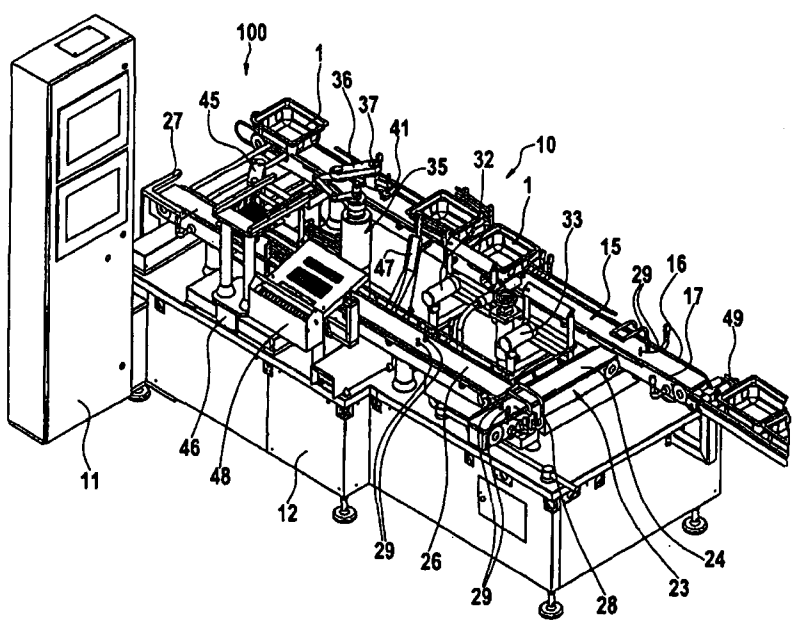
ABSTRACT

DEVICE FOR EXTRACTING CONTAINERS

The present subject matter relates to a device (10) for extracting containers (3) from a first transport unit (15) conveying the containers (3) in transport containers (1). The device (10) includes a first identification unit (32) arranged on a transport path of the first transport unit (15) for identification of the transport containers (1). The device (10) further includes a discharge unit (24) downstream of the first identification unit (32) which transfers one transport container (1) to a second transport unit (23). Further, a withdrawing unit (35) is provided on the conveying section of the second transport unit (23) for withdrawing at least one container (3). The device (10) further includes a feeding unit (27) for feeding the transport container (1) back to the first transport unit (15).

Fig. 4



I/We claim:

1. A device (10) for extracting containers (3), particularly pharmaceutical containers (3) from a first transport unit (15) conveying the containers (3) in transport containers (1), the device (10) comprising:

a first identification unit (32) disposed on a transport path of the first transport unit (15) for identification of the transport containers (1);

a discharge unit (24) disposed downstream of the first identification unit (32) to transfer the transport containers (1) to a second transport unit (23);

a withdrawing unit (35) disposed on a conveying section of the second transport unit (23) for withdrawing at least one container (3); and

a feeding unit (27) for feeding the transport containers (1) back to the first transport unit (15).

2. The device (10) as claimed in claim 1, wherein the transport container (1) comprises a receiving unit (2) that disposed in receivers (4) for receiving a plurality of containers (3), and wherein the receiving unit (2) is disposed in the transport container (1) and is capable of being extracted and inserted.

3. The device (10) as claimed in claim 2, further comprising a unit (45, 46) disposed in the region of the second transport unit (23) for extraction and transport of the receiving unit (2) from the transport container (1), which supplies the receiving unit (2) for extraction of the at least one container (3) from the transport container (1) of a lifting unit (43).

4. The device (10) as claimed in one of the claims 1 to 3, wherein the second transport unit (23) has a second identification unit (31) disposed in the region of the second transport unit, and wherein the second identification unit (31) interacts with the withdrawing unit (35) for extraction of the at least one container (3).

5. The device (10) as claimed in one of the claims 1 to 4, wherein the second transport unit (23) has a feeding unit (28) disposed in its region for the extraction of the transport container (1).

6. The device (10) as claimed in one of the claims 1 to 5, wherein the second transport unit (23) comprises a checking unit, particularly a weighing unit, disposed in its region.

7. The device (10) as claimed in one of the claims 1 to 6, wherein the first transport unit (15) and the second transport unit (23) are respectively provided as transport conveyors.

8. The device (10) as claimed in one of the claims 1 to 7, wherein the device (10) comprises only one single withdrawing unit (49) for fault free transport container (1) or container (3).

