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(54) **CONTROL DEVICE FOR DOSES**

(76) Inventor: **Raimo Juselius**, Vihti (FI)

Correspondence Address:
Edward A Pennington
Swidler Berlin Shereff Friedman
3000 K Street NW Suite 300
Washington, DC 20007-5116 (US)

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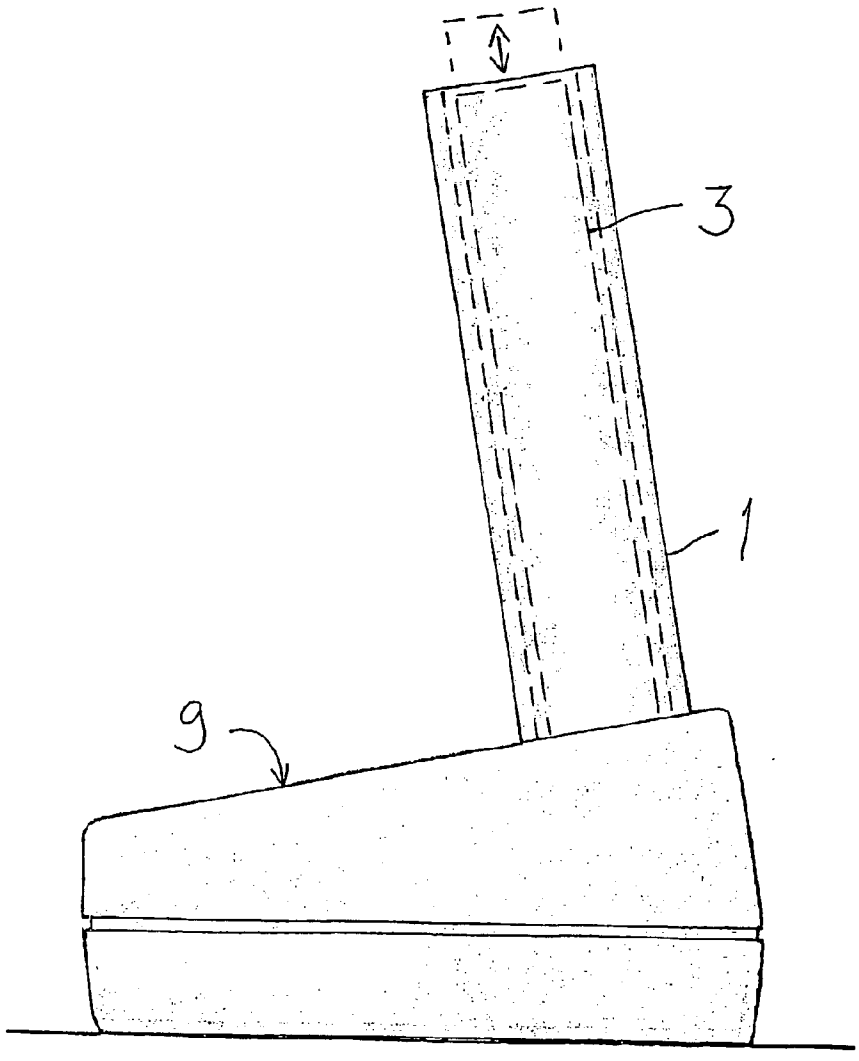
(57) **ABSTRACT**

The control device for doses contains one or more sockets **(1)** for a removable medicament dosage unit **(3)**, one or more indicators **(2)** of taking the dosage unit **(3)**, and one or more lifters **(4)** for lifting the dosage It unit located in the socket **(3)**. The control device is especially well suited for monitoring the administration of doses intended for treatment of diabetes. The sockets **(1)** are vertical or sloping tubes protruding from the body of the control device, in which injection pens containing insulin can be placed.



