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(54) **DEVICE AND METHOD FOR THE MONITORED LOADING OF TABLETS INTO POCKETS IN A WEB OF PLASTIC SHEET**

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(57) **ABSTRACT**

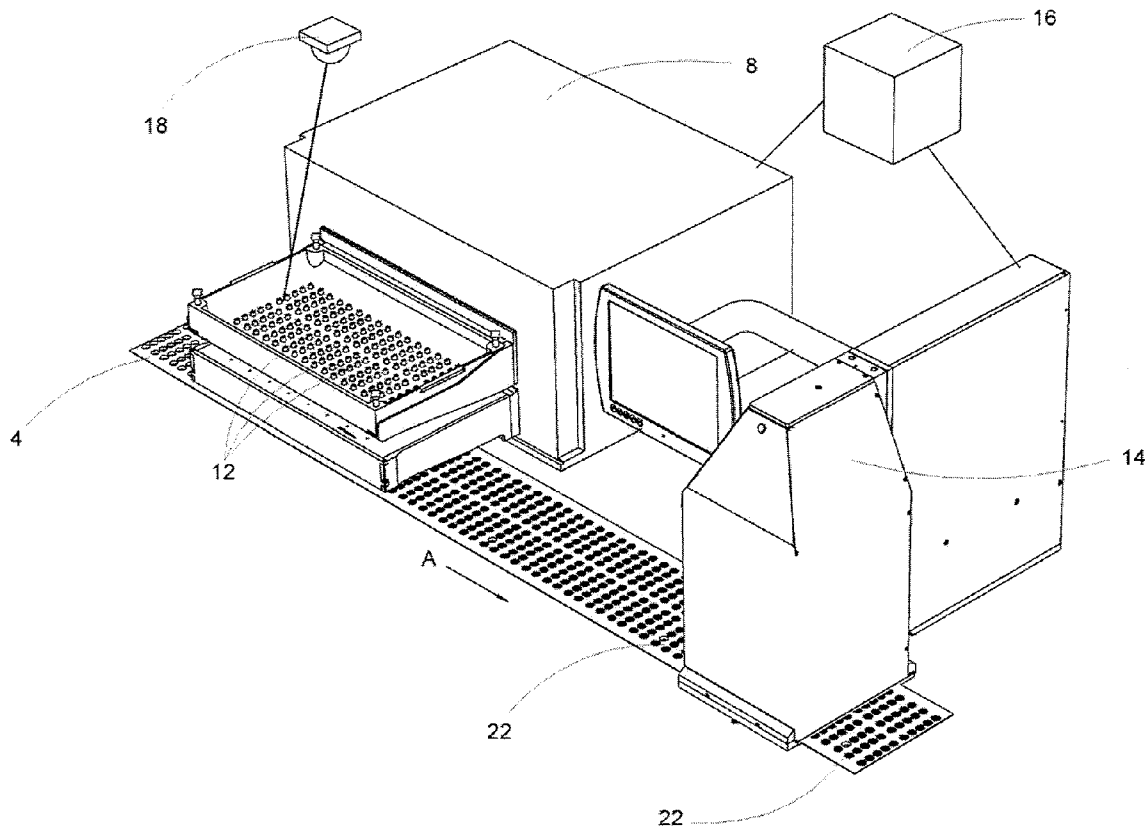
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The device for the monitored loading of tablets into pockets in a web of plastic sheet for the production of blister packs comprises a transport device for conveying the plastic sheet and a feed unit for feeding the tablets into the pockets in the plastic sheet. The feed unit comprises a plurality of filling channels. Downstream from the feed unit, an inspection device is provided to verify that each individual pocket in the plastic sheet has been filled. A control unit actuates a lighting or beam-emitting device on the basis of the results acquired by the inspection device to visually identify any blocked filling channel.

