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(54) **Mechanical press for printing or impressing symbols on a substrate**

(57) The present invention relates to printing or impressing of a plurality of symbols on a substrate (50), in particular of sequentially printing or impressing a sequence of markers such as number plates or license plates, for example a batch of car license plates. For this purpose a mechanical press (10) is provided and/or operated such that stamp units (20) comprising press units(40) are adjusted to select a string of symbols. The respective symbols are formed on surfaces (90) of the

press units (40). Each constellation of selected press units (40) is defined by a consecutive identifier number (70), which is received and processed by adjusting stamp units (20). Here, stamp units (20) are adjusted by selecting adjacent press unit (40) of the stamp units (20). It follows that only minor adjustments are required, which results in mechanically and system related improvements, such as improved processing speed, lower mechanical wear and reduced power consumption.

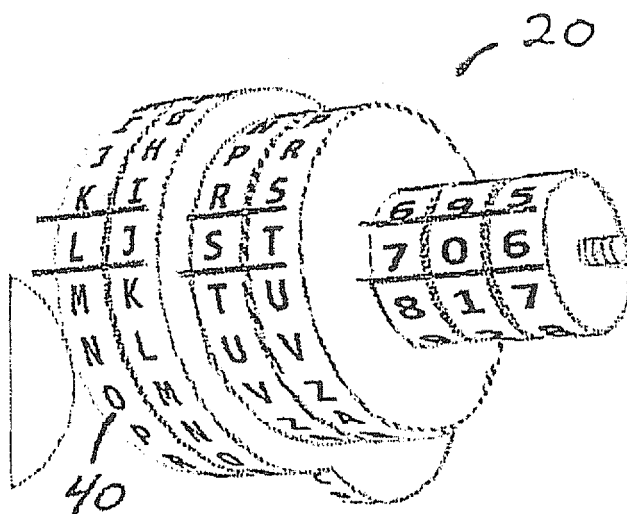


Fig. 2

Description

FIELD OF THE INVENTION

5 **[0001]** The present invention is in the field of printing or impressing a plurality of symbols on a substrate, in particular of sequentially printing or impressing a series of markers such as number plates or license plates, for example a batch of car license plates. The present invention comprises a mechanical press for printing or impressing a plurality of symbols on a substrate and a method of operating a mechanical press for printing or impressing a plurality of symbols on a substrate.

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BACKGROUND OF THE INVENTION

15 **[0002]** The technical field of labeling or marking objects can relate to manufacturing a large number of markers. For example, for the purpose of providing identifications for vehicles, the registration of every car in a single major city or urban region may require the production of tens of millions of distinguishing car license plates. In order to provide distinguishing license plates, every produced license plate must be marked with a unique label comprising symbols, such as for example a unique string of numbers and characters.

20 **[0003]** Depending on the country, state or region, the respective string of symbols must generally be selected according to official rules which are set out to simplify readability and improve the accuracy of recognition. For example, the Republic of Slovenia has issued Guidelines for registration of motor vehicles and trailers (Official Gazette of the Republic of Slovenia, no. 48/2011) wherein Article 30 requires license plates to fulfill certain physical dimensions and also that the respective identification string should include four or five characters. It is further required that the license plates including five characters must provide one of the following combinations:

- 25
- number, number, number, letter, letter
 - letter, letter, number, number, number
 - number, number, letter, letter, letter
 - letter, letter, letter, number, number
 - number, letter, letter, letter, number

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[0004] Alternatively, license plates including four characters must be based on one of the combinations:

- 35
- number, number, letter, letter
 - letter, letter, number, number
 - number, number, number, letter
 - number, letter, letter, number

40 **[0005]** It is also required that license plates provide registration marks which are legible for humans even at a distance of several tens of meters, such as to allow quick and accurate identification by traffic participants. It follows that the use of certain characters of the Slovenian alphabet C, S and Z are prohibited, because of their similarity to other characters C, S and Z. Moreover, because adjacent characters used in strings must be readily distinguishable, any string combination including for example 'l' adjacent to the number '1' or 'B' adjacent to the number '8' are not allowed.

