

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 940 235 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

08.09.1999 Bulletin 1999/36(51) Int Cl.⁶: **B28B 13/02**(21) Application number: **99200653.6**(22) Date of filing: **05.03.1999**

(84) Designated Contracting States:

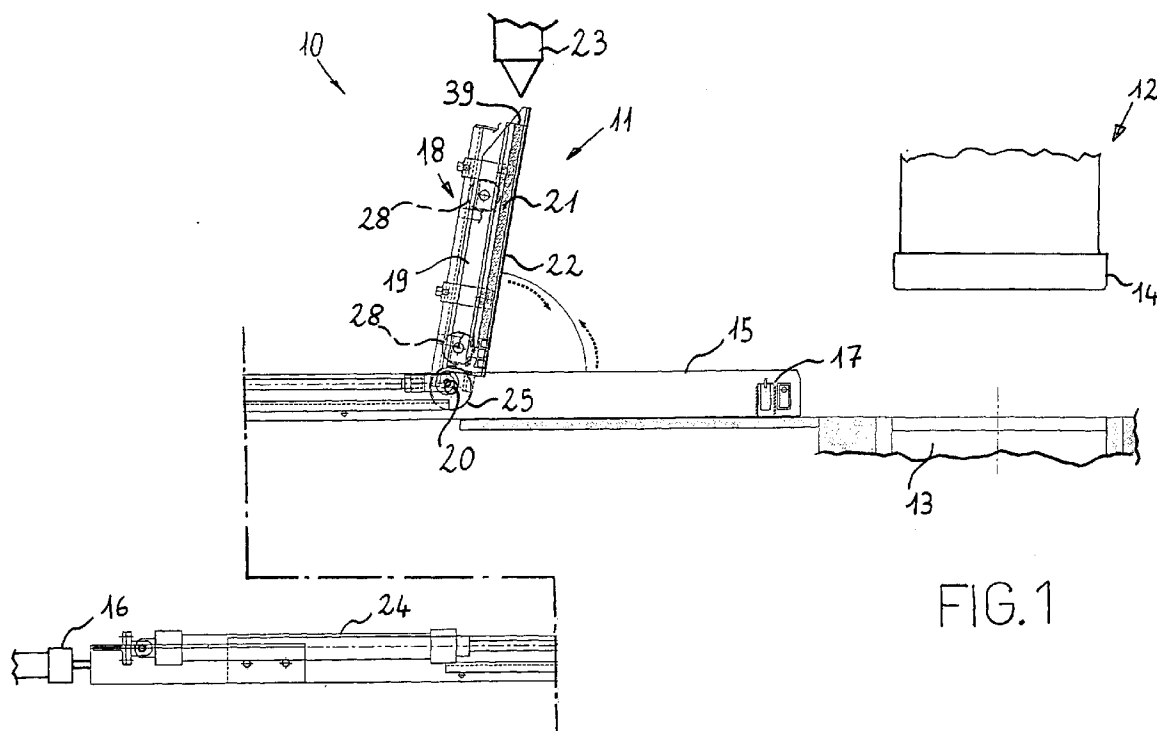
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**

Designated Extension States:

AL LT LV MK RO SI(30) Priority: **06.03.1998 IT MI980458**(71) Applicant: **Marazzi Gruppo Ceramiche S.p.A.
40123 Bologna (IT)**(72) Inventor: **Marazzi, Filippo
41100 Modena (IT)**(74) Representative: **Faraggiana, Vittorio, Dr. Ing.
Ingg. Guzzi & Ravizza S.r.l.
Via Vincenzo Monti 8
20123 Milano (IT)****(54) Machine for the production of tiles with variation of colour in the body**

(57) A machine for the production of tiles pressed with color variation in the body of the powders comprises a member (18,118) which is movable between an erect position and a reclined position. The member (18,118) defines a powder filling well (21,121) which is arranged with a powder inlet mouth (39,139) turned upward when

the member is in erect position to receive the powders poured therein from a delivery unit (23,123). The member (18,118) also comprises means (22,122) for pouring from the well which are controllable when the member (18,118) is in spread out position to pour the powders from the well into a pressing mold.

**FIG.1****EP 0 940 235 A2**

Description

[0001] The present invention relates to a machine for the production of tiles with variation of color in the body.

[0002] In the production of tiles the need is felt to be able to rapidly and economically produce tiles with color variations in the body. For example this can be used to simulate the striations peculiar to natural stones or to simulate inlays.

[0003] In the prior art there have been proposed machines which convey colored powders over the conventional mold by means of complex belt systems. These machines are however complex, costly and delicate, operating speed is low and the results are not easy to control. Because of the poor accuracy obtainable in distribution these machines are also usable only to obtain striations and not more consistent or complex designs.