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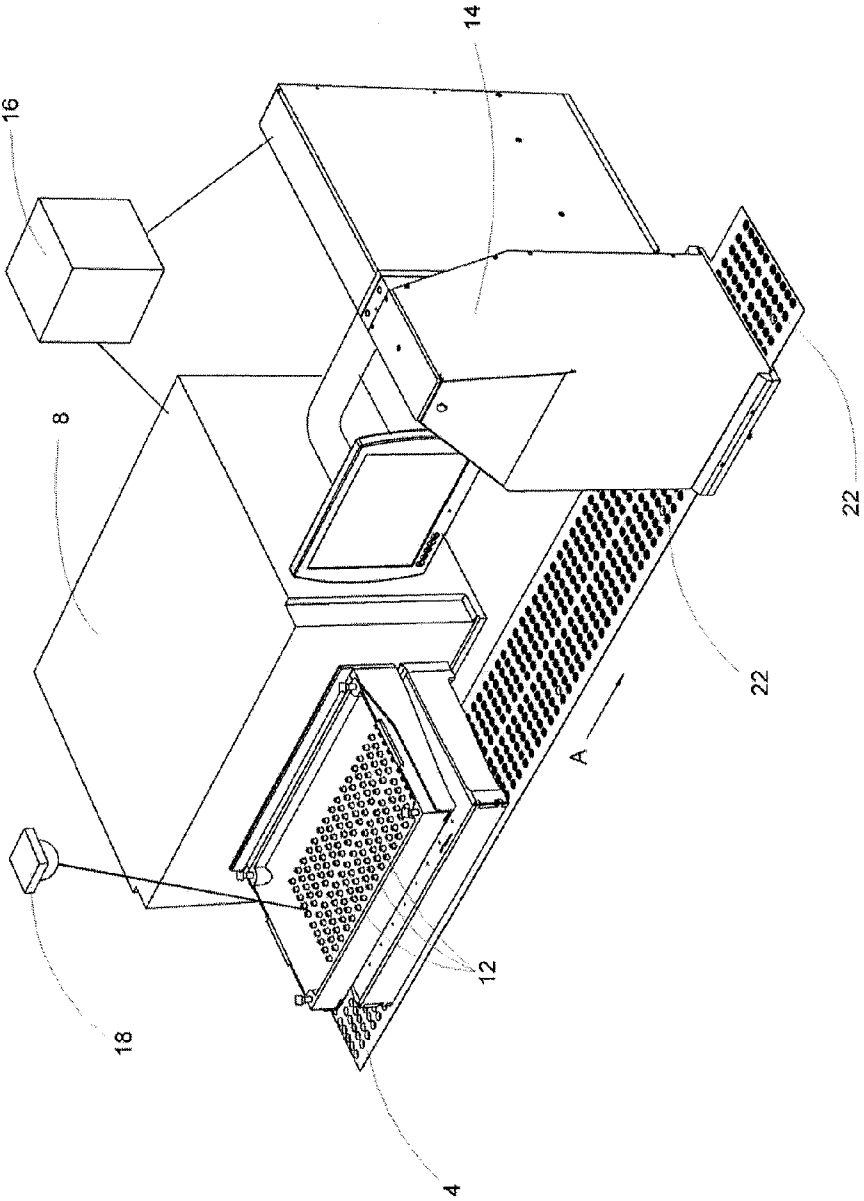


