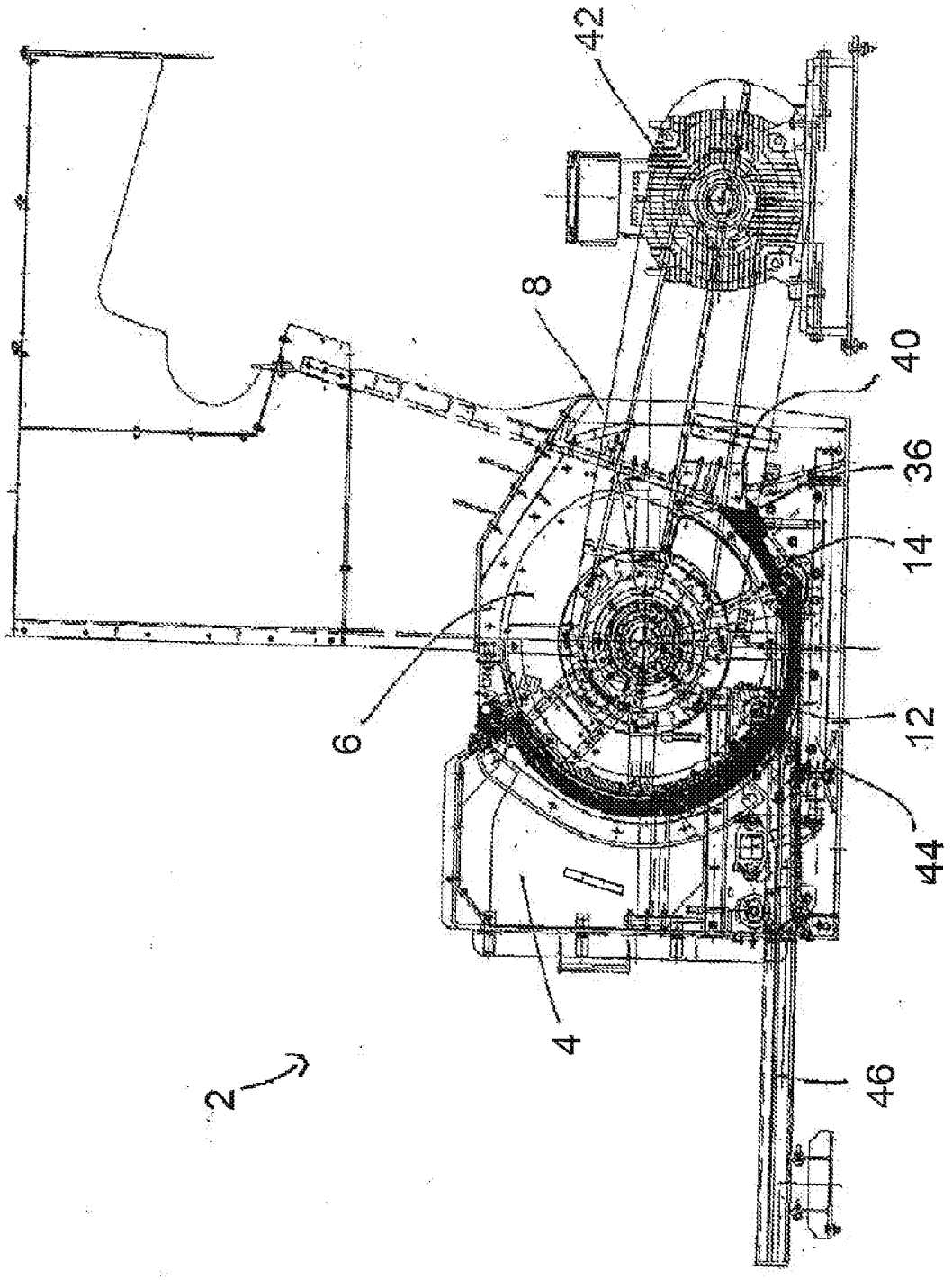



Fig. 3

