

Description

[0001] The present invention refers to an innovative system for marking slab packs, in particular plasterboard slab packs or coated gypsum slab packs.

[0002] It is known in the field to store slabs of plasterboard in packs, made up of a pile of slabs vertically stacked one on top of the other. In order to be able to identify them in a storeroom, the packs are usually marked with a logo or writing on the side, at the lateral edges of the single slabs. The slabs have a substantial size, with a length of a few metres, so the markings must be considerably large so as to be read even from a certain distance.

[0003] To mark the slabs, inks are normally used, that are applied, for example, with a pad suitably pressed against the side of the pack.

[0004] Such a technique, however, has been found to be unsatisfactory for a series of reasons. The cost of the marking is quite high. A considerable amount of ink is used, also due to the size of the marking. It is also necessary to frequently refill the pads with new ink, thus slowing down the marking process.

[0005] Moreover, ink often leaves wipes onto the product, and can even infiltrate between the gaps normally present between the successive adjacent slabs of the pack.

[0006] Laser techniques are also known for marking products, such as bottles or the like. These techniques however, have never been able to be used for marking slab packs of plasterboard. These systems of laser imprinting indeed foresee low power levels, not suitable for imprinting large markings like those necessary for the discussed products. Moreover, the relative systems for focusing the laser normally use optical type sensors, or similar, that have difficulty in reliably detecting the position of a slabs pack, in which there are more or less wide gaps between the different adjacent slabs.

[0007] The general purpose of the present invention is that of avoiding the aforementioned drawbacks by providing a system for marking slab packs of plasterboard which is fast and cost-effective.

[0008] A further purpose of the invention is to provide a marking system which makes it possible to obtain high quality writings or logos, with well defined outlines.

[0009] A further purpose of the invention is to provide a marking system which makes it possible to carry out the marking with maximum safety for the users of the system.

[0010] In view of such purposes it has been thought to make, according to the invention, a system for marking coated gypsum slab packs comprising means for marking slab packs and conveying means adapted to move slab packs to the marking means, said marking means comprising a laser device provided with a laser head adapted to imprint a mark on the slab pack, through laser, the laser device being moveable between an idle position retracted from a path of the slab packs and an operative

position advanced towards said path for imprinting the marking on the slabs pack.

[0011] In order to clarify the explanation of the innovative principles of the present invention together with its advantages with respect to the prior art, hereafter, with the help of the attached drawings, we shall describe a possible embodiment given as an example applying such principles. In the drawings:

- 10 - figure 1 represents a perspective view of a laser device used in a system according to the present invention,
- figure 2 represents a schematic view of the system in a first advancing step of the slabs pack towards the laser device, with the laser device in a retracted idle position,
- 15 - figure 3 represents a schematic view analogous to the previous one, with the laser device advancing towards the slabs pack,
- 20 - figure 4 represents a view of the system, which is analogous to the previous one, with the laser device in the operative position to carry out the laser marking of the slabs pack.

25 **[0012]** With reference to figures 1 and 2, a system 11 for marking is shown comprising conveying means 13 of slab packs of plasterboard 14 and a laser device 12.

[0013] The slabs pack 14 is formed by a vertical pile of slabs 24, to be marked on the side edge.

30 **[0014]** The conveying means 13 can comprise, for example, a series of transport rollers adapted to make the slab packs move in sequence along a set path.

[0015] The laser device 12 is arranged laterally with respect to the conveying path of the packs and comprises a laser head 15 provided with a laser output 30 from which the laser ray for marking comes out. The laser head 15 is of the type adapted to form a focused laser beam and comprises a suitable lens at the output 30. The laser head is of the class IV type, so as to have enough power to make a marking having a certain size over a reasonably short time.

35 **[0016]** The laser device 12 is moveable between an idle position retracted from the conveying path of the packs (fig. 2), and an advanced operative position to carry out the marking (fig. 4). The movement of the device 12 occurs under the action of an actuator 20, 22 provided with a worm screw, schematically represented in the figures. It should be understood that even another type of actuator can be used instead of the worm screw actuator.

40 **[0017]** The marking device 12 comprises a support 21 on which the laser head 15 is mounted and that is moveable under the action of the actuator 20, 22.

