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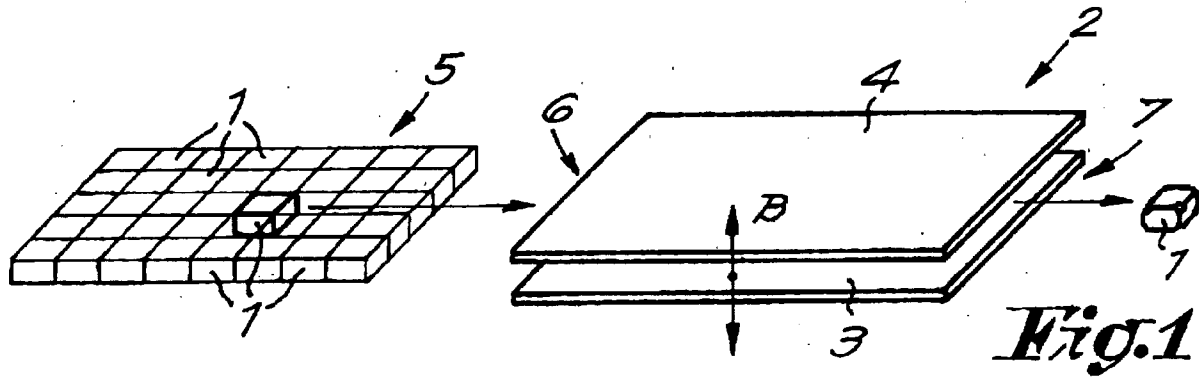
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(54) Method and device for distressing stones

(57) Method for distressing stones, in particular the visual ageing of stones, characterized in that the stones

(1) are provided between two or several elements (3-4) in between which they are beaten.



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Description

The present invention concerns a method and device for distressing, in particular visually ageing stones.

It is known that stones can be distressed by putting them in a rotating drum for a while. A number of stones is hereby provided in this drum, such that these stones are tossed as the drum rotates, which results in that pieces of the stone edges break off, so that these stones will look older.

This known technique is disadvantageous in that the stones leave the drum in a disordered manner. The further transport of the stones can take place either in an disordered manner, for example in container bags, or an ordered manner, for example stacked on pallets.

The use of container bags is disadvantageous in that they are expensive and difficult to handle.

In order to be transported on pallets, the distressed stones which leave the above-mentioned drum in a disordered manner will have to be piled and stacked again, which can only be carried out by very expensive machines or by means of a time-consuming manual manipulation.

The invention aims a method and a device for distressing stones based on an entirely different concept than the distressing by means of a drum, and which offer the advantage that among others the above-mentioned disadvantages can be excluded.

The invention aims a method which can be realized with a relatively small device, as opposed to the relatively large drums which have been used until now for distressing stones.

Another aim of the invention consists in offering a method for distressing stones which makes it possible to distress concrete stones relatively soon after their production. For, when the known drums are used, the concrete stones must have hardened very well, which implies that these concrete stones must harden first for 7 to 14 days, which requires a large storing space for the intermediate storing in case of large productions.

To this end, the invention concerns a method for distressing stones, in particular the visual distressing of stones, whereby the stones are provided between two or several elements in between which they are beaten.

As the stones are beaten between two elements and a free fall as in a drum is excluded, at least a certain order in the position of the stones can be maintained, such that they can be stacked and/or packaged for further transport without any effort and in a little time-consuming manner afterwards.

Preferably, the method is carried out such that the stones are entirely prevented from turning on their sides or from rotating between the two above-mentioned elements, such that the position of the stones cannot change during the manipulation and such that stones which are supplied in an orderly manner also leave the device in an orderly manner.

To this end, the stones are preferably provided such

between the two elements that their smallest dimension extends according to the direction perpendicular to the above-mentioned elements.

According to the most preferred embodiment, the stones are beaten back and forth between the two elements by subjecting one or both of these elements to a vibratory movement.

Preferably, the elements are kept at a mutual distance from one another during their movement, in particular during the vibratory movement, which is always smaller than twice the thickness of the stones provided in between. Thus the stones, in case several stones are manipulated simultaneously, cannot shift and/or roll over one another, so that they remain ordered in at least one plane.

Preferably, the stones are handled in groups, whereby the simultaneously handled stones are situated next to one another in one layer, for example in an amount which coincides with a pallet layer. These stones are hereby preferably also guided and/or supported sideways, so that they do not only remain arranged in one plane, but also remain lying next to one another in an orderly manner during the distressing process. A separate sorting handling at the end of the distressing process is thus excluded.

