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(71) Applicant:
**Metaalbedrijf Busschers B.V.
7482 GZ Haaksbergen (NL)**

(72) Inventor:
**Busschers, Alfonsius Johannes Maria
7482 GZ Haaksbergen (NL)**

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(54) Arrangement for sorting garbage

(57) The invention relates to a cylindrical sieve (1), for separating garbage (3) in two or three components. The holes (4) in the cylindrical sieve (1) are covered in order to prevent long, slender objects from protruding from the cylindrical sieve (1) and get stuck. Covers are

arranged as individual plates (6), as axial segments, as radial segments, as an additional cylindrical sieve or as an additional transport belt covering the underside of cylindrical sieve (1).

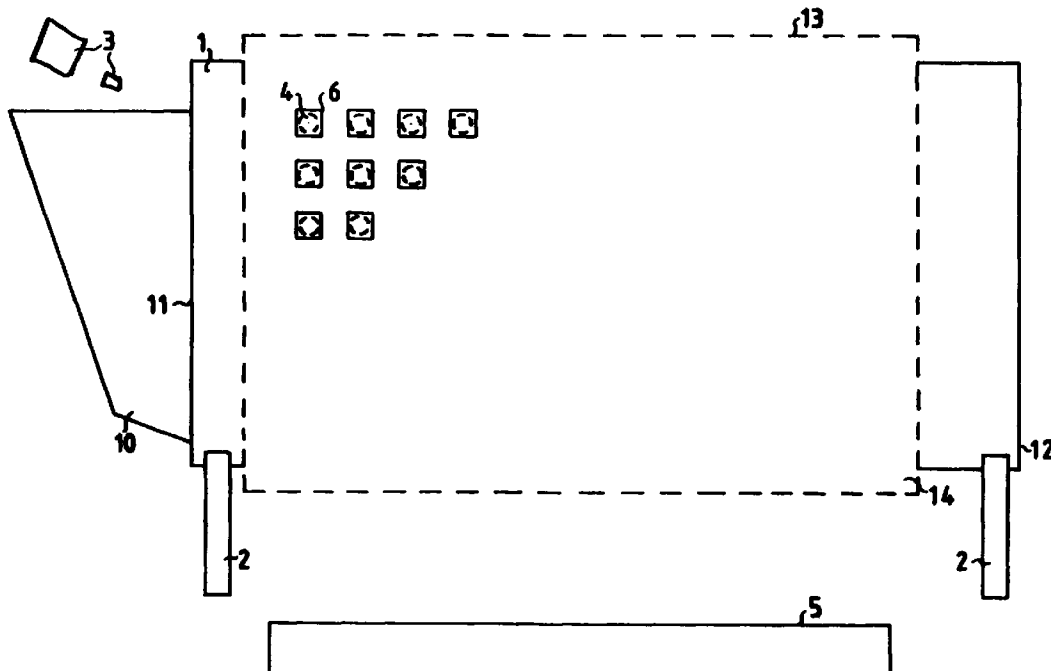


Fig. 2

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Description

[0001] The invention relates to an arrangement for sorting garbage, comprising a cylindrical sieve rotating while in operation, on one axial end provided with a fill opening for accepting unsorted garbage, on a second axial end provided with an outlet opening for discharging at least substantially coarser garbage and provided with holes along its outer surface for discharging finer garbage.

[0002] Arrangements of this kind are known as such, even for sorting garbage. Usually the outlet opening is located at a lower level than the fill opening, which causes the coarser garbage to automatically leave the cylindrical sieve after some time via the outlet opening and to fall onto a transport belt for example. Finer garbage, which leaves the cylindrical sieve via the holes, falls for example onto a second transport belt, running underneath the cylindrical sieve.

[0003] The problem with these known arrangements is that regularly a rod, tube, stake or any other long, slender object may leave the cylindrical sieve via a hole to protrude from the cylindrical sieve. The object then often gets stuck and the projecting part may strike then an object located near the cylindrical sieve, for example a transport belt. This may cause damage or even physical injuries and it causes delays, because the object must be removed manually, requiring an operator to enter the cylindrical sieve.

[0004] The arrangement according to the invention substantially obviates this problem and is characterized in that obstruction means are provided, moving together with the cylindrical sieve, for preventing long, slender garbage from falling through the holes.

[0005] A favourable embodiment of the arrangement according to the invention is characterized in that the obstruction means comprise a system of plates, arranged at least substantially parallel to the cylindrical sieve. In this way it is virtually impossible for a slender object to leave the cylindrical sieve, while finer garbage is hardly hindered by the plates. The plates should, however, not be chosen too small, in order to prevent a slender object that passes a hole from getting stuck between the cylindrical sieve and the plate. A favourable embodiment therefore is characterized in that the dimensions of a plate are larger than the dimensions of a hole belonging to that plate.