9. The device (10) as claimed in one of the claims 1 to 8, further comprising an indicating unit (34) that is disposed in the region of the first transport unit (15)for the transport containers (1) transported in the region of the first transport unit (15).

10. A packaging system (100) comprising a device (10) as claimed in one of the claims 1 to 9, wherein the device (10) comprises a first identification unit (31) that is directly coupled to at least one control unit (110) of the packaging system (100).

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S. JAYARAM
IN/PA-1347
AGENT FOR THE APPLICANT

To
The Controller of Patents
The Patent Office at New Delhi

Applicant(s) Name: **ROBERT BOSCH GmbH**

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Total No. of Sheets: 4

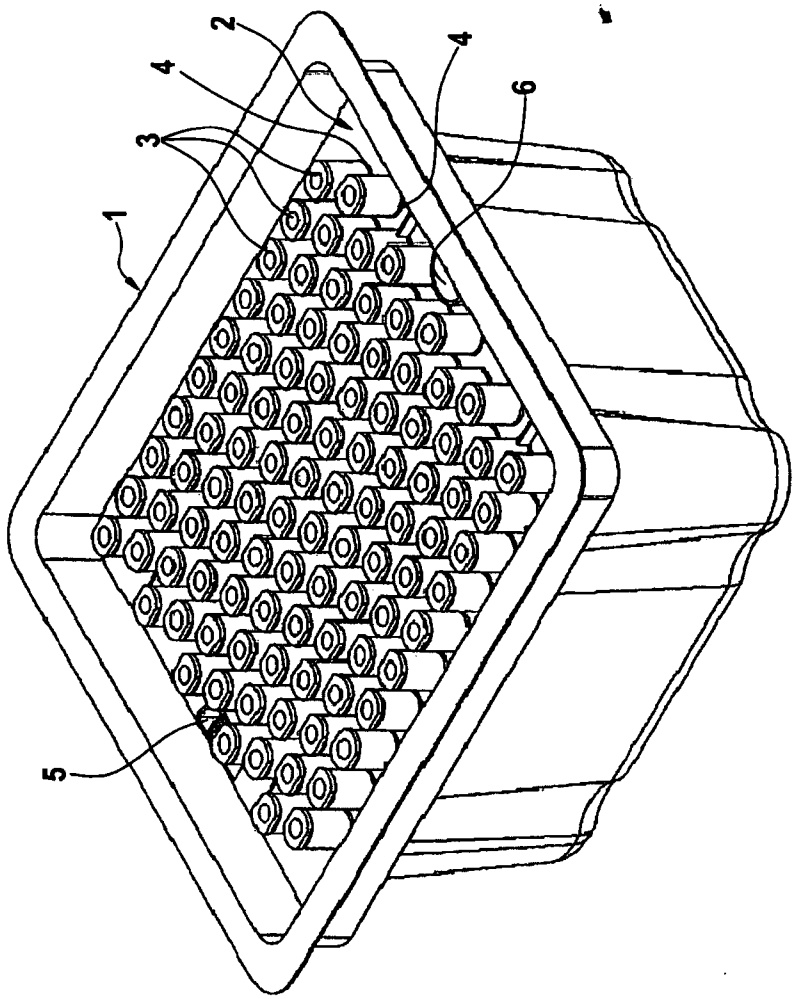

Fig. 1

S. JAYARAM
IN/PA-1347
Agent for the Applicant

