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(54) **Berendezés és eljárás zsákok felnyitására hulladéktömegben**

Az európai szabadalom ellen, megadásának az Európai Szabadalmi Közlönyben való meghirdetésétől számított kilenc hónapon belül, felszólalást lehet benyújtani az Európai Szabadalmi Hivatalnál. (Európai Szabadalmi Egyezmény 99. cikk(1))

A fordítást a szabadalmas az 1995. évi XXXIII. törvény 84/H. §-a szerint nyújtotta be. A fordítás tartalmi helyességét a Szellemi Tulajdon Nemzeti Hivatala nem vizsgálta.



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DEVICE FOR OPENING BAGS IN WASTE COLLECTIONS AND METHOD FOR SAME

The invention relates to a device for opening bags in waste collections as well as to a method for opening bags in waste collections.

A device of the type in question is known by way of example from the EP 0 686 562 B1. The device disclosed there comprises groups of tearing elements which are movable so that tearing forces can be produced by relative movement between tearing elements of different groups. The tearing forces arise when as a result of the relative movement the distances of the tearing elements of different groups relative to one another change. The tearing elements are then suitable to transfer the tearing forces to the bags which are present in a waste collection. This happens when the tearing elements come into engagement with the bags and finally, as a result of the relative movement, the material of the bags is torn open. The tearing forces therefore result from the drive power with which the tearing elements are moved.

In addition the tearing elements cause and/or boost the movement of the waste collection through the device. It may also happen that the material of the bags tears as a result of the individual tearing elements merely engaging on the bags in the waste collection. The high efficiency of the device and method of the type in question results however mainly from the relative movements of the tearing elements of individual groups relative to one another. Only through this relative movement is a sufficiently satisfactory efficiency achieved in terms of energy used when the bag is opened by tearing.

Tearing the material of the bags is to mean in this context tearing in the widest sense, i.e. that it may include slitting or cutting of the bags, depending on how the exact contact is made between the tearing element and the bag. In connection with the present invention however in the following all these processes in which the tearing elements engage on the material of the bags and cut through same at least in some parts in order to open the bags, are termed tearing processes, and the forces then transferred by the tearing elements to the bags are termed tearing forces.

According to the prior art formed by the EP 0 686 562 B1 the tearing elements are moved in a "stop and go operation". This means that a first group of tearing elements is initially stationary whilst a second group of tearing elements is moved, whereby a relative movement is produced between the tearing elements. After a certain time or after passing through a certain area of movement the first group of tearing elements would now also be set in motion and after a short common movement phase the movement of the second group of tearing elements is stopped, whereby a relative movement is again produced between the tearing elements of different groups.

It has indeed been shown that bags can be opened efficiently in this way, but as a result of the drive powers expended for this according to the prior art, the energy requirement of such a device and/or such a method is however always still comparatively high.

The object of the invention is therefore to provide a device and a method of the type in question which have a lower energy consumption compared with the prior art.

This is achieved through a device and a method having the features of the independent claims. The features of the dependent claims relate to advantageous embodiments.

According to the invention it is proposed to regulate the drive power of at least one group of tearing elements in dependence on the operating situation. Whereas with the previous devices of the type described already the drive power is controlled according to a predetermined program, the device according to the invention proposes a drive control which is in a position to adapt the momentary power of the drive to the momentary operating situation.

The regulation is here preferably undertaken in dependence on the momentary flow of the waste collection. When regulating the drive power in this way the drive power is lowered when comparatively small flows of waste are to be processed by the device. If by way of example higher flows of waste collection accrue at peak times, then the drive power is increased. It has been shown that considerable energy savings can be achieved hereby compared with the devices according to the prior art in which the respectively moved groups of tearing elements are moved with a constant drive power.

The regulating control can hereby act either on the force with which the tearing elements are moved, or on the moving speed of the tearing elements. In the case of an advantageous embodiment in which the tearing elements are arranged in groups on preferably ring-shaped support elements which are rotated to move the tearing elements, the regulation of the drive power can advantageously act on the torque and/or the angular speed of the rotation of the support elements.

