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(71) Applicant: **Greghi, Renzo**
20146 Milano (IT)

(72) Inventor: **Greghi, Renzo**
20146 Milano (IT)

(74) Representative: **Cicogna, Franco**
Ufficio Internazionale Brevetti
Dott.Prof. Franco Cicogna
Via Visconti di Modrone, 14/A
20122 Milano (IT)

(54) Screening apparatus

(57) The present invention relates to a screening apparatus for processing fractions deriving from working processes in general, comprising a screening section (3) for screening materials into an under-screening fraction, comprising products passing through the screening ports, and an over-screening fraction, comprising polluting materials which do not pass through the screening ports.

The screening section comprises an air section for supplying air through the screening ports to prevent the polluting materials from passing through said screening ports.

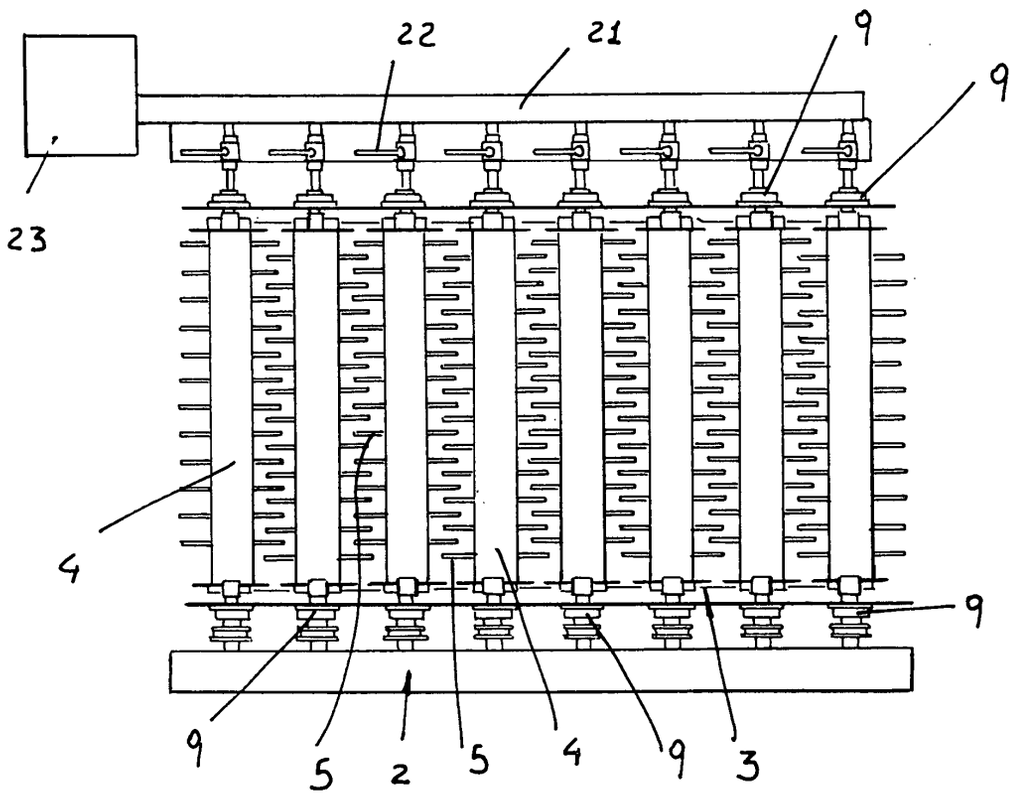


FIG. 1

EP 1 317 970 A1

Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a screening apparatus for processing fractions deriving from working processes in general and, more specifically, from working processes in the field of the soil processing apparatus which process peat or other biomasses, such as recovery wood materials, and in systems processing solid municipal waste and providing the so-called dry/moist separation.

[0002] The apparatus, however, can also be used for making fuel materials starting from the dry fraction of municipal solid waste, in processing plastics materials to be recovered, paper and paperboard materials derived from primary and secondary stocks, and for screening inert materials or soils containing polluting substances.

