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(54) Device and method for artificially ageing stones

(57) Device for artificially ageing stones (2) by breaking fragments of stone off the stones (2), comprising a supply device (1) for feeding in one or more stones (2), at least a first set of breaking means (3), which at least partially bound a throughput aperture through which the stones fed in are passed, and a discharge device (4) for discharging the stones fed through the breaking means.

The breaking means (3) comprise at least one rotary breaker shaft (7) provided with projecting mangling elements (8), which breaker shaft (7) bounds the throughput aperture at one longitudinal side, the mangling elements (8) being provided on the breaker shaft (7) at distances from each other that correspond substantially to the widths of the stones (2) to be aged artificially, and the mangling elements (8) projecting inwards into the throughput aperture in such a way that during operation the mangling elements (8) provided at the abovementioned distances from each other during rotation of the breaker shaft (7) break substantially only edge fragments of the stone material off stones (2) conveyed past the mangling elements (8).

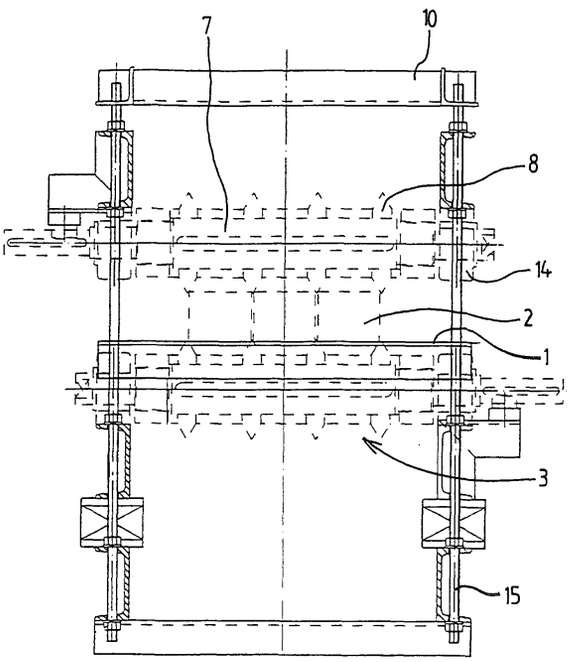

Fig 2

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Description

[0001] The invention relates to a device for artificially ageing stones, according to the preamble of claim 1.

[0002] Various devices and methods for ageing stones are known. For instance, stones can be placed for a certain time in a rotating drum, with the result that pieces will break off the edges of the stones, thus making these stones look older.

[0003] The disadvantage is that the stones come out of the drum in an unordered state. Further transportation of the stones cannot proceed until the stones have been stacked in an ordered manner on pallets. Otherwise the stones have to be transported as they are, unordered, in expensive container bags that are difficult to handle. A further disadvantage is that rotating the stones in the drum causes a very great noise nuisance. It also frequently happens that some stones are damaged too much and others are not damaged enough. Finally, the stones have to be fully hardened, in other words they have to be left for seven to fourteen days to harden before they can be placed in the drum.

[0004] A device according to the preamble of claim 1 is known, for example from EP-A-860,258. Fig. 7 shows a device with two vibrating plates situated opposite each other. The vibrating plates bound a throughput aperture, through which stones are fed. The stones are flung backwards and forwards between the plates, during which process pieces will break off the stones, with the result that they will look older. If desired, the plates can be provided with a profile, in order to facilitate the breaking off of pieces of stone.

[0005] A disadvantage in the case of this known device is that this device still causes very great noise nuisance and provides an irregular artificial ageing result. Furthermore, this device requires a large amount of operating space, partly as the result of the minimum throughput length required for the vibrating plates and the fact that the treated stones come out from between the vibrating plates with a distance between them.

[0006] The object of the invention is to overcome the abovementioned disadvantages at least partially, or to provide a serviceable alternative, and in particular to provide a low-noise, compact ageing device in the case of which the stones can retain their mutual positioning as far as possible after the treatment has been completed.