[0006] A further favourable embodiment according to the invention is characterized in that the obstruction means comprise a system of plates, connected to the cylindrical sieve and extending in an axial direction or in a radial direction, whereby each plate obstructs a multitude of holes. The advantage is that a reduced number of attachments is needed and that the axially or radially extending plates add to the stiffness of the cylindrical sieve in at least the axial or radial direction.

[0007] In order to prevent finer garbage that has passed through the holes from getting stuck between

the plates and the cylindrical sieve a still further embodiment is characterized in that a distance between a plate and the cylindrical sieve is larger than the dimensions of the holes in the cylindrical sieve.

5 [0008] A favourable embodiment of the invention, by which the garbage to be sorted can be separated in two fractions, is characterized in that a distance between two plates mutually is larger than the dimensions of the holes in the cylindrical sieve. Finer garbage that has passed the holes will substantially unobstructedly leave the arrangement and end up for example on a transport belt, running underneath the cylindrical sieve.

10 [0009] A very favourable embodiment of the invention, in which garbage to be sorted may be separated into three fractions, is characterized in that a distance between two plates mutually is smaller than the dimensions of the holes in the cylindrical sieve. Very fine garbage, for example a sand component contained in the garbage, can leave the arrangement between the plates, while coarser garbage will leave the system of plates near the outlet opening.

15 [0010] In a further very favourable embodiment the invention is characterized in that the obstruction means comprise a second cylindrical sieve, enclosing the first cylindrical sieve in a radial direction, whereby the second cylindrical sieve obstructs the holes in the first cylindrical sieve and whereby the second cylindrical sieve is provided with smaller holes than the first cylindrical sieve. The obstruction means now fully add to the structural strength of the arrangement and moreover enable the separation and removal of very fine garbage. For that purpose one preferably arranges the outlet opening of the first cylindrical sieve such as to protrude from the second cylindrical sieve such that finer garbage and very fine garbage can be collected separately for further transport.

20 [0011] Incidentally, it may happen that a long slender object passes a hole and is subsequently caught between the plate and the cylindrical sieve, an effect caused by the rotation of the cylindrical sieve, whereby the projecting part rotates away in a radial sense. A further favourable embodiment at least substantially removes this drawback and is characterized in that the obstruction means are provided with ribs, disposed in an axial direction, which ribs prevent the projecting parts from laterally rotating away. When axially extending plates are used this may be realized quite simply, for example by shaping the plates as U-profiles with the two legs pointing inward.

25 [0012] Moreover a vibrator device may be provided, located above the cylindrical sieve, for acting in a radial sense on the passing plates while in operation, for loosening any subjects that might still be caught, at their arrival at the highest point in the cylindrical sieve.

30 [0013] A still further embodiment of the invention is based on the assumption that long, slender garbage will substantially exclusively fall through the holes in the lowest part of the cylindrical sieve and that it therefore

suffices to locate obstruction means underneath the cylindrical sieve. This embodiment is characterized in that the obstruction means comprise an additional transport belt, moving underneath the cylindrical sieve in a radial direction. An additional advantage is that finer garbage leaves the additional transport belt at a well defined location, which allows the use of a small transport belt for the actual transport of the finer garbage.

[0014] A favourable embodiment is characterized in that the additional transport belt is provided with ribs, disposed orthogonally to a transport direction of the additional transport belt. The ribs provide a good contact between the additional transport belt and the cylindrical sieve, while still leaving clearance for finer garbage that passes the holes to be collected and removed. Moreover the ribs reduce the risk of long, slender garbage that has passed a hole of being caught between the additional transport belt and the cylindrical sieve.

[0015] The invention will now be further explained with reference to the following figures, in which:

- Fig. 1 schematically represents in front view a cylindrical sieve provided with plates;
- Fig. 2 schematically represents in side view a cylindrical sieve provided with single plates;
- Fig. 3 schematically represents in side view a cylindrical sieve provided with axially extending plates;
- Fig. 4 schematically represents in side view a cylindrical sieve provided with radially extending plates;
- Fig. 5 schematically represents in side view a double cylindrical sieve;
- Fig. 6 schematically represents in front view a cylindrical sieve provided with an additional transport belt.

[0016] Fig. 1 schematically represents in front view a cylindrical sieve 1 which can be rotated with the aid of a drive means 2, for example a system of transport wheels which in turn are rotated by an electromotor, further not shown. On one side garbage 3 is fed into cylindrical sieve 1, the coarser components of which leave the cylindrical sieve at an opposite side. The finer components will leave cylindrical sieve 1 via a system of holes 4. These finer components then for example fall on a transport belt 5, passing underneath cylindrical sieve 1. Cylindrical sieve 1 may be slightly tilted in an axial direction in order to facilitate the transport of garbage. Alternatively, cylindrical sieve 1 may be internally provided with sloping or spirally shaped ribs. On the outside cylindrical sieve 1 is provided with plates 6, for preventing rods, tubes, stakes or any other long and slender object from protruding from a hole 4 or from getting stuck. Plates 6 may be welded to cylindrical sieve 1, but preferably they are connected in such a way that they are easily detached. It is then possible to loosen an

object that gets occasionally stuck from the outside, without entering cylindrical sieve 1. Moreover, a vibrator device is provided, here embodied as a wheel 7, connected to a movable arm 8, rotatable around an axis 9, and mounted for running on the outside of cylindrical sieve 1. While running, wheel 7 is successively lifted up by each of the plates 6 passing by and then dropped into the space between the plates, which causes a powerful vibration. Objects that are possibly stuck in the holes 4 will be loosened by it.

