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(54) **SELECTOR ROLLER**

SORTIERWALZE

ROULEAU SÉLECTEUR

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US-A- 5 842 507

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Description

FIELD OF THE INVENTION

[0001] The present invention concerns a selector roller which can be used in machines for selecting wood material, and more generally flake or chip material, which is then used to obtain, for example, chipboard panels of the Particleboard, Oriented strand boards (OSB) or Medium density fiberboard (MDF) type, or other types.

[0002] These machines are used for the selection and cleaning of chips, flakes, sawdust and particles and anything else that can on each occasion be related, is similar or comparable, to these components, before further workings.

[0003] In the following description we will use the technical term "chips", also comprising with this term all the other similar, alike or comparable products such as flakes, sawdust, particles, etc.

[0004] The chips are normally screened with roller systems located on a single plane or on more or less coplanar planes.

[0005] The rollers of these selector machines have cylindrical or sub-cylindrical shapes, for example with one or more circumferential cusps.

[0006] The external surfaces of these rollers are normally shaped, and the rollers are normally associated with specific substantially parallel drawing shafts, in which the rollers of one shaft cooperate with those of the shaft nearby so as to obtain conformations suitable to obtain the desired selection.

BACKGROUND OF THE INVENTION

[0007] By particleboard panels we intend those panels, composed of wood particles, bonded with suitable glues, and normally hot pressed.

[0008] These panels can be characterized by a single-layer structure, by a multi-layer structure, or by a structure defined as "continuous variable granulometry", or of another type.

[0009] To obtain these panels by means of industrial methods from an incoherent mass of chips, the chips are selected either with constant size, or with a variable size, even very fine, in relation to the specific type of panel.

[0010] A fundamental element that determines the quality of the panels is the "workability" of the panel itself, and this parameter is related to the duration of the cutting tools and abrasive belts used.

[0011] However, with the ever increasing use of recycled wood, which can satisfy up to 100% of the demand for wood material, the workability of the panels decreases.

[0012] This occurs especially in the case, not rare, in which the contaminants such as sand, stones, minerals, rubble, etc. are not drastically eliminated.

[0013] The systems for removing contaminants from recycled wood chips are complex and normally provide, at the beginning of the cleaning cycle, roller screens to divide the incoherent mass into various homogeneous fractions.

[0014] Each of said fractions is then advantageously cleaned with suitable specialized systems to treat the specific granulometries of each fraction.

[0015] Therefore it is normal that foreign bodies heavier than wood, such as minerals, stones or hard and abrasive compounds, transit over the rollers of the screens, associated with the wooden fractions. Due to their greater specific weight, these heavy foreign bodies, as an effect of the vibrations generated by the rollers and the greater weight compared to the chips, rapidly precipitate toward the bottom of the layer, coming into contact with the drawing profiles of the rollers.

[0016] The selection of fine fractions is usually obtained by reducing the gap between the profiles of the opposite screening rollers to minimum values, which can even reach less than a millimeter.

[0017] In these conditions, heavy and abrasive contaminants, having a thickness even just slightly greater than the gap, are not readily discharged, or are not discharged at all, and remain between the rollers even for a very long time.

[0018] This condition means that these components become stuck between the profiles of the faces of the rollers which are therefore also subject to premature wear, with the possible formation of channels that effect the desired selection function and the lifespan of the rollers.

[0019] Furthermore, it should be considered that the quality of the panel is determined by the absence of impurities that are normally present in the chips, even more so when recycled woods are used as a starting point.

[0020] As indicated above, heavy foreign bodies, with the known selector rollers as conformations, are not normally eliminated, or are eliminated marginally, particularly if they have sizes that are small but not sufficient for them to be discharged between the slits that are provided between the opposite rollers.

[0021] In order to overcome these problems, in the state of the art the chips are screened in suitable granulometries, each of which is subsequently cleaned with various systems to remove the cubic particles and/or those with a large thickness and/or heavy foreign bodies in order to have a reasonable certainty that the contaminants are not present in the panel.

[0022] However, the solution of the problem, if implemented with the removal of the contaminants in steps subsequent to the selection and primary cleaning, would entail even considerable additional costs, as well as the rapid wear of the screening rollers.

[0023] The Applicant has therefore posed himself the problem of studying the phenomenon in depth in order to simplify and better guarantee the quality of the selection so as to obtain a considerable reduction in costs, and at the same time a certain exclusion of the undesired components.

[0024] From patent EP-B-1.007.227 (EP'227) (see figs. 1a and 1b) selector screens are known in which selector rollers 110 are present having a cusp-shaped conformation 118 and operating in reciprocal opposed cooperation on substantially parallel shafts along a common plane, thus defining a substantially uniform passage gap for the chips.

[0025] These selector rollers 110 each have a hole 120 for keying the roller on a roller-bearing shaft, and a circumferential surface 116 provided with selector portions 113 which have surface modifications and workings in selective terms as a function of the type of selection that has to be made. The surface modifications can possibly alternate with unmodified surfaces.

[0026] The Applicant has verified that these known rollers, while improving the quality of the selection, are in fact not able to remove with the necessary speed the heavy foreign bodies having a granulometry even slightly greater than the gap between the screening rollers.

[0027] This because the known rollers do not allow to adequately discharge heavy foreign bodies, or possible solid elements, such as for example metals, stones, inert materials or other.

[0028] Other selector rollers are described in the patent application with number WO 2019/137830 filed on 09.01.2019 (see figs. 2a-2b-2c).

[0029] These selector rollers 210 also have a hole 220 for keying the roller on a roller-bearing shaft 212, and a circumferential surface 216 provided with selector portions 213 which have surface workings and modifications having a selective function. Known selector rollers 210 have a cusp-like shape 218 defined by two sides 211, by an apical portion 215 and by lateral shoulders 217. In this case, the selector portions 213 define a stepped development 213.

[0030] The surface modifications on the selector portions 113, 213 of the known selector rollers 110, 210 can be of the radial, circumferential, or helical type.

[0031] Certain types of selection also allow the use of rollers having a circumferential surface with cylindrical or possibly convex shape with rounded shapes at their ends.

[0032] As a function of the shape of the circumferential surface, the cusps of the rollers can alternate with the cusps of the rollers disposed on a parallel and adjacent shaft.

[0033] From the application experience and from the tests carried out on the selector rollers described in patent application WO'830, the Applicant has discovered that, with a simple adaptation, it is possible to improve the elimination of the inert materials already during the step of selecting the chips with any type of roller indicated above.

[0034] This adaptation also allows to improve the performances of the rollers described in patent EP'227 mentioned above and in the application WO'830.

[0035] US-A-5,842,507 discloses a wood chip conditioner comprising two rollers having an outer surface forming a conditioning surface which comprises a series of sequentially alternating peaks and valleys radially circumscribing the roll so that a substantially sinusoidal pattern extends along the outer surface of the roll. The peaks and valleys of opposite rolls form a nip of uniform thickness through which wood chips traverse.

[0036] WO-A-2014/167407 discloses a device for riddling materials comprising at least two riddling rollers, each of them comprising fixed tools disposed side by side along each roller so as to define interstitial spaces both between two adjacent tools of the same roller and between tools of two adjacent rollers. The tools of one roller extend from an external surface of a corresponding fixing or distancing element fixed to a shaft of rotation of the roller. The rollers do not have a selector portion cooperating whit a selector portion of an opposite roller. Therefore, this solution, while it allows working and separate inter materials arising from demolitions or excavations, is not suitable for working and separate wood chips.