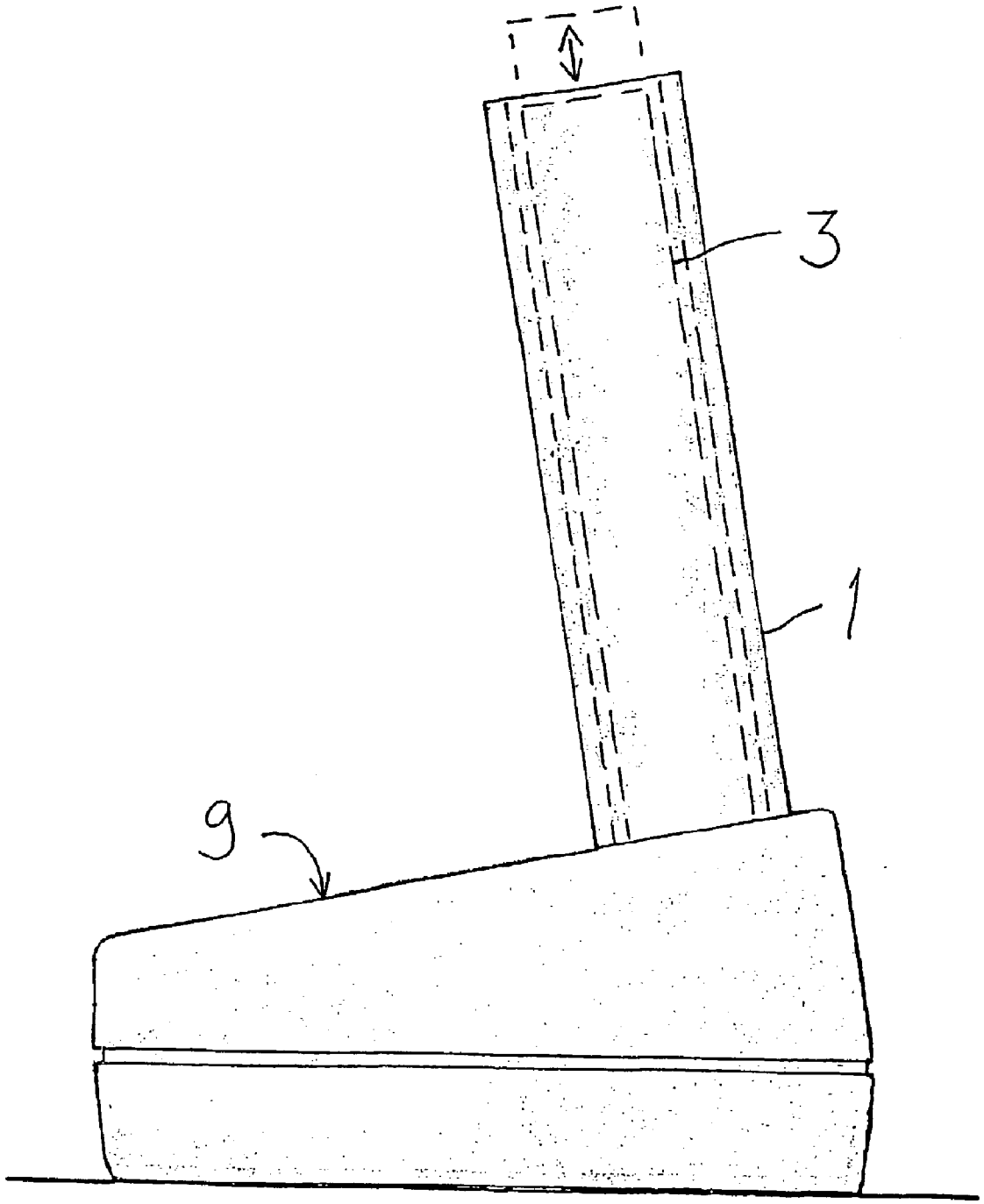


Fig. 1

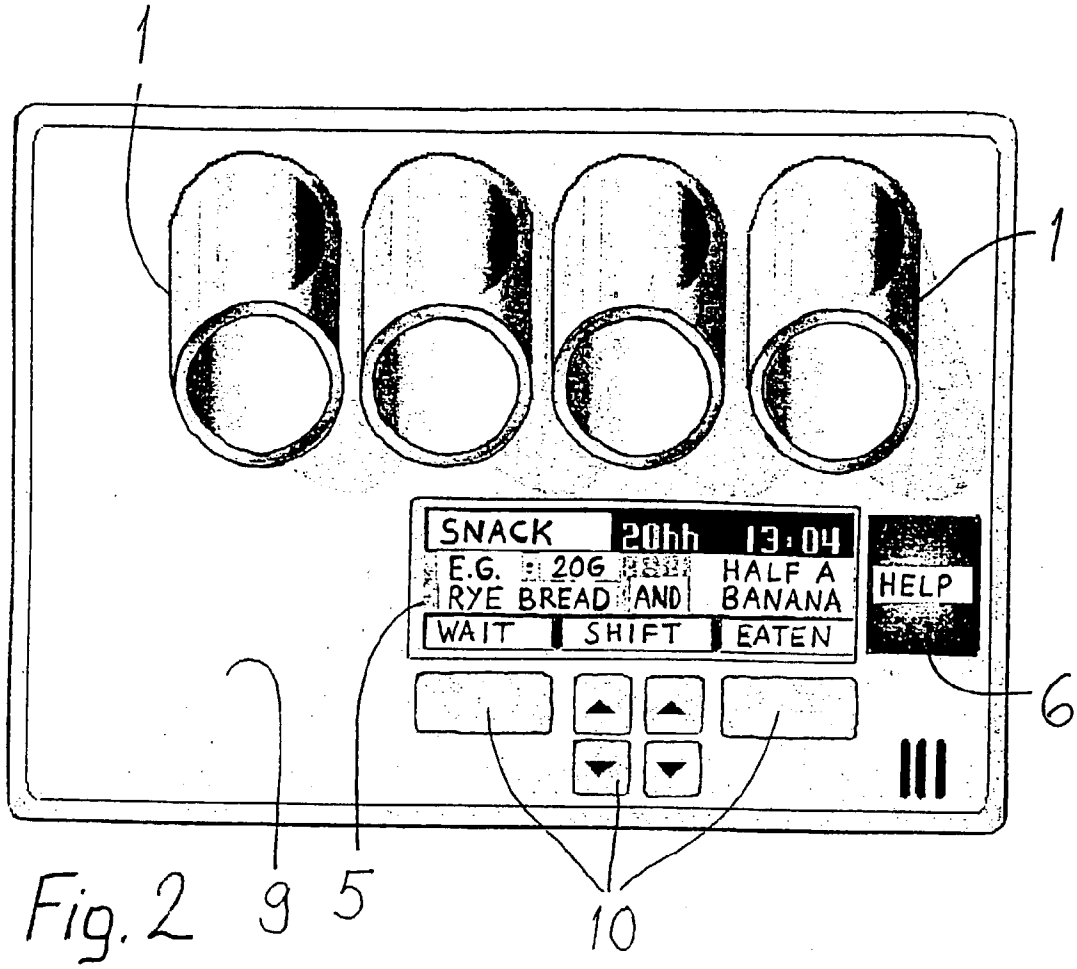

1
1
SNACK
20hh
13:04
E.G. : 20G
RYE BREAD AND
HALF A
BANANA
HELP
WAIT
SHIFT
EATEN
6
9
5
10

Fig. 2

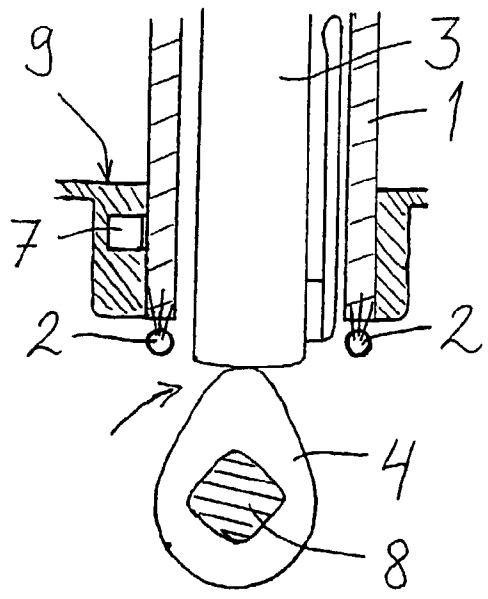

9
3
1
7
2
2
4
8

Fig. 3

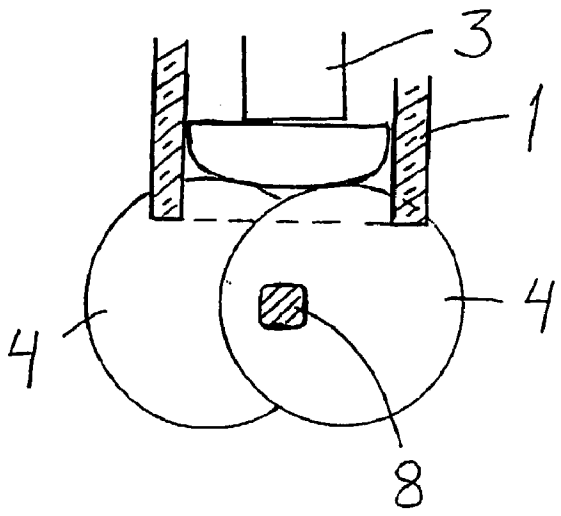


Fig. 4

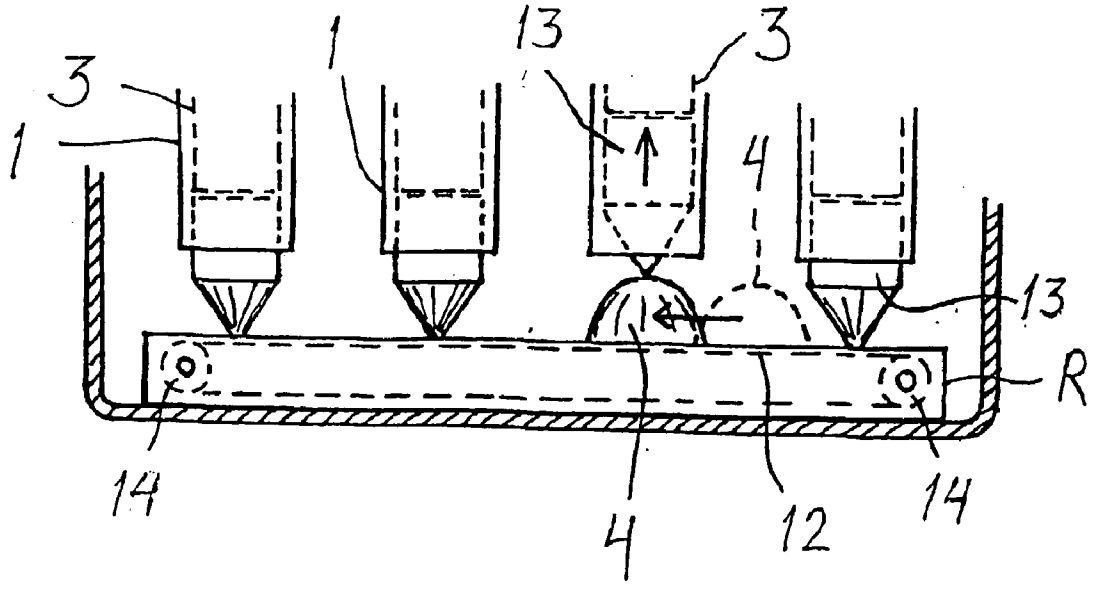


Fig. 5

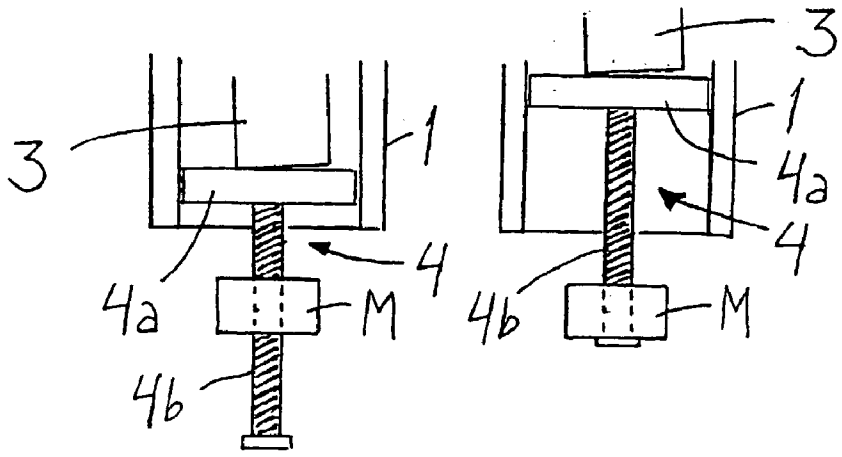


Fig. 6

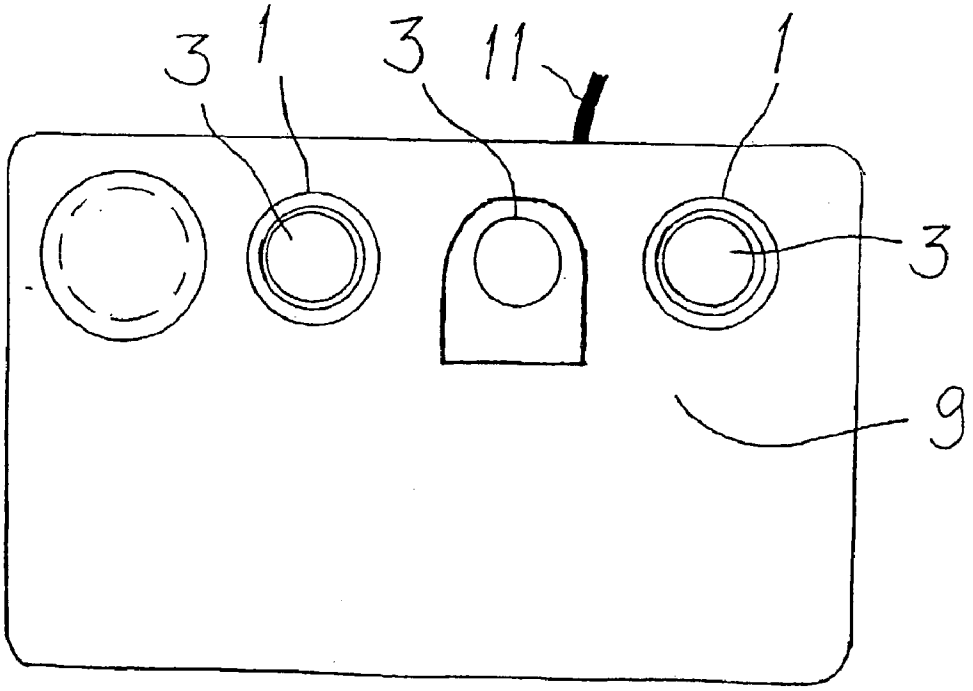


Fig. 7

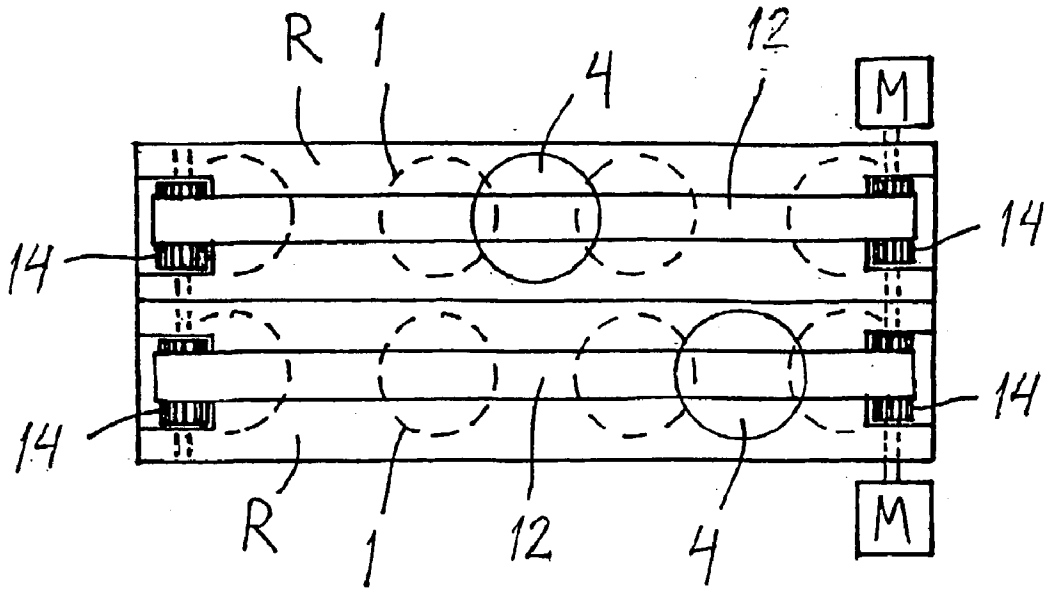


Fig. 8

CONTROL DEVICE FOR DOSES

[0001] The invention relates to a control device for doses containing one or more sockets for a removable medicament dosage units of medicament as well as one or more indicators of taking of the dosage unit.

[0002] It is known to use various medicament containers with alarm systems based on timers for drug doses which are to be administered at intervals and are usually in the form of pills, tablets, or corresponding doses to be administered orally, and as an example it is possible to mention the alarm systems for medicament containers disclosed in the application publications GB 2179919 and FR 2666225.

[0003] For example the treatment of diabetes requires administration of fixed doses of insulin at predetermined times according to the treatment plan.. US Pat. No. 4,950, 246 discloses a syringe intended for the use of a person having diabetes, an "injection pen", which can be used to meter a predetermined dose of insulin. The syringe has an integrated system with a sensor monitoring the progression of a pump rod inside the syringe and giving information to an electronic control unit for administering a correct dosage at the time of injection. In this syringe, the only alarm is an indication on the emptying of the reservoir to be expected.

[0004] The international publication WO 99/43283 discloses a new regimen for the treatment of diabetes, which can be easily implemented by the equipment available without making structural changes in the injection pen itself. This is implemented by means of special stand that functions as a control device for doses and contains several holes, "sockets" for the injection pens containing insulin. The stand comprises recesses for placing the injection pens in an erect position therein. For each