[0003] According to a prior method for separating the two fractions, respectively the under-screening fraction, that is the product to be further processed, and the over-screening fraction, that is the polluting material to be ejected from the working cycle, a plurality of series arranged screening apparatus are conventionally used.

[0004] The screening operation, in particular, consists of size-separating the useful product from the polluting substance, as well as air separating the polluting material from the screened products, with a recovery of a product having a size greater than the mesh size of the screening elements.

[0005] More specifically, the screening of the product is performed by a screening member the screening device of which can be constituted by a rotary cylinder or a disc screening assembly, whereas the screening of the polluting fraction, usually comprising plastics materials, is performed by an air type of separation.

[0006] The separating device comprises a separating chamber where, by using air, the polluting fraction is separated from the useful products.

[0007] The screening member comprises a cylinder or a plurality of screening discs, to which the material to be screened, comprising several fractions of different particle size, and to be further processed, and several polluting fractions to be ejected from the working cycle, is supplied continuously by a feeding or supplying belt arrangement.

[0008] The screening member divides the materials into a first fraction, which, as stated, is called the under-screening fraction, and comprises the product passing through the ports of the screening cylinder, and a second fraction, which has been called the over-screening fraction, comprising a product having a size larger than the port size of the screening member.

[0009] Downstream of the screening device is provided an air separating assembly which conventionally mainly comprises a chamber to which the fraction to be processed is supplied, said fraction comprising the polluting substances and remaining products, thereby causing the polluting substances to be separated while generating through the chamber a raising stream, by using one or more fans and one or more suckers.

[0010] The fraction of product separated from the polluting fraction due to the weight difference of said fraction, deposits on an ejector belt removing it to the outside of the chamber and feeding it to further processing operations.

[0011] The materials to be processed have variable characteristics, with respect to their particle size and component rate.

[0012] In order to allow the materials to be properly processed, prior methods provide to affect the screening section in order to change the port size, and the air section, to modify the air amount required for the separating process.

[0013] The use of a comparatively large amount of air, as required for separating the polluting substances from the useful products, causes a great environmental impact, because of the powders driven through the environment by air.

[0014] Downstream of the air separating assembly, moreover, it is necessary to provide a decantation chamber, or a calming device, to allow the plastics materials, as separated from the wood-cellulosic materials, to properly deposit for removal.

SUMMARY OF THE INVENTION

[0015] The aim of the present invention is to overcome the above mentioned drawbacks, by providing a screening apparatus for processing fractions deriving from working processes in general, allowing to greatly simplify all the operations related to the adjustment of the apparatus, thereby reducing the dead time of the several operating steps thereof.

[0016] Within the scope of the above mentioned aim, a main object of the present invention is to provide such a screening apparatus which requires a comparatively small amount of processing air, thereby greatly reducing the environmental impact.

[0017] Another object of the present invention is to provide such a screening apparatus the operation cost of which is much smaller than that required by prior like apparatus, and which, moreover, requires a comparatively small power consume.

[0018] Yet another object of the present invention is to provide such a screening apparatus which, in addition to being advantageous from a mere , economic standpoint, is also very reliable and safe in operation.

[0019] According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by a screening apparatus for processing fractions deriving from working processes in general, characterized in that said screening apparatus comprises a screening section for subdividing the ma-

terial being processed into an under-screening fraction, comprising a material passing through screening ports of said apparatus, and an over-screening fraction, comprising polluting materials which do not pass through said screening ports, said screening section comprising moreover an air supplying section for supplying air to said screening ports to prevent the polluting material from passing therethrough.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] Further characteristics and advantages of the present invention will become more apparent hereinafter from the following detailed disclosure of a preferred, though not exclusive, embodiment of a screening apparatus for processing fractions deriving from working processes in general, which is illustrated, by way of an indicative, but not limitative example, in the figures of the accompanying drawings, where:

Figure 1 is a top plan view of the screening apparatus according to the invention;
Figure 2 is a side elevation view of the screening apparatus according to the invention; and
Figure 3 shows a detail of a shaft-disc assembly constituting the screening device and with a related air delivery or distributing system.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0021] With reference to the number references of the above mentioned figures, the screening apparatus for processing fractions deriving from working processes in general, according to the present invention, which has been generally indicated by the reference number 1, comprises a bearing framework 2, defining a screening section 3 including a screening member made of a plurality of screening shafts 4 supporting eccentric discs 5, which are rotatably coupled to a coupling frame 3.