45 **[0006]** It follows that the manufacturing of large numbers of license plates must satisfy a complicated set of rules and limitations in order to comply with official legislations. This represents a demanding task, in particular for the case where a large number of license plates have been ordered and are subject to series production. As a matter of fact, series production is quite common in the field of license plate production, for example in Slovenia, where new license plates are generally ordered in bulks comprising large numbers of license plates, and the manufacturing takes place in series production for enabling lower production costs, lower prices and easier management of machine and human resources.

50 **[0007]** The series production of license plates is conventionally conducted by operating mechanical presses. Typically, the constellation of symbols (e.g. characters and numbers) representing a registration identifier of a license plate is selected by typesetting the composition of symbols by arranging a plurality of press units. Each press unit represents a physical entity which is formed by a corresponding symbol and the respective constellation of symbols is thus arranged in a mechanical press for pressing and impregnating the license plate with a selected string of symbols. This typesetting procedure is repeated for each individual production of a license plate, because each license plate is defined to carry a unique and thus a different constellation of symbols.

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[0008] Such typesetting of strings of symbols can be performed by hand, wherein human operators are responsible for arranging the respective constellation of press units in a manually operated mechanical press. In this cumbersome process, the operator reads the ordered strings from a display or a printed list of registration identifiers, and he must

manually perform the typesetting and monitoring of the process.

[0009] Semiautomatic presses require the operator to perform the typesetting by hand, but are capable of automatically verifying the typesetting layout using optical, mechanical or electronic devices. Thus, semiautomatic presses read the desired constellation of symbols from a memory and compare the constellation with the typesetting performed by the human operator. It follows that semiautomatic presses generally require computing devices such as for example a processor unit connected to a memory and a display. In contrast, fully automatic presses require no human operator, and operate in a similar manner as computer printers. In other words, fully automatic presses operate by receiving information defining the string of symbols to be impregnated into a license plate, and pressing the same without the involvement of any human operators for typesetting or verification purposes.

[0010] Thus, semiautomatic and fully automatic presses must receive identifier information defining the desired string of symbols to be impregnated into each of the license plates. For this purpose, semiautomatic and fully automatic presses are generally adapted to receive the identifier information in form of the string of symbols representing the desired string of symbols to be impregnated, or alternatively by receiving the identifier information in a different encoded format. In the latter case, the encoded identifier information is received by the press, decoded and then used for operating the press.

[0011] Hence, conventional presses require different types of operation and human involvement for manufacturing a large numbers of license plates. Moreover, the identifier information received and processed by semiautomatic and fully automatic presses must be generated and provided such as to enable pressing of a large series of license plates. In this context, undesired double pressing of identical license plates is prevented by keeping records of already processed identifier information. It must also be ensured that the identifier information received by presses satisfy rules and limitations for complying with official legislations. Typically, the identifier information represents the string of symbols to be pressed in each case, and each string of symbols is verified by hand to comply with the above rules, prior to forwarding the string to the press. Thus, the respective operation of presses involves a complex and cumbersome procedure of keeping records of already processed identification information, and for ensuring by verification that the identification information forwarded to the press complies with all necessary rules and legislations. Moreover, due to the above complex interrelation between information processing and technical operation of presses, it is also complicated and difficult to adapt the operation of presses to new environments, such as for example new rules and legislations of another state or country,

[0012] It follows from the above that the technical field of labeling or marking objects for manufacturing a large number of markers relates to a number of technical issues, where it is desired to provide or enable:

1. faster and cheaper manufacturing of series of registration marks,
2. more transparent inventory management of both free and used identification information,
3. more transparent and faster modelling of rules for selecting strings of symbols, e.g. for license plates,
4. reduced memory requirements for storing possible constellations of symbols,
5. reduced mechanical wear and power consumption of presses, and
6. reduced costs of human labour.