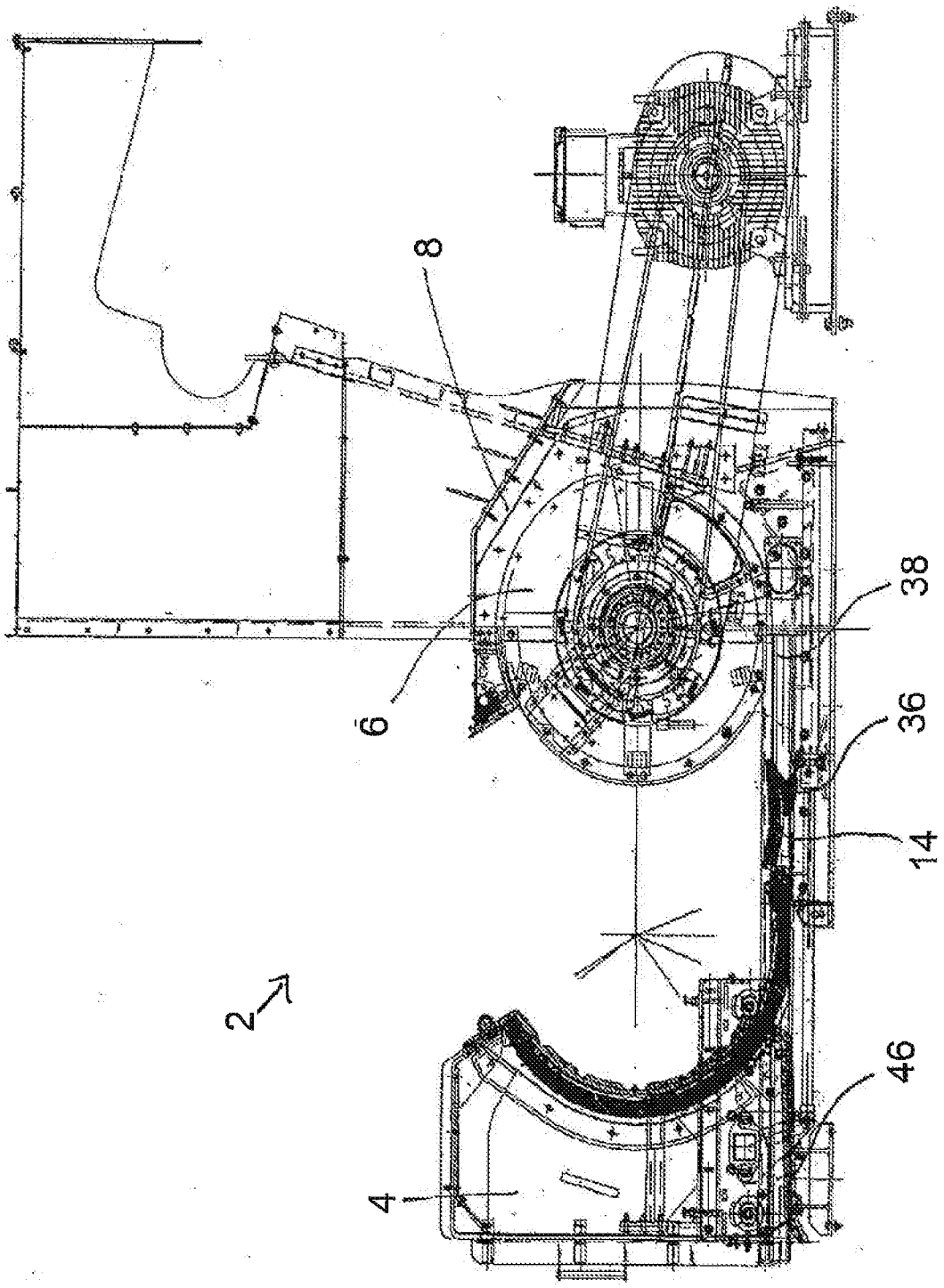



Fig. 4