injection pen there is a pair of indicators. The device is arranged to give an alarm in a certain order, wherein the indicator of the respective injection pen gives an alarm that it is time to administer a dose from the injection pen in question. The act of removing this injection pen from the stand is detected by means of a suitable sensor detecting the movement of the injection pen away from the stand. When the removal of the injection pen has been detected, a second indicator is shifted to a state in which it indicates that the dose has been administered. The indication may take place visually, for example by means of a signal light. The publication discloses how the injection pen can be locked to the stand at other times to prevent inappropriate use of the same. The diameters of the pens determine the size of the sockets in such stands.

[0005] The control device for doses must unambiguously indicate the unit from which a dose must be taken at a given time. This is especially important for users, whose perception has been impaired due to old age or illness.

[0006] It is an aim of the invention to present a further development of a known control device, in which the dosage unit next in order is indicated very clearly and in a secure manner. For achieving the aim, the injection pen according to the invention is primarily characterized in that it comprises one or more transfer members, which are arranged to shift the dosage unit located in the socket to a position which differs from the normal position of the dosage unit, and back to the normal position. As a result of this, it is possible to emphasize even more clearly one or more dosage units that have the turn, advantageously with another visual signal related thereto, and make the dosage units differ from one or more dosage units in the normal position, if there are two or more sockets in the control device. The transfer device can be a lifter for lifting the dosage unit located in the socket. By means of the lifter it is possible to lift the dosage unit from which the dose has to be administered and make it especially well distinguishable from other dosage units in the control device.