[0037] US-A-1,498,144 discloses a screening device to grade coal without breaking it, comprising a screening bed formed by a plurality of parallel rolls consisting of a plurality of spools keyed on a shaft. The rollers are provided with grooves which cooperate with the grooves of an opposite roll to form an aperture through which the screened material can fall through the screening bed. This solution do not allow to screen woodchips.

[0038] GB-A-280,191 discloses grizzlies for screening coal, coke and similar material.

[0039] One purpose of the present invention is therefore to improve the strong selection capability of any selector machine whatsoever with rollers located on adjacent and facing axes, in an alternating and non-alternating manner, of the type identified above, as well as similar and comparable rollers.

[0040] Another purpose of the present invention is therefore to obtain selector rollers that improve and complete the selector function.

[0041] It is also a purpose of the invention to allow the rollers identified above to guarantee, already during the step of the first selection process, the removal of the heavy contaminants from the mass of particles.

[0042] This prevents the selected material from having to be subsequently retaken, with an increase in costs and time and with waste of equipped surfaces, personnel, raw materials and energy.

[0043] Another purpose is the reduction of investments, of energy consumption and of the labor required, all resulting in a substantial reduction of costs, of occupied spaces and pollution.

[0044] Another purpose is to make the first selection of the chips efficient so as to avoid further production of wood dusts otherwise generated in the necessary additional processes, knowing that the dusts are a loss of wood material suitable for the production of the panels, a risk for the operators and damage to the environment.

[0045] Another purpose of the present invention is to provide a selector roller which also allows to discharge,

and/or eliminate, in a simple and effective manner, solid contaminants and inert materials, preventing, or at least limiting, the wear of the rollers and consequently increasing the useful life of a set of selector rollers.

[0046] Another purpose of the invention is therefore to discharge as quickly as possible the solid contaminants and inert materials, which, due to size and shape, would otherwise remain for a long time between the rollers, ruining the profiles of the circumferential surfaces.

[0047] The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

[0048] The present invention is set forth and characterized in the independent claim 1, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

[0049] In accordance with the above purposes, the present invention concerns perfected selector rollers, which function in an improved and more efficient manner with respect to selector rollers of the state of the art.

[0050] Advantageously, although not in a limited manner, the invention is directed to selector rollers which have a circular or sub-circular profile such as convex, cusp-shaped or inclined. These selector rollers, as a function of the peripheral profile, can work parallel to or alternated with other selector rollers.

[0051] The selector rollers can also be located along a single plane or on advantageously parallel planes.

[0052] According to the invention, a selector roller for selecting particles, advantageously but not exclusively of wood material, advantageously comprises a hole for inserting the roller on a roller-bearing shaft and a selector portion specifically equipped for the selection. The equipped portion has surface workings and modifications suitable to operate in a desired manner on the chips to be selected.

[0053] Examples of workings of the selector portions are described in the granted patent cited and in the patent application cited.

[0054] According to some embodiments, the selector portions are configured to cooperate with the selector portions of another selector roller so as to define a passage gap through which the chips can pass.

[0055] According to one aspect of the present invention, the selector roller comprises a plurality of circumferential throats made in the external surface. The circumferential throat is particularly aimed at operating on the heavy contaminants.

[0056] The circumferential throat can be configured to increase locally the gap between respective selector portions of two cooperating rollers so as to allow possible heavy contaminants to be easily and rapidly discharged.

[0057] The selector roller comprises a plurality of selector portions and a plurality of circumferential throats.

[0058] The circumferential throats and selector portions can be alternated with each other along a direction axial to the selector roller.

[0059] According to a further formulation of the present invention, the selector roller comprises two lateral shoulders and a substantially central cusp, defined by sides inclined with respect to each other, also possibly not equal, and by a circumferential apical portion.

[0060] According to this embodiment, each side of the cusp can comprise at least one selector portion and at least one circumferential throat.

[0061] The present invention is also applicable to rollers having a circumferential selector surface that is cylindrical, or convex, conical, or with a double-cone with cusp offset toward one side or in any case not central.

[0062] Hereafter, in order to simplify the description, we will describe only the case of rollers with a central cusp, with the understanding that the description is applicable, with minimal adaptations, to every type of selector rollers.

[0063] Advantageously, the conformation of the selector rollers, in the case taken as an example, entails a disposition of the rollers, during use, such that the passage gap between facing rollers has a zigzag development.

[0064] As indicated, the Applicant has discovered that by providing suitable circumferential throats or recesses positioned at least in the flanks of the sides that determine the cusp of the selector rollers, a better selection of the unwanted contaminants is obtained, that is, the solid or inert components such as metals of any type, pebbles, rubble, or suchlike.

[0065] These contaminants can have sizes greater than the passage gap between the opposite rollers and, with the invention, can be discharged in a simple and quick manner through the circumferential throats made on the external surface of the profiles of the screening rollers.

[0066] The cooperation between facing throats of opposite rollers generates in fact extra passage gaps to discharge heavy foreign bodies of granular shape.

[0067] The invention therefore eliminates these solid contaminants making other subsequent working processes unnecessary, and consequently also reduces the wear of the external surfaces of the selector rollers, extending their useful life and reducing costs.

[0068] According to the embodiments used here to explain the invention, due to the prevalence of the heavy contaminants to be eliminated, the circumferential selector portions can have circumferential sizes that decrease from the cusp toward the lateral shoulder along the respective side.

[0069] The two sides of the cusp can be specular, and/or one side can be equipped differently and specialized according to particulates and specific selection processes and/or inert materials to be eliminated.

[0070] According to some embodiments, each side of the selector roller which defines the cusp comprises one

or more circumferential throats, or recesses, respectively interposed between the adjacent selector portions and/or between a selector portion and the apical portion.

[0071] This for example due to the volume of heavy contaminants to be discharged.

[0072] According to some embodiments, circumferential throats can also be provided between one selector portion and a respective lateral shoulder.

[0073] According to the invention, due to the prevalent type and volume of the inert materials, there can be a specialized number of circumferential throats, which can have a specialized size, configuration and developments.

[0074] In this way, the circumferential throats can have a rounded, semi-cylindrical or V-shaped circumferential bottom.

[0075] According to a variant, the lateral shoulder of the selector roller, which operates in conjunction with the lateral shoulder of another adjacent roller, can also have, or define, a circumferential throat according to the invention.

[0076] According to some embodiments, the adjacent lateral shoulders of two adjacent rollers define a circumferential recess, that is, each lateral shoulder has its own circumferential recess.

[0077] The opposite cusps of facing rollers can generally have a conical shape, that is, with circumferential, or sub-circumferential steps, or possibly have a convex or undulated shape, as is shown as a purely indicatively example in the first drawings attached.

[0078] According to one embodiment, during use, the circumferential throats present in the facing rollers are disposed along a single plane orthogonal to the axis in a known manner.

[0079] According to a variant, to improve the selection action, the circumferential throats of two facing rollers lie on planes orthogonal to the axis but alternately offset by a desired value.

[0080] According to some embodiments, the apical portion can have surface workings and modifications the same as or different from the surface modifications and workings provided on the selector portions.

[0081] According to the invention, the conical shapes of at least one side, that is, the stepped shapes of at least one side, fall under the present invention where they have at least one circumferential throat on at least one side of the cusp, if present.

[0082] According to the invention, the at least one circumferential throat, depending on how the roller is to be operated, can be orthogonal to the axis of rotation, or lie at least partially on a plane inclined with respect to the orthogonality to the axis of rotation.