According to a special characteristic of the invention, elements are used of which one or both of the sides directed to one another are provided with profilings, such as thickenings, to promote that pieces are beaten off the stones, whereby the stones are preferably placed such opposite these profilings that said profilings are situated on one or several of the angles of the stones. Thus, the handling can be restricted to a minimum amount of time, and it is possible to determine quite precisely in what places pieces of the stones may break off.

The device according to the invention consists of two elements in between which the stones are beaten back and forth.

Preferably, these elements consist of mainly flat elements, in particular plates, in between which the stones can be provided, can be pushed through respectively, whereby at least one of these elements is provided with driving means, such that one or both of these elements are moved such that the stones provided between these elements are beaten back and forth between the elements.

In order to better explain the characteristics of the invention, the following preferred embodiments are described as an example only without being limitative in any way, with reference to the accompanying drawings, in which:

figure 1 schematically represents the method according to the invention;

figures 2 to 4 schematically represent different variants of the method;

figure 5 schematically represents a device according to the invention;

figure 6 shows a section according to line VI-VI in figure 5;
 figure 7 schematically represents a variant;
 figure 8 represents a practical embodiment of a device according to the invention;
 figure 9 shows a section according to line IX-IX in figure 8;
 figure 10 schematically represents another variant of a device according to the invention;
 figure 11 schematically represents an installation for producing concrete stones, whereby a distressing process according to the invention is simultaneously carried out.

As represented in figure 1, the method according to the invention mainly consists in that the stones 1 to be distressed are provided in a suitable device 2 between two elements 3-4, in between which they are beaten, in this case beaten back and forth, by making one or both of the elements 3-4 carry out a certain movement, in particular a vibratory movement. By beating the stones 1 back and forth, as indicated by B, pieces will break off the stones 1, so that they look visually older.

As is schematically represented, the elements 3 and 4 preferably consist of flat elements, in particular plates, which extend parallel or almost parallel in relation to one another.

As is represented in figure 1 by a thick and a thin line, the stones 1 can be handled one by one or in groups. In the latter case, the stones 1 are preferably handled per layer 5 formed of stones 1 laid next to one another.

The method is preferably carried out as a feed-through process, by which is meant that the stones 1 are pushed between the elements 3-4 on one end 6, and are removed from between the elements 3-4 on the other end, in this case the opposite end 7, after they have been processed.

The feed-through can be carried out continuously or in steps.

According to the invention, the movement of the stones 1 can be realized according to several possibilities, a number of which are represented in figures 2 to 4.

According to figure 2, one element, in this case the element 4, is held still while the other element 3 is moved back and forth, in this case up and down, in relation to the fixed element 4. As a result, the stones 1 provided between the elements 3 and 4 are thrown up and down between the elements 3 and 4 due to the vibration, so that pieces will break off the stones 3 and 4 due to the forces of impact exerted on the stones 1.

In the case of figures 3 and 4, both elements 3-4 are moved back and forth, in particular up and down, preferably with a vibratory movement.

According to figure 3, the elements 3 and 4 are moved in relation to one another according to opposite movements, in other words, the elements 3 and 4 are intermittently moved away from one another and back

to one another.

According to figure 4, the elements 3 and 4 are kept at a constant distance from one another, and they are moved simultaneously, so that the stones 1 are swung up and down between these elements 3-4, so that the aimed effect is also obtained.

As mentioned above, measures are preferably taken which restrict the lateral tilting of the stones 1 between the elements 3-4 and/or prevent the stones 1 from shifting or rolling over one another.

To this end, the distance D between the elements 3-4 always has to be smaller than twice the thickness D1 of the stones 1 provided in between. Moreover, the stones 1 are preferably provided such between the elements 3-4 that their smallest distance extends in a direction perpendicular to the sides of the above-mentioned elements 3-4 which are directed to one another.

From the schematic representations of figures 1 to 4, it is clear that the device 2 for realizing the above-mentioned method may actually consist of two elements 3-4, in particular plates, in between which the stones 1 can be beaten back and forth.

Figures 5 and 6 schematically represent a variant of this embodiment 2. The element 4 is hereby provided with profilings 8 on the bottom side, in particular thickenings, to promote that pieces are beaten off the stones 1. These profilings 8 may consist of material thickenings.

As is shown in figure 6, the stones 1 and the profilings 8 are situated opposite one another, such that the profilings 8 are situated opposite one or several of the angles of the stones 1.

As is further represented in figures 5 and 6, the device 2 may be equipped with guides 9-10 which offer a lateral guidance and/or support to the stones 1. In the example of figures 5 and 6, these guides 9-10 consist of struts which are fixed to the element 3.

The guides 9 and 10 make sure that the stones 1 cannot leave the device 2 sideways and also that they remain in an orderly position. When profilings 8 are used, these guides 9-10 also make sure that the stones 1 remain positioned correctly in relation to these profilings 8.