[0017] Fig. 2 shows schematically in side view a cylindrical sieve 1, provided with drive means 2 and a non-rotating hopper 10 that connects to fill opening 11. During operation the cylindrical sieve 1 is positioned such that it slopes from left to right, such that coarser garbage that is poured into cylindrical sieve 1 will eventually be discharged at outlet opening 12, because of the rotating movement of cylindrical sieve 1. Cylindrical sieve 1 is on substantially its entire surface provided with holes 4, and each hole 4 is individually covered by a single plate 6. Plates 6 are located at some distance of cylindrical sieve 1, such that finer garbage that can pass the holes 4 will fall on a transport belt 5 and will be removed. The arrangement of plates 6 forms, as it were, a second cylindrical sieve 13, rotating together with cylindrical sieve 1 and enclosing it. The mutual distance between the plates can be chosen freely. An obvious choice is to make the distance such that garbage that has passed holes 4, will practically unhindered fall onto transport belt 5. One can also select the mutual distance between the plates to be very small, such that finer garbage gets caught between cylindrical sieve 1 and cylindrical sieve 13, until this finer garbage can leave cylindrical sieve 13 at an additional outlet opening 14. Very fine garbage may, however, find its way between plates 6 and will be collected on transport belt 5. In this way the garbage is separated into three components.

[0018] The single plates 6 are preferably attached to cylindrical sieve 1 with a bolt. The advantage is that, if an object gets stuck it can be easily removed, because only one bolt has to be loosened and the single plate is easy to handle. The disadvantage is that many attachments are needed and that coarser garbage, especially when the distance between the plates 6 is chosen to be small, is seriously hindered by all the attachments that are in its way towards the additional outlet opening 14.

[0019] It is also possible to employ plates 6 such that they cover more than one hole, for example rectangular plates 6, covering four holes each, provided with only one central connection.

[0020] Fig. 2 moreover shows that at the interface with the drive means 2 cylindrical sieve 1 is not provided with holes. This is not mandatory, but it prevents drive means 2 from rapidly becoming dirty. Moreover it should be noted that cylindrical sieve 1 may as well be rotated via an axially disposed rotation axis on which a drive means act. In that case the entire cylindrical sieve 1 may be

covered with holes.

[0021] Fig. 3 shows schematically in side view a cylindrical sieve 1 provided with holes 4 and with a system of axially disposed plates 6, again for preventing long slender objects from leaving cylindrical sieve 1 via the holes 4. If the distance between the plates 6 is chosen to be small, at least smaller than the diameters of the holes 4, the plates 6 again form a second cylindrical sieve 13, enclosing cylindrical sieve 1. In this way the garbage can again be separated into three components. Is the mutual distance large, a separation into two components takes place. The plates 6 can be manufactured easily and need a limited number of attachments compared with the embodiment described with reference to Fig. 2. This is especially advantageous if the plates are mounted with a small mutual distance, for the separation of garbage in three components. Although the plates 6 in Fig. 3 are represented such that they cover in width only one hole 4, it is also possible to give plates 6 a larger width, such that they cover more holes. The advantage is that a smaller number of attachments will suffice.

[0022] Fig. 4 schematically shows in side view a cylindrical sieve 1, provided with holes 4 and with a system of radially disposed plates 6. Plates 6 have a limited number of attachments, which is advantageous if the plates 6 are mounted with a small mutual distance, for separating the garbage into three components. The plates shown in Fig. 4 can be given a larger width, such that they cover more holes in an axial direction. The advantage again is that fewer attachments are needed.

[0023] The embodiments as shown in Fig. 3 and Fig. 4 are equivalent, the first embodiment adding to the strength of the apparatus in an axial direction and the second embodiment adding to the strength in radial direction.

[0024] Fig. 5 shows in side view a cylindrical sieve 1, enclosed by a second cylindrical sieve 13, made in one piece. Here cylindrical sieve 13 is provided with holes 15 which do not correspond to the holes 4; holes 15 again provide for the separation of very fine garbage. In this embodiment the second cylindrical sieve 13 adds to the strength of the arrangements in both directions.

[0025] Fig. 6 shows schematically in front view a cylindrical sieve 1, the bottom of which is enclosed by an additional transport belt 15. Cylindrical sieve 1 and additional transport belt 15 have corresponding speeds and are each individually driven by known means, not shown here. Via holes 4 in cylindrical sieve 1 finer garbage can reach the space between cylindrical sieve 1 and additional transport belt 15 and next be put down onto transport belt 5, which may now be chosen relatively narrow as compared to the embodiments mentioned in Fig. 1-5, because the finer garbage is delivered more concentrated. Moreover, additional transport belt 15 covers the holes 4 as described with reference to the previous figures, in order to prevent long, slender objects from falling through.