By way of example the mass flow can be used as a regulating parameter for the flow of waste collection supplied to the device. It is however also possible to use a different representative value, which is oriented by way of example to the volume to be processed per unit of time, for the regulation of the drive powers.

The device preferably also has a pressing device for pressing the waste collection against the tearing elements. A pressing device of this kind can ensure the contact between the bags which are to be opened, and the tearing elements, and can thus ensure a reliable transfer of the tearing forces to the bags. The pressing device can more advantageously be an assembly of individual pressing elements which act individually on the flow of waste collection, by way of example through spring loading which is regulated, preferably hydraulically, by way of example for each individual pressing element. This segmentation of the pressing device into individual pressing elements has the advantage that even with a very heterogeneous composition of the waste collection a more reliable pressure into the regions of the waste collection flow associated with the individual pressing elements, is guaranteed even if by way of example locally large, non-compressible objects press individual pressing elements away from their tearing elements, since adjacent pressing elements are not affected hereby.

More particularly with regard to the fact that where applicable bulky and hard objects can be present in a waste collection, it is advantageous if individual pressing elements and/or the entire pressing device are configured so that they can yield to such extraneous materials. This effectively prevents any interference to the operation caused by such extraneous material jamming between their pressing devices and the tearing elements. The pressing device and/or individual pressing elements can then have by way of example a special resilient bearing which enables the pressing device and/or its individual pressing elements, when encountering extraneous materials, to let the extraneous materials pass through the device by moving away from the tearing elements.

Furthermore it can be expedient if the device has a pressure control device which enables the pressing device to move selectively into a position of use or a position of non-use. By position of use is meant a position in which the waste collection flow is charged by the pressing device with a force acting in the direction of the tearing elements, whilst position of non-use is to mean a position in which the pressing device or the pressing elements

form in the best case scenario a rigid barrier as a boundary of the space available for the waste collection flow to pass through the device. This can be the case by way of example when individual finger-type pressing elements, which in the position of use exert an elastic or resilient force on the waste collection flow and thus press this against the tearing elements, in a position of non-use are moved, more particularly pivoted away, from the tearing elements into a position of non-use which is spaced further away from the tearing elements than the position of the pressing elements in the position of use.

It is furthermore advantageous if the device according to the invention has a supply device for supplying the waste collection into the active region of the tearing elements. This can be by way of example a moving floor, which is generally also known as a "walking floor". A supply device of this type is then particularly advantageous when a supply control device is provided which is suitable for regulating the supply speed of the waste collection.

Thus not only can the speed at which the waste collection is supplied to the device according to the invention be suitably matched to the momentary drive power, but rather it is also possible by way of example to react to fluctuations in the composition of the waste collection and to implement different ratios between the supply speed and drive power independently of same.

A superordinate control device can preferably also be provided for this which serves to control the drive control device, the pressure control device and/or the supply control device. The different control devices can then be discrete systems connected only by the necessary signal transmission paths, by way of example in order to enable the respective control devices to be arranged in the spatial vicinity of the units which are to be controlled, by way of example electric motors of a drive, such as by way of example torque motors. Alternatively the individual controls can also be individual circuits on a common circuit carrier, such as a circuit board or a chip. A software-based implementation of the individual controls in a corresponding intelligent computer-supported or memory-programmable control is also possible.

The superordinate control can then preferably provide different selectively retrievable operating modes in which the drive control according to the invention and where applicable advantageous supply and/or pressure control devices can be controlled according to specific requirements, and/or the drive power of the tearing elements as well as preferably the pressing device and/or the supply device can be regulated or controlled according to specific predetermined or predeterminable regulating parameters.