[0007] This object is achieved according to the present invention by a device according to claim 1. The device is designed with breaking means which comprise at least one rotary breaker shaft. The breaker shaft is provided with projecting mangling elements. The mutual centre-to-centre distance between the mangling elements corresponds substantially to the width of the stones to be treated. The breaker shaft is placed downstream of a supply device, the supply device being designed in particular to feed in rows of stones lying side by side. The breaker shaft bounds one longitudinal side of a throughput aperture. Stones fed through the throughput aperture can pass the mangling elements only if small edge fragments break off the stones. The so-called nibbling of the edge fragments can advantageously be performed with low noise levels. In addition, it is a damage process that can be controlled very accurately, for example by slightly varying a setting height of the breaker shaft with mangling elements relative to the throughput aperture, or by giving the mangling elements a desired profile.

[0008] It is pointed out that US-A-4,557,246 discloses a brick-cleaning machine with several sprockets provided at a distance from each other on rotary shafts. However, the sprockets together serve to remove a cement layer from a used building brick and to give the brick an original undamaged surface. Since the cement residues can be situated over the entire surface of the brick, the distances between the individual sprockets are relatively short. Moreover, several shafts are disposed one after the other, the sprockets of the respective shafts being disposed in a staggered manner relative to each other.

[0009] The breaking means according to the present invention are preferably designed with two breaker shafts situated opposite each other and having mangling elements. This ensures that bottom and top edges of each stone are treated simultaneously.

[0010] The device can comprise pushing elements for pressing the stones through the throughput aperture of the breaking means. However, the one or more breaker shafts is/are advantageously driven, so that the row of stones is, as it were, forced through the throughput apertures.

[0011] Further preferred embodiments are set out in the subclaims.

[0012] The invention also relates to a method for artificially ageing stones, according to claim 9.

[0013] The invention will be explained in greater detail with reference to the appended drawing, in which:

Fig. 1 shows a diagrammatic side view of an embodiment of a device according to the invention;
Fig. 2 shows a front view of the device in Fig. 1;
Fig. 3 shows a view on an enlarged scale of the breaking means in Fig. 2;
Fig. 4 shows a diagrammatic arrangement of a device with a first and a second set of breaking means; and
Fig. 5 shows a variant of an embodiment of the breaking means shown in Figs 1 - 3.

[0014] The device in Figs 1 - 3 comprises a supply device 1, formed here by a slide conveyor. The supply device 1 serves to feed in rows of stones 2 lying side by side, which stones are to be subjected to an artificial ageing treatment. The supply device 1 opens out at breaking means 3, which in turn connect to a discharge device 4, formed here by a slide conveyor. The breaking means 3 comprise two breaker shafts 7, which are sit-

uated one above the other and on which disc-shaped mangling elements 8 are fitted. The breaker shafts 7 are bearing-mounted in a frame 10.

[0015] As can be seen clearly in Figs 2 and 3, an elongate aperture is left clear between the breaker shafts 7 with mangling elements 8. The distance between the tops of two mangling elements 8 lying opposite each other is slightly shorter here than the height of the stones 2 to be treated, while the distance between the tops of two mangling elements 8 lying side by side is selected so that it is slightly shorter than the width of the stones 2 to be treated. The distances between the individual mangling elements 8 can be altered in a simple manner by sliding various formats of filler pieces 12 over the breaker shafts 7. The height of the throughput aperture can be set in a simple manner by moving bearings 14 for the breaker shafts 7 up or down along screwed rods 15 of the frame 10.

[0016] As already stated, the breaker shafts 7 are driven in opposite directions of rotation, a key groove 17 ensuring that each of the mangling elements 8 will rotate along with the breaker shaft 7 concerned.

[0017] The mangling elements 8 shown are designed with a V-shaped peripheral edge. If desired, the peripheral edge can further be provided with a specific profile, for example knurls. Differently shaped mangling elements, for example spherical, can also be used. A different shape in this case will generally provide a different type of damage and external appearance of the treated stones 2. Different types of mangling elements 8 can also be placed on the same breaker shaft 7. As a result of this, a great diversity of external appearance can be obtained for each batch of treated stones 2.

[0018] During operation, stones coming from the supply device 1 are forced through between the breaker shafts 7, which are being driven in opposite directions, during which process the mangling elements 8 situated opposite each other cause little pieces to break off the edges and corners of the stones 2. It will be clear that four edges are damaged during each throughput of stones through the breaking means 3. The process is then preferably repeated for the other edges.