[0026] By providing additional transport belt 15 with ribs, not shown in Fig. 6 but running orthogonally to the transport direction, one can attain a situation in which there is on one hand a well-defined space between cylindrical sieve 1 and additional transport belt 15, and on the other hand the remote possibility of a long, slender object getting stuck. As there is moreover a well-defined physical contact between cylindrical sieve 1 and additional transport belt 15, it is generally sufficient to provide either cylindrical sieve 1 or additional transport belt 15 with drive means.

[0027] Especially when separating very coarse garbage, like rubble, it is of major importance that cylindrical sieve 1 is made very robust. One may chose for a cylindrical sieve 1 with a large wall thickness, but this implicates a large weight, too. One may also opt for a cylindrical sieve 1 with a double wall 16,17, where the holes 4 are realized as tubes, connecting the walls 16,17 and moreover giving way to smaller garbage. An additional advantage of this embodiment is that the chance of clamping a long, slender object is reduced even further.

[0028] Moreover, it is possible to provide cylindrical sieve 1 with holes of different diameters, for example the first three meters measured from funnel 10 with holes of 50 millimetre diameter and the following three meters with holes of 150 millimetre diameter, which again provides for a separation into more fractions. If additional transport belt 15 is used, one may chose for one common additional transport belt 15 or for separate additional transport belts 15 for removing the fractions.

Claims

1. Arrangement for sorting garbage, comprising a cylindrical sieve rotating while in operation, on one axial end provided with a fill opening for accepting unsorted garbage, on a second axial end provided with an outlet opening for discharging at least substantially coarser garbage and provided with holes along its outer surface for discharging finer garbage, characterized in that obstruction means are provided, moving together with the cylindrical sieve, for preventing long, slender garbage from falling through the holes.
2. Arrangement according to claim 1, characterized in that the obstruction means comprise a system of plates, arranged at least substantially parallel to the cylindrical sieve.
3. Arrangement according to claim 2, characterized in that the obstruction means comprise a system of plates, connected to the cylindrical sieve and extending in an axial direction or in a radial direction, whereby each plate obstructs a multitude of holes.

4. Arrangement according to claim 2 or 3, characterized in that a distance between a plate and the cylindrical sieve is larger than the dimensions of the holes in the cylindrical sieve. 5
5. Arrangement according to claim 4, characterized in that a distance between two plates mutually is larger than the size of holes in the cylindrical sieve. 10
6. Arrangement according to claim 4, characterized in that a distance between two plates mutually is smaller than the size of holes in the cylindrical sieve. 15
7. Arrangement according to claim 1, characterized in that the obstruction means comprise a second cylindrical sieve, enclosing the first cylindrical sieve in a radial direction, whereby the second cylindrical sieve obstructs the holes in the first cylindrical sieve and whereby the second cylindrical sieve is provided with smaller holes than the first cylindrical sieve. 20
8. Arrangement according to one of the preceding claims, characterized in that the obstruction means are provided with ribs, disposed in an axial direction. 25
9. Arrangement according to claim 1, characterized in that the obstruction means comprise an additional transport belt, moving underneath the cylindrical sieve in a radial direction. 30
10. Arrangement according to claim 9, characterized in that the additional transport belt is provided with ribs, disposed orthogonally to a transport direction of the additional transport belt. 35

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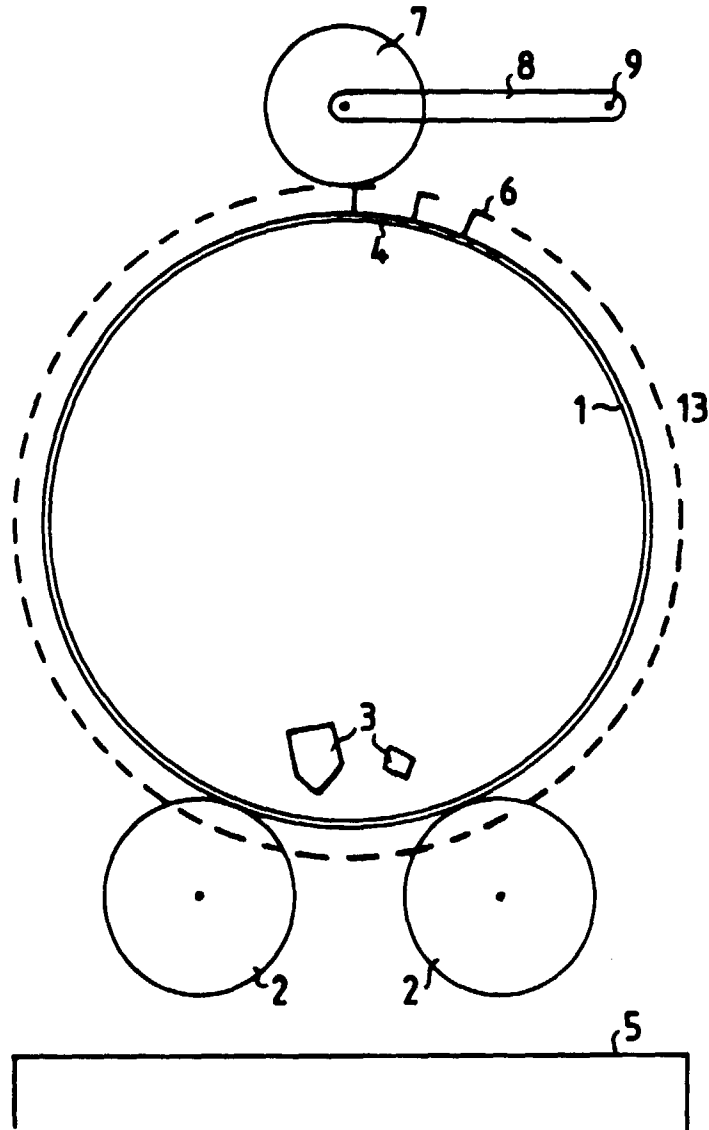