[0007] According to a preferred embodiment, the socket is composed of one or more vertical or sloping supporting elements protruding from the body of the control device. Besides making it possible to use injection pens of various sizes and produced by different manufacturers in the same stand with good support without actually locking the injection pens to the stand, this structure also makes it possible to dimension the length of the lifting movement of the lifter and the length of the supporting element/elements in such a manner with respect to each other that the upper end of the dosage unit rises above the upper end of the supporting element as a result of the movement of the lifter, whereafter the dosage unit can be removed from the socket.

[0008] According to a preferred embodiment, the socket can be a tube inside of which the entire injection pen can be placed, wherein it can be exposed by means of a suitable lifting mechanism located at the lower end of the tube. The tube is advantageously transparent.

[0009] Furthermore, there are different structural alternatives for the lifter, which will be described hereinbelow. The lifter in the lifting mechanism is located permanently or temporarily underneath the socket so that when the lifter is operated with a suitable power transmission member, it moves to a position in which it lifts the dosage unit to a upper position from underneath, either directly or via a separate element located therebetween, at the same time supporting the dosage unit. Such a lifter may be a member located permanently below the socket, such as a rotating eccentric or a supporting element that can be moved linearly up and down, or a wedge-shaped member that moves underneath the socket and lifts the dosage unit by wedge effect.

[0010] In the following, the invention will be described in more detail with reference to the appended drawings, in which

[0011] **FIG. 1** shows a side-view of the control device according to the invention,

[0012] **FIG. 2** shows top view of the control device of **FIG. 1**,

[0013] **FIG. 3** shows the operation of the control device in a situation where the indicator indicates an event of administration of a dose,

[0014] FIGS. **4** to **6** show other lifter structures,

[0015] **FIG. 7** shows a manner of using the sockets of the control device, and

[0016] **FIG. 8** shows an alternative for placing the sockets.