Thus by way of example a special operating mode can be provided for processing waste collections which are rich in waste paper wherein both groups of tearing elements are moved simultaneously wherein the movement is however controlled in such a way that a relative movement is nevertheless produced between the tearing elements of different groups, wherein a pressing device is set into a position of use at the same time. Furthermore an operating mode can more advantageously be provided for processing waste collections rich in industrial waste and which normally contain a larger amount of large objects, such as by way of example waste collections rich in household refuse, wherein with a likewise simultaneous movement, preferably with a variable speed, of both groups of tearing elements, the pressing device is set into a position of non-use in order to enable large objects to pass unhindered through the device.

The invention will now be explained in further detail below diagrammatically with reference to Figures 1 to 7.

Figure 1 shows a perspective view of an example of a device according to the invention;

- Figure 2 shows a detailed view of the tearing elements of the device illustrated in Figure 1, arranged in groups on the support elements;
- Figure 3 shows a perspective view of an example of a device according to the invention wherein the support elements with the tearing elements are not shown;
- Figure 4 shows a detailed view of a pressing element of the device illustrated in Figure 3;
- Figure 5 shows a view of a different example of a device according to the invention, corresponding to Figure 3;
- Figure 6 shows in a detailed view, a pressing device of the device illustrated in Figure 5;
- Figure 7 shows an example of a device according to the invention with a supply device.

The device 1 according to the invention has a plurality of tearing elements 2. The tearing elements 2 are in the case of the exemplary device 1 arranged in groups on ring-shaped support elements 3. The support elements 3 preferably form a roller-like rotation body 4, as shown in Figure 2. This is preferably configured so that adjacent support elements 3 can be moved relative to one another at a differential speed. It is hereby possible to carry out the method according to the invention which provides relative movement between the tearing elements 2 of different groups of tearing elements 2. This can more advantageously happen by moving one group of tearing elements 2 which is arranged on a support element 3, relative to a group of tearing elements 2, which is arranged on an adjacent support element 3, when the support elements 3 are rotated at different speeds. It is also then possible that a part of the support elements 3 is stationary whilst the remaining support elements 3 are rotated.

According to the invention a control of the torque and/or the speeds with which the individual support elements 3 are moved, can now be undertaken in dependence on the operating state of the device 1. It is then particularly advantageous if the regulation is carried out on the basis of the waste collection flow supplied to the device.

The exemplary device according to the invention preferably has a pressing device 5, as shown by way of example in Figures 3 and 5. In the illustrated examples the pressing device 5 is designed each time as an arrangement of a plurality of arcuate segment type pressing elements 6. The configuration of the pressing elements 6 can then be adapted in an advantageous manner to the composition of the waste collection being processed. Thus by way of example Figure 4 shows a pressing element 6 which has a flat surface area 7 facing the tearing elements 2. A pressing element 6 of this type is particularly suitable for processing small bags, in particular bags with a volume of 30 litres maximum. The exemplary pressing device 5 illustrated in Figure 6 has on the other hand a plurality of narrow individual pressing elements 6. These form a type of rake which with the concave curved side of its line assembly faces the roller-type rotation body 4. The pressing elements 6 of the individual pressing devices 5 are loaded by a suitable pretensioning mechanism individually with an elastic hydraulic force and/or spring force which presses the pressing elements 6 against the roller-like rotation body 4. It is thereby more advantageously possible to transfer the pressing elements 6 from the position of use previously described into a position of non-use in which the pressing elements 6 are moved away from the roller-like rotation body 4 so that a gap of a defined width is produced between the rotation body 4 and the pressing device 5. This can be advantageous if waste collections with a plurality of large objects are to be processed.