Fig. 1

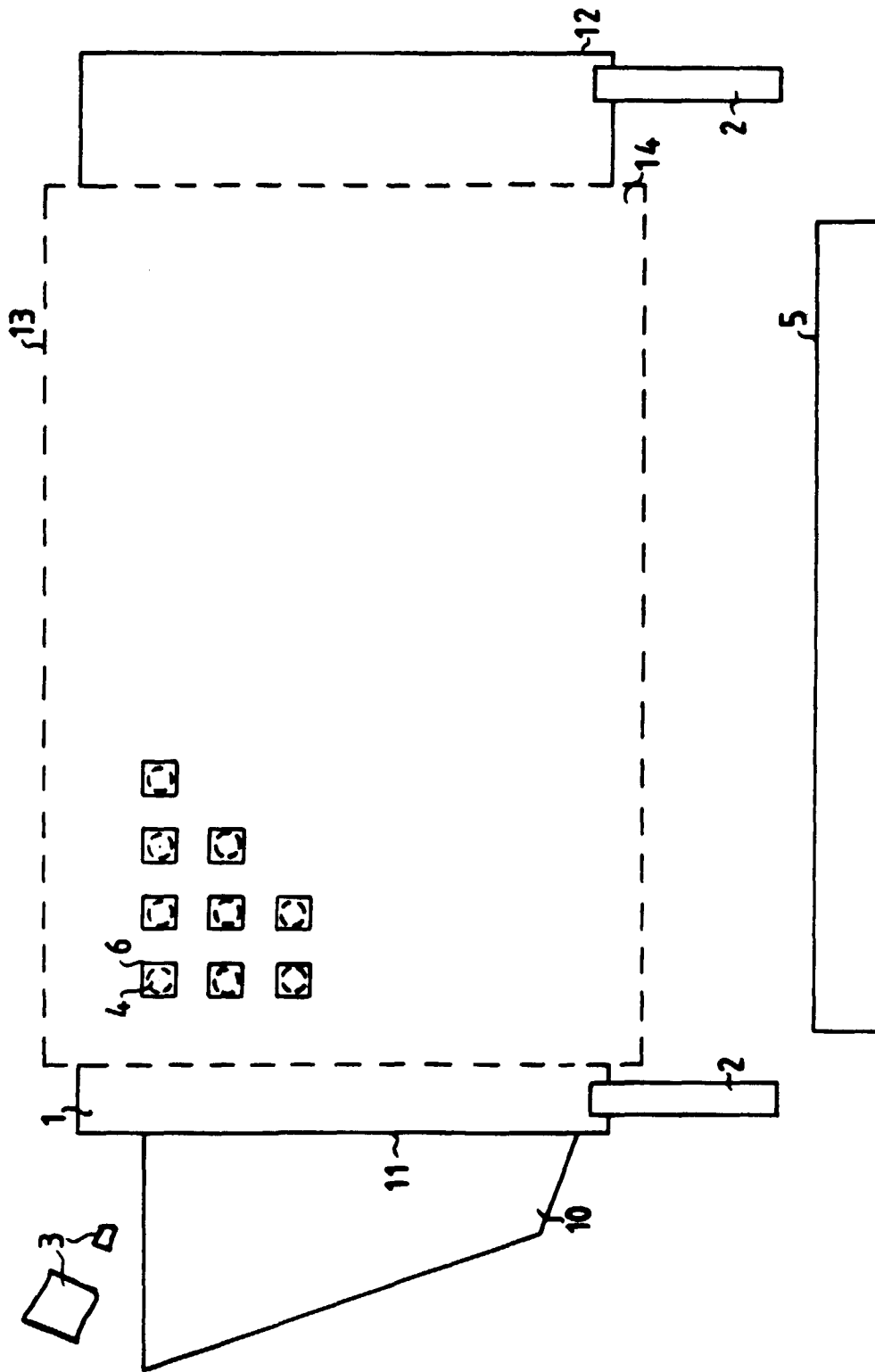


Fig. 2