When the stones 1 are provided in steps in the device 2 and are processed in steps, also the far ends 6 and 7 can be equipped with supports which keep the stones 1 more or less in place. These can be removable supports 11 and 12 which are situated in the places indicated in figure 6 in the position in which they are provided.

Figure 7 schematically represents a variant of the device 2 in which the elements 3-4 are erected with a fall, which offers the advantage that the supplied stones 1 automatically vibrate through the device 2 from the one end 6 to the other end 7.

Figures 8 and 9 show a more practical embodiment.

The element 3 hereby consists of a table which vibrates up and down. The up and down movement is ob-

tained by means of eccentric mechanisms 13 which are driven by means of a motor 14 and which consist of bearings 15 or such which are eccentrically fixed on shafts 16 which are driven in turn by the motor 14 via transmissions 17, whereby supporting arms 18 are provided on these bearings 15 onto which the table is fixed by means of hinge points 19.

The table is prevented from tilting down by means of a hinged joint 20 with a support 21.

Guides 9-10 in the form of L-shaped struts are fixed to the element 3.

The element 4 consists of a fixed plate which is attached to supports 22.

The working of the device 2 according to figures 8 and 9 is mainly the same as described by means of the above figures. It is clear that the rotation of the shafts 16 results in an up and down movement of the supporting arms 18 and consequently of the element 3.

It should be noted that the eccentricity E is preferably selected such that it is smaller than half the thickness D1 of the stones 1. Moreover, the largest possible distance D between the elements 3 and 4 should preferably be smaller than twice the thickness D1, but the smallest distance D should be larger than D1.

Further, it should be noted that the device 2 can be realized such that a number of parameters of the movements of one or both of the elements 3-4 can be adjusted and/or set. As represented in figure 8, the vibration speed can for example be adjusted by controlling the motor 14 either with or without a speed regulator 23.

According to another possibility which is not represented here, also other parameters of the movement can be adjusted and/or set, such as for example the amplitude of vibration.

It is clear that instead of a conventional motor 14 and one or several eccentric mechanisms 13, also other driving means can be used. This is illustrated by the example of figure 10 in which the element 3 is part of a vibrating table or vibrator and is elastically supported to this end and set in motion by means of a vibrating motor 24.

It should be noted that the above-mentioned elements 3-4 can form a whole. Thus, the device 2 may for example consist of a tube with a rectangular section through which the stones 1 are pushed, while this tube is moved to and fro with a vibrating movement, diagonally to its longitudinal direction. In this case, the two above-mentioned elements 3-4 are formed of the two opposite walls of the tube respectively. This tube may hereby be made such that the stones 1 can only be pushed through it one after the other, or it can also be made such that several stones 1 can be simultaneously pushed through it one next to the other.

The invention is particularly suitable and advantageous when used for distressing concrete stones. However, it is clear that it can also be used for other stones, such as for example bricks or natural stones.

In the case of concrete stones, the method will be

preferably integrated in the production process or added to it at the end.

As shown in figure 11, the stones 1, in this case the concrete stones, are formed in a first stage 25 by making concrete vibrate in a mould 26 by means of a suitable device 27 which is known as such and as a consequence is only represented schematically. Several stones 1 are hereby simultaneously formed next to one another, preferably in a number which coincides with the number of stones 1 that is required to form a layer on a pallet.

In a second stage, the formed stones 1 are hardened in a natural or artificial manner. To this end, they are stored layer by layer, for example in a space 28 provided to this end. To this end, the stones 1 coming from the device 27 can be stacked on pallets 30 in this space 28 by means of an automatic transport device 29.

Once the concrete stones have sufficiently hardened, they are collected from the space 28 by means of the transport device 29 and they are carried to a device 2 according to the invention via a conveyor belt 31, after which they are exposed to a distressing process as they are fed through said device 2.

In all these stages, the stones 1 remain neatly arranged, so that they can finally be taken up by means of a stacker 32 with a clamping system 33 and so that several layers can be piled one on top of the other so as to form a pallet 34 with a number of concrete stones stacked on it.

All this is possible as the distressing method according to the invention does not require the stones 1 to be completely hardened, which is indeed necessary when the stones 1 are distressed by means of a drum.

According to the invention, the stones 1, in the case of concrete stones, are preferably distressed even before they are five days old. When the hardening process is artificially speeded up by means of steam/CO₂, this period can be significantly reduced. Thus is obtained that the stones 1 do not need to be stored any longer in the space 28 than is required now to harden and trade them.

The present invention is by no means restricted to the embodiments described above and represented in the accompanying drawings; on the contrary, such a method and device for distressing stones according to the invention can be made in all sorts of variants while still remaining within the scope of the invention.