[0083] With the configurations of the rollers allowed by the invention, the circumferential throats engage with the contaminants and allow to discharge almost all the various heavy foreign bodies minimizing the wear of the external surfaces of the rollers.

[0084] According to some embodiments, due to the type and normal size of the heavy contaminants to be expelled, the circumferential throats can have a depth such as to define, in direct or indirect union with the circumferential throats of an opposite roller, a passage gap having an amplitude comprised between about 1.5 and about 5 times the amplitude of the passage gap present between the selector portions.

[0085] According to some embodiments, the passage gap defined by the circumferential throats has an amplitude comprised between about 1.5 and about 3 times the amplitude of the passage gap present between opposite selector portions.

[0086] According to some embodiments, the circumferential throat(s) can have a maximum depth comprised between about 1 mm and about 6mm, preferably comprised between 1mm and 4 mm.

[0087] According to some embodiments, the circumferential throats have a width comprised between about 0.2 and 1.5 times the amplitude of the respective adjacent selector portions.

[0088] According to some embodiments, the circumferential throats have a width comprised between about 0.2 and 0.9 times the amplitude of the respective adjacent selector portions.

[0089] According to some embodiments, the circumferential throats have a width comprised between about 0.2 and 0.5 times the amplitude of the respective adjacent selector portions.

[0090] According to a first variant, in one roller the throats all have substantially the same sizes, an advantageous solution when the granulometry of the inert materials is substantially uniform.

[0091] According to a variant, the throats have in the same roller one or more widths so as to be able to act on different granulometries.

[0092] Similarly, the throats in the same roller can have depths differentiated according to the characteristics of the heavy contaminants.

[0093] According to another formulation, the two sides, which determine the cusp, have the same number of selector portions with different size and/or conformation morphologies.

[0094] According to a variant, the two sides of the roller, which determine the cusp, have selector portions differentiated by size and/or conformation and/or number.

[0095] A machine to select particles of wood material can comprise at least two parallel and alternated roller-bearing shafts.

[0096] According to the invention, each shaft of the selector machine comprises at least two rollers, the rollers having respective external surfaces provided with selector portions facing and cooperating with each other.

[0097] According to one formulation of the invention, the selector machine comprises positioning means suitable to allow the reciprocal positioning of the adjacent shafts, the positioning means being chosen from means of the manual type, interlock means, or controlled and programmed means.

BRIEF DESCRIPTION OF THE DRAWINGS

[0098] These and other characteristics of the present invention will become apparent from the following description of some embodiments, given as a non-restrictive example with reference to the attached drawings wherein:

- figs. 1a and 1b are respectively a view of a plurality of selector rollers according to the state of the art disposed respectively facing each other, and a detailed view of the external surface of one of the known rollers;
- figs. 2a - 2b - 2c are respectively a view of a plurality of selector rollers according to state of the art disposed respectively facing each other, and a detail of the external surface of the rollers in a lateral view and in a perspective view;
- fig. 3 is a view of a plurality of selector rollers according to embodiments described here disposed respectively facing each other;
- figs. 3a - 3b - 3c - 3d are partial section views of possible variants of profiles of the external surfaces of the selector rollers of fig. 3;
- fig. 4a - 4b - 4c are enlarged views of possible variants of the profiles of facing selector rollers of fig. 3.
- fig. 5 is a partial view of two facing rollers according to variant embodiments described here;
- fig. 6 is a partial view of two facing rollers according to other variant embodiments described here;
- figs. 7a - 7b - 7c are partial views of possible variants of profiles of selector rollers;
- figs. 8a - 8b - 8c are enlarged views of possible variants of the profiles of facing selector rollers of fig. 5.

[0099] To facilitate comprehension, the same reference numbers have been used, where possible, to identify identical common elements in the drawings. It is understood that elements and characteristics of one embodiment can conveniently be incorporated into other embodiments without further clarifications.

DETAILED DESCRIPTION OF SOME EMBODIMENTS

[0100] The invention refers to embodiments described in the two patent titles referenced. It is in the spirit of the invention that the invention protected here and described by way of example hereafter is also applicable to cylindrical selector rollers or selector rollers with a convex surface.

[0101] Embodiments of the present invention are described here with reference to the attached drawings from 3 to 8c and concern selector rollers 10, hereafter also referred to as "rollers", suitable to select particles and flakes of fibrous material, advantageously wood, but not only, to divide it according to size and granulometry.

[0102] Said rollers can also be used to treat other types of material in flakes or in flat or substantially flat elements, containing heavy contaminants with a predominantly granular or spherical or cubic shape.

[0103] The rollers 10 have an annular shape, which develops around a central axis X, defining the axis of rotation, and are provided with a central hole 20 by means of which the roller 10 can be keyed, possibly in a replaceable manner, on a shaft 12.

[0104] Parallel batteries of rollers 10 are provided in a selector machine, which are mounted on respective axes X, X' or shafts 12, the series of rollers 10 being present on one shaft 12 cooperating with a series of rollers 10 present on another shaft 12 parallel to the first.

[0105] As a function of the shape of the rollers 10 on one shaft 12 they can or may not be alternated with rollers 10 present on the parallel shaft 12.

[0106] According to a variant, the shafts 12 can be provided, for example alternatively, lying on parallel planes.

[0107] This variant being suitable to exert a greater action of selection or transport of the material located on the rollers 10.

[0108] The roller 10 has an external circumferential surface 16 suitable to cooperate, during use, with respective external surfaces 16 of rollers 10 respectively facing each other to operate the desired selection.

[0109] The external surface 16 is provided with at least one selector portion 13 provided with surface modifications 21, 22, 23 configured to actuate the desired selection of the chips, facilitating the action of feeding and drawing them between successive rollers 10.

[0110] According to some embodiments, combinable with all the embodiments described here, the selector portions 13 can have transverse grooves 21, made in transverse direction in the respective side 11.

[0111] According to some embodiments, the transverse grooves 21 on one selector portion 13 are offset with respect to the transverse grooves 21 of an adjacent selector portion 13.

[0112] According to some embodiments, the selector portions 13 can have modifications and deformations suitable to define hollows 22 and protrusions 23 suitable to facilitate the drawing of the chips.

[0113] According to some embodiments, the hollows 22 and the protrusions 23 can have a shape defining a zigzag profile (fig. 3a).

[0114] According to variant embodiments, the hollows 22 and the protrusions 23 define an undulated profile (fig. 3b)

[0115] According to other variants, the hollows 22 and the protrusions 23 can have mating shapes, for example rectangular (fig. 3d), square, or trapezoidal (fig. 3c).

[0116] Each roller 10 comprises at least one circumferential throat 14 made in the external surface 16 and configured to operate on heavy contaminants.

[0117] According to the invention, each roller 10 comprises a plurality of circumferential throats 14 alternated with selector portions 13.

[0118] The circumferential throats 14 are advantageously defined by grooves having a substantially con-

stant section which develop on the entire circumference of the roller 10.

[0119] According to some embodiments, the circumferential throats 14 have a circular development lying on a plane orthogonal to the axis X.

[0120] According to possible variants, at least one part of the circumferential throat 14 lies on a plane inclined with respect to the axis X.

[0121] According to some embodiments, selector portions 13 and circumferential throats 14 alternate each other along the axis X.

[0122] The rollers 10 according to the invention have a cusp 18 defined by conical lateral surfaces to form two conical or sub-conical sides 11, the top of the cusp 18 being defined by an apical portion 15 providing a circumferential connection.

[0123] The roller 10 also has lateral shoulders 17 in the axial ends, normally, but not necessarily, cylindrical, suitable to cooperate, during use, with respective lateral shoulders 17 of adjacent rollers 10 on a same shaft 12.