45 **[0018]** The laser device 12 also comprises a box-shaped shielding 16 which encloses the laser output 30 of the laser head 15, and comprises a front opening 50 intended to be closed by the lateral wall of the slabs pack 14. The laser beam carries out the marking on the area covered by the shielding.

[0019] The shielding 16 is laser opaque and has the function of avoiding that the laser reflects outside the marking area, with possible damage to things or people. Advantageously, the shielding 16 is made from Plexiglas.

[0020] The shielding is mounted on the support 21 so as to be moveable with respect to the laser head 15 in the movement direction of the head itself.

[0021] In particular, the shielding 16 is slidably mounted along four rods 26 integral with the support 21 and arranged at the vertices of a rectangle. The shielding 16 is pushed by a spring towards an end-stop position located out in front, as shown in figures 1 and 2. The shielding 16 is mounted onto the rods 26 with clearances which allow the opening of the shielding to be oriented parallel to the wall 51 of the pack 14 to be marked, even when this is not perfectly perpendicular to the axis of the rods 26 and of the worm screw 22.

[0022] On the upper face of the shielding 16 an opening is formed at which a flexible tube 19 for sucking in the fumes from burning the coated gypsum, is connected.

[0023] The laser device 12 also comprises presence sensor means 17 of the slabs pack in front of the laser head 15. Advantageously, the sensor means 17 are configured so as to ascertain whether the pack 14 has actually closed the front opening 50 of the shielding, to ensure the maximum safety in use of the system.

[0024] Advantageously, the presence sensor means of the pack comprise at least three switches 17, which are not aligned, arranged in proximity of the edge of the opening 50, adapted to detect a contact with the lateral wall of the pack 14. In a preferred embodiment of the invention, there are four switches 17, arranged at the four vertices of the rectangular opening 50, integral with the shielding 16. The electromechanical switches 17 are connected in series, so that it is sufficient for one of these to not be pressed to detect an incorrect positioning of the pack with respect to the shielding.

[0025] The laser device also comprises sensor means adapted to detect when the focal distance between the laser output 30 and the lateral wall 51 of the pack to be marked has been reached.

[0026] The focal distance sensor means comprise a sensor 18 adapted to detect a set movement of the shielding 16 with respect to the laser head 15, which corresponds to a desired distance of the laser output 30 from the wall 51 of the pack.

[0027] The sensor 18 is formed with a reference end-stop, supported by an arm 25 integral with the support 21, as clearly shown in figure 1. It should be understood that the sensor 18 could alternatively detect a movement of another feeler element moveable with respect to the laser head, different from the shielding 16.

[0028] The system also comprises control means 23 (schematically represented in figure 2), connected to the sensor means 17 and 18 adapted to control the actuation of the actuator 20 and of the laser head 15.

[0029] In particular, the control means 23 are such as to actuate the laser marking only when they detect con-

tact through all the presence sensors 17 and they detect a correct focal distance of the pack 14 through the sensor 18.

[0030] Now we shall briefly describe the operation of the system with reference to figures 2-4.

[0031] Figure 2 shows the laser device 15 in the idle position retracted from the conveying path of the slab packs, with a slabs pack 14 which is brought in front of the laser head.

[0032] The control means 23 then control the actuation of the actuator 20, which pushes the laser device 12 forwards. The laser head 15 and the shielding 16 integrally advance until the position of figure 3 is reached, in which the switches 17 come into contact with the lateral wall 51 of the pack 14.

[0033] The control means 23 then control a further advancement of the laser device 12. In this step the shielding 16 rests against the slabs pack and does not advance, so that the laser head 15 runs inside the shielding until the position of figure 4 is reached, in which the laser output 30 is at the focal distance d from the wall 51 of the slabs pack to be marked. The correct position of the laser head is detected through the sensor 18. In this condition the marking is carried out, after which the laser device 12 is again retracted towards the idle position, ready for marking the subsequent slabs pack.

[0034] At this point it should be clear how the purposes of the present invention have been reached.

[0035] In particular, a system has been provided for marking plasterboard slab packs which allows a well defined marking to be obtained, without blurred edges.

[0036] The marking is carried out cost-effectively and quickly, thanks to the use of a class IV laser. It is indeed not necessary to use expensive marking inks.

[0037] The system also allows a high level of safety to be obtained for the users. The presence of the box-shaped shielding and of the presence sensors, indeed reduces to the minimum the possibility of reflection of the laser rays towards the surrounding area.