50 Claims

1. Method for distressing stones, in particular the visual ageing of stones, characterized in that the stones (1) are provided between two or several elements (3-4) in between which they are beaten.
2. Method according to claim 1, characterized in that the lateral tilting of the stones (1) and/or the shifting

or rolling of the stones (1) is prevented.

3. Method according to claim 2, characterized in that the distance (D) between the elements (3-4) is always smaller than twice the thickness (D1) of the stones (1) provided in between. 5
4. Method according to any of the preceding claims, characterized in that the stones (1) are beaten back and forth between the above-mentioned elements (3-4) by moving at least one of the elements (3-4), preferably by means of a vibratory movement. 10
5. Method according to claim 4, characterized in that the elements (3-4) are moved according to any of the following possibilities: 15
 - one element (4) is held still, whereas the other element (3) is moved back and forth in relation to the fixed element (4); 20
 - one element (4) is held still, whereas the other element (3) is moved up and down under the fixed element (4);
 - both elements (3-4) are moved back and forth;
 - both elements (3-4) are moved in relation to one another with opposite movements; 25
 - both elements (3-4) are simultaneously moved back and forth with the same movements, such that the mutual distance (D) in between them always remains the same. 30
6. Method according to any of the preceding claims, characterized in that for the above-mentioned elements (3-4) use is made of flat elements, in particular plates which are mainly situated parallel or almost parallel to one another. 35
7. Method according to any of the preceding claims, characterized in that elements (3-4) are used of which one or both of the sides directed to one another are provided with profilings (8), such as thickenings, to promote that pieces are beaten off the stones (1), whereby the stones (1) are preferably placed such opposite these profilings (8) that said profilings (8) are situated on one or several of the angles of the stones (1). 40
8. Method according to any of the preceding claims, characterized in that the stones (1) are provided between the elements (3-4), are removed therefrom respectively, according to a feed-through process, either continuously or in steps. 50
9. Method according to any of the preceding claims, characterized in that the stones (1) are laterally guided, supported respectively. 55
10. Method according to any of the preceding claims,

characterized in that at least one of the two above-mentioned elements (3-4) is moved and in that one or several parameters of this movement, such as the amplitude and speed, can be adjusted and/or set.

11. Method according to claim 1, characterized in that the stones (1) are hammered.
12. Method according to any of the preceding claims, characterized in that several stones (1) are processed simultaneously while they are situated next to one another in a plane, whereby they are kept neatly arranged during the processing.
13. Method according to claim 12, characterized in that it is integrated in a production process for making visually aged concrete stones (1), whereby this production process successively provides in the formation of concrete stones (1) by vibrating concrete in a mould (26), whereby several concrete stones (1) are hereby simultaneously formed next to one another, preferably in a number which coincides with the number of stones (1) that is required to form a layer on a pallet (34); the hardening of the formed concrete stones (1), whereby they are stored layer per layer, as they are formed in the above-mentioned mould (26); the distressing of these stones (1), layer by layer, after the concrete stones (1) have hardened sufficiently, by providing them between two elements (3-4) in between which they are beaten; and finally the collection of the thus distressed stones (1), layer by layer, and the piling of several layers so as to form a pallet (34) with a number of concrete stones (1) stacked upon it.
14. Device for realizing the method according to any of the preceding claims, characterized in that it mainly consists of two elements (3-4) in between which the stones (1) are beaten back and forth.
15. Device according to claim 14, characterized in that the above-mentioned elements (3-4) consist of mainly flat elements, in particular plates, in between which the stones (1) can be provided, can be pushed through respectively, whereby at least one of these elements (3-4) is provided with driving means, such that one or both of these elements (3-4) are moved such that the stones (1) provided between these elements (3-4) are beaten back and forth.
16. Device according to claim 15, characterized in that the driving means consist of an eccentric mechanism (13) driven by a motor (14) or in that they consist of a vibrating table or vibrator.
17. Device according to any of claims 14 to 16, charac-

terized in that the above-mentioned elements (3-4) are made in the shape of a table upon which the stones (1) are provided and of a plate provided on top of it, whereby the device (2) is provided with longitudinal guides (9-10) which form a feed-through duct together with the plate and the table, such that the stones (1) can be supplied via one far end (6) and can be discharged via the other far end (7).

18. Device according to any of claims 15 to 17, characterized in that the elements (3-4) are erected with a fall, such that the stones (1) are vibrated through the device (2).