[0124] According to some embodiments, a roller 10 can be obtained in a single body.

[0125] According to a variant, a roller 10 can also be obtained with two facing half-rollers and possibly joined together in relation to the apical portion 15 of the cusp 18 or in a different position orthogonal to the axis X.

[0126] When two rollers 10 are adjacent, the lateral shoulders 17 of two rollers 10 of one shaft 12 create a circumferential ring 19 which cooperates with the apical portion 15 of the cusp 18 of the opposite and offset roller 10 (figs. 1, 3 and 4) present in the contiguous shaft 12.

[0127] This conformation allows to obtain on the plane that contains all the axes X, X' of the shafts 12 a zigzag slit having the desired characteristics.

[0128] According to a first solution, the two sides 11 are morphologically identical.

[0129] According to a first variant, the two sides 11 have different diametric lengths.

[0130] According to another variant, the two sides 11 have different conformations.

[0131] According to some embodiments, the two sides 11 can be specular or obtained differently.

[0132] According to another variant, the two sides 11 have a conical development.

[0133] According to another variant, one of the two sides 11 has a continuous conical development and the other a stepped conical development.

[0134] In relation to one and/or the other side 11, each side 11 has one or more selector portions 13, having a conical, sub-conical or cylindrical development.

[0135] According to possible solutions, the roller 10 comprises at least one circumferential throat 14 on each side 11 that defines the cusp 18.

[0136] According to some embodiments, one or more selector portions 13 and one or more circumferential throats 14 can be present on each of the sides 11.

[0137] According to some embodiments, the selector portions 13 of one side 11 can all be the same or differentiated on one side 11 with respect to the other.

[0138] Also, according to possible variants, the selector portions 13 can also be differentiated on a same side 11 depending on the type of selection desired.

[0139] According to the invention, the roller 10 comprises a plurality of circumferential throats 14, disposed on one side 11 and on the other of the cusp 18 and between one and the other of the selector portions 13.

[0140] According to some embodiments, a circumferential throat 14 can also be provided between a selector portion 13 and the adjacent lateral shoulder 17.

[0141] According to further embodiments, a circumferential throat 14 can also be present in correspondence with the zone where two adjacent rollers 10 are adjacent to each other.

[0142] The circumferential throats 14, depending on both the type of heavy contaminants which are provide and/or their average size, in relation to the action that is intended to be performed on the contaminants, have a specialized development on the bottom, so that it is possible to have cylindrical (fig. 4a and 7a), rounded (fig. 4c and 7b), or V-shaped (fig. 4b and 7c) circumferential throats 14.

[0143] According to some embodiments, the circumferential throats 14 of a roller 10 have homogeneous shapes and characteristics.

[0144] According to other embodiments, the shapes and/or characteristics of the circumferential throats 14 can be different from one another, or in groups, along the same side 11 or differentiated on one side with respect to the other of the cusp 18, in order to satisfy different needs of selection and/or distinction of the heavy contaminants.

[0145] The number of selector portions 13 and/or circumferential throats 14 on one or the other side 11 can vary as a function of the type and/or size of the chips to be selected and the shape and/or type of heavy contaminants that have to be discarded.

[0146] By way of example, figs. 3, 5 and 6 show possible embodiments. Fig. 3 shows rollers 10 having two selector portions 13 and two circumferential throats 14 on each side 11 and possibly one throat 14 defined by the lateral shoulders 17 of two adjacent rollers 10; fig. 5 shows rollers 10 having three selector portions 13 and four circumferential throats 14 on each side 11, and fig. 6 shows rollers 10 having three selector portions 13 and three circumferential throats 14 on each side.

[0147] According to some embodiments, the selector portions 13 can have a diameter decreasing between the apical portion 15 of the cusp 18 and the lateral shoulders 17.

[0148] According to some embodiments, the selector portions 13 can define a continuous conical development (fig. 3) or a stepped conical development (figs. 5 and 6).

[0149] According to the embodiments where the selector portions 13 have a stepped conical development, it can be provided a circumferential throat 14 for each step.

[0150] According to some embodiments, the lateral shoulders 17 can also be variably shaped and possibly provide ridges or hollows able to facilitate the discharge of heavy contaminants.

[0151] A roller 10 can be in a single body, or in two facing bodies cooperating with the facing walls, both bodies having respective lateral shoulders 17.

[0152] According to some embodiments, for example described with reference to figs. 4a-4c and 8a-8c, the lateral shoulders 17 can be shaped so as to define, with a lateral shoulder 17 of an adjacent roller 10, a circumferential recess 25 in correspondence with the annular ring 19, suitable to cooperate with the cusp 18 of a facing roller 10, which defines a circumferential throat 14.

[0153] According to one embodiment, the circumferential recess 25 can have a flat, conical, or curved profile.

[0154] The facing lateral shoulders 17, depending on the type of heavy contaminants to be eliminated, can be plano-cylindrical (fig. 4a and 8a), conical (fig. 4b and 8b), or determine a rounded throat (fig. 4c and 8c). Also in this case, it is the type of retention of the inert materials that determines this conformation.

[0155] In the event the facing lateral shoulders 17 have a plano-cylindrical conformation, they can or may not not have defining shoulders or edges 24.

[0156] In the event they have defining edges 24, these edges 24 delimit a plane conformation (fig. 8a), a conical conformation (fig. 8b) or a rounded conformation (fig. 8c), the choice of the conformation is determined as in the other cases.

[0157] The conformation of the adjacent lateral shoulders 17 is indifferent with respect to the circumferential throats 14 between the selector portions 13 in the same roller 10, so that the conformation of the former can be different from the conformation of the latter.

[0158] According to some embodiments, the perimetral conformation of the cusp 18 and/or of the apical portion 15 is determined by the drawing action which has to be exerted on the chips and on the heavy contaminants.

[0159] According to some embodiments, the apical portion 15 can have workings and modifications 21, 22, 23 substantially analogous to those present on the selector portions 13.

[0160] For example, the apical portion 15 can have hollows and protrusions 22, 23 which define pyramid-shaped portions, possibly separated from each other by grooves 21 disposed in a transverse direction.

[0161] According to some embodiments, the sides 11 can be inclined, with respect to the central axis X, by an angle α comprised between about 20° and about 60°.

[0162] According to preferential embodiments, the sides 11 can be inclined, with respect to the central axis X, by an angle α comprised between about 30° and about 50°.

[0163] According to some embodiments, the circumferential throats 14 can have a maximum depth D comprised between about 1mm and about 6mm measured with respect to the lowest edge that defines the throat 14.

[0164] By lowest edge we mean the edge that is located at a shorter distance from the central axis X with respect to the other edge that defines the circumferential throat 14.

[0165] According to some embodiments, the circumferential throats 14 can have a first width W1, measured in the direction of the central axis X, comprised between about 1mm and about 7mm.

[0166] According to some embodiments, the first width W1 can be comprised between about 2mm and about 5mm.

[0167] According to some embodiments, the selector portions 13 can have a second width W2 comprised between about 1mm and about 6mm.

[0168] According to some embodiments, the first width W1 of a circumferential throat 14 can be comprised between about 0.2 and 1.5 times the second width W2 of an adjacent selector portion 13.

[0169] When the selector portions 13 of one roller 10 are aligned with the selector portions 13 of the respective facing rollers 10, they define between them a first passage gap having an amplitude G1.

[0170] When the circumferential throats 14 of one roller 10 are aligned with the circumferential throats 14 of respective facing rollers 10, they define between them a second passage gap having an amplitude G2 greater than the first amplitude G 1.