[0022] The coupling frame 3 comprises inclination changing means, said means comprising, for example, a cylinder 6 which can be operated or driven by an oleodynamic central unit 7.

[0023] The screening member comprises, in particular, a plurality of adjoining shafts 4 supported by bearings 9, for facilitating the rotary movement thereof, and also adjoining the related discs 5 so as to define a screening plane 10.

[0024] As shown, the shafts 4 are driven by a driving motor 11 which is advantageously provided with a frequency changing device, to provide an optimum driving speed depending on the types of the materials being processed.

[0025] The screening plane or panel 10 is arranged above a collecting hopper 12, which, at the bottom thereof, leads to a removal or outlet belt 13, on which the product is deposited, so as to cause said product to pass through a plurality of screening ports or gaps arranged between respective discs of the screening section.

[0026] A main feature of the present invention is that an air processing or supplying section is moreover provided, which can be directly embedded in the screening section and which is made by coupling the inside 20 of the shafts 3 with a duct 21 for supplying air, which air feeding duct is coupled to the individual shafts through adjusting valves 22.

[0027] The duct 21 is in turn connected to a ventilating unit 23, designed for controlling the amount of air being delivered.

[0028] Thus, the subject apparatus, from a mere dynamic standpoint, is based on the simultaneous raising and entraining operation to which is subjected the material fed to the apparatus, under the action the material is subjected to owing to the discs 5 which, as they are rotatively driven, continuously blends and remix the material, causing said material to be stirred as it is fed to the outlet.

[0029] Under such an action, the material is upward directed, and then it falls again on the sliding plane 10 formed by said discs 5.

[0030] In such a process, the material or product is caused to pass through the screening ports or gaps defined between a disc and an adjoining disc of the screening section, thereby said material is collected on the outlet belt 13 arranged under the hopper 12.

[0031] The large size material of the screening disc gaps or ports is driven to the outlet and conveyed on an outlet belt, generally indicated by the reference number 15.

[0032] The above disclosed movement will continue so as to cause all the material to pass through the screening ports or gaps to be discharged at the end of the mentioned sliding plane 10.

[0033] The air being supplied to the screening section prevents bi-dimensional bodies, such as plastics materials, which have the smaller cross-section, from passing through the screening ports.

[0034] In particular, said air is conveyed to the inside of each shaft 4, which has an air distributing section upward directed.

[0035] The amount of air being supplied, which is very small with respect to that used in prior methods, is defined depending on the design parameters, so as to assure that an even air flow is provided, upward directed, and, moreover, to provide such an upward directed stream sufficient to prevent said plastics materials or other undesired bodies from passing through the screening ports or gaps.

[0036] From the above disclosure it should be apparent that the invention fully achieves the intended aim and objects.

[0037] In particular, it should be apparent that the screening apparatus according to the invention allows to provide an optimum adjustment of the screening proc-

ess, owing to the control system included in the apparatus.

[0038] Thus, for the most part of the products, it will be possible to properly set an optimum processing speed, the sufficient air amount, in order to optimize the screening result, as well as to properly slant the screening section, to optimize the material holding time during the screening process.

[0039] The apparatus according to the present invention does not include any plastics material and powder sucking devices, with a consequent less dead time in the operation of the machine, which would be caused by possible failures of the sucker blowers due to said plastics material and the wear caused by the sucked powder.

[0040] Moreover, the subject apparatus require a less power cost, together with an actual absence of decanting chambers or calming devices as well as depowdering sections for removing powders, with a consequent much less environmental impact.