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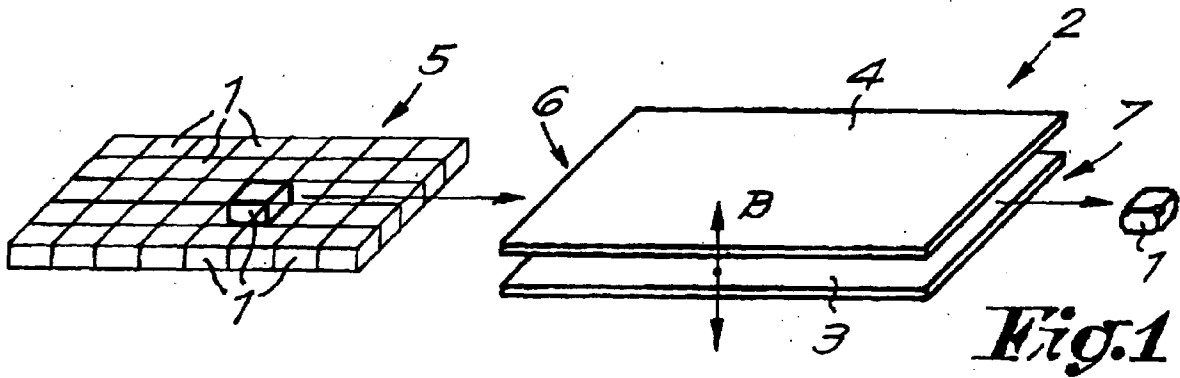