[0017] **FIGS. 1 and 2** show a control device for doses which forms a stand for two or more medicament dosage units **3**, in this case injection pens. The stand is intended to be placed for example on a table. It is the purpose of the stand to control and monitor the administration of several

doses during the day. To each injection pen, there is allotted a time of the day in the memory of the device telling when the injection should be taken. When it is the time to administer a dose from the pen, a visual indicator by the pen shows that the dose should be taken from the pen in question. At the same time an acoustic alarm can be given. The removal of the pen is detected by means of a suitable sensor, for example a sensor operating by means of a mechanical switch or on contactless principle, and when the pen is removed for a certain period of time, this is interpreted as an event of administration of the dose. When the event of administration of the dose has been registered in this way, the visual indicator by the pen remains, for a given time, for example until the beginning of the next standby time of the same pen, in a state that shows that the dose has already been taken from the pen. This is indicated advantageously with a colour light that can be easily detected. The indicator for the pen showing that a dose should be taken and the indicator showing that the dose has been taken can be different indicators which are turned "on" and "off". It is, of course, possible to use physically the same indicator which changes its state, e.g. colour, according to the state of the pen in question. The operating principle is the same for each injection pen to be monitored in the stand. The injection pens can be different in that they contain medicaments which act differently and which should be taken at a certain time of the day. Especially in the treatment of diabetes, the pens may contain different types of insulin.

[0018] In the following the structure of the control device implementing the aforementioned operating principle will be described in more detail. **FIG. 1** shows a side-view of a stand for keeping several dosage units **3**, in this case injection pens containing insulin. The stand is a casing, provided with the necessary electronics therein and containing a coupling for an external power source (coupling for a battery charger or a plug to be inserted to a socket). For each injection pen there is a socket **1** to which it can be placed to a vertical position, or, as shown in the figure, to a sloping position. The socket **1** is composed of a tube, which is dimensioned in such a manner that the dosage unit **3** illustrated with broken lines is in the normal position located entirely in the tube, i.e. the end of the same is located inside the inlet opening of the tube so that it cannot be removed from the tube with fingers. The tube is attached to the body casing of the control device, to a recess located in the inclined front wall, i.e. the top wall **9** of the casing. The tube is made of transparent material, for example acrylic plastic, wherein it is easy to see whether there is an injection pen inside the tube.

[0019] In the same wall of the casing from which the tubes protrude, there is also a display and buttons required for operating the device. The function of the display and buttons will be described hereinbelow

[0020] **FIG. 2** shows a top view of the device. As can be seen in the figure, the device contains tubes for four injection pens. The invention is not, however, restricted to the number of tubes, and thus, it also falls within the scope of the invention that there is only one tube for one injection pen, although the device is best suited for controlling the administration of different types of doses, wherein it is necessary to use at least two different dosage units **3**, and at least two different sockets **1**, respectively, for example when two different types of insulin are used for the treatment of diabetes. When the device contains two or more sockets **1**, they are identical in shape and size so that a conventional injection pen fits in each socket, irrespective of the manufacturer of the pen. The front wall of the container, i.e. the top wall **9** which is slightly inclined, contains a display **5** on which different kind of information can be shown depending on the ways in which the device is programmed. In the normal state the display may only show for example the date and the time. For the treatment of diabetes a separate time has been programmed for each injection pen in the data processing unit of the device The device also contains a time measuring device (clock) whose time is shown on the display in the manner mentioned above, and the data processing unit is arranged to compare the pre-programmed time with the time of the time measuring device. When it is time to administer a dose from the injection pen in question, the data processing unit gives commands to members which control the following functions: the alarm of the device gives a visual alarm by means of a signal light visible by the appropriate injection pen, and possibly an acoustic alarm as well. At the same time the display shifts to a state in which information programmed in the memory of the data processing unit is transmitted thereon, said information relating to the event of administration of that particular dose, for example the size of the dose (in the case of diabetes, units of insulin from the injection pen indicated by the alarm, or another measurement which is used in the injection pen and can be set therein before the injection). Thus, the data processing unit and the time measuring device cooperate in a manner similar to a timer.

[0021] Furthermore, it is possible that alarms relating to other actions can also be programmed in the data processing unit, which alarms are given at fixed times of the day, i.e. when the device gives an alarm, it does not necessarily indicate that a dose must be taken, but it can refer to other measures (meal, exercise, etc.) relating to the treatment of diabetes. The alarm of the device can in this case give a visually and/or acoustically different alarm than the alarm relating to the administration of a dose.

[0022] According to the principle disclosed in the publication WO 99/43283, the device also registers the removal of the dosage unit, and thus, the corresponding indicator will continuously indicate that the dose has been taken. This function will be described in more detail hereinbelow. If the dosage unit has not been removed within a fixed period of time after the alarm, the device gives another alarm.

[0023] The device can communicate with an outside supervisor for example by means of landline or wireless communication. Thus, for example a doctor can monitor the treatment, and in the case of a bilateral connection, the doctor can also program the device from a distance. Thus, it is possible to program different kinds of instructions in the data processing unit of the device, such as the sizes of doses, other instructions such as instructions for meals and exercises which can be shown on the display, etc. Furthermore, it is possible to change the administration times (set new alarm times) from a distance. Although the connection is protected as well as possible, to be sure the device contains a security function allowing only a change of particular scale one way or the other in the values relating to the administration of the medicament dose (time of day, size of the dose), i.e. an upper limit is determined for the changes (for example units of insulin and h). A special alarm may be

automatically transmitted outside via the data transmission line if the device has not registered an event of administration of the dose within a predetermined time after the first alarm given to the user of the device. Furthermore, the figure shows an emergency button **6**, which, when pressed continuously for a predetermined period of time, for example 0.5 seconds, sends a special alarm outside. The special alarm may be programmed to be transmitted via the data transmission line directly to a special, address, for example to an emergency centre. Furthermore, **FIG. 2** shows activity buttons **10**, by means of which it is possible to move in the menu shown on the display **5** and confirm that different activities (meal, exercise) have been performed. These confirmations are also registered in the memory and the person supervising the treatment can monitor them via the data transmission line.