Fig. 1

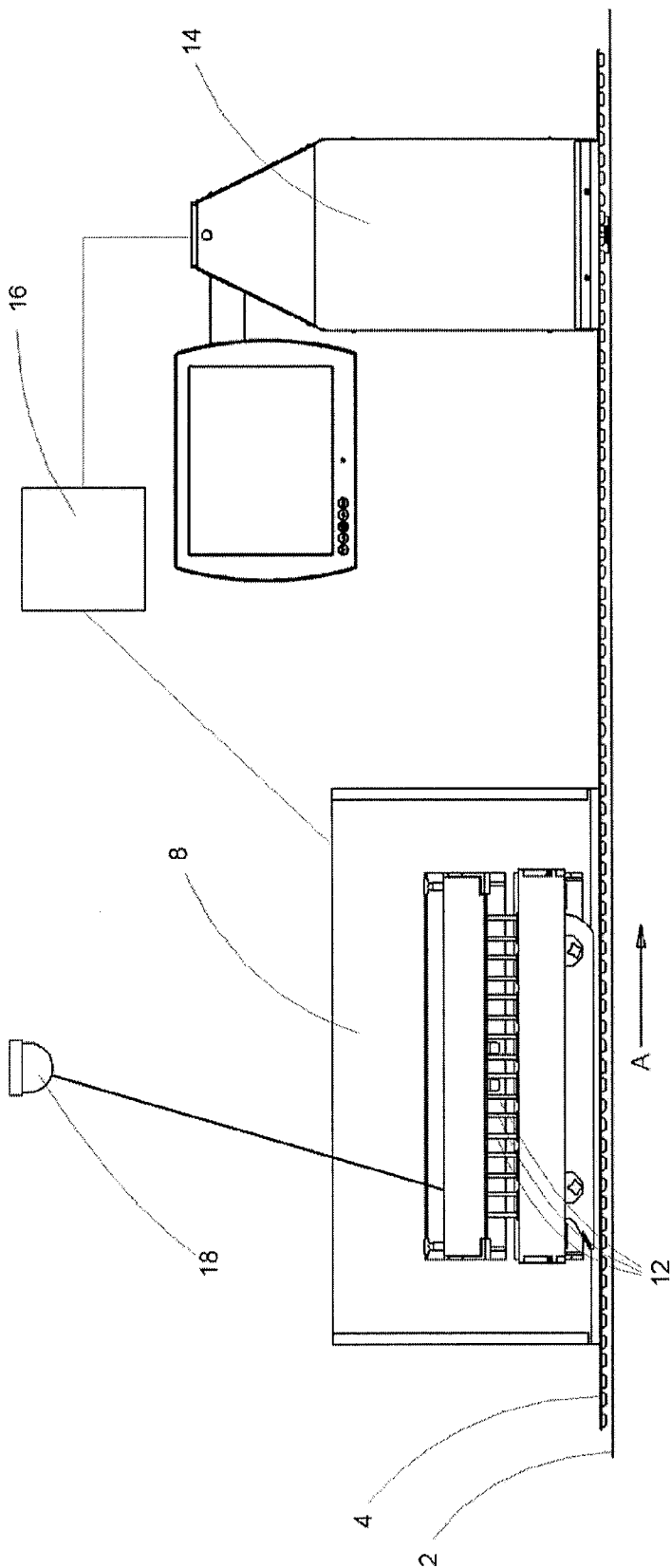


Fig. 2

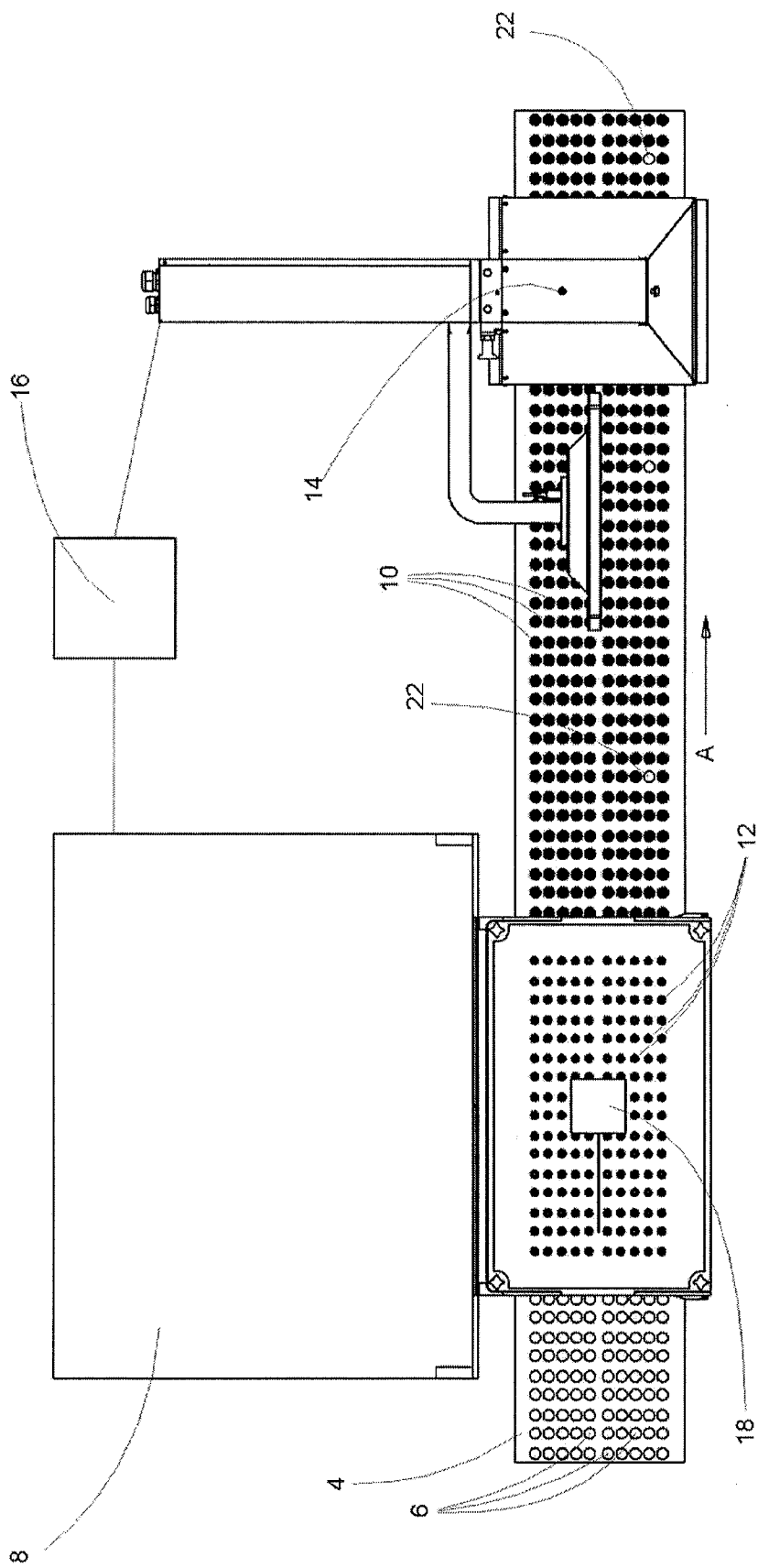


Fig. 3

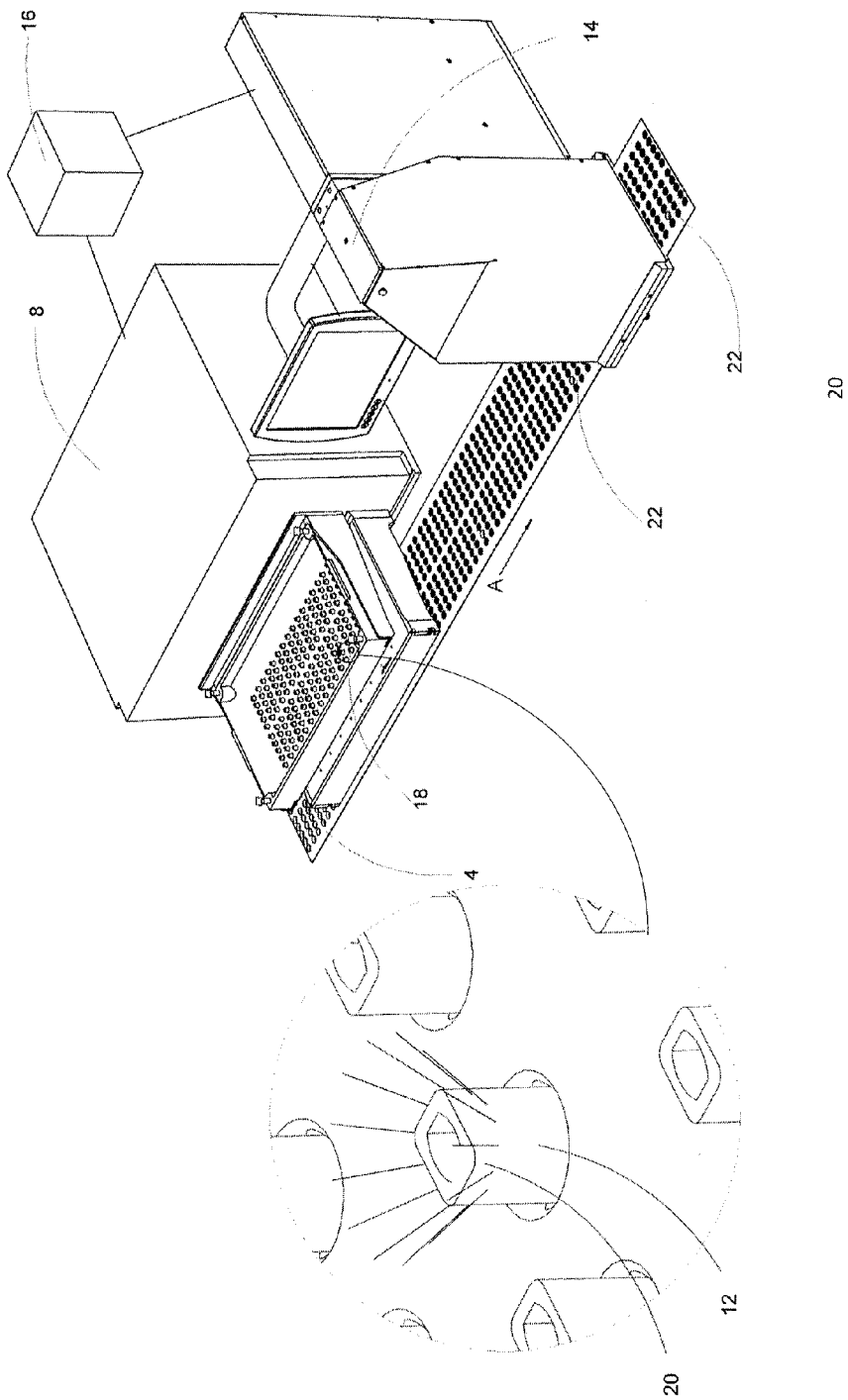


Fig. 4

DEVICE AND METHOD FOR THE MONITORED LOADING OF TABLETS INTO POCKETS IN A WEB OF PLASTIC SHEET

RELATED APPLICATIONS

[0001] The present patent document claims the benefit of priority to European Patent Application No. EP 12187633.8, filed Oct. 8, 2012, the entire contents of each of which are incorporated herein by reference.

FIELD AND BACKGROUND OF THE INVENTION

[0002] For the production of blister packs in the pharmaceutical industry, pockets are first formed in a web of plastic sheet, after which the pockets are filled with tablets by a feed unit. To achieve the greatest throughput, a feed unit of this type usually comprises a plurality of filling channels. Once the pockets have been filled, the plastic sheet is then sealed with a cover sheet and finally stamped into individual blister packs.

[0003] In the case of feed units of this type, it is possible for tablets to become jammed in the filling channels, either by tipping over on their own or as a result of the fragments or dust present in the associated filling channel. The blocked filling channel results in the failure to fill a pocket in the plastic sheet, and thus the resulting blister pack will be only partially filled and must be rejected. To correct this problem, the blister machine must be stopped and the blocked filling channel emptied by hand.

[0004] Problems with the feed unit usually lead to the mechanical shut-down of the entire packaging line. The faster the system goes back into operation, the less the loss of productivity. The availability of the system is therefore increased by correcting such problems speedily. Because of the large number of filling channels, however, correcting problems in modern feed units is often difficult, because it is impossible to see from the outside which filling channels are blocked.

SUMMARY OF THE INVENTION

[0005] It is an object of the present invention to provide a device and a method for the monitored loading of tablets into pockets in a web of plastic sheet, which device and method make it easier to detect blockages in the filling channels of a feed unit and allow the problems to be corrected in a more user-friendly manner.