[0004] The general purpose of the present invention is to overcome the above shortcomings by supplying a simple and economical machine which would allow rapid production of tiles with color variations in the body with well controllable and repeatable results.

[0005] In view of this purpose it was sought to provide in accordance with the present invention a machine for the production of tiles pressed with color variation in the body of the powders comprising a member which is movable between an erect position and a reclined position with the member defining a powder filling well which is arranged with a mouth for inlet thereto of the powders turned upward when the member is in erect position to receive the powders poured therein from a delivery unit with the member also comprising means for pouring from the well which are controllable when the member is in spread out position to pour the powders from the well into a pressing mold.

[0006] To clarify the explanation of the innovative principles of the present invention and its advantages compared with the prior art there is described below with the aid of the annexed drawings a possible embodiment thereof by way of non-limiting example applying said principles. In the drawings:

- Fig. 1 shows a partially cross sectioned diagrammatic side elevation view of a machine in accordance with the present invention,
- Fig. 2 shows a partial plan view of the machine of Fig. 1,
- Figs. 3 to 5 show side elevation views of operating stages of the machine of Fig. 1,
- Figs. 6 and 7 are diagrammatic front views of variant embodiments of details of the machine of Fig. 1,
- Fig. 8 is a view similar to Fig. 1 but showing a variant embodiment, and
- Figs. 9 and 10 are diagrammatic side and front views of a variant embodiment of a detail of the machine in accordance with the present invention.

[0007] With reference to the figures, Fig. 1 shows a

machine indicated as a whole by reference number 10 for the production of tiles. The machine comprises a section 11 for loading the powder and a section 12 for pressing. The pressing section comprises a mold 13 and a press 14. Mold and press are virtually prior art and will not be further described or shown. The filling section comprises a filling truck 15 which by means of an actuator 16 is movable between a retracted or powder reception position (shown in Fig. 1) and an advanced or powder pouring position (shown in Fig. 4). The truck can comprise mold cleaning means 17 in front which run on the upper surface of the mold when the truck moves between its two positions. A virtually prior art machine has been described up to this point.

[0008] In accordance with the present invention the filling section comprises a unit 18 for powder reception mounted on the truck to run with it and comprising a powder reception member 19 which can overturn around an axis 20 to change from an erect position (shown in Fig. 1) to a reclining position (shown in Fig. 3).

[0009] The member 19 defines a well 21 closed by a movable bottom 22 into which a delivery unit 23 pours through an upper mouth 39 of the well in erect position the powders to be pressed as clarified below.

[0010] When the member 19 is in horizontal position the bottom 22 can be made to run by means of an actuator 24 to dump the powder contained in the well.

[0011] As may be seen in Fig. 2 overturning of the member 19 is controlled by a pulley 25 integral with the overturning axis and is driven by a motorized belt 26. The box bottom 22 runs on guides 27 by means of wheels 28. For the sake of simplicity only one half of the device is shown in Fig. 2. It is understood that the partial view of Fig. 2 represents symmetrical mirror images of the device centered on the axis 29.

[0012] In erect position the overturning member 18 can be inclined towards the reclining position with an angle between 90° and 45° and advantageously between 60° and 80° to the horizontal as may be seen in Fig. 1.

[0013] At the beginning of the pressing cycle the machine in use is in the position shown in Fig. 1. The delivery unit 23 unloads the powder to be pressed into the well 21. By changing the powder delivery position the well 21 can be filled with a body of powders of different colors so as to form striations or designs in the body. The slight thickness of the well permits satisfactory accuracy in powder distribution.

[0014] When the well 21 is full the overturning member 18 is taken to the horizontal position as shown in Fig. 3 and the truck 15 advances to take the well 21 vertically over the mold as shown in Fig. 4. After reaching this position the dumping means formed by the box 22 are driven by the actuator 24 so as to open the bottom of the well and dump the powders into the mold. Then the truck backs off and the box advances so as to take the filling unit into the initial position shown in Fig. 3 and then Fig. 1. The press is then operated to press the pow-

der in the mold in accordance with the prior art.

[0015] There is obtained in this manner a tile of pressed powder with the arrangement of the powders provided during dumping of the powder from the distributor 23 into the well 21.

[0016] As delivery into the well takes place by layers or cross sections of tile precise designs and/or striations can be provided.