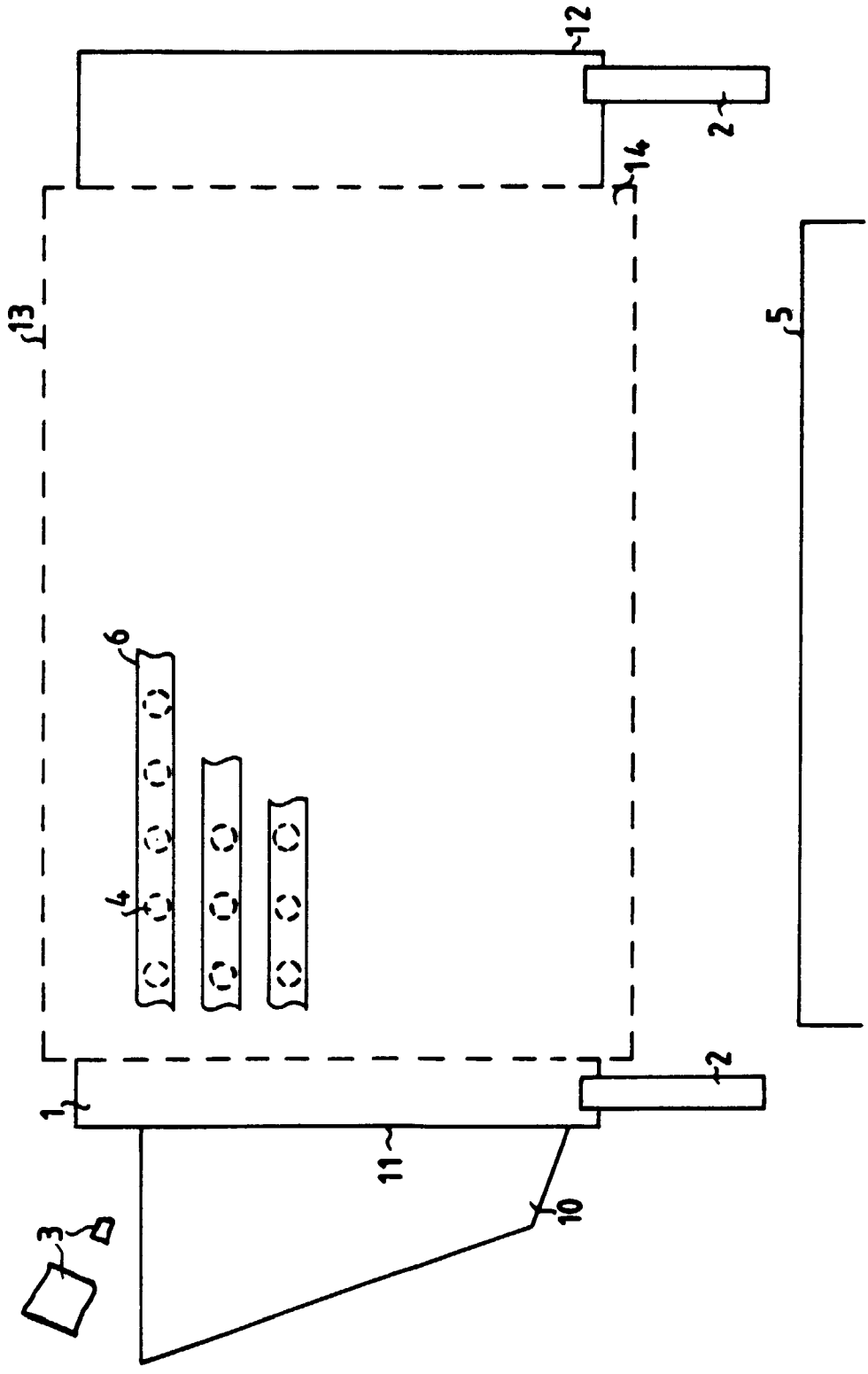


Fig. 3