[0006] According to an aspect of the invention, the device for the monitored loading of tablets into pockets in a web of plastic sheet for the production of blister packs comprises:

- [0007]** a transport device for conveying the plastic sheet in a transport direction;
- [0008]** a feed unit for feeding the tablets into the pockets in the plastic sheet, wherein the feed unit comprises a plurality of filling channels;
- [0009]** an inspection device downstream from the feed unit to verify that each individual pocket in the plastic sheet has been filled;
- [0010]** a control unit, which receives the results acquired by the inspection device; and
- [0011]** a lighting or beam-emitting device, which is actuated on the basis of the results acquired by the inspection device and which visually identifies the filling channels which are blocked, wherein the lighting or beam-emitting

ting device comprises at least one laser pointer, which directs a laser pointer beam at a blocked filling channel, or comprises a plurality of lighting devices, each of which is assigned to a separate one of the filling channels.

[0012] In this way, data acquired from the filled plastic sheet are used to detect any defects which may have occurred previously in the feed unit, to assign this defect to a specific location, and to identify it visually to the operator. This simplifies the problem-correction process and guarantees the fastest possible resumption of production.

[0013] The inspection device preferably comprises a camera system. The visual field of a camera system of this type covers a large number of pockets in the plastic sheet, and the system is able to examine them all simultaneously, so that the monitoring of the pockets in the plastic sheet to verify that they are filled can be conducted reliably even at high production speeds.

[0014] If the lighting or beam-emitting device comprises at least one laser pointer, which directs its beam at the blocked filling channel, the lighting or beam-emitting device is separate from the filling channels in question and can be used in conjunction with different feed units.

[0015] The at least one laser pointer can preferably be pivoted in several directions. This offers the advantage that the number of laser pointers can be reduced to a minimum. It is especially preferable to reduce it to precisely one laser pointer. This can be done because of the pivotable mounting, which makes it possible for the laser pointer to be directed at any one of the filling channels in the filling channel matrix.

[0016] As an alternative, it is also conceivable that the lighting or beam-emitting device could comprise a plurality of lighting devices, each one being assigned to a separate filling channel. In this way, several channels can be identified simultaneously as being blocked. In this case, the lighting devices are preferably designed as LEDs.

[0017] It is especially preferred that each filling channel be designed as a filling tube, and that the lighting devices be integrated into the filling tubes.

[0018] A method for the monitored loading of tablets into pockets in a web of plastic sheet for the production of blister packs comprises the following steps:

- [0019]** conveying the plastic sheet in a transport direction;
- [0020]** feeding the tablets into the pockets in the plastic sheet by means of a feed unit, which comprises a plurality of filling channels;
- [0021]** inspecting each individual pocket in the plastic sheet downstream from the feed unit by means of an inspection device to verify that each pocket has been filled;
- [0022]** actuating a lighting or beam-emitting device on the basis of the results acquired by the inspection device to visually identify the channels which are blocked, wherein the lighting or beam-emitting device comprises at least one laser pointer, which directs a laser pointer beam at a blocked filling channel, or comprises a plurality of lighting devices, each of which is assigned to a separate one of the filling channels.

[0023] According to the principle which is preferred here, the control unit recognizes regularly recurring defects in the pockets of the plastic sheet and assigns them to a specific filling channel.

[0024] If at least one laser pointer is used as the lighting or beam-emitting device which directs a beam at the blocked filling channel and if several blocked filling channels are present, it is preferable for the laser pointer to indicate the blocked filling channels in succession, preferably in a repeating cycle.

[0025] If, conversely, the lighting or beam-emitting device is designed as a plurality of lighting devices, each of which is assigned to a separate filling channel, and if several blocked filling channels are present, the lighting devices will preferably light up the blocked filling channels simultaneously.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] Additional features and advantages of the present invention can be derived from the following description, which refers to the drawings:

[0027] FIG. 1 shows a perspective view of a first embodiment of the device for the monitored loading of tablets into pockets in a web of plastic sheet according to the invention;

[0028] FIG. 2 shows a side view of the device according to FIG. 1;

[0029] FIG. 3 shows a top view of the device according to FIG. 1; and

[0030] FIG. 4 shows a perspective view of a second embodiment of the device for the monitored loading of tablets into pockets in a web of plastic sheet according to the invention with an enlarged view of a detail.