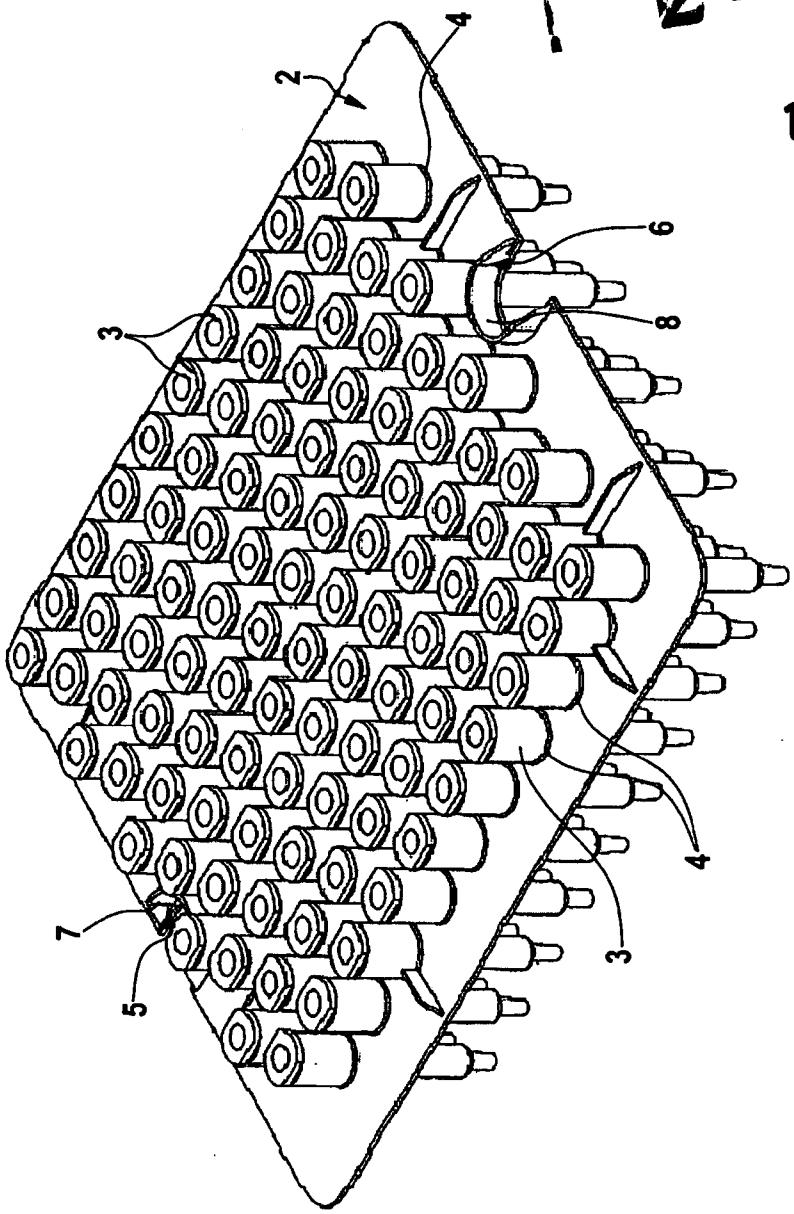

Fig. 2

S. JAYARAM
IN/PA-1347
Agent for the Applicant

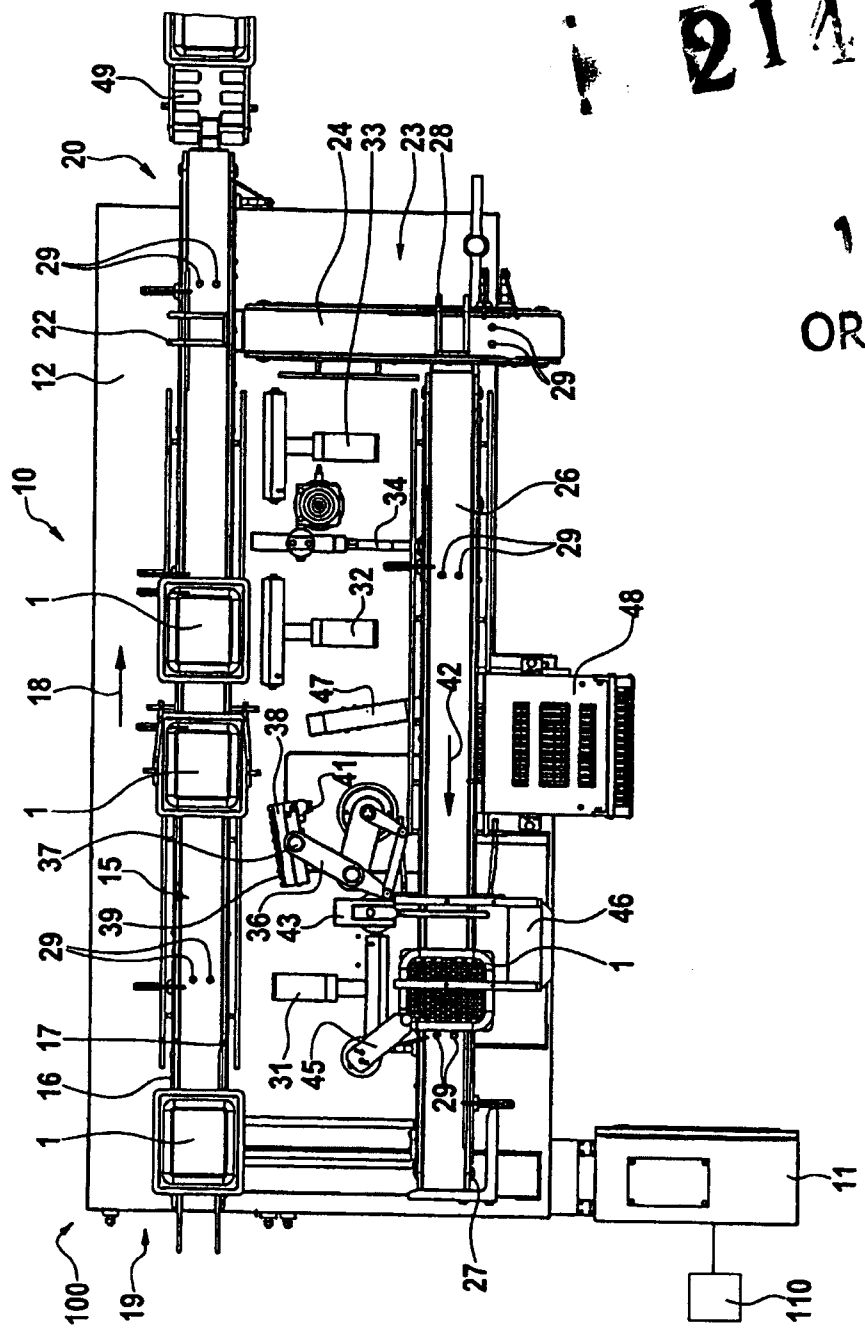

Fig. 3

S. JAYARAM
IN/PA-1347
Agent for the Applicant

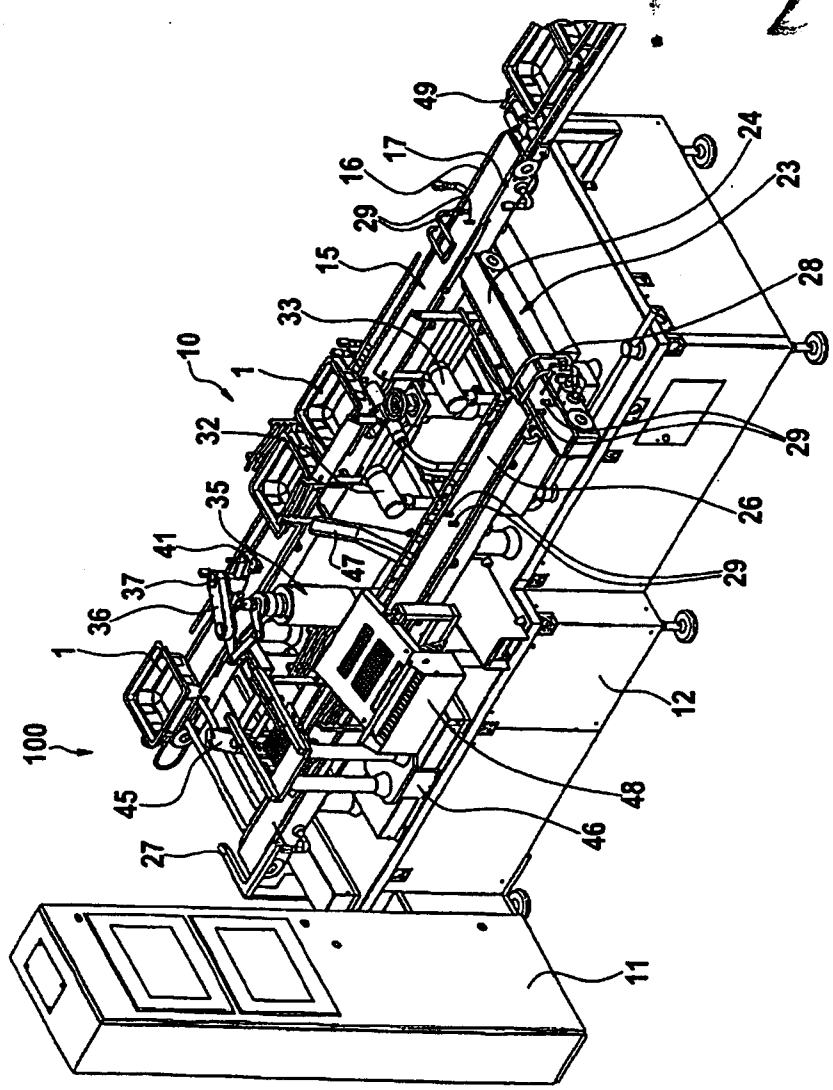

Fig. 4

S. JAYARAM
IN/PA-1347
Agent for the Applicant

TECHNICAL FIELD

The present subject matter relates to a device for extracting containers and, in particular, relates to extraction of pharmaceutical containers.