Figure 7 shows a device 1 of the type according to the invention which has a housing region 8, arranged on the left in the drawing, for receiving the rotation body 4 and the pressing device 5. The opening of the bags

consequently takes place in this housing region 8. The larger right-hand part of the illustrated device 1 is occupied by a supply region 9. This has a container-like configuration and can preferably be accessed through a diagrammatically illustrated maintenance hatch 10. The open-top configuration of the supply region 9 enables this to be filled easily from above. The supply region 9 more advantageously has a supply device (not shown) which is in a position to move the waste collection into the active area of the roller-like rotation body 4 and tearing elements 2. This can preferably be a walking floor which is more expediently designed in sealed manner, i.e. in which the individual mutually movable elements of the walking floor which form the support bearing surface for the waste collection heaped up on the walking floor, are sealed from one another so that the fine or finely particled constituent parts of the waste collection being processed cannot pass the walking floor.

In an advantageous way the device is configured so that the waste collection can leave the device 1 at the bottom after the bags are opened. In the illustrated example the device 1 is advantageously set up for this on a frame 11 which makes it possible to engage underneath the device 1, more particularly the active area of the tearing elements 2, with a device for discharging the waste collection. This can be both a transport container, such as a trough or the like. But it can also be a transport device, such as a conveyor belt which is arranged so that this transport device projects underneath the device 1 according to the invention.

BERENDEZÉS ÉS ELJÁRÁS ZSÁKOK FELNYITÁSÁRA HULLADÉKTÖMEGBEN

SZABADALMI IGÉNYPONTOK

1. Berendezés (1) zsákok felnyitására hulladéktömegben, ami tartalmaz tépőelemek (2) egy első csoportját szakítóerőknek a zsákokra történő átadására és tépőelemek (2) egy második csoportját szakítóerőknek a zsákokra történő átadására, ahol a tépőelemek (2) csoportjai meghajtással úgy mozgathatók, hogy a tépőelem (2) csoportok egymáshoz viszonyított elmozdulása szakítóerőt eredményez,
azzal jellemezve,
hogy a berendezés el van látva egy meghajtás szabályzó berendezéssel, ami úgy van kialakítva, hogy a tépőelemek (2) legalább egy csoportjának meghajtó teljesítményét az üzemelés adott helyzetétől függően szabályozni tudja.
2. Az 1. igénypont szerinti berendezés (1),
azzal jellemezve,
hogy a meghajtás szabályzó berendezés a mozgási sebesség, különösen a szögsebesség és/vagy a meghajtó erő, különösen a tépőelemek forgatónyomatékának szabályozására szolgál.
3. Az 1. vagy 2. igénypont szerinti berendezés (1),
azzal jellemezve,
hogy a meghajtás szabályzó berendezés a meghajtó teljesítménynek a bevezetett hulladék tömegáramától függő szabályozására szolgál.
4. Az előző igénypontok bármelyike szerinti berendezés (1),
azzal jellemezve,



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hogy tartalmaz egy nyomószerkezetet (5) a hulladéktömegnek, különösen zsákoknak a tépőelemekre (2) történő rászorítására, ahol a nyomószerkezet (5) célszerűen több egyedi, egymástól függetlenül a hulladéktömegre ható nyomóelemet (6) tartalmaz.

5. A 4. igénypont szerinti berendezés (1),

azzal jellemezve,

hogy a nyomószerkezet (5), célszerűen az egyedi nyomóelemek (6), úgy vannak kialakítva, hogy a tépőelemek (2) és a nyomószerkezet (5) közé került zavaró anyagoknak utána engedjenek, azaz előnyösen rugózóan és/vagy hidraulikusan vannak ágyazva.

6. A 4. vagy 5. igénypont szerinti berendezés (1),

azzal jellemezve,

hogy el van látva egy nyomásszabályzó berendezéssel, ami úgy van kialakítva, hogy a nyomószerkezetet (5) letaszás szerint üzemi állapotba vagy üzemen kívüli állapotba kapcsolja.

7. Az előző igénypontok bármelyike szerinti berendezés (1),

azzal jellemezve,

hogy tartalmaz egy bevezető szerkezetet a hulladéktömegnek a tépőelemek (2) hatótartományába történő bevezetésére, előnyösen egy csúszófeneket.