[0038] Moreover, the particular structure with mobile shielding with respect to the laser head allows an indication of the correct focal distance of the wall to be marked, to be reliably obtained, without requiring complex sensor systems. The system has a simple structure and does not need a lot of maintenance.

[0039] Of course, the aforementioned description of an embodiment applying the innovative principles of the present invention is given as an example of such innovative principles and therefore, it must not be taken to limit the scope of protection claimed hereby.

Claims

1. System for marking coated gypsum slab packs comprising means (12) for marking slab packs and conveying means (13) adapted to move slab packs (14) to the marking means, said marking means (12)

comprising a laser device provided with a laser head (15) adapted to imprint a mark on the slabs pack (14) by means of laser, the laser device (12) being moveable between an idle position retracted from a path of slab packs and an operative position advanced towards said path for imprinting the marking on the slabs pack.

2. System according to claim 1, **characterised in that** the laser head (15) has a laser output (30) for emitting the laser, the laser device (12) being provided with a laser opaque box-shaped shielding (16) containing said laser output (30) and it is provided with an opening (50) intended to be closed by a wall (51) of a pack (14) in the operative position of the laser device. 5
3. System according to claim 1, **characterised in that** it comprises presence sensor means (17) adapted to detect the presence of a slabs pack (14) in front of the laser head (15). 10
4. System according to claims 2 and 3, **characterised in that** the presence sensor means (17) are arranged in such a manner to detect a positioning of the slabs pack (14) such that the opening (50) of the shielding (16) is closed by a wall (51) of the slabs pack. 15
5. System according to claim 3, **characterised in that** the presence sensor means (17) comprise at least three non-aligned switches, adapted to detect a contact with the wall (51) of the slabs pack. 20
6. System according to claims 2 and 3, **characterised in that** the presence sensor means comprise switches (17) arranged in proximity to the edge of the opening (50) of the shielding (16), integral with the shielding. 25
7. System according to claim 1, **characterised in that** it comprises means (18) for sensing the focal distance between an output (30) of the laser generated by the laser head (15) and the wall (51) of the slabs pack (14) to be marked. 30
8. System according to claim 7, **characterised in that** the sensor means (18) for detecting the focal distance comprise a sensor for detecting a preset movement of a feeler (16) with respect to the laser head (15), said feeler being adapted to contact the wall (51) of the slabs pack during the movement of the laser device from the idle position to the operative position. 35
9. System according to claim 8, **characterised in that** the feeler is obtained from a laser opaque shielding (16), of the laser device. 40
10. System according to claim 3 and 7, **characterised in that** it comprises control means (23) connected to the presence sensor means (17) and to the focal distance sensor means (18), adapted to control the emission of the laser ray only when a proper positioning of the slabs pack with respect to the laser head (15) is detected. 45
11. System according to claim 1, **characterised in that** the laser head (15) is transversely moveable with respect to the conveying direction of the slabs packs (14) to mark a lateral wall (51) of the pack. 50
12. System according to claim 1, **characterised in that** the laser head (15) is of a class IV type. 55