BACKGROUND

In pharmaceutical packaging industry, pharmaceutical containers like injection syringe, vials or ampoules are processed in combined filling and sealing systems. The pharmaceutical containers are filled, for example, with a liquid pharmaceutical product, weighed and subsequently sealed by a sealing element. Within the scope of the production process or the different processing steps, the pharmaceutical containers are subjected to different checks or tests, in order to ensure a good filling and a good sealing of the pharmaceutical containers. If the errors occur during the processing of the pharmaceutical containers, then it is necessary to remove the pharmaceutical containers to an appropriate station.

The pharmaceutical containers are usually removed directly from a conveyor device conveying the pharmaceutical containers. In the process of removing the pharmaceutical containers, gaps are formed in between pharmaceutical containers while extracting the pharmaceutical containers. Thus, the gaps or empty places on the conveyor device are required to be filled either with "good pharmaceutical containers" in order to avoid any difficulties in the subsequent processing steps at the appropriate stations, or to stop the conveyor device at the time of checking or extraction of the pharmaceutical containers from the conveyor device. However, the checking or extraction of the pharmaceutical container from the conveyor device requires a lot of time, which is problematic for the mentioned process.

Further, a manipulation device is known from the document DE 196 04 100 A1, in which injection syringes can be removed individually or collectively from a storage container and the storage container includes receivers for the injection syringes.

SUMMARY

This summary is provided to introduce concepts related to a device for extracting containers and the concepts are further described below in the detailed description. This

summary is neither intended to identify essential features of the claimed subject matter nor is it intended for use in determining or limiting the scope of the claimed subject matter.

In one embodiment, the present subject mater relates to a device for extracting containers, particularly pharmaceutical containers from a first transport unit conveying the containers in transport containers. The device includes a first identification unit disposed on a transport path of the first transport unit for identification of the transport containers, a discharge unit disposed downstream of the first identification unit to transfer the transport containers to a second transport unit, a withdrawing unit disposed on a conveying section of the second transport unit for withdrawing at least one container, and a feeding unit for feeding the transport containers back to the first transport unit.

In another embodiment, the present subject matter further relates to a packaging system having a device configured according to the present subject matter. The device includes a first identification unit that is directly coupled to at least one control unit of the packaging system.

BRIEF DESCRIPTION OF THE FIGURES

Further advantages and features of the present subject matter result from the following description of the embodiments and with the help of figures, wherein:

Fig. 1 represents a perspective view of a transport container along with pharmaceutical containers disposed in the transport container in a receiving unit.

Fig. 2 represents a perspective view of the receiving unit with the pharmaceutical containers according to Fig. 1.

Fig. 3 represents a top view of a device for extracting the containers in accordance with the present subject matter.

Fig. 4 represents a perspective representation of the device according to Fig. 3.

DETAILED DESCRIPTION

An object underlying the present subject matter is to provide a device for extracting containers in such a manner that a running production process or conveying process in the packaging system is disturbed as less as possible. The said object is achieved by a device for extracting containers having the features of the claim 1. Accordingly, according to the

present subject matter, the transport containers or injection syringes, which contain potentially defective containers or potentially defective injection syringes, are conveyed by a discharge unit to a second transport unit different from or separate from the first transport unit. As a result, it is enabled that production low or transport flow is not disturbed by transport containers on the first transport unit, i.e., the following transport containers with "good containers" are transported further, without the concerned transport containers being discharged or stopped.

As a result, the transport container with the potentially defective containers is placed on a second transport unit. The checking of the containers in the transport container on the second transport unit may, in principle, take arbitrarily long time. However, this does not lead to disadvantages. In particular, relatively complex or time consuming tests can also be carried out on the containers.

Further embodiments and/or implementations of the device in accordance with the present subject matter for extraction of the containers are set forth in the dependent claims. All combinations out of at least two of the features disclosed in the claims, the description and/or the figures fall within the scope of the present subject matter.

In an embodiment, the transport container has a withdrawing unit for a plurality of containers disposed in receivers and the receiving unit is disposed in the transport container and is capable of being inserted and extracted. As a result, the containers disposed in the receivers of the receiving unit can be removed in a simple manner by means of an appropriate withdrawing unit and for example, replaced with "good containers", so that the transport container can subsequently be transferred again, for example, directly in the production flow or in the first transport unit.