8. A 7. igénypont szerinti berendezés (1),

azzal jellemezve,

hogy el van látva egy bevezető szerkezet vezérlő berendezéssel, ami a bevezető szerkezetet vezérli, és szabályozza a hulladéktömeg bevezetési sebességét.

9. Az előző igénypontok bármelyike szerinti berendezés (1),

azzal jellemezve,

hogy a tépőelemek csoportonként, előnyösen gyűrű alakú hordozóelemekhez (3) vannak hozzárendelve, előnyösen azokon vannak elrendezve, ahol célszerűen a szomszédos hordozóelemek (3) egymáshoz képest elmozdíthatók.

10. Az előző igénypontok bármelyike szerinti berendezés (1),

azzal jellemezve,

hogy tartalmaz egy főlérendelt vezérlő egységet a meghajtás szabályzó berendezés, a nyomásszabályzó berendezés és/vagy a bevezető szerkezet vezérlő berendezés vezérlésére, ami előnyösen úgy van kialakítva, hogy felváltva különböző üzemmódokat tegyen lehetővé.



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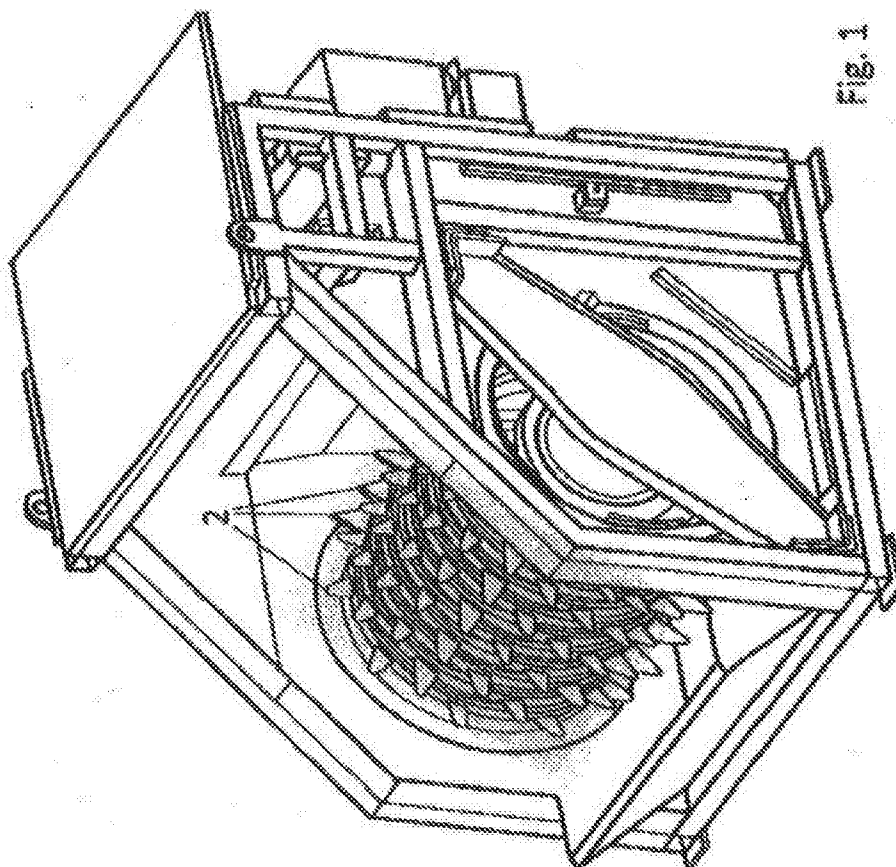