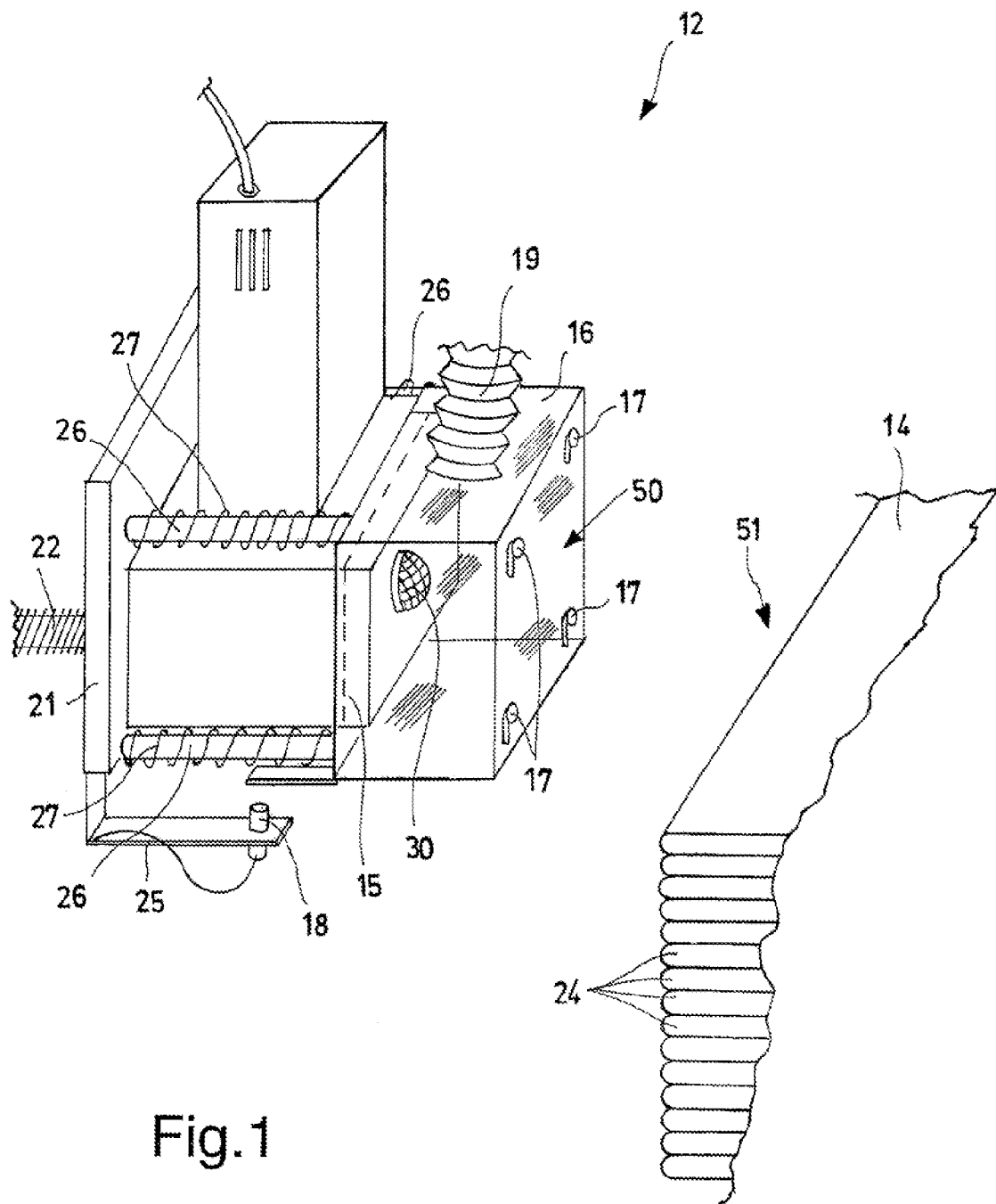


Fig.1

Fig.2

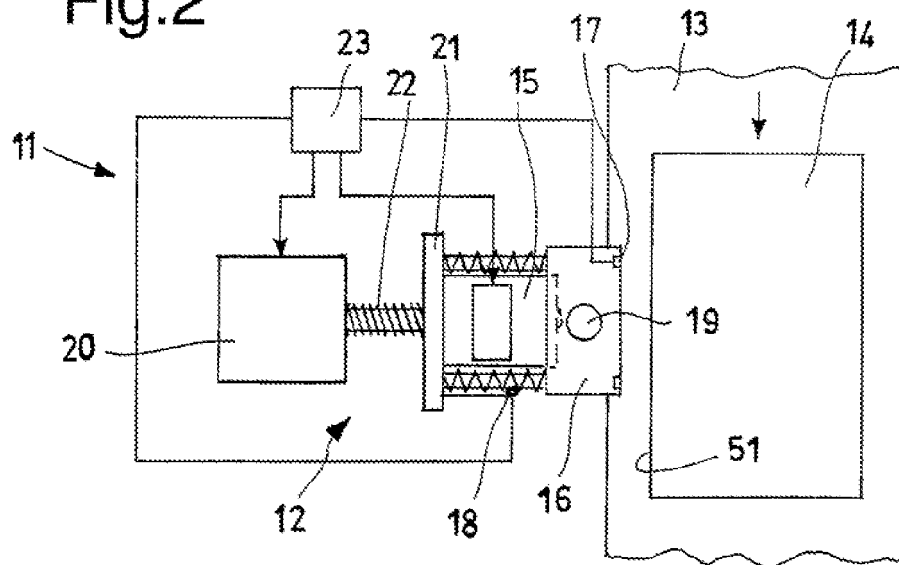


Fig.3

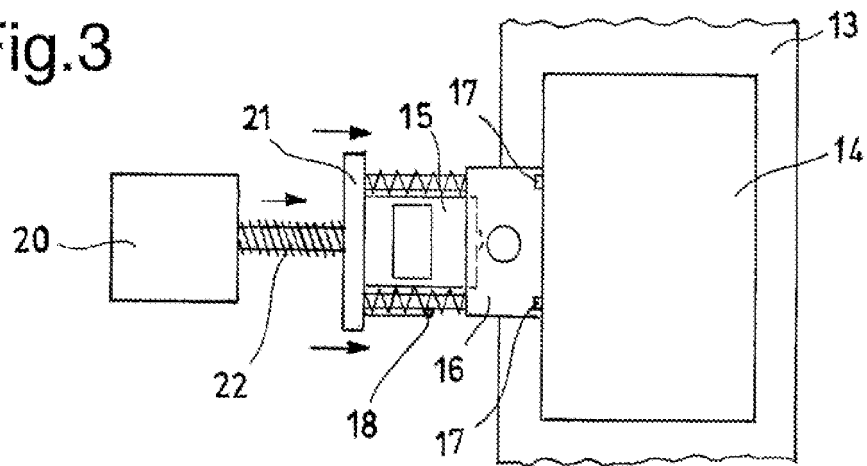
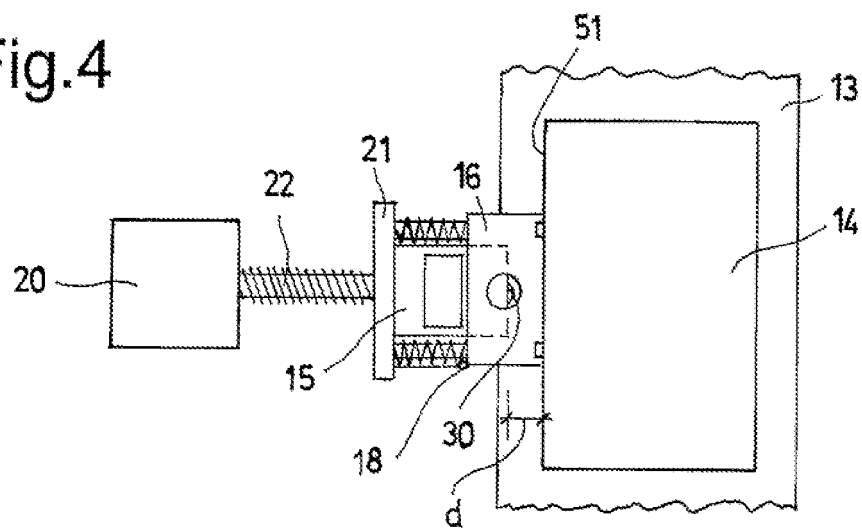


Fig.4





EUROPEAN SEARCH REPORT

Application Number
EP 09 17 9005

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	DE 103 40 375 A1 (SCHWEISTECHNISCHE UND BILDUNGS [DE]) 21 April 2005 (2005-04-21) * claim 5 * * paragraph [0017] - paragraph [0018] * -----	1-12	INV. B23K26/08 B41M5/24
Y	WO 02/094570 A1 (METSO PAPER INC [FI]; KORHONEN ANTTI [FI]) 28 November 2002 (2002-11-28) * page 1, line 4 - line 13; figures 1,2 * * page 2, line 13 - line 29; claims 1,4 * -----	1-12	
Y	US 6 603 136 B1 (WAGNER RONALD WILLIAM [US] ET AL) 5 August 2003 (2003-08-05) * paragraph [0002] - paragraph [0007]; claims 1-22 * -----	1-12	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B23K B41M
1	Place of search The Hague	Date of completion of the search 9 March 2010	Examiner Simpson, Estelle
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 17 9005

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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09-03-2010

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 10340375	A1	21-04-2005	NONE	

WO 02094570	A1	28-11-2002	BR 0209886 A	08-06-2004
			CA 2447615 A1	28-11-2002
			CN 1518501 A	04-08-2004
			EP 1395431 A1	10-03-2004
			FI 20011064 A	22-11-2002
			US 2004159253 A1	19-08-2004

US 6603136	B1	05-08-2003	NONE	