In an embodiment, a unit of the device is disposed in the region of the second transport unit for extraction and transportation of the receiving unit from the transport container, such that the transport container supplies the receiving unit for extraction of the at least one container from the transport container of a lifting unit. As a result, a high flexibility is achieved with reference to the arrangement of the lifting unit, so that the extraction of containers is spatially separated from the extraction of the receiving unit.

In order to make sure that the right containers are removed from the transport containers, in addition, in another embodiment, a second identification unit is disposed in

the region of the second transport unit and the second identification unit interacts with the withdrawing unit for extraction of the at least one container from the transport container. As a result, it is ensured that only those containers, which have been identified as being defective by means of the first identification unit and the second identification unit, are removed from the transport container.

In addition, in another embodiment, a feeding unit disposed in the region of the second transport unit. This feeding serves for the purpose of extraction of the transport containers, which are removed either directly from the first transport unit, or to remove those transport containers, which are still identified as defective even after circulation over the second transport device. In particular, it can be provided that a checking unit, particularly a weighing unit is disposed in the region of the first and the second transport unit. In this way, the containers which were previously identified as critical or defective, or were selected intentionally or by chance by an operator or by the machine control system, can be checked by means of appropriate checking units in the region of the second transport unit. As a result of this, the production steps of the packaging system can be checked or made sure that no containers, which are "good", are removed.

A simple handling of the transport containers on the first transport unit and the second transport unit is enabled, if both the transport units are each configured as conveyer belts or transport conveyors, on which the transport containers are conveyed by frictional contact. Such transport units are known in assembly-line technology and in manufacturing systems in the most varied manner and for example, enable to control the movement of the transport containers by using transversely running conveyor belts and deflecting or blocking elements extending in the transport path of the transport containers.

In order to be able to document the result of the checking or the number of flawless containers or to be able to apply other information in the transport container, in an embodiment of the present subject matter, it is provided that an indicating unit for the transport containers transported in this region is disposed in the region of the first transport unit.

In another embodiment, the device for extraction of containers is a component of a packaging system, which has a plurality of processing stations. Further, the device in is connected at the end of the packaging system, i.e., at this point, all irregularities or errors of

the containers are taken into account during the production process of the containers, as a result of that the corresponding containers are removed from the packaging system.

For this purpose, in one embodiment, it is provided that the first identification unit of the device is coupled to at least one control unit of the packaging system. As a result, that all errors occurred during the production process of the individual container or data can be stored in the control unit of the packaging system. By such a combination of features, it can be ensured that all potentially defective containers are removed by means of the device in accordance with the present subject matter.

Fig. 1 shows a transport container 1, which is also termed as "Tub" in pharmaceutical industry. Box type transport container 1 serves for receiving a receiving unit 2, which is also termed as "Nest", having a plurality of receivers 4. The corresponding receivers 4 of the receiving unit 2 receives a plurality of pharmaceutical containers 3, particularly injection syringe 3 to be disposed or transported in the receiving unit 2, in a form-fit manner. Further, the receiving unit 2 is provided with recesses 5, 6 on two opposite front faces. The recesses 5, 6 interact with a withdrawing unit (which is explained later in more details), so that an extraction or a lifting and a lowering of the receiving unit 2 from the transport container 1 is enabled.

In Fig. 2, the receiving unit 2 and the injection syringes 3 are represented separately. The recesses 5, 6 are formed particularly in the shape of sections 7, 8. Further, it can be seen that the injection syringes 3 interact with the receivers 4 of the receiving unit 2, in a form-fit manner, particularly in the middle region of the receivers 4. The injection syringes 3 are disposed in the receiving unit 2 in a plurality of rows. The individual rows have an offset with respect to each other and the injection syringes 3 within each row are respectively disposed at a uniform distance with respect to each other. Figs. 3 and 4 show a device 10 for extraction of the injection syringes 3 in accordance with the present subject matter. The device 10 is particularly a component of an otherwise non-illustrated packaging system 100, which has a plurality of processing stations, not represented as well in the figure, on which the injection syringes 3 are subjected to a series of processing steps or handling steps, which serve for the purpose of filling and sealing the injection syringes 3. The injection syringes 3 are filled, particularly with a liquid pharmaceutical product, which can be respectively metered very precisely. Further, it is essential that the injection syringes

3 are sealed carefully, in order to avoid, for example, the entry of germs or the like, into the filled injection syringes 3.