DETAILED DESCRIPTION OF SPECIFIC EMBODIMENTS

[0031] The device for the monitored loading of tablets into pockets in a web of plastic sheet is used in the production of blister packs. The term “tablets” is intended to include all possible similar pharmaceutical products such as oblongs, coated tablets, capsules, etc.

[0032] The embodiment of the device according to the invention shown in FIGS. 1-3 comprises, first, a transport device 2 for conveying a plastic sheet 4 in a transport direction (arrow A). The transport device 2 is merely suggested in FIG. 2 for the sake of clarity. The transport device 2 can be realized in many different ways, its design depending on the design of the blisters. The transport device 2 conveys the plastic sheet 4 preferably in step-by-step fashion, but it could also travel continuously.

[0033] The plastic sheet 4 comprises a plurality of pockets 6 open toward the top, which are to be filled with tablets. For this purpose, a feed unit 8 is provided, which feeds the tablets 10 (see FIG. 3) into the pockets 6 of the plastic sheet 4. The feed unit 8 comprises a plurality of filling channels 12. Each filling channel 12 is preferably assigned to precisely one filling position, so that the filling channels 12 can be mounted in stationary fashion. It is also conceivable that the filling channels 12 could move individually or in groups in one or several directions and thus travel to various pockets 6 in the plastic sheet 4.

[0034] In the preferred embodiment shown here, the filling channels 12 are formed by filling tubes. Each filling tube 12 preferably has the cross-sectional shape of the tablets 10 to be supplied, which leads to the optimal guidance of the tablets 10 in the filling channels 12. Movable blocking plates (not shown) are preferably provided in the individual filling channels 12 to dispense the tablets 10 in each filling channel 12 one at a time. Downstream from the feed unit 8, an inspection

device 14 for verifying that each individual pocket 6 of the plastic sheet 4 has been filled is arranged. The inspection device 14 is preferably a camera system, which covers a wide visual area and thus can quickly inspect each individual pocket 6 in the plastic sheet 4 to verify that it is filled. Other types of inspection devices 14 operating on, for example, the principle of capacitance could also be provided.

[0035] The results acquired by the inspection device 14 are transmitted to a control unit 16, which receives these results and actuates a lighting or beam-emitting device 18 on the basis of these results of the inspection device 14. The lighting or beam-emitting device 18 serves to visually identify the filling channels 12 which are blocked, this visual identification taking place directly in the area of the filling channel 12 itself, so that an operator can see which filling channel 12 is blocked and proceed to clean it without undue effort.

[0036] In the embodiment shown in FIGS. 1-3, the lighting or beam-emitting device 18 is designed as a laser pointer. More than one laser pointer can also be provided. Preferably, however, only a single laser pointer is provided, which directs its beam at a blocked filling channel 12 from above. For this purpose, it is advantageous for the laser pointer to be pivotable in several directions and to comprise a suitable design which allows it to direct its beam onto any desired filling channel 12 in the large matrix of filling channels 12. The dot of light produced by the laser pointer is therefore located directly on the blocked filling tube 12, thus identifying it. The laser pointer can also target the filling tube 12 in question from some other direction and thus visually identify where the blockage is. Other lighting or beam-emitting devices 18 which project light onto the blocked filling channels 12 are also conceivable.

[0037] The embodiment of the device for the monitored loading of tablets into pockets in a web of plastic sheet according to the invention shown in FIG. 4 is identical in its essential parts to the embodiment of FIGS. 1-3. Here, however, the lighting or beam-emitting device 18 comprises a plurality of lighting devices 20, each of which is assigned to a filling channel 12. These lighting devices 20 are therefore installed in stationary fashion on the filling channels 12. The lighting devices 20 are preferably designed as LEDs. The lighting devices 20 can be arranged directly next to the filling channels 12. In cases where the filling channels 12 are designed as filling tubes, the lighting devices can also be integrated into the filling tubes, as can be seen from the enlarged view in FIG. 4.