[**0024**] **FIG. 3** shows schematically how the dosage unit **3** located inside the tube is lifted up to the operational position. The lower end of the dosage unit is positioned in the space below the top wall **9**, the tube extending to this space as well. When the pre-programmed time and the time of the time measuring device match, an alarm relating to the event of administration of the dose is given, and in connection with the alarm the data processing unit also gives an actuating command to a lifter **4** located in the lower end of the tube and touching the lower end of the injection pen, said lifter lifting the pen inside the tube so that the opposite end of the pen rises above the inlet opening of the tube. In **FIG. 3** the lifter **4** is implemented by means of an eccentric attached to an electrically rotated shaft **8** with a quadratic cross-section. The lifter **4** is of such a type that it does not lock the pen in its place, but the lower end of the pen rests freely on top of said lifter, and the pen can be removed by tilting the container, wherein the pen slides out, or by removing the tube. In a device containing several injection pens the eccentrics are placed on the same shaft **8** at regular angular distances so that they face different directions, and the shaft always revolves a corresponding distance (i.e. in a device with four sockets at distances of 90°) Furthermore, the visual light indicator **2** connected to the dosage unit is placed inside the casing, in the lower end of the tube in such a manner that it directs light from the end of the tube to the wall of the tube. Thus, the tube functions as a light guide and conducts the light emitted by the indicator into view, wherein it can be seen at least in the upper end of the tube as a glowing, ring-like light. The indicator **2** can be composed for example of a series of light-emitting diodes located at the end of the tube. When the event of administration of the dose has been registered, the colour of the light-emitting diodes can change (for example from green to red), or other light-emitting diodes that are placed for this purpose below the tube and emit different kind of light are switched on. Furthermore, a text may appear on the display **5** indicating from which socket **1** (tube) the dosage unit **3** should be taken and the size of the respective dose, and for this purpose, the front wall may contain a letter or a number by each tube.

[**0025**] When the lifter **4** has lifted the injection pen to the upper position, the removal of the same is detected by means of a sensor, for example with a sensor marked with the reference numeral **7** in **FIG. 3**, such as a light cell, operating on the contactless principle, and thus the indicator **2** indicates that the dose has been taken and the time (date and time of day) the dose was taken is at the same time registered in the memory of the data processing unit of the device. The sensor **7** is located at a suitable height from the upper position of the supporting surface supporting the pen in the lifter **4**, so that it can detect the removal of the pen from the socket when the pen transferred to the upper position by means of the lifter has been lifted away from the height of the observation area of the sensor **7**. By means of the above-mentioned bidirectional data transmission connection, the person supervising the treatment, such as a doctor, can monitor the times of administration of the doses. The injection pen must be removed for a predetermined period of time, so that mere lifting of the pen up and lowering it back down right thereafter would not be registered as an event of administration of the dose.

[**0026**] **FIG. 4** shows another alternative in which the eccentric functioning as a lifter **4** has a circular shape and it is fixed eccentrically (outside the centre of the circle) to the shaft **8**. Due to the circular shape the height of the edge surface of the eccentric is increased and reduced evenly when the shaft is rotating. Also in this case the eccentrics may be placed on the same shaft **8** that rotates the eccentrics. Between the eccentric and the dosage unit there may be a separate supporting base **4***a*, the eccentric touching the lower surface of the base and the lower end of the dosage unit **3** resting on the upper surface of the base. Such a supporting base may be located in the tube and the lower end of the tube may contain a vertical recess, so that the eccentric may be in contact with the lower surface of the supporting base **4***a* located in the tube.

[**0027**] Another alternative is to place the eccentrics in pairs on two shafts rotated with motors of their own in such a manner that the eccentrics are fixed to the same shaft in different angular positions. Thus, the selection of the shaft to be rotated and the direction of rotation of the same can be utilized to select the unit to be lifted up. As for the shape of such eccentrics, they can be of the type provided with a cam shown in **FIG. 3**, or they can be circular as shown in **FIG. 4**. **FIG. 4** shows two eccentrics fixed on the same shaft **8** with an angular distance of 180° with respect to each other, seen in the longitudinal direction of the shaft.

[**0028**] **FIG. 5** shows a lifting mechanism which is an alternative to the eccentric shaft. The lifting mechanism contains a lifting element functioning as a lifter **4**, which tapers upwards in such a manner that the walls facing the direction of propagation (direction of the reciprocating movement) of the same are inclined in a wedge-like manner (in the case shown in the figure also convex outwards). The lower end of the lifting element is fixed to a conveyor **12** moving the lifting element in steps below each socket **1** (lower end of the tube) in such a manner that this movement makes the dosage unit **3** in the tube rise to a position in which it can be removed from the tube. When the pre-programmed time and the time of the time measuring device match, the data processing unit thus gives an actuating command to the driving motor of the conveyor **12** in connection with the alarm relating to the administration of the dose, said driving motor being advantageously a step motor, and the conveyor moves a fixed distance so that the lifter **4** moves from the position off the lower end of the tube (shown with broken lines) directly underneath the tube. Because the lower end of the dosage unit is not necessarily shaped to match the shape of the lifting element, the lifting mechanism utilizes a separate plunger **13** with a conical lower end, the lower end of the dosage unit resting on the

upper surface of the same, and the lifting action takes place when the surface of the lifting element and the conical surface of the plunger touch each other. The lifting element and the plunger **13** may be made of suitable plastic having a suitably low friction on its surface.

[**0029**] The conveyor **10** can be moved electronically. In practice, the movement is implemented in such a manner that the conveyor **5** is a loop-like cogged belt. Both ends of the cogged belt contain a cogged wheel **14**, one of them being advantageously coupled to a driving motor, which is advantageously a step motor. The lifting element moves back and forth in the upper section of the loop of the conveyor belt, between the cogged wheels **14**. The return section of the loop in the conveyor **12** is located below the reciprocating path of motion of the lifting element, and thus the conveyor **10** occupies a small amount of space in the horizontal direction.

[**0030**] The conveyor **12** can also be implemented as a sort of a conveyor screw that extends past and below the different sockets **1** and moves the lifter **4** while rotating, which lifter is equipped with a corresponding internal threading and fixed to a guide extending in the transfer direction so that said lifter does not rotate but moves in the direction of the conveyor screw. The transfer of the lifter may be implemented with a step motor which can be arranged as an extension for the conveyor screw in the end of the body module.

[**0031**] As can be seen in **FIG. 5**, this control device also contains several sockets **1** formed of tubes in a row, the lower ends of the sockets being shown. The tubes are fixed to a structure in the casing of the control device. The body module R containing the lifting mechanism (the conveyor **12** and the lifting element, i.e. the lifter **4**) are placed in the bottom of the body casing of the control device. In the lower position, the plungers **13** can rest freely against the conveyor **12**, and the height of the same with respect to the distances between the lower ends of the tubes and the conveyor **12** is such that their upper ends are located inside the tubes, so that they stand erect and are guided into the tubes during the lifting movement. Naturally, the distance between the lower ends of the tubes and the conveyor **12** is such that the lifting element is capable of travelling underneath the tubes in the horizontal direction. The body module R containing the conveyor attached thereto may also be made of plastic.