[0017] Fig. 6 shows a possible embodiment of the delivery unit 23. In this embodiment the delivery unit comprises a head 30 running on command along tracks 31 parallel to the inlet mouth of the well 21. The head 30 has ducts 32 inside it for controlled delivery of different powders from the outlet mouth 33. By commanding running of the head along the guides and simultaneous delivery of selected powders it is possible to secure desired designs and striations layer after layer. In the well 21 there can also be provided baffles 34 appropriately shaped for separation of various zones of the well so as to obtain more accurate designs or zones with different powder distribution.

[0018] Fig. 7 shows a variant of the delivery unit (still indicated by reference number 23). It comprises a multiple delivery head 35 made up of a plurality of delivery units each for controlled delivery of a predetermined powder.

[0019] The head 35 is fixed and dumps onto a revolving belt 36 which conveys the powder received towards a dumping end 37. The belt is parallel to the mouth of the well 21 and is movable at least in its dumping end 37 along the extension of the mouth e.g. on guides 38. During movement of the belt on the guides the dumping end moves along the entire extension of the mouth of the well 21 while an upper part of belt always remains underneath the delivery mouths of the head 35. In this manner the head can be used to deliver the various powders onto the belt in predetermined quantities and sequence. Running of the delivery end on the well then pours the powders from the running belt into the well.

[0020] Fig. 8 shows a variant embodiment of the powder reception member. In this embodiment members similar to those of Fig. 1 are indicated by the same numbers increased by one hundred.

[0021] There is thus a powder reception unit 118 mounted on the truck 115 to run therewith and comprising a powder reception member 119 which can be overturned around an axis 120 to change from an erect position (shown in solid lines) and an extended position (shown in broken lines) by means of a powered pulley 125. The member 119 defines a well 121 closed on one face with a powered running belt 122 onto which a delivery unit 23 identical to those described above dumps the powders through a mouth 139.

[0022] When the well is full the member 119 is brought into a horizontal position and the belt 121 is started to convey the powder from the well to dump it into the mold. The truck 115 advances simultaneously so as to move the dumping end 140 along the mold and fill it complete-

ly.

[0023] When filling is finished the truck backs to its initial position and the press can lower onto the mold for pressing the powders.

5 **[0024]** Figs. 9 and 10 show another variant embodiment of the delivery unit (again indicated by reference number 23).

[0025] Unit 23 can be applied to any of the embodiments shown in the other figures.

10 **[0026]** The unit comprises a main hopper 251 and a secondary hopper 252 both of which are equipped with respective capped gates 253, 254 controlled by actuators 255, 256.

15 **[0027]** Controlled delivery mouths 257 for colored powders which arrive through flexible ducts 258 dump into the main hopper 251 to provide the tile body. There can be any number of delivery mouths 257 e.g. depending on the number of colors it is desired to be able to mix directly in the hopper. The figures show four mouths arranged at the vertices of a square.

20 **[0028]** Powders for graining the tile reach the secondary hopper 256 through a duct 259. The head 23 is powered to run with wheels 262, 263 along guide tracks 260, 261 arranged horizontally parallel to the upper filling mouth of the well 21.

[0029] During movement the head 23 dumps onto an inclined plane or chute 250 which conveys the powders into the well 21.

30 **[0030]** In this manner during operation of the machine the head runs forward and backward along the tracks while it dumps selected colors filling the well with successive layers.

35 **[0031]** The powder dumped from the main hopper creates the main body of the tile while the powder dumped from the secondary hopper creates the finer graining. This helps give a more natural appearance to the finished product.

[0032] At this point it is clear that the preset purposes have been achieved by making available a machine permitting rapid and accurate formation of a body of differently colored powders according to predetermined or even apparently random schemes so as to obtain designs, striations, color spots et cetera in the entire body of the tile being formed.

45 **[0033]** Naturally the above description of an embodiment applying the innovative principles of the present invention is given by way of non-limiting example of said principles within the scope of the exclusive right claimed here.

50 **[0034]** For example the machine could comprise means of cleaning, delivery from the mold, conveyance of the pressed tile et cetera as easily imaginable by one skilled in the art. In addition the multiple head could also be made up of a plurality of individual heads running independently on the mouth of the well.