[0171] Therefore, only the particles and chips having a thickness smaller than the first amplitude G1 can transit through the first passage gap G1 between the facing selector portions 13, while the cubic-shaped, or thick, chips or the possible heavy contaminants are more easily and rapidly discharged through the circumferential throats 14.

[0172] In particular, the chips with an elongated shape transit mainly in a substantially horizontal and lying position with respect to the external surface 16 of the rollers, in the gap defined by the facing selector portions 13 and are discharged when their size is smaller than the first passage gap G1.

[0173] The heavy contaminants can instead fall to the bottom of the circumferential throats 14 and from the edges that delimit them.

[0174] According to one embodiment, the amplitude of the passage gap G2 between the facing circumferential throats 14 is from about 1.5 to about 5 times the amplitude of the passage gap G1 defined between the facing selector portions 13.

[0175] According to one embodiment, the amplitude of the passage gap G2 in correspondence to a circumferential throat 14 is from about 1.5 to about 3 times the amplitude of the passage gap G1 defined between facing selector portions 13.

[0176] According to some embodiments, the first amplitude G1 can be for example comprised between 1mm and 12mm and the second amplitude G2 can be comprised between 1.5mm and 18mm.

[0177] However, these values can vary since they depend on the type of material worked and on the quantity

and quality of the heavy contaminants present.

[0178] They can also depend on the position of the rollers 10 in a selector machine in order to obtain progressive selections.

[0179] It is clear that modifications and/or additions of parts may be made to the roller 10 as described heretofore, without departing from the field and scope of the present invention.

[0180] It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of roller 10, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

Claims

1. Selector roller suitable for the selection of chips made of wood or similar materials, comprising a hole (20) for keying the roller on a roller-bearing shaft (12), and at least one external surface (16) with at least two selector portions (13), wherein said selector portions (13) are provided with surface modifications (21, 22, 23) configured to actuate the desired selection of the chips, said selector roller having a cusp (18) defined by conical lateral surfaces to form two conical or sub-conical sides (11), the top of the cusp (18) being defined by an apical portion (15) providing a circumferential connection, said selector roller also having a plurality of circumferential throats (14), disposed on one side (11) and on the other of the cusp (18) and between one and the other of the selector portions (13), said circumferential throats (14) cooperating with said selector portions (13) and configured to operate on heavy contaminants, and wherein each of said circumferential throats (14) has a maximum depth (D) comprised between 1 mm and 6 mm measured with respect to the lowest edge that defines each of said circumferential throats (14) and the edge of the adjacent selector portion (13).

2. Selector roller as in claim 1, **characterized in that** it comprises lateral shoulders (17) configured to cooperate with adjacent rollers and there is at least one circumferential throat (14) in correspondence with the zone where said lateral shoulders (17) are adjacent to each other.

3. Selector roller as in any claim hereinbefore, **characterized in that** each of said circumferential throats (14) has a circular development lying on a plane orthogonal to an axis (X) of said roller.

4. Selector roller as in any claim 1 or 2, **characterized in that** at least part of each if said circumferential throats (14) lies on a plane inclined with respect to an axis (X) of said roller.

5. Selector roller as in any claim hereinbefore, **characterized in that** each of said circumferential throats (14) has a semi-cylindrical conformation.

6. Selector roller as in any claim from 1 to 4, **characterized in that** said at least one circumferential throat (14) has a conformation with parallel sides.

7. Selector roller as in claim 6, **characterized in that** each of said circumferential throats (14) has a cylindrical bottom.

8. Selector roller as in claim 6, **characterized in that** each of said circumferential throats (14) has a V-shaped bottom.

9. Selector roller as in any claim from 1 to 6, **characterized in that** each of said circumferential throats (14) has a curvilinear bottom.

10. Selector roller as in claim 2, **characterized in that** at least one lateral shoulder (17) has a circumferential throat (14).

11. Selector roller as in claim 2, **characterized in that** said circumferential throat (14) affects two adjacent lateral shoulders (17).

12. Selector roller as in any claim hereinbefore, **characterized in that** each of said circumferential throats (14) has an amplitude (W1) comprised between 0.2 and 1.5 times an amplitude (W2) of the selector portion (13) with which it cooperates.

13. Selector roller as in any claim hereinbefore, **characterized in that** each of said circumferential throats (14) has an amplitude (W1) comprised between 1 mm and 7 mm.

14. Selector machine for chips or similar materials, advantageously but not exclusively of wood material comprising at least two parallel roller-bearing shafts (12), **characterized in that** each shaft (12) comprises at least one roller (10) as defined in any claim hereinbefore, said rollers (10) having respective selector portions (13) facing and cooperating with each other.

15. Selector machine as in claim 14, **characterized in that** at least one circumferential throat (14) of a roller (10) is aligned with at least one circumferential throat (14) of a respective facing roller (10) and an amplitude of the passage gap (G2) between said facing circumferential throats (14) is from 1.5 to 5 times an amplitude of the passage gap (G1) defined between said facing selector portions (13).

16. Selector machine as in claim 15, **characterized in that** at least one circumferential throat (14) of a roller (10) is at least partly offset with respect to at least one circumferential throat (14) of a respective facing roller (10).

17. Selector machine as in any of the claims from 14 to 16, **characterized in that** it comprises positioning means suitable to allow the reciprocal positioning of the adjacent shafts (12), said positioning means being chosen from means of the manual type, interlock means, or controlled and programmed means.

Patentansprüche

1. Auswahlwalze geeignet für die Auswahl von Spänen, die aus Holz oder ähnlichen Materialien gemacht sind, mit einem Loch (20) zum Keilverbinden der Walze an einer Wälzlagerwelle (12) und wenigstens einer äußeren Fläche (16) mit wenigstens zwei Auswahlabschnitten (13), wobei die Auswahlabschnitte (13) mit Flächenmodifikationen (21, 22, 23) versehen sind, die gestaltet sind, um die gewünschte Auswahl der Späne in Gang zu bringen, wobei die Auswahlwalze eine Spitze (18) hat, die durch konische Seitenflächen definiert ist, um zwei konische oder subkonische Seiten (11) auszubilden, wobei der obere Bereich der Spitze (18) durch einen apikalen Abschnitt (15) definiert ist, der eine Umfangsverbindung vorsieht, wobei die Auswahlwalze auch eine Vielzahl von Umfangshälsen (14) hat, die an einer Seite (11) und an der anderen Seite der Spitze (18) und zwischen einem und dem anderen der Auswahlabschnitte (13) angeordnet sind, wobei die Umfangshälse (14) mit den Auswahlabschnitten (13) zusammenwirken und gestaltet sind, um an schweren Verunreinigungen zu arbeiten, und wobei jeder der Umfangshälse (14) eine maximale Tiefe (D) hat, die zwischen 1 mm und 6 mm liegt und die mit Bezug zu dem untersten Rand, der jeden der Umfangshälse (14) definiert, und dem Rand des benachbarten Auswahlabschnitts (13) gemessen ist.

2. Auswahlwalze nach Anspruch 1, **dadurch gekennzeichnet, dass** sie seitliche Schultern (17) aufweist, die gestaltet sind, um mit benachbarten Walzen zusammenzuwirken, und es wenigstens einen Umfangshals (14) in Übereinstimmung mit der Zone gibt, wo die seitlichen Schultern (17) benachbart zueinander sind.

3. Auswahlwalze nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** jeder der Umfangshälse (14) einen kreisförmigen Verlauf hat, der in einer Ebene senkrecht zu einer Achse (X) der Walze liegt.