[0041] From the above disclosure, it should be also apparent that the subject apparatus can be operated with a much less cost, since the screening process is carried out by a single screening apparatus, with a simplified maintenance requirement, a less power cost, and a less process movements of the treated products.

[0042] The invention, as disclosed, is susceptible to several modifications and variations, all of which will come within the scope of the inventive idea.

[0043] Moreover, all the constructional details can be replaced by other technically equivalent elements.

[0044] In practicing the invention, the used materials, as well as the contingent size and shapes of the component elements of the apparatus, can be any, depending on requirements.

Claims

1. A screening apparatus for processing fractions deriving from working processes in general, **characterized in that** said screening apparatus comprises a screening section for subdividing the material being processed into an under-screening fraction, comprising a material passing through screening ports of said apparatus, and an over-screening fraction, comprising polluting materials which do not pass through said screening ports, said screening section comprising moreover an air supplying section for supplying air to said screening ports to prevent the polluting material from passing therethrough.

2. A screening apparatus, according to the preceding claim, **characterized in that** said screening section comprise a supporting frame for supporting a plurality of screening shafts and discs, said frame being coupled to inclination changing means.

3. A screening apparatus, according to the preceding claims, **characterized in that** said disc bearing shafts define inner ducts for supplying air to the screening ports.

4. A screening apparatus, according to one or more of the preceding claims, **characterized in that** said disc bearing shafts are coupled to a manifold, coupled to an air delivery section, controlled by a logic central programmable unit.

5. A screening apparatus, according to one or more of the preceding claims, **characterized in that** said apparatus comprises a driving motor for driving said screening section, said driving motor being controlled by a frequency changing device and also driving said means for changing the inclination of said disc bearing shaft frame.

6. A screening apparatus for processing fractions deriving from working processes in general, according to one or more of the preceding claims, and substantially as broadly disclosed and illustrated and for the intended objects.