[0019] For this purpose, Fig. 4 shows a device with a first and second set of breaking means 20 and 21 respectively. During operation, a layer of stones is in each case lifted by means of a special grip from a stack of stones 22 and placed on a slide conveyor 23. The layer is composed here, for example, of eight times twelve stones measuring ten by ten centimetres. By means of a pushing device (not shown), the layer of stones 22 is moved horizontally along the slide conveyor 23 towards the first set of breaking means 20. The breaking means 20, 21 are each composed of two horizontal breaker shafts with mangling elements, namely one above and one below the slide conveyor 23. The breaker shafts are positioned at right angles to the slide conveyor 23. The breaker shafts are driven in opposite directions, with the result that the layer of stones is pulled through between the mangling elements. The corners and edges of the stones are damaged in the process. The layer of stones subsequently reaches a second slide conveyor 24, which is positioned at right angles to the first slide conveyor 23. The layer of stones is now pulled through between driven breaker shafts of the second set of breaking means 21, in the course of which the as yet undamaged corners and edges undergo their artificial ageing treatment. Each stone is therefore provided in two treatment steps with chipped-off or damaged parts on all edges. From the second slide conveyor 24 the stones, still neatly oriented, can be placed on a pallet 25 again by means of a transfer unit (not shown).

[0020] In a variant, one set of breaking means will suffice. After undergoing a first treatment step, the stones can be treated again by the same breaking means, by rotating them through 90°.

[0021] Many variants are possible in addition to the embodiment illustrated. For instance, the mangling elements can be made blunter towards the end faces of the breaker shaft. The stones to be treated often have slight differences in dimensions. These differences in dimensions are now compensated for in a simple manner by designing the mangling elements with a less sharp profile towards the outside.

[0022] Fig. 5 shows a variant of an embodiment of the breaking means with mangling elements 41 provided with curved peripheral faces. The radius of curvature R of the mangling elements 41 increases here in the direction of the end faces of the breaker shaft 40. More particularly, the following applies for the respective radii of curvature: R1 < R2 < R3. The mangling elements 41 therefore become increasingly flat towards the outside. Yet more particularly, the following applies: R1 = ½ R2 = 1/3 R3. Here again, slight deviations in dimensions or irregularities on the stones can be compensated for in a simple manner without adversely affecting the quality of the artificial ageing process.

[0023] The stones to be treated can be either concrete stones or bricks, and are preferably conveyed to the breaking means directly after a brief hardening time. This saves on handling and storage costs.

[0024] Thus, a cheap, compact and low-noise device for producing stones with the external appearance of traditional cobblestones is provided according to the invention. The surfaces of the stones remain substantially undamaged during the treatment, while the edges of the stones are partially chipped away.

Claims

1. Device for artificially ageing stones by breaking fragments of stone off the stones, comprising:

   - a supply device (1) for feeding in one or more stones (2);
   - at least a first set of breaking means (3), which

at least partially bound a throughput aperture through which the stones (2) fed in are passed; and

- a discharge device (4) for discharging the stones (2) fed through the breaking means (3),

characterized in that the breaking means (3) comprise at least one rotary breaker shaft (7) provided with projecting mangling elements, which breaker shaft (7) bounds the throughput aperture at one longitudinal side, the mangling elements (8) being provided on the breaker shaft (7) at distances from each other which correspond substantially to the widths of the stones (2) to be aged artificially, and the mangling elements (8) projecting inwards into the throughput aperture in such a way that during operation the mangling elements (8) provided at the abovementioned distances from each other during rotation of the breaker shaft (7) break substantially only edge fragments of the stone material off stones (2) conveyed past the mangling elements (8).

2. Device according to claim 1, in which the breaking means (3) comprise two rotary breaker shafts (7), situated opposite each other and having mangling elements (8) which bound the throughput aperture on opposite longitudinal sides.

3. Device according to claim 2, in which drive means are provided for driving the breaker shafts (7) in opposite directions of rotation.