4. Auswahl nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** wenigstens ein Teil von jedem der Umfangshälse (14) in einer Ebene liegt, die mit Bezug zu einer Achse (X) der Walze geneigt ist.

5. Auswahlwalze nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** jeder der Umfangshälse (14) eine halbzylindrische Gestalt hat.

6. Auswahlwalze nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** der wenigstens eine Umfangshals (14) eine Gestalt mit parallelen Seiten hat.

7. Auswahlwalze nach Anspruch 6, **dadurch gekennzeichnet, dass** jeder der Umfangshälse (14) einen zylindrischen Boden hat.

8. Auswahlwalze nach Anspruch 6, **dadurch gekennzeichnet, dass** jeder der Umfangshälse (14) einen V-förmigen Boden hat.

9. Auswahlwalze nach einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet, dass** jeder der Umfangshälse (14) einen gekrümmten Boden hat.

10. Auswahlwalze nach Anspruch 2, **dadurch gekennzeichnet, dass** wenigstens eine seitliche Schulter (17) einen Umfangshals (14) hat.

11. Auswahlwalze nach Anspruch 2, **dadurch gekennzeichnet, dass** der Umfangshals (14) zwei benachbarte seitliche Schultern (17) beeinflusst.

12. Auswahlwalze nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** jeder der Umfangshälse (14) eine Weite (W1) hat, die zwischen 0,2 und 1,5-mal einer Weite (W2) des Auswahlabschnitts (13) liegt, mit dem er zusammenwirkt.

13. Auswahlwalze nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** jeder der Umfangshälse (14) eine Weite (W1) hat, die zwischen 1 mm und 7 mm liegt.

14. Auswahlmaschine für Späne oder andere Materialien, vorteilhafter Weise aber nicht exklusiv aus Holzmaterial, wobei die Auswahlmaschine wenigstens zwei parallele Wälzlagerwellen (12) aufweist, **dadurch gekennzeichnet, dass** jede Welle (12) wenigstens eine Walze (10) aufweist, wie sie in einem der vorhergehenden Ansprüche definiert ist, wobei die Walzen (10) jeweilige Auswahlabschnitte (13) haben, die einander zugewandt sind und miteinander zusammenwirken.

15. Auswahlmaschine nach Anspruch 14, **dadurch gekennzeichnet, dass** wenigstens ein Umfangshals (14) einer Walze (10) mit wenigstens einem Umfangshals (14) einer jeweiligen zugewandten Walze (10) ausgerichtet ist und eine Weite des Durchgangsspalts (G2) zwischen den zugewandten Umfangshälsen (14) von 1,5 bis 5-mal einer Weite des Durchgangsspalts (G1) ist, der zwischen den zugewandten Auswahlabschnitten (13) definiert ist.

16. Auswahlmaschine nach Anspruch 15, **dadurch gekennzeichnet, dass** wenigstens ein Umfangshals (14) einer Walze (10) wenigstens teilweise mit Bezug zu wenigstens einem Umfangshals (14) einer jeweiligen zugewandten Walze (10) versetzt ist.

17. Auswahlmaschine nach einem der Ansprüche 14 bis 16, **dadurch gekennzeichnet, dass** sie eine Positionierungseinrichtung aufweist, die geeignet ist, um das wechselseitige Positionieren der benachbarten Wellen (12) zu gestatten, wobei die Positionierungseinrichtung von einer Einrichtung des manuellen Typs, einer ineinandergreifenden Einrichtung oder einer gesteuerten und programmierten Einrichtung ausgewählt ist.

Revendications

1. Rouleau sélecteur approprié pour la sélection de copeaux en bois ou en matériaux similaires, comprenant un trou (20) pour verrouiller le rouleau sur un arbre de roulement à rouleaux (12) et au moins une surface externe (16) avec au moins deux parties de sélecteur (13), dans lequel lesdites parties de sélecteur (13) sont pourvues de modifications de surface (21, 22, 23) configurées pour actionner la sélection souhaitée des copeaux, ledit rouleau sélecteur présentant une pointe (18) définie par des surfaces latérales coniques pour former deux côtés coniques ou subconiques (11), le sommet de la pointe (18) étant défini par une partie apicale (15) assurant une connexion circonférentielle, ledit rouleau sélecteur présentant également une pluralité de gorges circonférentielles (14), disposées d'un côté (11) et de l'autre de la pointe (18) et entre l'une et l'autre des parties de sélecteur (13), lesdites gorges circonférentielles (14) coopérant avec lesdites parties de sélecteur (13) et étant configurées pour fonctionner sur des contaminants lourds, et dans lequel chacune desdites gorges circonférentielles (14) présente une profondeur maximale (D) comprise entre 1 mm et 6 mm mesurée par rapport au bord le plus bas qui définit chacune desdites gorges circonférentielles (14) et le bord de la partie de sélecteur adjacente (13).

2. Rouleau sélecteur selon la revendication 1, **caractérisé en ce qu'**il comprend des épaulements latéraux (17) configurés pour coopérer avec des rouleaux adjacents et **en ce qu'**il existe au moins une gorge circonférentielle (14) en correspondance avec la zone où lesdits épaulements latéraux (17) sont mutuellement adjacents.

3. Rouleau sélecteur selon l'une quelconque des revendications précédentes, **caractérisé en ce que** chacune desdites gorges circonférentielles (14) présente un développement circulaire situé sur un plan orthogonal à un axe (X) dudit rouleau.

4. Rouleau sélecteur selon l'une quelconque des revendications 1 ou 2, **caractérisé en ce qu'**au moins une partie de chacune desdites gorges circonférentielles (14) se trouve sur un plan incliné par rapport à un axe (X) dudit rouleau.

5. Rouleau sélecteur selon l'une quelconque des revendications précédentes, **caractérisé en ce que** chacune desdites gorges circonférentielles (14) présente une conformation semi-cylindrique.

6. Rouleau sélecteur selon l'une quelconque des revendications 1 à 4, **caractérisé en ce que** ladite au moins une gorge circonférentielle (14) présente une conformation avec des côtés parallèles.

7. Rouleau sélecteur selon la revendication 6, **caractérisé en ce que** chacune desdites gorges circonférentielles (14) présente un fond cylindrique.

8. Rouleau sélecteur selon la revendication 6, **caractérisé en ce que** chacune desdites gorges circonférentielles (14) présente un fond en forme de V.

9. Rouleau sélecteur selon l'une quelconque des revendications 1 à 6, **caractérisé en ce que** chacune desdites gorges circonférentielles (14) présente un fond curviligne.

10. Rouleau sélecteur selon la revendication 2, **caractérisé en ce qu'**au moins un épaulement latéral (17) présente une gorge circonférentielle (14).

11. Rouleau sélecteur selon la revendication 2, **caractérisé en ce que** ladite gorge circonférentielle (14) affecte deux épaulements latéraux adjacents (17).

12. Rouleau sélecteur selon l'une quelconque des revendications précédentes, **caractérisé en ce que** chacune desdites gorges circonférentielles (14) présente une amplitude (W1) comprise entre 0,2 et 1,5 fois une amplitude (W2) de la partie de sélection (13) avec laquelle elle coopère.

13. Rouleau sélecteur selon l'une quelconque des re-

vendications précédentes, **caractérisé en ce que** chacune desdites gorges circonférentielles (14) présente une amplitude (W1) comprise entre 1 mm et 7 mm.