SUMMARY OF THE INVENTION

[0013] Accordingly, a problem underlying the invention is to provide an improved mechanical press for printing or impressing a plurality of symbols on a substrate and an improved method of operating such a mechanical press. In particular, it is desired to provide a press and a method of operating the press, wherein the selection of symbols is defined to improve mechanical and system characteristics of the press in operation, such as for example to achieve faster processing speed, less mechanical wear and for lowering power consumption.

[0014] This problem is solved by a mechanical press for printing or impressing a plurality of symbols on a substrate according to claim 1, and by a method of operating a mechanical press for printing or impressing a plurality of symbols on a substrate according to claim 13. Preferable embodiments are defined in dependent claims.

[0015] The mechanical press for printing or impressing a plurality of symbols on a substrate according to the invention comprises:

- a plurality of stamp units, each comprising a plurality of press units having at least one surface formed by a symbol,
- an adjustment unit adapted to adjust at least one of the stamp units to select one of the plurality of press units of the stamp unit for printing or impressing, wherein

- at least two of the plurality of stamp units comprising a different number of press units,
- the adjustment unit being adapted to receive a series of consecutive identifier numbers, and to adjust the at least one stamp unit based on each of the received identifier numbers such as to print or impress a string of symbols of selected press units on a substrate, and
- 5 - wherein the adjustment unit is adapted to adjust at least one of said stamp units by selecting an adjacent press unit of the stamp unit when the adjustment unit receives each of the consecutive identifier numbers.

10 **[0016]** Hence, the mechanical press according to the present invention provides a device for printing or impressing a string of selected symbols on a substrate. For this purpose, the mechanical press comprises a plurality of stamp units, wherein each of the stamp units includes a plurality of press units, and wherein at least two of the stamp units comprise a different number of press units. Each press unit has at least one surface formed by a symbol. An adjustment unit is adapted to adjust the stamp units such as to select a press unit for printing or impressing the symbol formed on its surface on the substrate. Hence, symbols are selected and arranged for printing or impressing a string of selected symbols on the substrate. Then, the symbols formed on the selected press units is pressed against a surface of the substrate, either directly or via an intermediate layer comprising ink or other coloring materials. It follows that each of the selected symbols is formed by impressing its shape into the surface of the substrate, or alternatively the shape of the symbol is printed on the surface of the substrate by arranging an intermediate layer comprising ink or other coloring materials between the press unit and substrate. In either case, the symbols can for example be formed by incising or engraving the symbols into the surface of the press units, wherein the symbols can for example comprise numbers and/or letters. In particular, some of the press units can for example have numbers formed on at least one of their surfaces while other press units can have letters formed on at least one of their surfaces.

20 **[0017]** The press units can be made of soft or hard materials, which may depend on the type of substrate material being printed or impressed. For example, the substrate may include materials made of a sheet of paper, carton, wood, plastic or metal plate, in particular a number plate or a license plate.

25 **[0018]** Each of the press units can comprise two or more surfaces having the formed symbol. For example, the press units can comprise a clamping unit for clamping together two surfaces of the press unit. In this embodiment, the two surfaces can be formed by a positive and negative image of the symbol, respectively, wherein the substrate can be arranged between the two surfaces for impressing the shape of the symbol by clamping.

30 **[0019]** In an embodiment, each of the press units is integrated into a surface of a stamp unit in a fixed manner, or alternatively it is inserted into the stamp unit in a removable manner. For example, at least one of the stamp units may comprise a plurality of trays, wherein each of the trays is adapted to receive one of the press units. In the case of removable press units, the adjustment unit is adapted to select a press unit by adjusting a stamp unit such that the selected press unit can be removed from one of its trays. Then, the selected press unit can be arranged together with other selected press units in a press device for printing or impressing the respective symbols on the substrate. The press device is adapted to print or impress the symbols by pressing the formed symbols against a surface of the substrate, either directly or via an intermediate layer comprising ink or other coloring materials. In particular, the press device may be adapted to sandwich the substrate and selected press units between two pressure applying surfaces of the press device.