Fig. 1

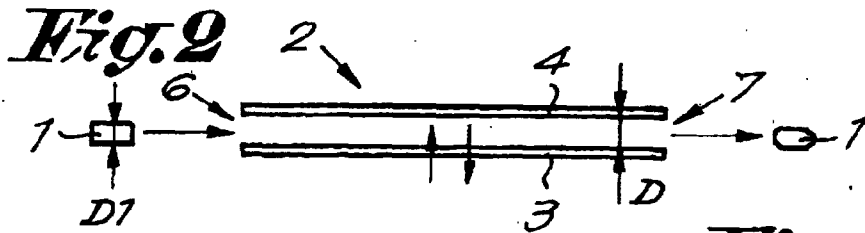


Fig. 2

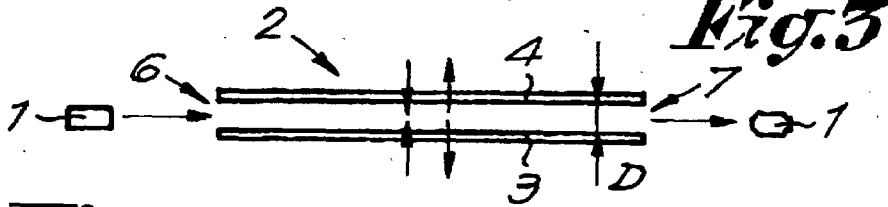


Fig. 3

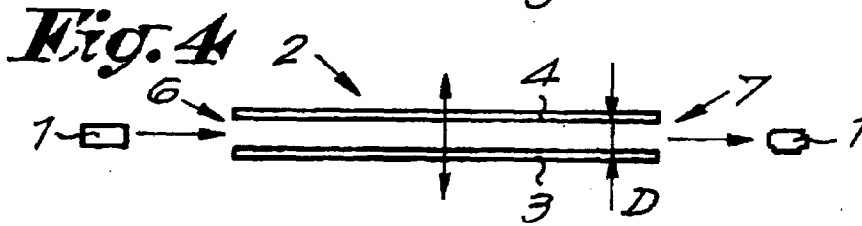


Fig. 4



Fig. 5