FIG. 1

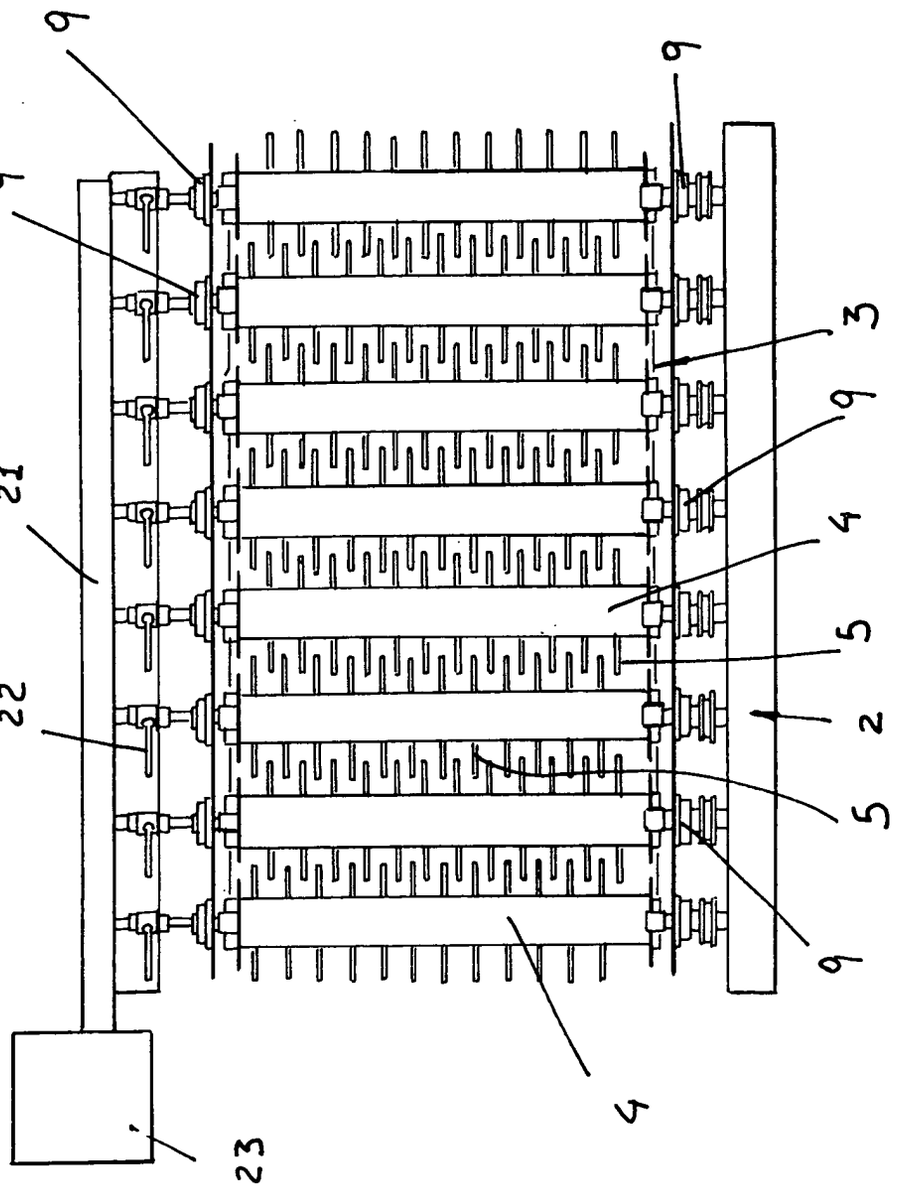
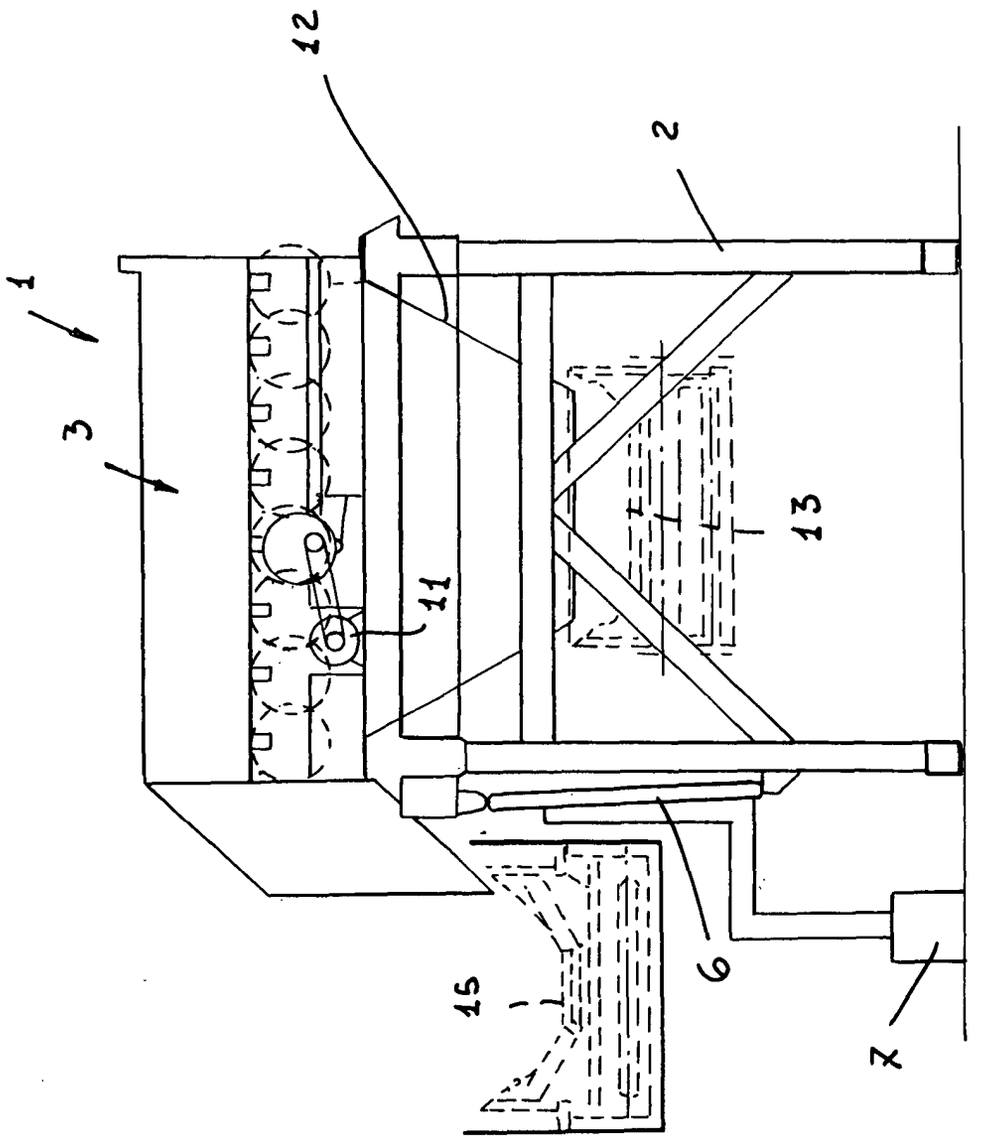