4. Device according to one of the preceding claims, in which the mangling elements (8) are substantially disc-shaped.

5. Device according to one of the preceding claims, in which the mangling elements (8) are designed with a peripheral face that is V-shaped or curved in cross section.

6. Device according to claim 5, in which the mangling elements (8) at the end faces of the breaker shaft (7) are blunter or are designed with a greater radius than the mangling elements (8) situated nearer the centre of the breaker shaft (7).

7. Device according to one of claims 1 - 6, in which means are provided for rotating the stones (2) through 90° and feeding the stones (2) back to the breaking means (3).

8. Device according to one of claims 1 - 6, in which a throughput (24) is provided downstream of the first set of breaking means (20), for feeding stones (2) in a direction perpendicular to the original throughput direction, which throughput (24) opens out at a second set of breaking means (21).

9. Method for artificially ageing stones using a device according to one of claims 1 - 8, comprising the following steps:

- providing mangling elements (8) at mutual distances on a breaker shaft (7), which distances correspond substantially to the widths of stones of a particular format of stone (2) to be aged artificially;
- feeding in one or more stones (2) of the abovementioned format;
- conveying the stones (2) through the mangling elements (8) while the breaker shaft (7) is rotating;
- making the mangling elements (8) break off substantially only edge fragments of the stone material of the stones (2); and
- discharging the stones (2).