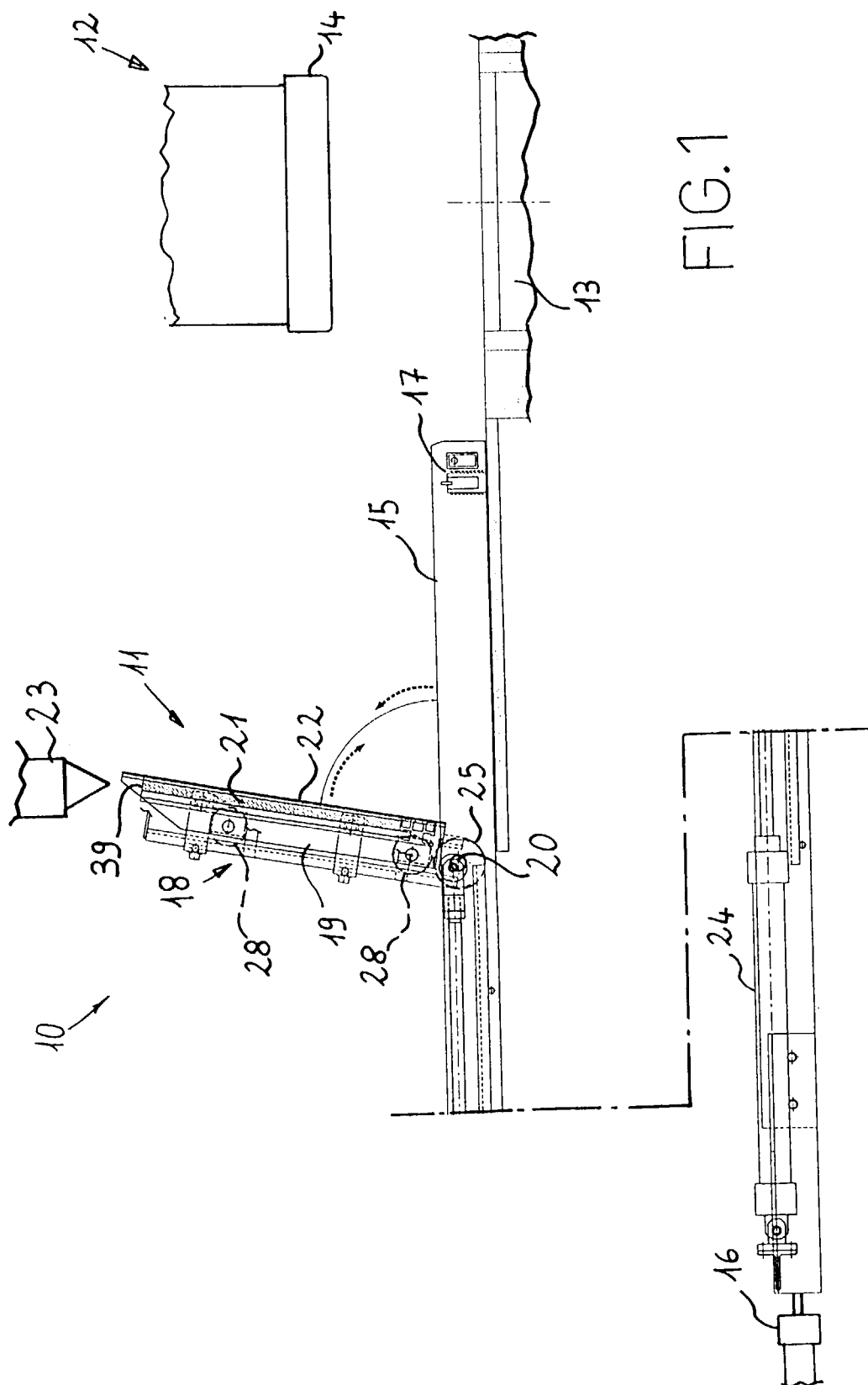
55 **[0035]** If the hoisting movement of the dumping member were sufficient to avoid interference with the press the truck movement could be eliminated and the powder

dumped into the mold by a simple movement of the dumping member from the erect position to the reclining position vertically over the mold.

[0036] Lastly multiple dumping members and delivery heads could be associated for use with multiple presses for simultaneous production of multiple tiles.