[0038] The method for the monitored loading of tablets into pockets in a web of plastic sheet proceeds as follows. First, the plastic sheet 4 is conveyed in the transport direction A. During the pauses in the transport cycle of the plastic sheet 4, the feed unit 8 feeds tablets 10 into the pockets 6 in the plastic sheet 4. Then each individual pocket 6 in the plastic sheet 4 is inspected downstream from the feed unit 8 by the inspection device 14, which detects any recurring defects 22 which may be present, such defects indicating the presence of a persistent blockage of a specific filling channel 12. On the basis of the results acquired by the inspection device 14, the lighting or beam-emitting device 18 is actuated and thus identifies visually the one or more filling channels 12 which are blocked.

[0039] If the lighting or beam-emitting device 18 comprises a laser pointer and if several blocked filling channels 12 are present, the laser pointer will preferably identify the blocked filling channels 12 in succession according to, for example, a recurring pattern. If the lighting or beam-emitting

device **18** comprises a plurality of lighting devices **20**, each of which is assigned to a separate filling channel **12**, and if several blocked filling channels are present, the lighting devices **20** of the blocked filling channels **12** will preferably light up simultaneously. Blinking patterns or other types of signals are also conceivable.

[0040] The control unit **16** does not have to be designed as an independent element; it can instead be integrated into the inspection device **14** or into the lighting or beam-emitting device **18**.

1. A device for monitored loading of tablets into pockets in a web of plastic sheet for a production of blister packs, the device comprising:

- a transport device for conveying the plastic sheet in a transport direction;
- a feed unit for feeding the tablets into the pockets in the plastic sheet, wherein the feed unit comprises a plurality of filling channels;
- an inspection device downstream from the feed unit to check whether each individual pocket in the plastic sheet has been filled;
- a control unit, which receives results acquired by the inspection device; and
- a lighting or beam-emitting device, which is actuatable by the control unit on the basis of the results acquired by the inspection device and which visually identifies a blocked filling channel,

wherein the lighting or beam-emitting device comprises at least one laser pointer, which directs a laser pointer beam at a blocked filling channel, or comprises a plurality of lighting devices, each of which is assigned to a separate one of the filling channels.

2. The device of claim **1** wherein the inspection device comprises an optical camera system.

3. The device of claim **1** wherein each filling channel is designed as a filling tube.

4. The device of claim **1** relating to the laser pointer wherein the at least one laser pointer is pivotable in several directions.

5. The device of claim **1** relating to the lighting devices wherein the lighting devices are designed as LEDs.

6. The device of claim **1** relating to the lighting devices wherein each filling channel is designed as a filling tube, and wherein the lighting devices are integrated into the filling tubes.

7. A method for monitored loading of tablets into pockets in a web of plastic sheet for a production of blister packs, comprising:

- conveying the plastic sheet in a transport direction;
- feeding the tablets into the pockets in the plastic sheet by means of a feed unit, which comprises a plurality of filling channels;

inspecting each individual pocket in the plastic sheet downstream from the feed unit by means of an inspection device to check whether the pocket is filled;

actuating a lighting or beam-emitting device on the basis of results acquired by the inspection device to visually identify a blocked filling channel, wherein the lighting or beam-emitting device comprises at least one laser pointer, which directs a laser pointer beam at a blocked filling channel, or comprises a plurality of lighting devices, each of which is assigned to a separate one of the filling channels.

8. The method of claim **7** wherein the control unit detects regularly recurring defects in the pockets of the plastic sheet and assigns the defects to a specific filling channel.

9. The method of claim **7** relating to the laser pointer wherein, if several blocked filling channels are present, the laser pointer identifies the blocked filling channels in succession.

10. The method of claim **7** relating to the lighting devices wherein, if several blocked filling channels are present, the lighting devices light up the blocked filling channels simultaneously.

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