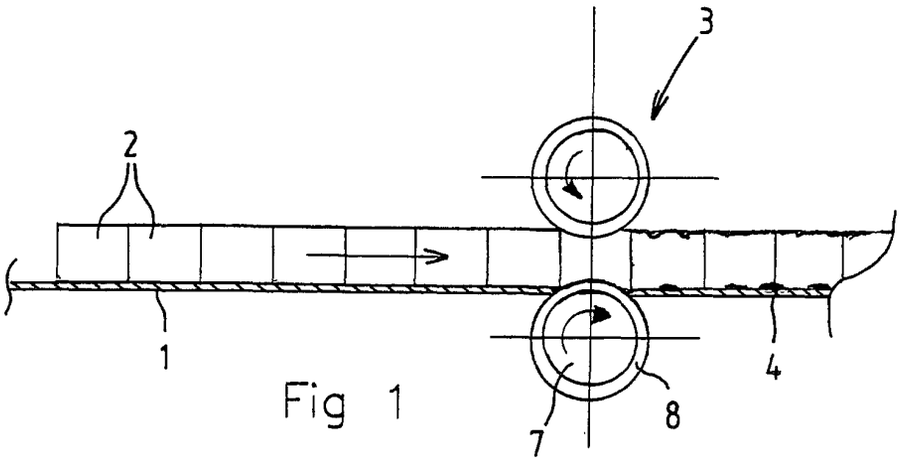

Fig 1

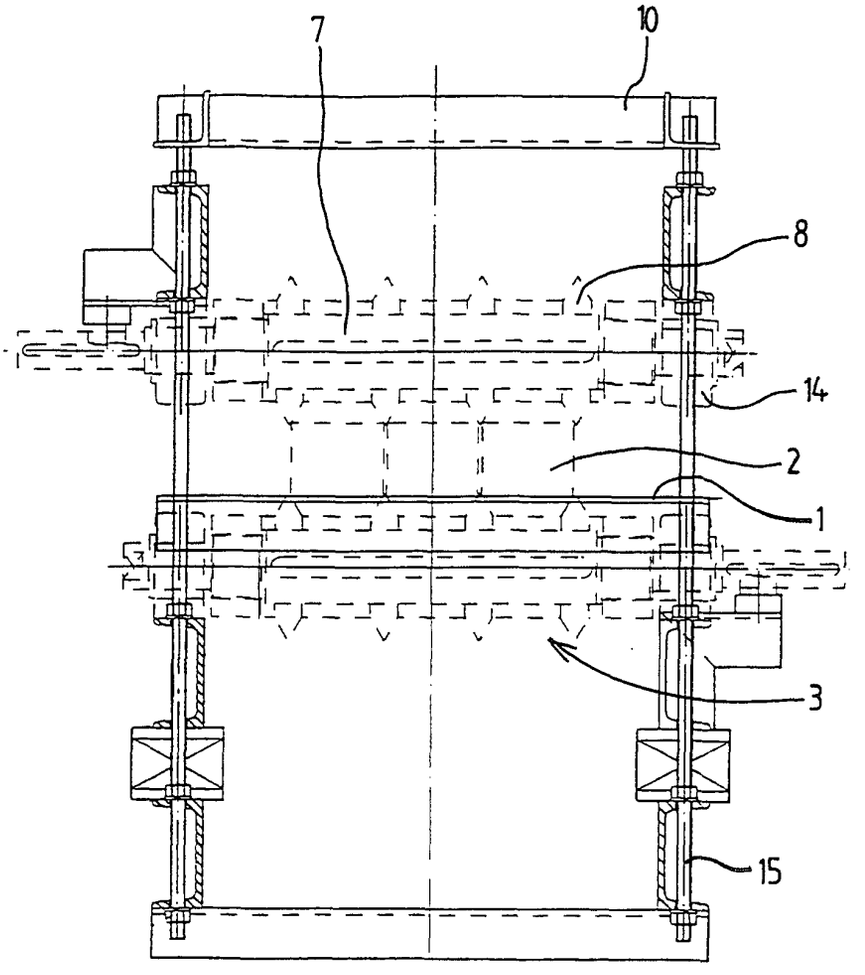

Fig 2

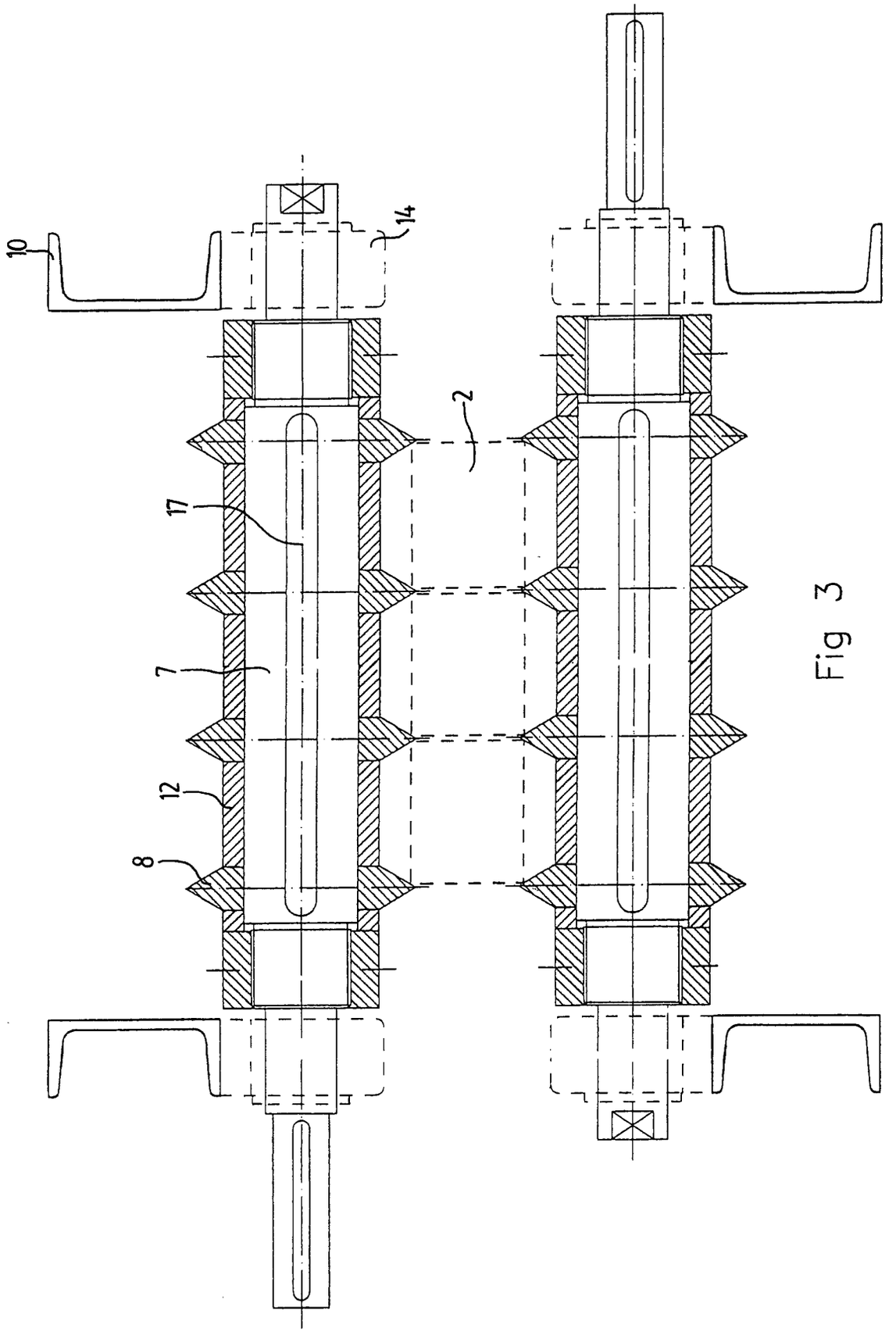

Fig 3

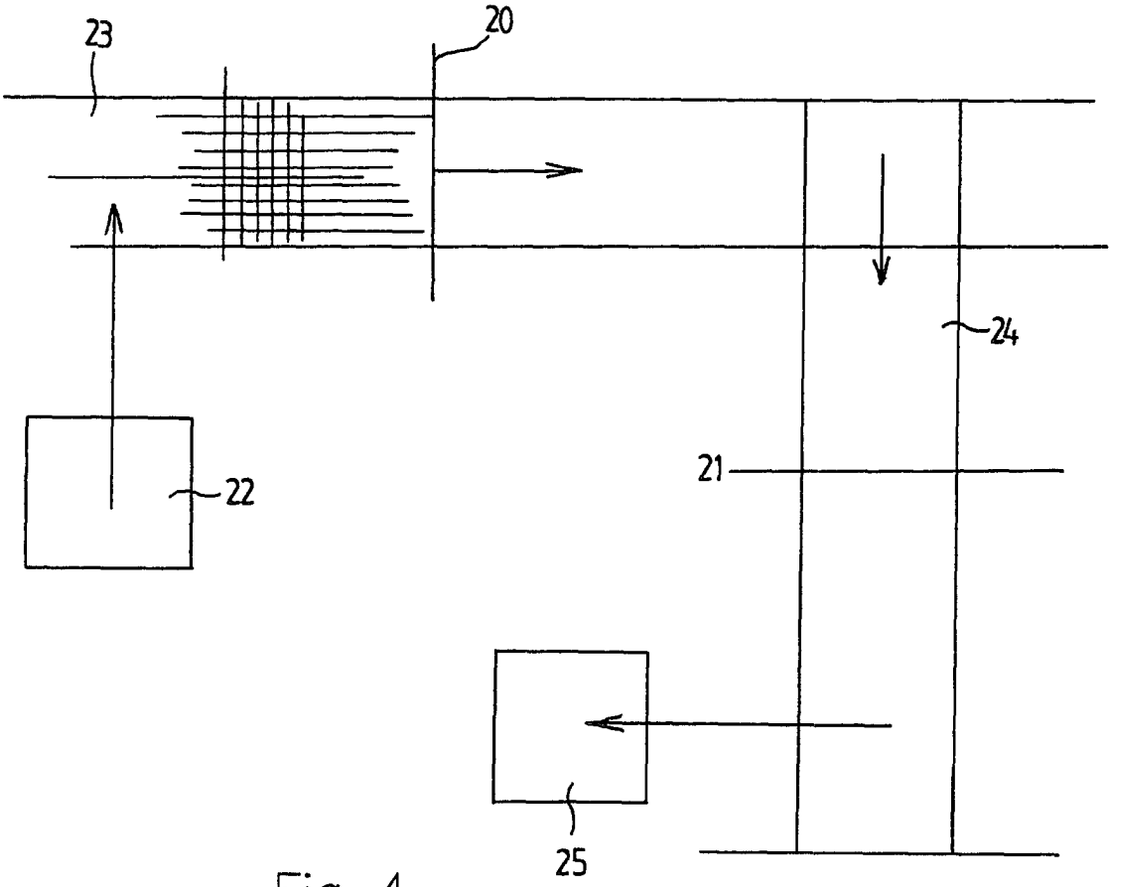