35 **[0020]** According to the invention, the adjustment unit is adapted to adjust at least one of the stamp units for selecting press units for printing or impressing. Moreover, the adjustment unit is adapted to receive a series of consecutive identifier numbers, and to adjust the at least one stamp unit based on each of the received identifier numbers. In this respect, the adjustment unit selects an adjacent press unit of a stamp unit when it receives each of the consecutive identifier numbers. It follows that the movement of each of the stamp units is limited to adjusting between two adjacent press units comprised by the stamp unit. Thus, because the distance between adjacent press units is lower than the average distance between press units, the mechanical press requires only a minimum amount of adjustment of stamp units to arrange the symbols for each subsequent printing or pressing of distinguishing strings of symbols. Consequently, the selection of symbols improves mechanical and system related characteristics of the press, in particular for performing series production, for example to achieve faster processing, less mechanical wear and for lowering power consumption.

40 **[0021]** The adjustment unit receives a series of consecutive identifier numbers, wherein each of the identifier numbers defines one of the constellations of symbols to be printed or impressed on the substrate. For example, each of the identifier numbers can define the symbols to be impressed on a license plate in a series production of a number of license plates, wherein each of the license plates carries a unique combination of symbols. The respective identifier numbers received by the adjustment unit may represent any sequence of consecutive numbers belonging to any number system, such as for example decimal, hexadecimal, binary or octary number systems, to name a few examples. Moreover, the identifier numbers received by the adjustment unit may be defined in a machine readable format, for example computer readable format, may be modulated or encoded depending on the receiving and/or coding scheme used in the adjustment unit.

45 **[0022]** In an embodiment, the adjustment unit is adapted to receive identifier numbers belonging to a set of consecutive

integer numbers such that each of the integer numbers corresponds to a different constellation of press units selected by the adjustment unit. In this respect, the adjustment unit may be adapted to select a string of symbols by adjusting (n+1) stamp units {su(0) ... su(n)} for printing or impressing the symbols of selected press units on the substrate. Here, the selection of press units is based on the integer number ID received by the adjustment unit and corresponding to the formula:

$$ID = a_0 + \sum_{k=1}^n \left(a_k \left(\prod_{j=0}^{k-1} b_j \right) \right),$$

[0023] In this notation, a_k denotes an index of the symbol selected by adjusting the stamp unit su(k) to select a press unit formed by one of the symbols and b_j denotes the total number of press units comprised by the stamp unit su(j). More specifically, the stamp unit positions defining the selected press units of the (k+1) stamp units can be defined by offset values {sup(0) ... sup(n)} from an initial position, wherein a method for calculating the sequence {sup(0) ... sup(n)} can be based on the following inductive formulas:

for k=0

$$a_0 = ID \bmod b_0$$

for k>=1

$$a_k = \left((ID - (ID \bmod \left(\prod_{j=0}^{k-1} b_j \right))) / \left(\prod_{j=0}^{k-1} b_j \right) \right) \bmod b_k$$

$$sup(k) = C * a_k$$

[0024] In this context, the operator mod() calculates the respective remainder of integer division and the constant C applies to define the corresponding adjusting positions of the press units (C can be 1 or any real number).

[0025] The adjustment unit can be adapted to receive an identifier number which is embedded in a linked data object, in particular wherein the series of identifier numbers represents a series of linked data objects. In other words, the adjustment unit may be adapted to receive linked data objects, wherein each of the linked data objects includes an identifier number and a link to a subsequent data object, wherein the subsequent data object includes the consecutive identifier number. Hence, the links between data objects provide flexible means to define and/or adjust the sequence of identifier numbers received and processed by the adjustment unit, for example in order to leap over identifier numbers or identifier number ranges which should be avoided or may even be forbidden due to national rules and legislations.