14. Machine de sélection pour copeaux ou matériaux similaires, avantageusement mais non exclusivement en bois, comprenant au moins deux arbres de roulement à rouleaux parallèles (12), **caractérisée en ce que** chaque arbre (12) comprend au moins un rouleau (10) tel que défini dans l'une quelconque des revendications précédentes, lesdits rouleaux (10) présentant des parties de sélecteur respectives (13) se faisant face et coopérant mutuellement.

15. Machine de sélection selon la revendication 14, **caractérisée en ce qu'**au moins une gorge circonférentielle (14) d'un rouleau (10) est alignée avec au moins une gorge circonférentielle (14) d'un rouleau respectif en vis-à-vis (10) et une amplitude de l'espace de passage (G2) entre lesdites gorges circonférentielles en vis-à-vis (14) est de 1,5 à 5 fois une amplitude de l'espace de passage (G1) défini entre lesdites parties de sélecteur en vis-à-vis (13).

16. Machine de sélection selon la revendication 15, **caractérisée en ce qu'**au moins une gorge circonférentielle (14) d'un rouleau (10) est au moins partiellement décalée par rapport à au moins une gorge circonférentielle (14) d'un rouleau en vis-à-vis respectif (10).

17. Machine de sélection selon l'une quelconque des revendications 14 à 16, **caractérisée en ce qu'**elle comprend des moyens de positionnement appropriés pour permettre le positionnement réciproque des arbres adjacents (12), lesdits moyens de positionnement étant choisis parmi des moyens de type manuel, des moyens de verrouillage mutuel ou des moyens commandés et programmés.