[**0032**] The propagating movement of the lifting element functioning as the lifter **4** may be implemented in such a manner that within the daily schedule the lifter travels according the programmed information and under the control of the clock device in one direction, to the point of location of each socket **1**. It also stops by each socket for a certain period of time, wherein it keeps the dosage unit up. When the last dosage unit of the daily schedule is lifted up for administration of the dose, it returns with one longer return movement back to the other end of the conveyor to a standby position in the vicinity of the first dosage unit of the day. During this return movement the units therebetween are each lifted up temporarily and lowered down straight after that, and this is not inconvenient because these sudden rises and falls cannot be interpreted as a command for administration of a dose. Furthermore, the return movement can occur at a suitable time at night.

[**0033**] **FIG. 6** shows yet another lifting mechanism. Here, the lifter **4** is formed by a supporting base **4***a* which is arranged to move directly upwards and downwards and a vertical rod attached in a torsionally rigid manner underneath said supporting base, said rod forming a conveyor screw **4***b*. The lower end of the dosage unit **3** rests on the supporting base **4***a* which is positioned in the lower end of the socket **1** in such a manner that it is incapable of rotating therein around the vertical axis. An electrically operating motor M is fixedly attached to the body of the device, below the supporting base, the conveyor screw **4***b* extending through an opening in the centre of the motor M. The opening is formed by a rotating part of the motor that is equipped with an inner threading, said part engaging the outer threading of the conveyor screw, thus making the screw move in the height direction while rotating, i.e. the power transmission changes the rotating movement into the linear movement of the vertical rod. Such a motor M is very efficient, but it does not occupy a great deal of space. Each lifter **4** has a motor of its own. When it is time to take a dose from a predetermined unit, the motor M connected to the respective lifter **4** is automatically started up to lift the lifter to the upper position. When the motor M is rotated to the opposite direction it is possible to lower the lifter **4** back to the lower position. It is also possible to use another kind of power transmission mechanism implemented with a vertical rod, by means of which the supporting base **4***a* can be made to move the necessary distance in the vertical direction to transfer the dosage unit to the upper position.

[**0034**] In all the cases described above in FIGS. **4** to **6** there can be light sources **2** located at the lower ends of the tubes and sensors **7** in the lower part of the tube within a suitable distance from the lower end, as in **FIG. 3**.

[**0035**] The lifter **4** can be of another type as well, for example a plunger operating electrically by means of a magnetic coil, wherein the lifters of different sockets are not mechanically connected to each other. If it is desired that the injection pen can be removed at other times than the time set for administrating the dose, the lifter **4** can also be arranged to operate manually, for example mechanically by means of a control apparatus, or with a special press button. The tubes surrounding the injection pens may also be easily detachable from the casing, for example they can be screwed off. If the tube is fixed to the body casing by means of a screw thread, the outwards protruding portion of the tube can then be handily adjusted as well. In practice, however, it has been observed that the insulin injection pens of different manufacturers differ from each other very slightly in length, whereas in diameters the variation is greater.

[**0036**] The function of the lifter **4** by the socket **1** is advantageously arranged in such a manner that when the indicator **2** has detected that the dose has been taken, the lifter **4** is transferred to a position corresponding to the lower position of the pen immediately or relatively soon after a delay time. This ensures the prevention of double injection, because the injection pen moves into the lower position after the dose has been taken, in which position the injection pen cannot be easily removed. Thus, in a situation when it is not the time to take the injection, all pens are in the lower position. Despite of this prevention of double injection provided already by the structure of the control device, it is possible to arrange an alarm within a fixed, predetermined precautionary time from the moment of registering the administration (for example within 2 hours), if, however, some kind of an attempt is made to remove the same pen. In

this case the alarm of the device receives information from the sensor **7** detecting the removal of the pen, and the alarm can give an acoustically or visually different alarm, warning of the risk of double injection.

[**0037**] The invention is not limited solely to tubes, but the sockets can be composed of one or several longitudinal supporting elements with another shape, said supporting elements extending in the height direction. It is for example possible to use several rib-like elements around the dosage unit **3**. One supporting element with an open cross-section may also be sufficient for each socket, said supporting element being located in a sloping position in such a manner that the dosage unit **3** rests against the same and said supporting element may thus be shaped on the side of the dosage unit as a curved groove-like structure. In the alternatives where the supporting element does not surround the dosage unit **3** entirely as a tube-shaped element, the dosage unit can be removed without a lifter as well, but also in these cases it is possible to arrange a mechanical lifting movement in conjugation with the time of administering the dose, wherein, in addition to the visual indicator, said dosage unit **3** is at the same time distinguishable from the others. Also in this case the supporting elements can be dimensioned in such a manner that in the normal position the upper ends of the dosage units remain below the upper end of the supporting element, and the lifter **4** lifts the upper end of the dosage unit **3** above the upper end of the element.

[**0038**] **FIG. 7** shows that all tubes or sockets **1** with another shape do not necessarily have to contain an injection pen, but the device can be programmed for a smaller number of different injection pens. The basic model is a device with four sockets, wherein the maximum number of injection pens is four. The connecting cable by means of which the device can be connected to a plug socket is marked with the reference numeral **11**. In **FIG. 4** one of the sockets is missing (a tube or a corresponding supporting element/elements has/have been released) and the hole remaining in the body casing is plugged. One of the sockets is also modified into a special seat for a portable injection pen provided with a control device of its own, containing a sensor detecting the movement relating to the injection (e.g. the movement of the piston or a part connected thereto kinetically). Thus, the seat functions as a charger for the battery of the control device. The control device can be the device presented in the international publication WO99/43283 that can be attached to the injection pen as a separate element and contains timer and alarm functions of its own. When the body casing is designed, such a charger possibility can be taken into account for example in such a manner that one hole in the body casing, in which the lower end of the dosage unit is located in normal use, is equipped with direct current contacts, which are otherwise covered by the tube fixed to the hole e.g. by means of screwing down, but which are coupled to the conductors of a fitting element attached in the hole to replace the tube, said conductors passing to the charging contacts of the fitting element. Into such a fitting element fixed to the body casing it is now possible to insert a control device accompanying the pen, the contacts of the control device being now connected to the contacts of the fitting element. Another structural possibility is to arrange a hole in the body casing which is originally wider and functioning as a charger and containing current contacts required for the charging in readiness, and the control device can be inserted in the hole. When the aim is to change this section into a conventional socket, a fitting element is inserted therein, containing an attachment point for a tube or another supporting element, or a tube or a corresponding supporting element is already contained therein.