Fig 4

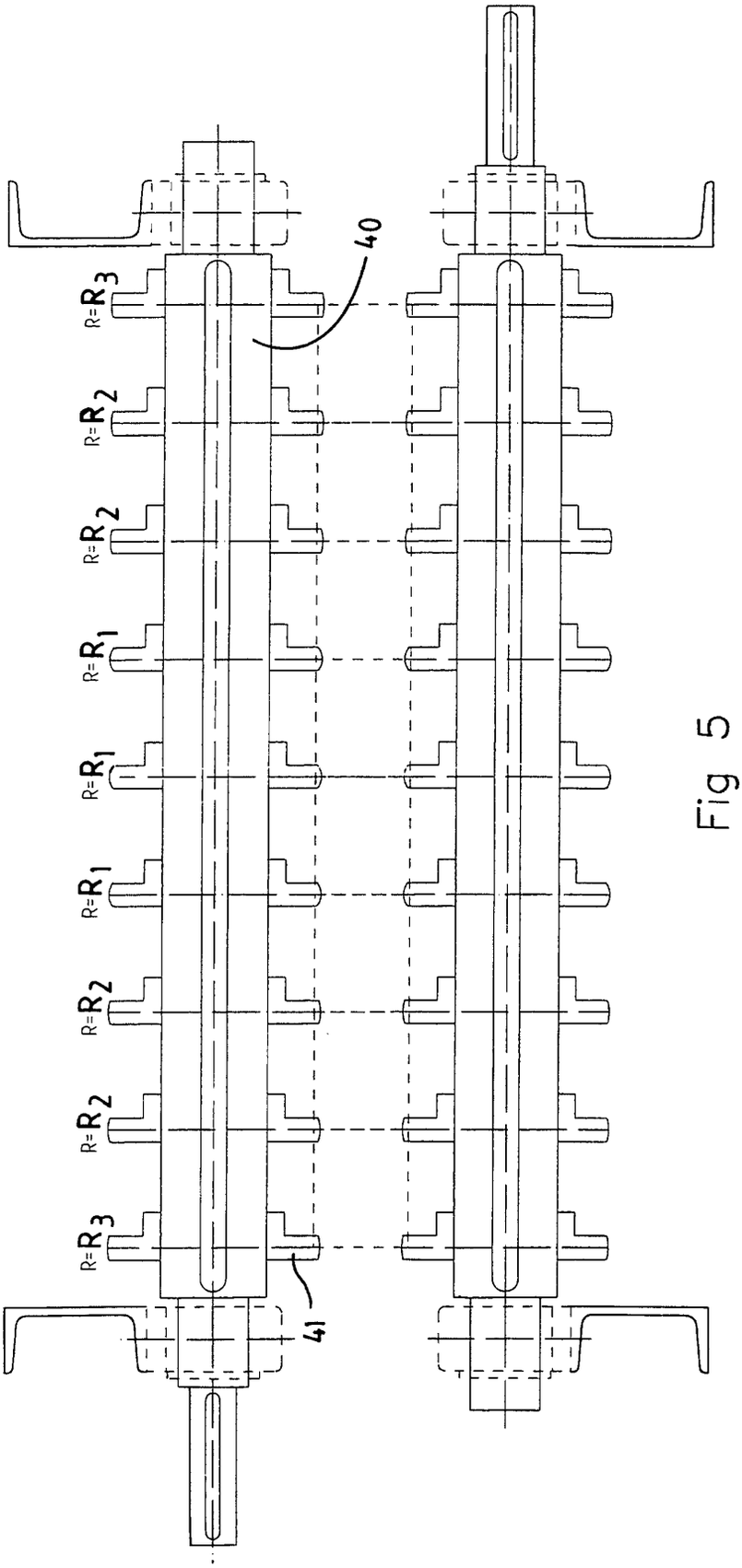

Fig 5

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Application Number
EP 01 20 4596

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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	21 February 2002	Rijks, M

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