Claims

1. Machine for the production of tiles pressed with color variation in the body of the powders comprising a member (18,118) which is movable between an erect position and a reclined position with the member (18,118) defining a powder filling well (21,121) which is arranged with a powder inlet mouth (39,139) turned upward when the member is in erect position to receive the powders poured therein from a delivery unit (23,123) with the member (18,118) also comprising means (22,122) for pouring from the well which are controllable when the member (18,118) is in spread out position to pour the powders from the well into a pressing mold. 10
2. Machine in accordance with claim 1 characterized in that the pouring means comprise a movable bottom (22) of the well which is powered to run between a well closing position and a lower open position of the well when in reclined dumping position vertically over the mold. 25 30
3. Machine in accordance with claim 1 characterized in that the dumping means comprise a moving belt (122) constituting the well bottom when in reclined position with the belt having its dumping end (140) arranged near the mold and moving to run thereon. 35
4. Machine in accordance with claim 1 characterized in that the moving member is mounted on a truck (15,115) for conveyance between a filling position far from the mold and a dumping position near the mold. 40
5. Machine in accordance with claim 1 characterized in that the delivery unit comprises a multiple head (30,35) for controlled delivery of different powders into the well. 45
6. Machine in accordance with claim 5 characterized in that the multiple head (30) runs along the mouth of the well to distribute the powders therein. 50
7. Machine in accordance with claim 5 characterized in that the multiple head (35) dumps the powders onto a revolving belt (36) which has a dumping end (37) moving along the mouth of the well to distribute the powders therein. 55
8. Machine in accordance with claim 1 characterized in that in erect position the moving member (18,118) is inclined towards the reclined position at an angle between 45° and 90° and in particular between 60° and 80° to the horizontal.
9. Machine in accordance with claim 1 characterized in that the delivery unit comprises a controlled powder dumping head moving above the inclined plane (250) to dump thereon with the inclined plane in turn dumping into said well.
10. Machine in accordance with claim 9 characterized in that the head comprises a main hopper (251) and a secondary hopper (252) with both dumping onto the inclined plane (250).
11. Machine in accordance with claim 9 characterized in that several ducts (258) for controlled feeding of different powders reach the main dumping hopper (251).