Fig. 1

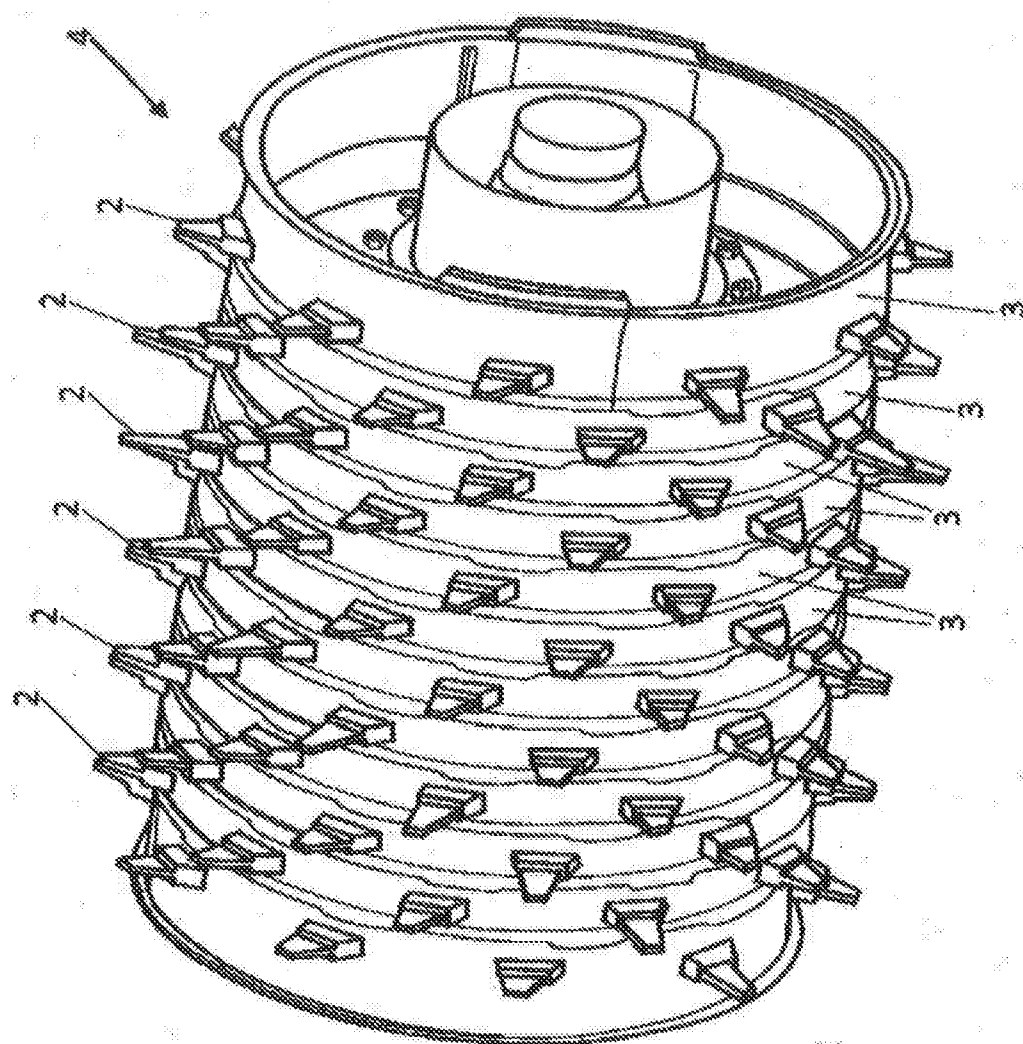


FIG. 2