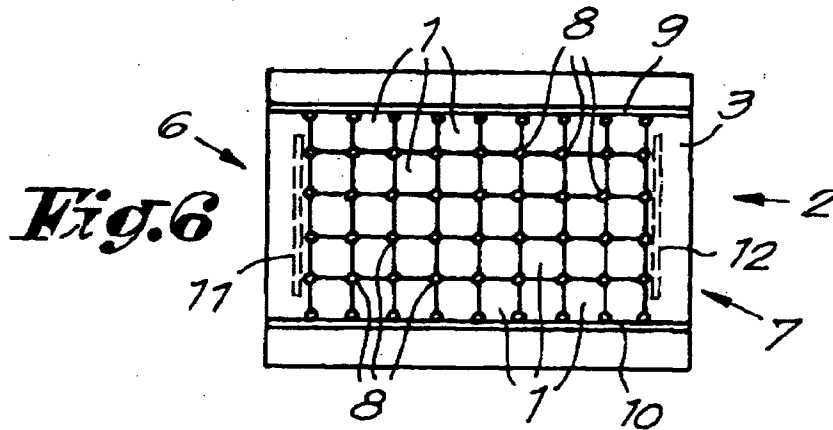
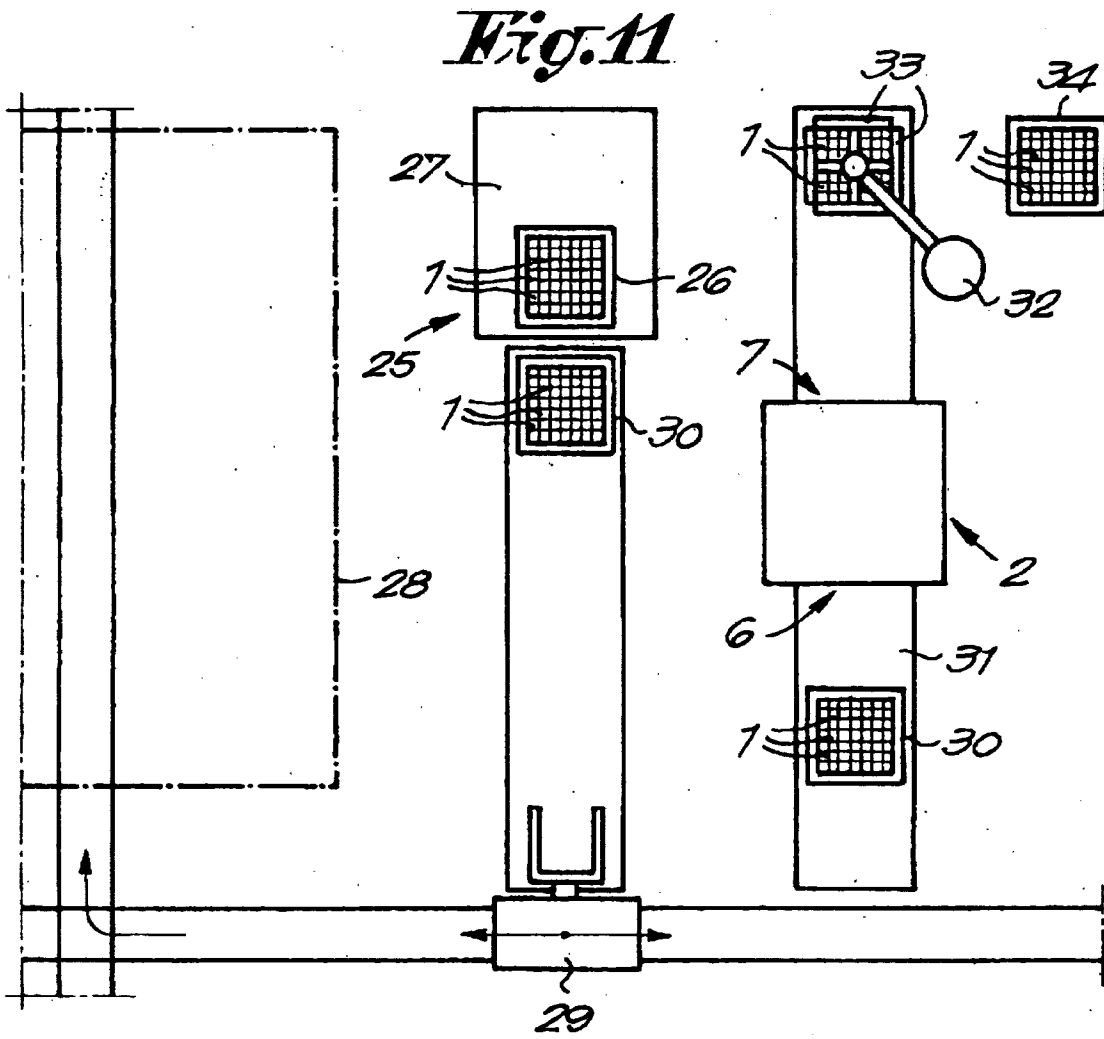
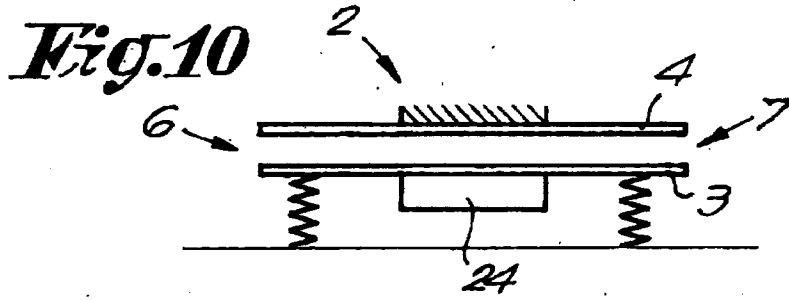
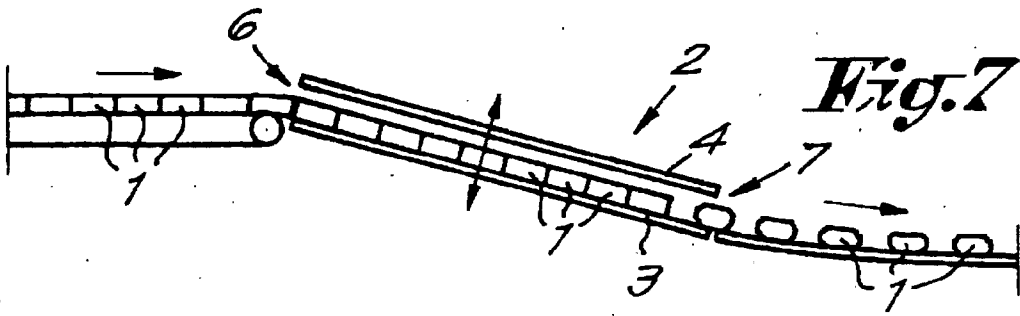