161

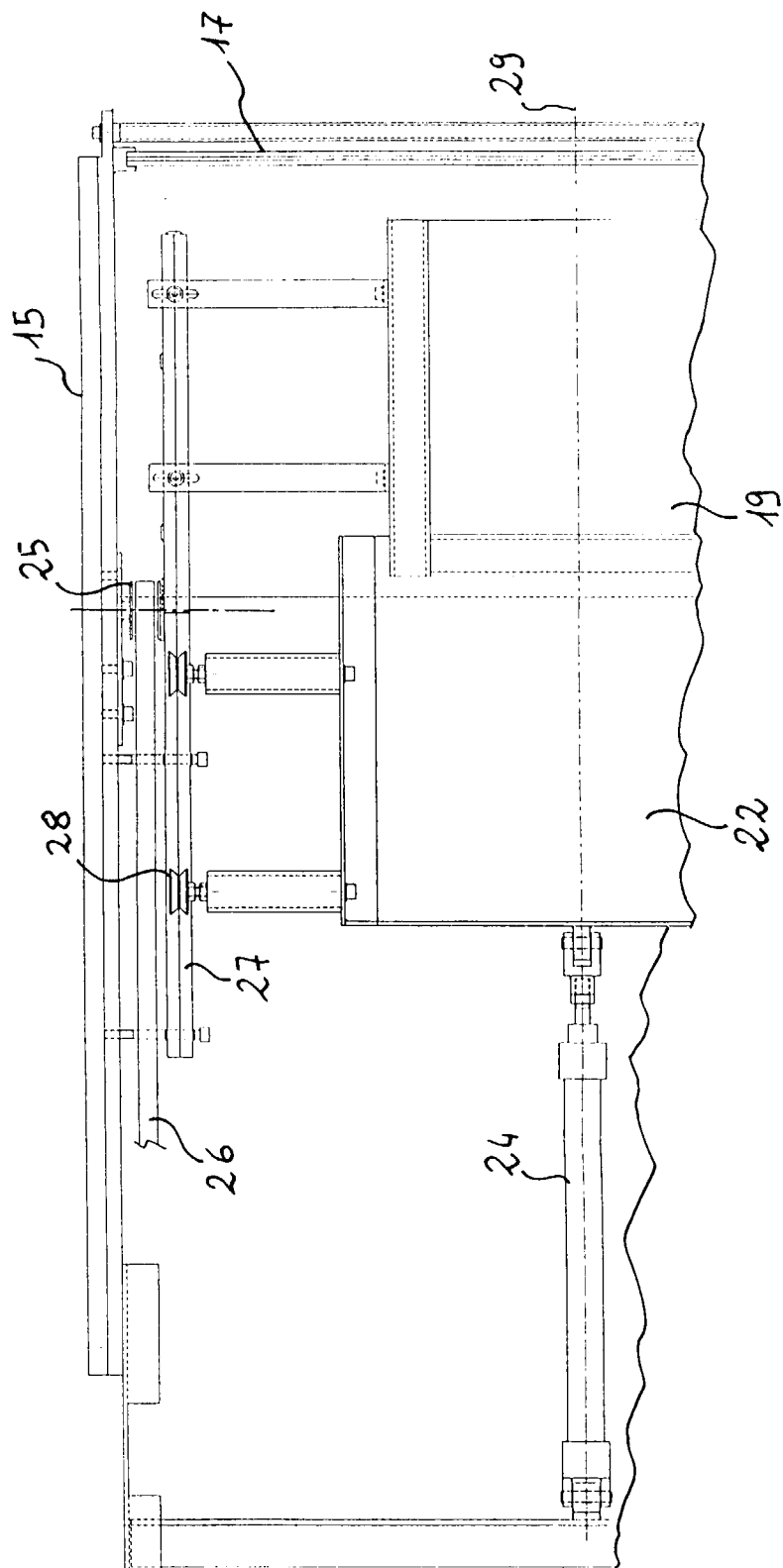
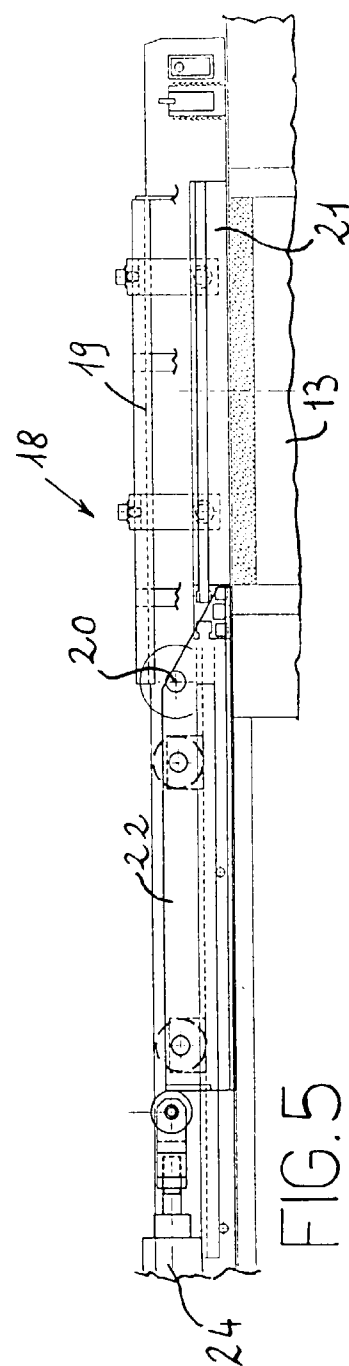
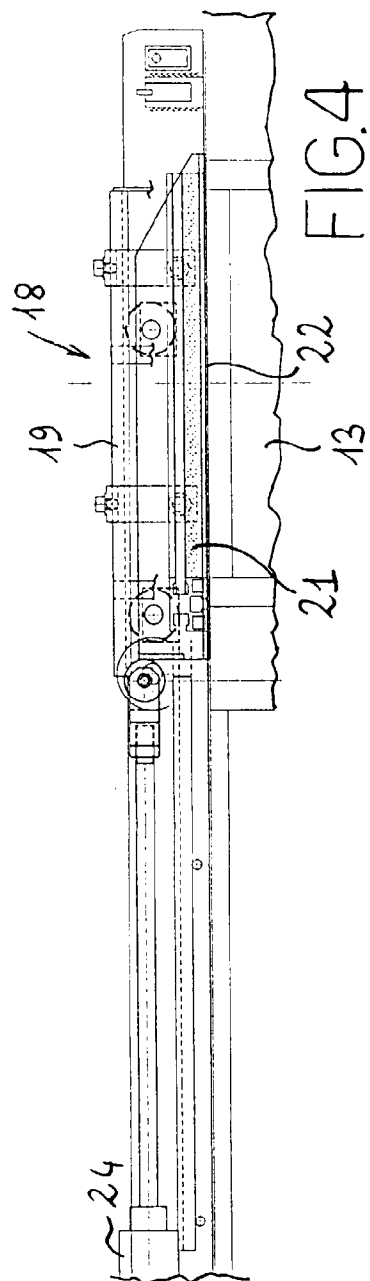
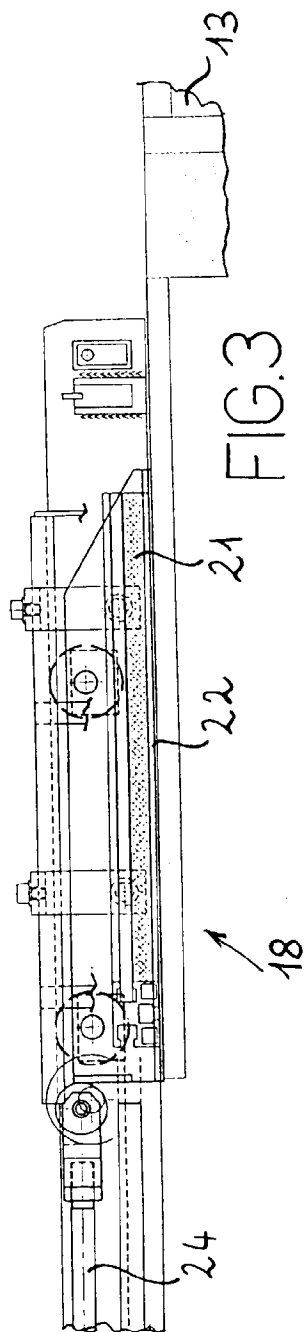