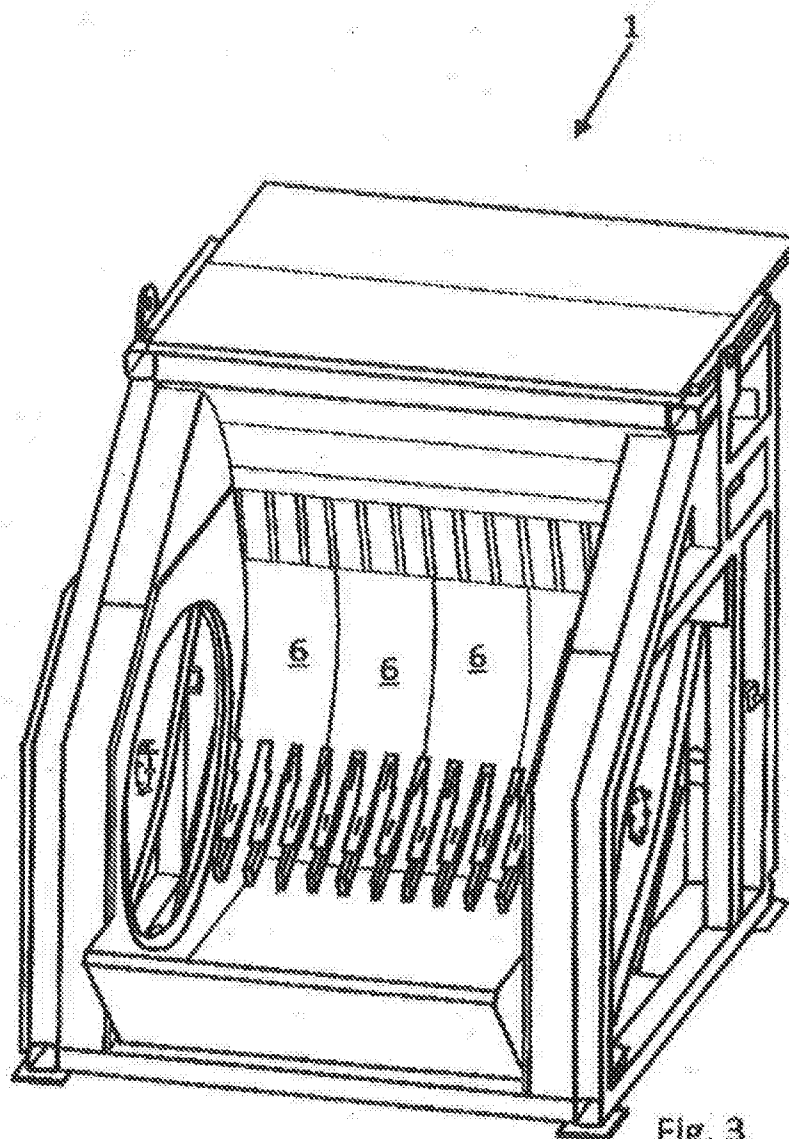


Fig. 3

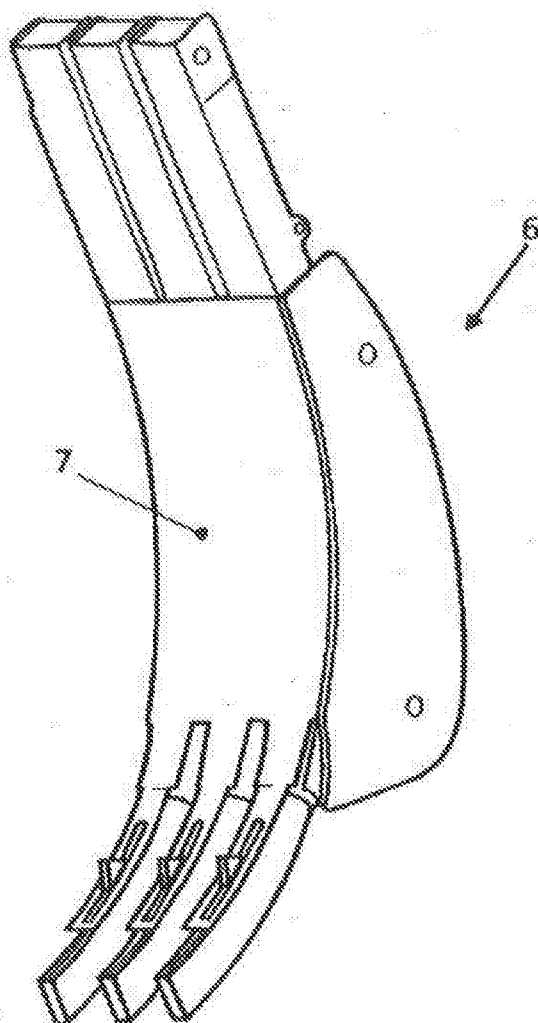