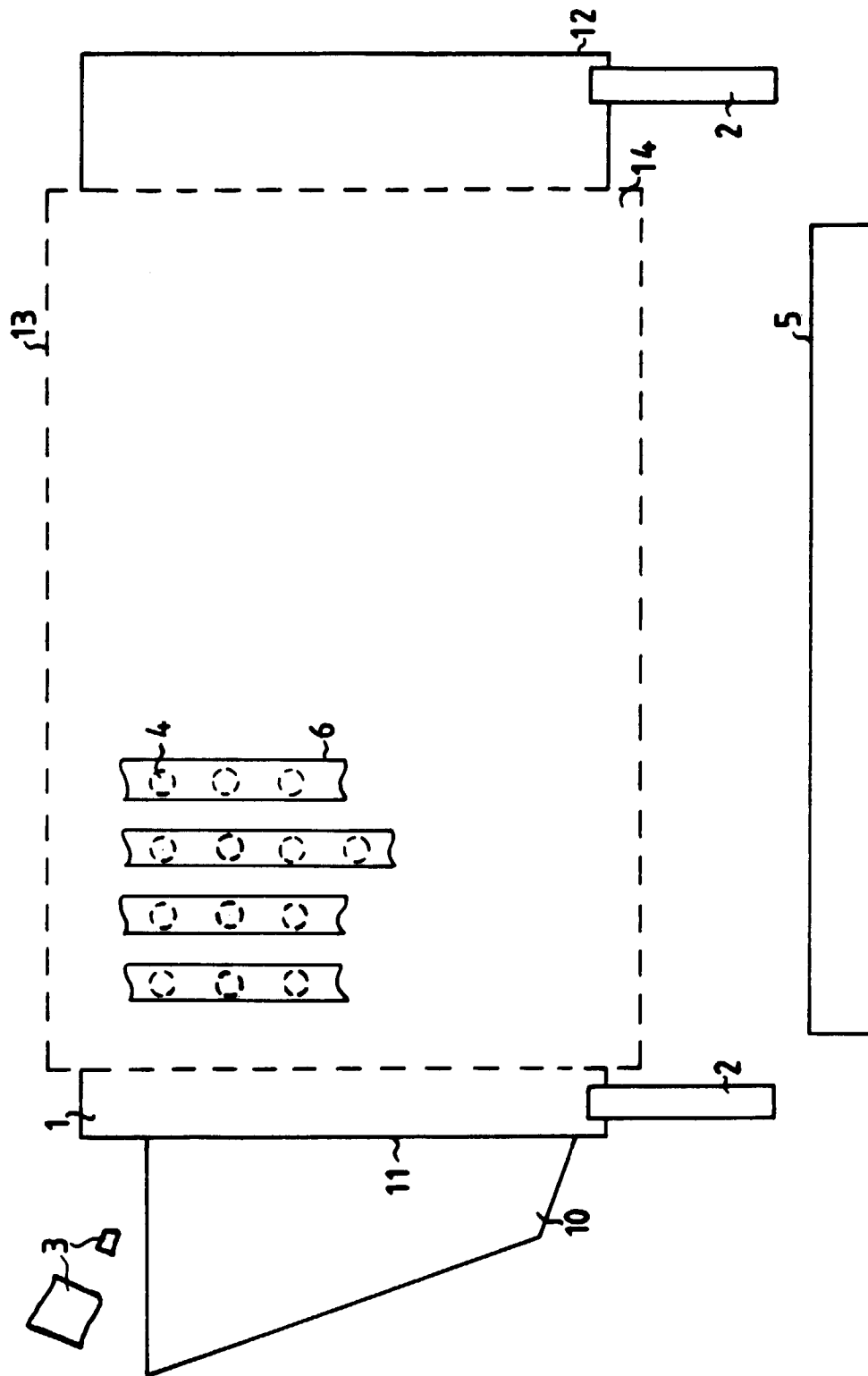


Fig. 4

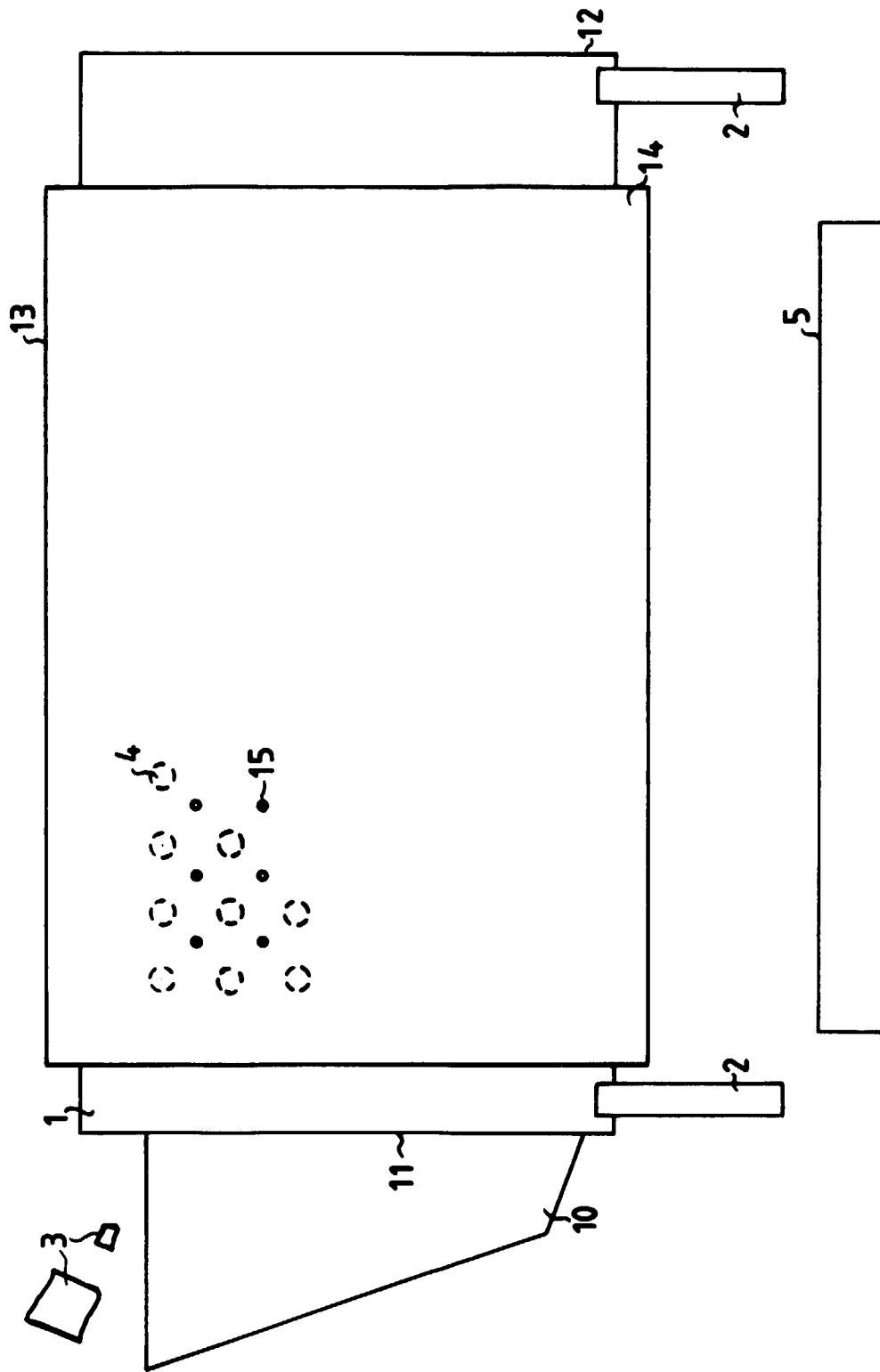