FIG. 2



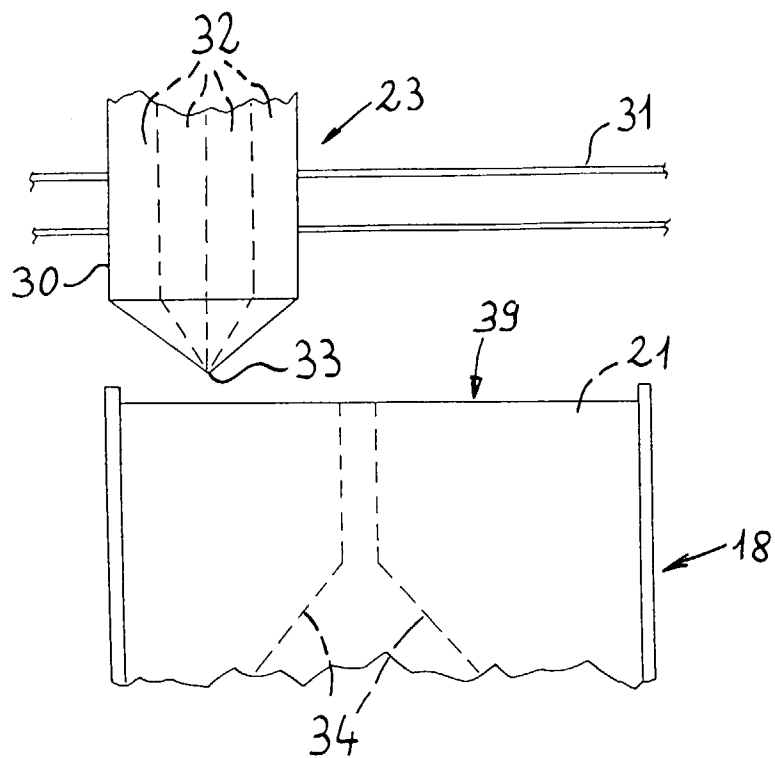


FIG. 6

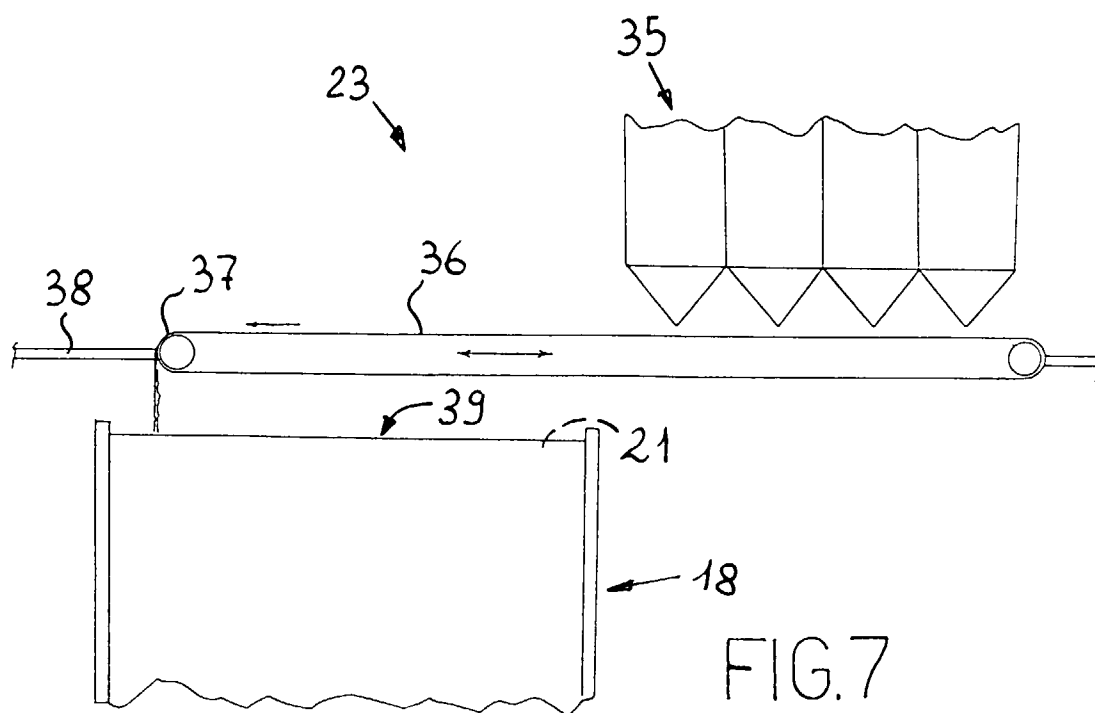