Fig. 6



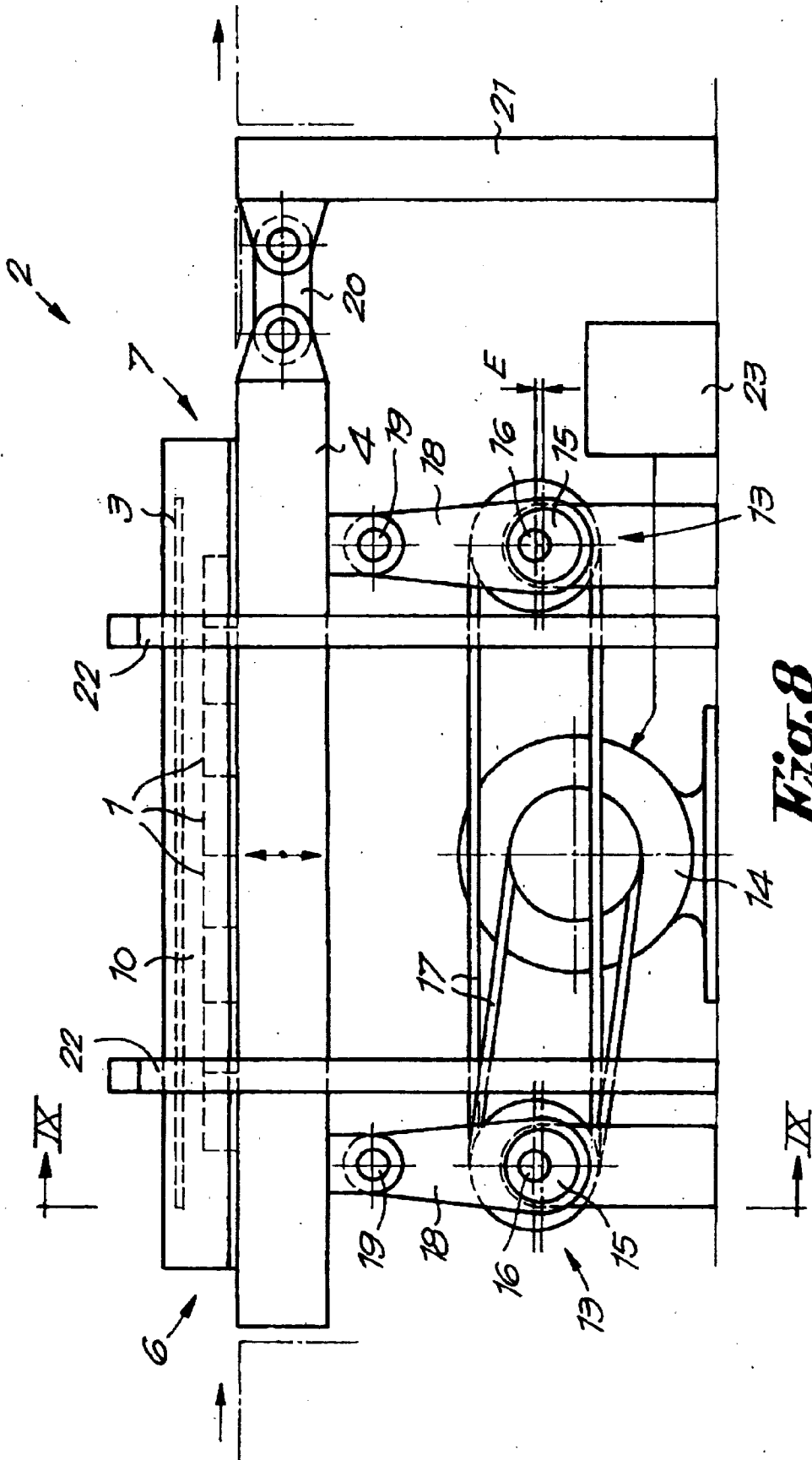


Fig. 8

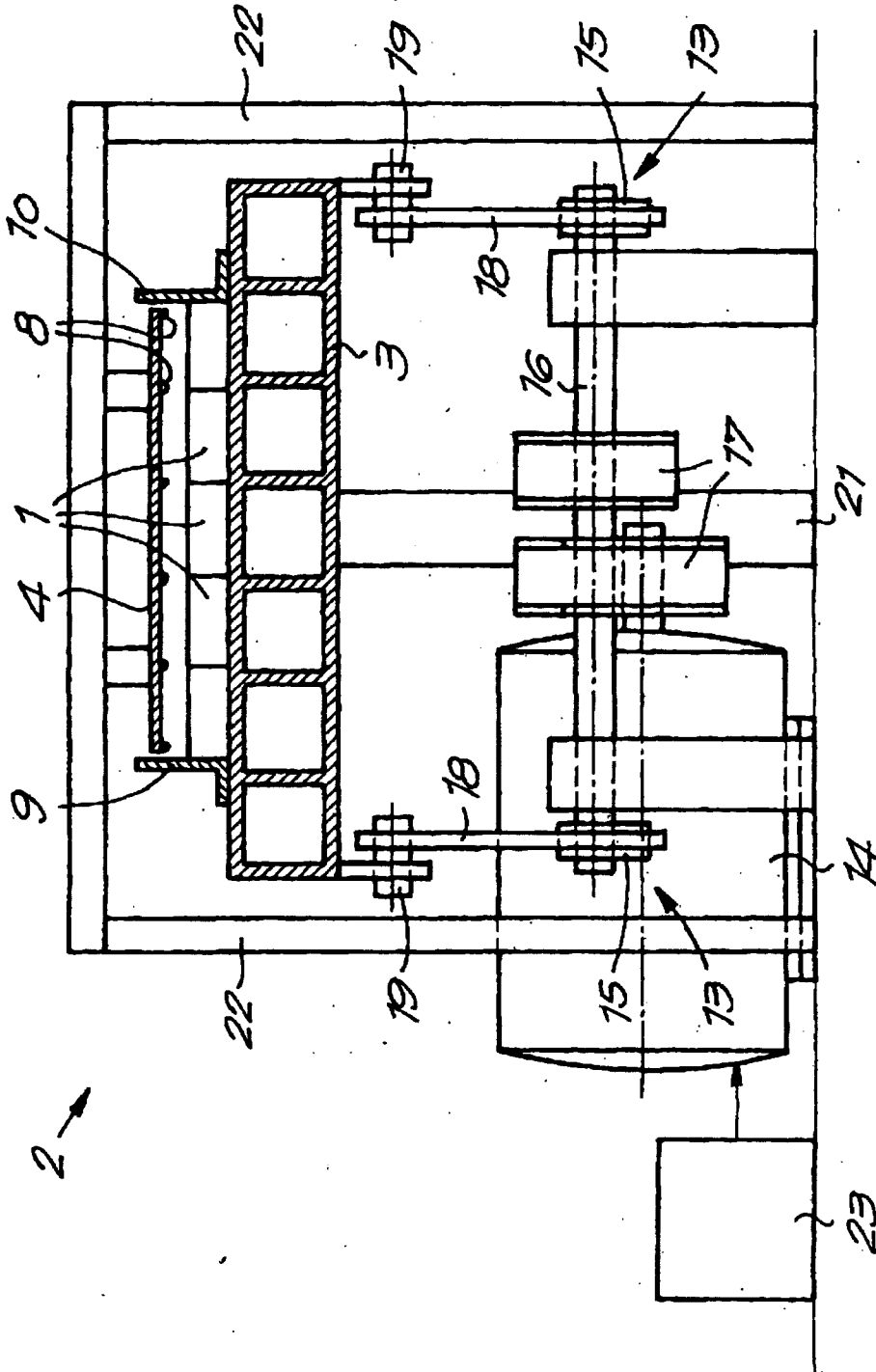


Fig. 9



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EUROPEAN SEARCH REPORT

Application Number
EP 98 20 0572

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP 0 339 308 A (SF VOLLVERBUNDSTEIN) 2 November 1989 * claim 1 *	1,8,11, 12,14	B28D1/00
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B28D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		22 June 1998	De Gussem, J
CATEGORY OF CITED DOCUMENTS			
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