In order to extract the injection syringes 3, which are filled during the production steps within the packaging system 100, for example, either with an incorrect amount of filling commodity, or the injection syringes 3 where a sealing stopper or the like was not introduced correctly on the injection syringes 3, the device 10 is connected particularly at the end of the actual packaging system 100. The device 10 can specifically also serve for the purpose of extraction of the injection syringes 3 only for the purposes of control, even if these have not been assigned before as potentially defective. However, for the sake of simplicity, potentially defective injection syringes 3 are described in the following.

The packaging system 100 has a control unit 110, which detects and stores all potential errors occurred during the production process of the individual injection syringes 3 and stores them. The control unit 110 of the packaging system 100 is connected to a control unit 11 of the device 10. In particular, data about potentially defective injection syringes 3 is transferred to the control unit 11 of the device 10 by means of the control unit 110 of the packaging system 100.

The device 10 has a stand or a tabletop 12. Along a longitudinal side of the tabletop 12, a first conveying unit or a first transport unit 15 extends, which exemplarily has two conveyor belts 16 and 17 spaced apart from each other in parallel, on which the transport containers 1 are conveyed continuously by frictional contact. A conveying direction of the transport containers 1 between an inlet region 19 of the device 10 and an outlet region 20 of the device 10 is indicated by an arrow 18 (see Fig. 3).

The first transport unit 15 interacts with a second transport unit 23 through a first feeding unit 22. The second transport unit 23 includes a discharge unit 24, which is disposed transverse to the first transport unit 15, at the end of the tabletop 12 near the outlet region 20. Another conveyor belt 26, which is likewise a component of a second transport unit 23, is disposed parallel to the first transport unit 15. The conveyor belt 26 extends almost over the entire length of the device 10 and in turn, has another feeding unit 27 disposed at right angles to the conveyor belt 26 at its end. It is still essential that a second feeding unit 28 is disposed aligned with the conveyor belt 26 in the region of the discharge unit 24.

In the region of the first transport unit 15 and of the second transport unit 23, a plurality of upwardly- and downwardly- moveable blocking elements 29 are disposed, which stop the movement of the transport container 1 on the respective transport units 15 and 23. The transport units 15 and 23 indicated and described so far, are already known in general in terms of the conveyor technology, so that detailed functioning of the same is not explained in details herein.

Between the first transport unit 15 and the conveyor belt 26, exemplarily three cameras 31 to 33 are disposed on the tabletop 12. Each of the cameras 31 to 33 serve for the purpose of detecting a code, for example, disposed on a side wall of the transport container 1 or a format disposed there (not represented) and to compare with the information stored within the control unit 11 of the device 10.

The camera 32 is provided for the identification of the transport containers 1 transported on the first transport unit 15, while the camera 33 serves for checking the imprint on the transport container 1 by a print head 34 or an indicating unit 34. An identification of the transport containers 1 located on the conveyor belt 26 takes place by the camera 31. In addition, the print head 34 is disposed between both the cameras 32 and 33 in the region of the conveyer belt 15, by means of which information is detected through the cameras 31 to 33. The information may either be updated or, however, new information may be added, e.g., by a printing format.

In approximately in the middle region of the tabletop 12, a manipulation robot 35 is disposed, which has a combination tool 38 that can swivel in a vertical axis 37 at an end of an arm 36. The combination tool 38 has a block form or an elongated form. Further, a plurality of gripping units 39 are disposed on one side of the combination tool 38, while a single gripping tool 41 is disposed on an end region on the side of the combination tool 38 opposite to the gripping units 39. While a complete series of the injection syringes 3 or a part of it can be removed from the receiving unit 2 by the gripping units 39, the gripping tool 41 serves the purpose of extraction of an individual injection syringe 3 from the receiving unit 2.

Further, a lifting unit 43 for lifting a complete series of the injection syringes 3 from the receiving unit 2 is connected to the manipulation robot 35 in the conveying direction of the transport containers 1 on the conveyor belt 26. The conveying direction indicated by the

arrow 42 in Fig. 3. A lifting out unit 45 with a transport frame 46 is similarly connected to the lifting unit 43 in the conveying direction 42. By means of the lifting out unit 45, the complete receiving unit 2 can be removed from the transport container 1 and can be put down on the transport frame 46. The transport frame 46 in turn leads the isolated receiving unit 2 in the region of the lifting unit 43.