FIG. 7

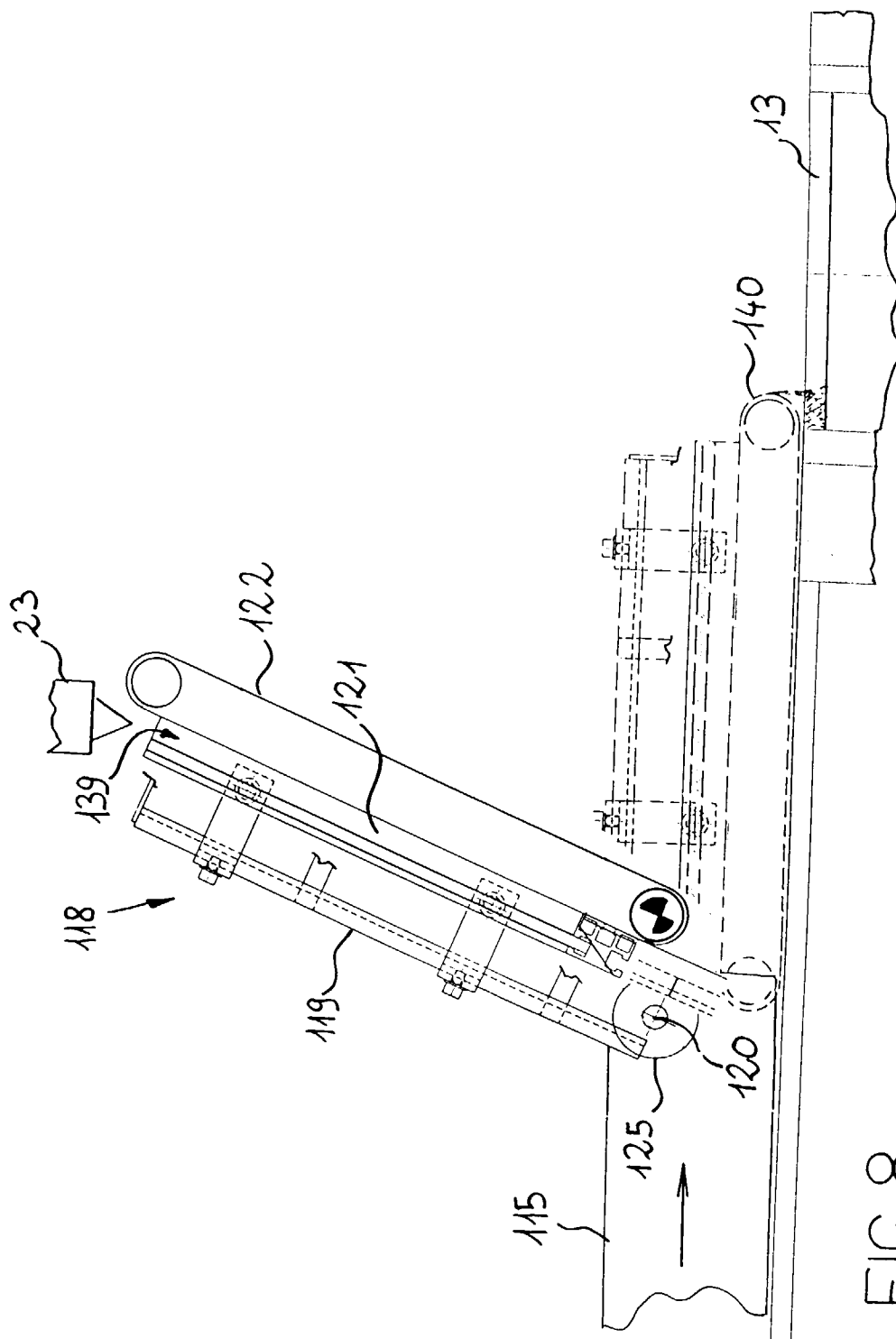


FIG. 8