[**0039**] In the charging by means of the body casing, the control device and the injection pen are attached to each other, wherein they can be easily taken along from the body casing. Naturally, it is also possible to register the placement of the pen and the control device in the charging and release from the charging into the memory of the device, because such a movement can be easily detected and this information can also be read from outside by means of the data transmission line. **FIG. 4** shows how among three "operating" sections the one in the middle functions as a charger for the control device of a portable injection pen. In the treatment of diabetes it is thus possible to act in such a manner that the morning insulin is taken at home from the injection pen of the outermost socket, the portable injection pen and the control device are taken along from the charger when going away for the day, and the evening insulin is again taken at home from the other outermost socket. When the body casing is modified, the movements of the lifters **4** are of course programmed to occur according to the locations of those injection pens that can be lifted up. When eccentrics located on the same shaft are used, the shaft **8** can revolve double a distance at the moment of operation, so that it is possible to pass by the empty (plugged) section or the section functioning as a charger.

[**0040**] Hereinabove, the invention has been described primarily with reference to the treatment of diabetes and insulin injection pens. The invention is, however, also suitable for controlling the administration of other medicament doses. Thus, the dosage unit **3** contains medicament which must be taken at set times and in doses of particular size. Different dosage units **3** can contain different medicaments or the same medicament. Different medicaments may also be intended for treatment of different diseases. Thus, the invention can be applied in cases where the person in question uses two or more medicaments for the treatment of one or more diseases or ailments. Such medicaments are not necessarily injectable, but they can also be doses taken orally. Thus, the dosage unit can be a container containing medicinal preparations in a solid form, in solid pieces of particular size that correspond to a dose of fixed magnitude (e.g. mg of the active ingredient). The container may be for example a longitudinal container containing tablets or the like. Dosage instructions and the act of monitoring the administration of doses by means of the control device can thus be implemented in a similar manner as in the case of insulin, including the data transmission to an outside supervisor (e.g. doctor) and different alarm functions.

[**0041**] **FIG. 8** shows a top view of an entity composed of two body modules R. Both body modules comprise a lifter **4** reciprocating in the manner described in connection with **FIG. 5** and a loop-like conveyor **10** of its own. Thus, the control device may contain two rows composed of several sockets, and underneath both rows there is a body module of its own. This is advantageous if the aim is to provide the device with two distinguished groups of sockets, wherein the first one can contain for example injection pens containing insulin that are intended for treatment of diabetes, and the second one dosage units containing other medicaments intended for the treatment of diabetes. Such a dosage unit

containing other kind of medicinal substance than insulin can be for example a container containing medicinal preparations in a solid form, in solid pieces of particular size that correspond to a dose of fixed magnitude (e.g. mg of the active ingredient). The container may be for example a longitudinal container containing tablets or the like. When such a control device has separate lifting mechanisms for both medicinal categories, the lifting mechanisms can be programmed to operate irrespective of each other, but it is also possible that the injection pen and the dosage unit containing other type of medicament are lifted up simultaneously, especially if it is appropriate for the treatment to take the insulin and the other medicament belonging to the treatment plan at the same time. Both conveyors **5** are transferred with a driving motor (step motor) of their own, which is marked with the letter M.

[**0042**] It is also possible to form two parallel rows containing the dosage units of two different types of medicament (injection pens and containers of doses taken orally) in such a manner that the conveyors **5** are placed next to each other in the same body module R. These conveyors can be transferred with a common driving motor M, if the intention is that adjacent dosage units in different rows are lifted up simultaneously. This can also be implemented with such an alternative in which two different rows share a common conveyor **5**, wherein the lifting element extends so far in a direction transverse to the transfer direction, that it is capable of simultaneously influencing two dosage units located in adjacent sockets.

[**0043**] The control device equipped with two rows can, of course, be used in connection with other lifting mechanisms as well. To implement the above-described principle, the lifters **4** located at the same point but in different rows may be programmed to operate simultaneously, if it is appropriate to take another medicament in connection with the injection.

1. A control device for doses, which contains one or more sockets (**1**) for a removable medicament dosage unit (**3**) and one or more indicators (**2**) of taking of the dosage unit (**3**), characterized in that it contains one or more transfer members, which are arranged to shift the dosage unit located in the socket (**1**) into a position which differs from the normal position of the dosage unit, and back to the normal position.

2. The control device according to claim 1, characterized in that the transfer member is a lifter (**4**) for lifting the dosage unit (**3**) in the socket.

3. The control device according to claim 1 or **2**, characterized in that the socket (**1**) is composed of one or more vertical or sloping supporting elements protruding from the body of the control device.

4. The control device according to claim 3, characterized in that the socket (**1**) is a vertical or sloping tube protruding from the body of the control device.

5. The control device according to any of the preceding claims, characterized in that the transfer member is coupled to a time measuring device and arranged to function automatically at a predetermined moment of time.

6. The control device according to claim 4 or **5**, characterized in that at least part of the length of the tube is transparent.

7. The control device according to any of the preceding claims 4 to 6, characterized in that the indicator (**2**) of taking the dose is a light indicator located at the lower end of the tube and directed towards the tube to convey light through the tube.

8. The control device according to any of the preceding claims 2 to 7, characterized in that the lifter (**4**) is an eccentric attached to a shaft (**8**).

9. The control device according to any of the preceding claims 2 to 7, characterized in that the lifter (**4**) is arranged to travel transversely to the lifting direction and to lift up the dosage unit (**3**) in the socket (**1**) during this movement in a direction substantially perpendicular to the movement of propagation.

10. The control device according to any of the preceding claims 2 to 7, characterized in that the lifter (**4**) can be transferred in the vertical direction via a rod coupled to the motor (M), such as via a conveyor screw (**4***b*).

11. The control device according to any of the preceding claims, characterized in that it contains two or more sockets (**1**).

12. The control device according to claim 11, characterized in that the transfer member is arranged to influence at least one socket (**1**) at a time so that the position of the dosage unit (**3**) placed therein differs from the normal position of at least one dosage unit (**3**) located in another socket (**1**).

13. The control device according to claim 11 or **12**, characterized in that it contains at least two parallel rows composed of several sockets (**1**).

14. The control device according to claim 13, characterized in that the transfer members in connection with sockets (**1**) located in different rows at the same point along the direction of the rows, are arranged to act simultaneously to transfer the dosage units (**3**) at the same point in different rows pairwise to a position differing from the normal position.

15. The control device according to any of the preceding claims, characterized in that it contains a charger.

16. The control device according to claim 15, characterized in that it contains a fitting element which can be fixed to a hole intended for the socket (**1**) in the body of the control device to transform the hole into a charger, or it contains a fitting element which can be fixed to a hole functioning as a charger in the body of the control device to transform the charger into a hole intended for the socket (**1**).

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