Further, on the tabletop 12, a throw-off container 47 is provided for the injection syringes 3 recognized as defective and a unit 48, by means of which the complete series of injection syringes 3 can be removed for manual reweighing of the injection syringes 3. Not represented, however, optionally provided are further checking units, particularly weighing units that can be disposed in the region of the manipulation robot 35 in order to check individual or the number of injection syringes 3 with respect to the correct filling quantity.

The device 10 described so far works as follows: The data is transmitted from the control unit 110 of the packaging system 100 to the control unit 11 of the device 10 with respect to potentially defective injection syringes 3. In particular, here the data or an image of the identification feature printed on the transport container 1 is transmitted, from which it follows as to which transport container 1 and which injection syringes 3 disposed in the transport container 1 are potentially defective. The transport containers 1 conveyed on the first transport unit 15 in uniform or non-uniform distances initially reach in the receiving region of the camera 32, where it is hindered by means of the blocking elements 29 on the further transport unit.

The identification of the transport container 1 is carried out by the camera 32 and compared with the images stored in the control unit 11 or with the information stored there. If it turns out that the concerned transport container 1 does not contain any potentially defective injection syringes 3, then the transport container 1 reaches in the further course directly at the print head 34, in order to be introduced on the transport container 1 by means of such optional information. If the imprint is subsequently confirmed by means of the camera 33, as readable, then there is no push by the first feeding unit 22 on the discharge unit 24. Rather, the blocking elements 29 let the transport container 1 pass, for example, on a rolling belt 49 or single withdrawing unit 49. The rolling belt is provided for flawless transport container 1 or the flawless injection syringe 3.

On the other hand, if the transport container 1 the container that contains potentially defective injection syringes 3, or in which a checking of the injection syringes 3 should take place, or where the injection syringes 3 could not be identified or if the identification imprint is not correct, then the concerned transport container 1 is pushed over from the first transport unit 15 on the discharge unit 24. If the transport container 1 was identified (and if potentially defective injection syringes 3 are to be removed from it or a check is to be carried out), the transport container 1 is pushed over by the second feeding unit 28 on the discharge unit 24 on the conveyor belt 26. Otherwise, the blocking elements 29 let the transport container 1 run through, so that the transport container is extracted completely.

On the conveyer belt 26, the transport container 1 reaches the renewed identification by means of the camera 31. There, the corresponding transport container 1 is identified once again, in order to make sure that the transport container 1 is the same transport container 1 which has been already identified by the camera 32 as having potentially defective injection syringes 3. By means of the lifting out unit 45, the receiving unit 2 reaches the transport frame 46. The transport frame 46 conveys the removed receiving unit 2 in the region of the lifting unit 43, where the corresponding series of injection syringes 3 is lifted from the receiving unit 2, in order to extract the potentially defective injection syringes 3 subsequently by means of the manipulation robot 35 or the combination tool 38.

In one implementation, the potentially defective injection syringe or syringes 3 are checked on a checking unit (not represented), and are transferred in a separating container 47 while determining an error of the corresponding injection syringe or syringes 3. Should this happen, then it is also conceivable or possible to transfer "good" or potentially flawless injection syringes 3 stockpiled within the device 10, in the corresponding receivers 5 of the receiving unit 2, so that the receiving unit 2 is completely filled with potentially flawless injection syringes 3.

Subsequently, the receiving unit 2 so manipulated, can again be used by means of the transport frame 46 and the lifting out unit 45 in the transport container 1, on which then, the concerned transport container 1 is pushed over by means of the feeding unit 27 again in the production flow or in a gap on the first transport unit 15.

It is still essential that the transport container 1, which has not been identified even after repeated circulation in the device 10 in which a check has failed or the imprint of the print head 34 is not readable, is extracted only at one place, namely over the discharge unit 24.

The device 10 described so far, can be modified or converted in a variety of ways. Thus, the device 10 is not restricted to the usage of the described first and second transport units 15 and 23, but can also have transport units configured in different types. It is merely important that apart from the main transport path for the transport containers 1, a diversion is created in a kind of a "bypass", which serves to control and extract potentially defective injection syringes 3 or the injection syringes to be checked, such that instead of injection syringes 3, other containers can also be processed accordingly.

By a modified arrangement of the cameras 31 to 33 or of other appropriate identification units, it is possible to detect the transport containers 1 irrespective of the place of an identification feature. Similarly, it is possible to arrange the print head 34 in such a manner that a dynamic printing is possible on each side of the transport container 1.