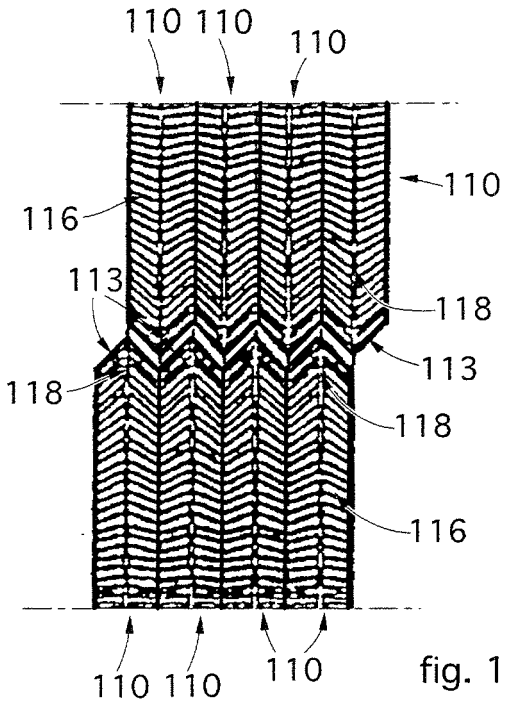

fig. 1a

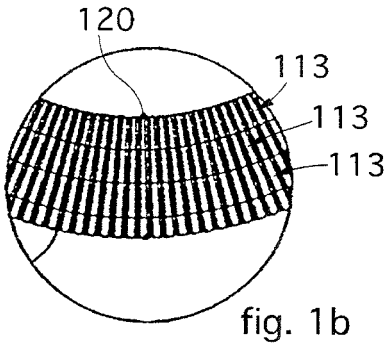

fig. 1b

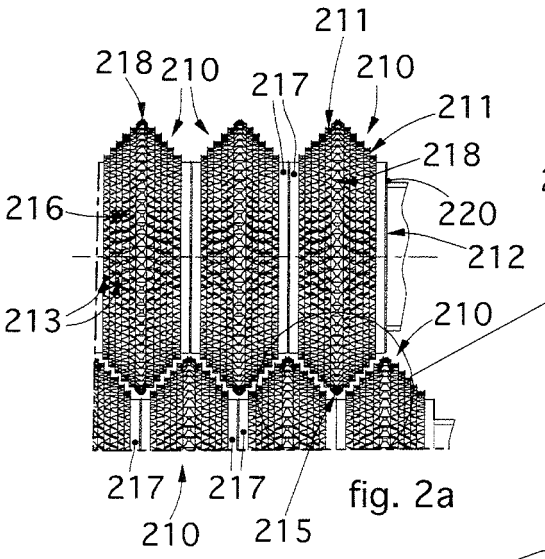

fig. 2a

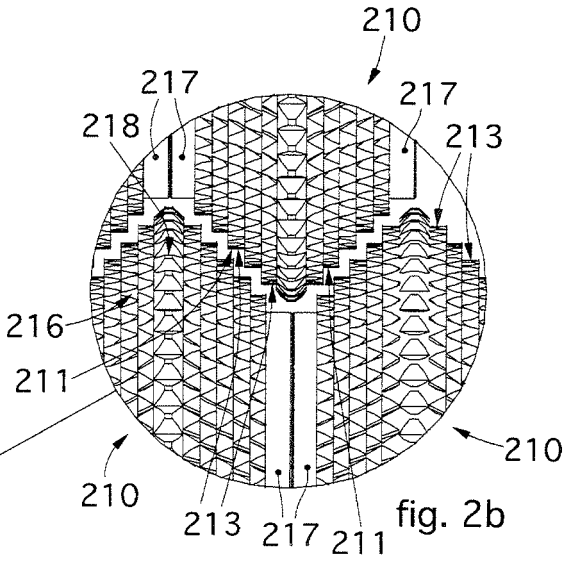

fig. 2b

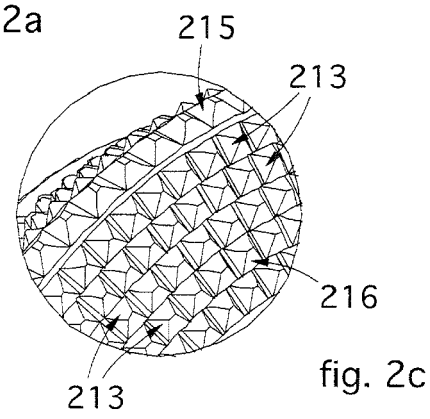

fig. 2c

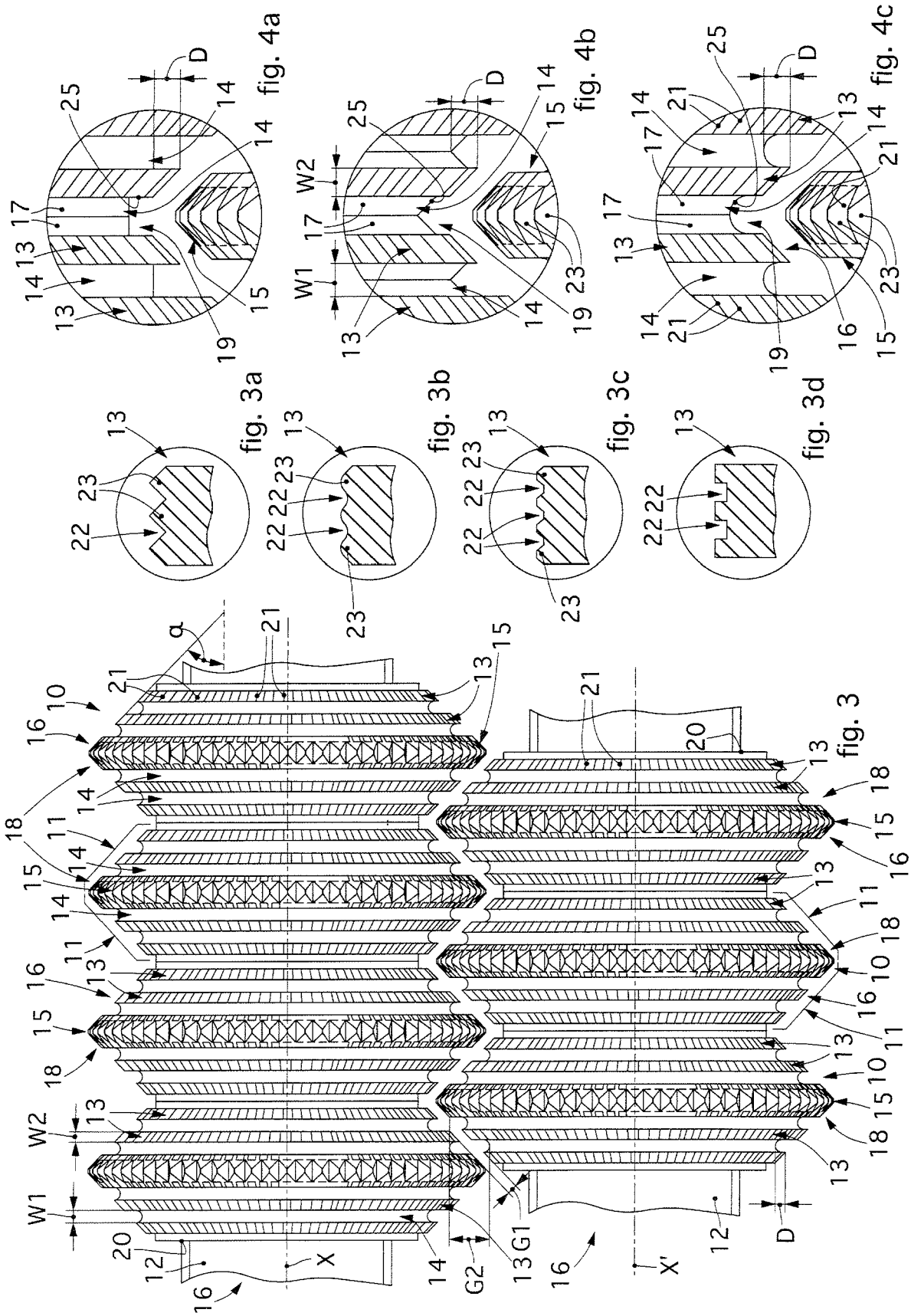
fig. 4a
fig. 4b
fig. 4c
fig. 3a
fig. 3b
fig. 3c
fig. 3d
fig. 3

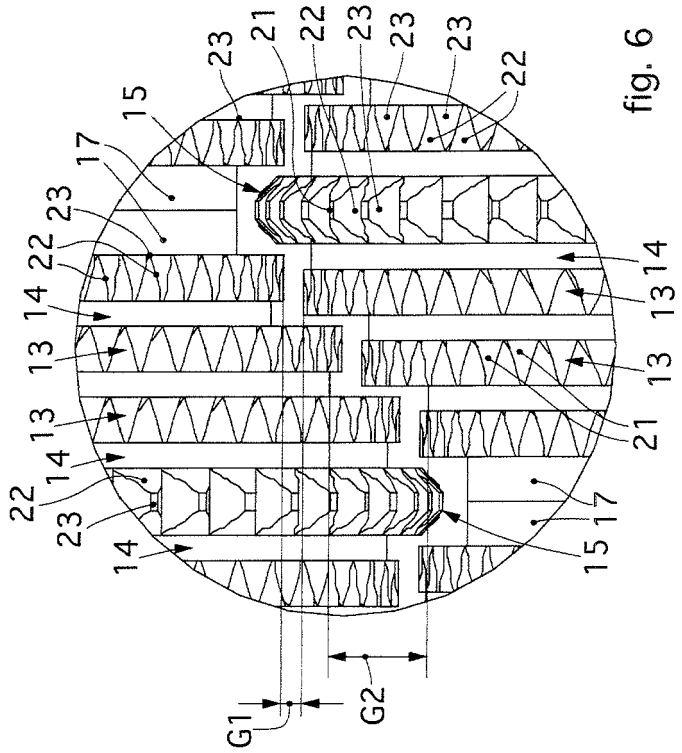

fig. 6

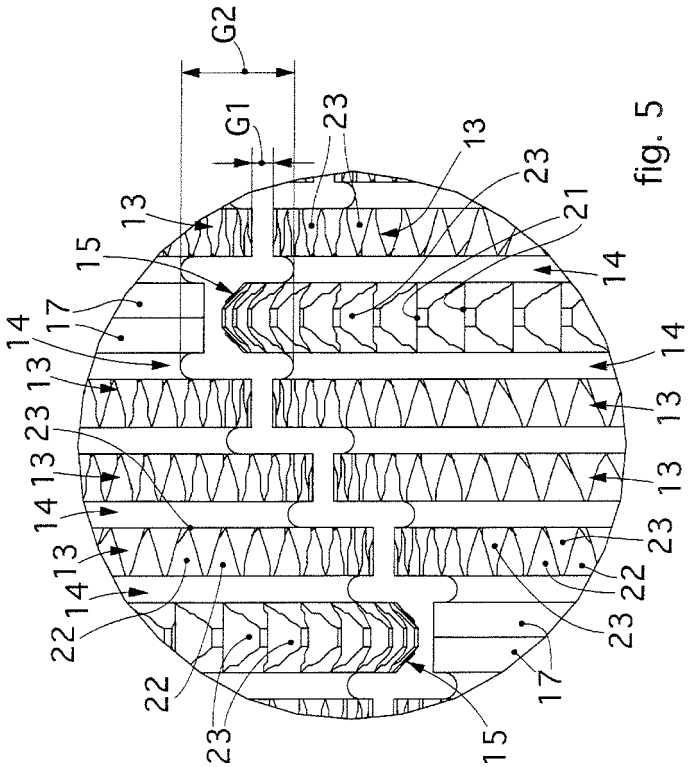

fig. 5

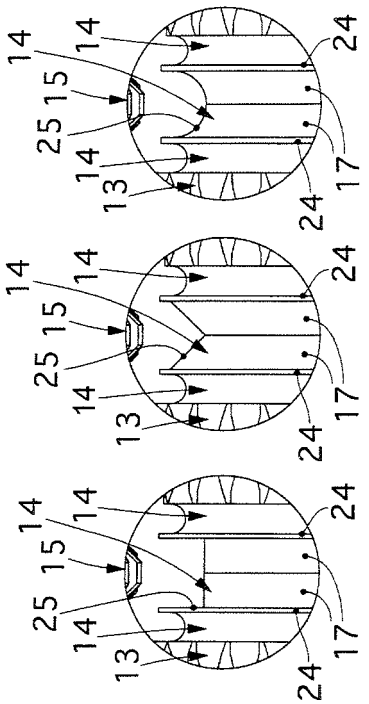

fig. 8c

fig. 8b

fig. 8a

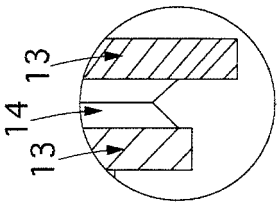

fig. 7c

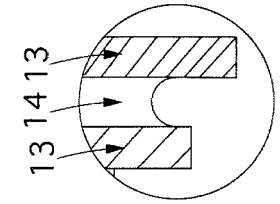

fig. 7b

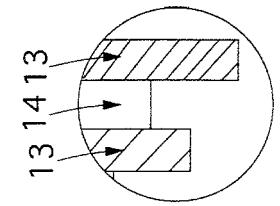

fig. 7a

REFERENCES CITED IN THE DESCRIPTION

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