Fig. 5

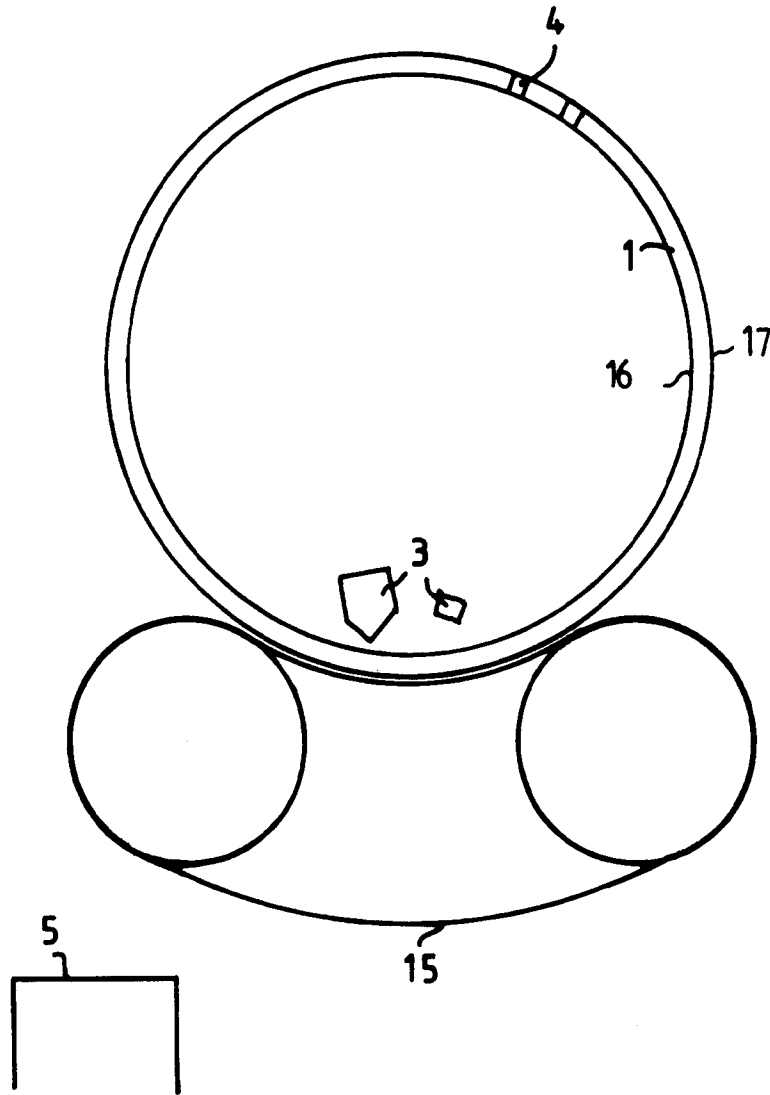


FIG. 6