FIG. 2



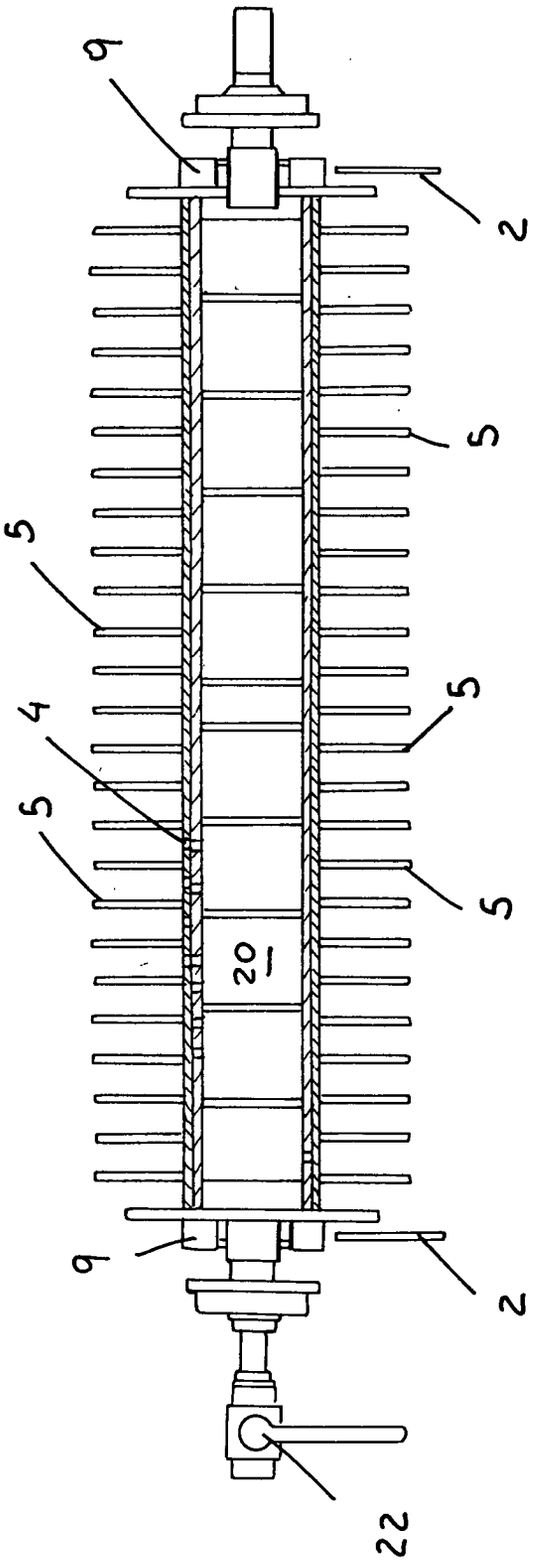


FIG. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 02 02 6649

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	6 March 2003	Laval, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 02 02 6649

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82