Fig. 4

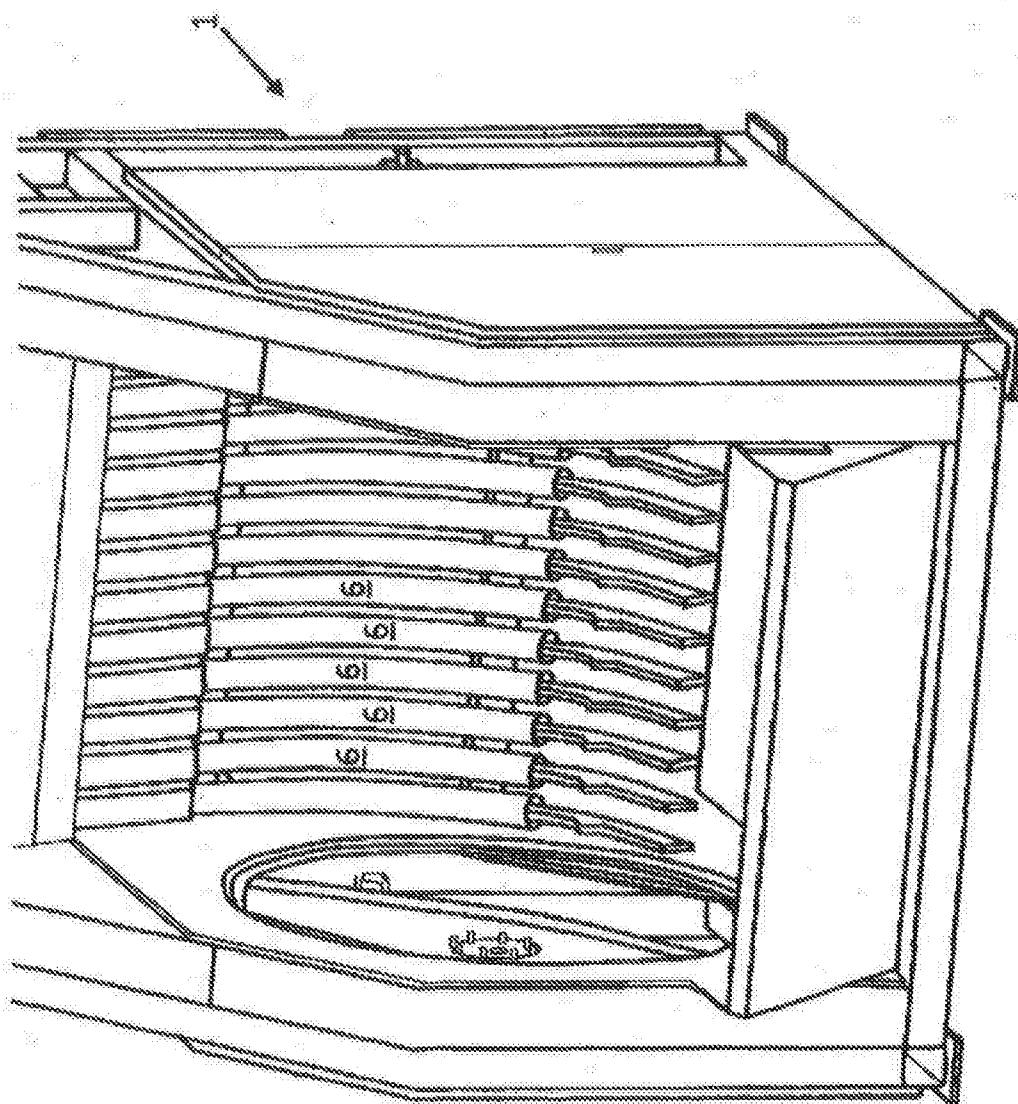


Fig. 5