[0026] In any of the above embodiments of the mechanic press, the adjustment unit is adapted to receive a series of consecutive identifier numbers, and to adjust at least one of the stamp units accordingly to select press units for printing or impressing. For this purpose, the adjustment unit can for example comprise a control unit and at least one actuator, wherein the control unit is adapted to control the at least one actuator and the at least one actuator is configured to adjust stamp units. For example, the mechanical press may comprise the above discussed trays for receiving press units, which may be linearly stacked. In this embodiment, the adjustment unit is adapted to linearly shift the position of the stamp units in the direction of tray stacking in order to select press units for printing or impressing.

[0027] Alternatively, at least one of the stamp units may include a wheel having press units arranged in a peripheral series along at least a portion of the lateral area of the wheel. The press units may be integrated into the wheel or the wheel may comprise a plurality of trays for receiving the press units. In both cases, the wheel is adapted to be rotatably adjustable by the adjustment unit, such as to select the stamp units for printing or impressing.

[0028] In an embodiment, the rotatable wheels may be arranged in a side-by-side manner and may be configured to be rotatable about an axis of rotation, wherein the axis of rotation of at least two of the wheels are parallel to each other or represent the same axis of rotation. In this way, the wheels can be arranged in a compact manner, for example on a single axis of rotation, which saves space and simplifies maintenance work. Further, the plurality of said rotatable wheels may be mechanically coupled in an ordered series, such that a full rotation of one of the wheels in the series causes a

rotation of a next wheel in the series by one press unit formed by a symbol. Consequently, the adjustment unit can adjust a plurality of the wheels by rotating only one or a few of the wheels. This arrangement allows a simpler and robust implementation of the adjustment unit by exploiting mechanical coupling between wheel elements, e.g. for reducing the number of actuators being applied for wheel adjustments.

5 **[0029]** The method of operating a mechanical press for printing or impressing a plurality of symbols on a substrate according to the invention comprises adjusting at least one of a plurality of stamp units, wherein each of the stamp units comprises a plurality of press units. At least one surface of each of the press units is formed by a symbol. The adjustment of each of the stamp units selects one of the press units for printing or impressing. The method further comprises printing or impressing a string comprising the symbols of the selected press units on a substrate.

10 **[0030]** The step of adjusting at least one of the plurality of stamp units includes receiving a series of consecutive identifier numbers, and adjusting the plurality of stamp units based on each of the received identifier numbers. In this regard, possible definitions of consecutive identifier numbers are discussed above in connection with the mechanical press according to the invention. Moreover, the plurality of stamp units are adjusted such that adjacent press units of stamp units are selected when each of the consecutive identifier numbers are received. Moreover, at least two of the stamp units comprise a different number of press units.

15 **[0031]** It follows that when consecutive identifier numbers are received, the adjustment of each of the stamp units is limited to adjusting between two adjacent press units comprised by the respective stamp unit. Thus, because the distance between adjacent press units is lower than the average distance between press units, the method requires minimum movement of stamp units to arrange the symbols for each subsequent printing or pressing of strings with distinguishing symbols. Consequently, the respective selection of symbols represents a step of the method improving mechanical characteristics of operating a press in series production, such as for example to achieve faster processing, less mechanical wear and for lowering power consumption.

20 **[0032]** In an example, at least one of the stamp units comprises a wheel having press units arranged in a peripheral series along at least a portion of the lateral area of the wheel and the step of adjusting the stamp unit comprises rotating the wheel. Alternatively, at least one of the stamp units may comprise a linear stack arrangement of press units and the stamp unit may be adjusted by linearly shifting the stamp unit in the direction of the linear stack arrangement.

25 **[0033]** In either case, at least one of the stamp units may comprise a plurality of trays, wherein each of the trays is adapted to receive a press unit. Here, the step of adjusting the at least one of a plurality of stamp units for printing or impressing includes adjusting the respective stamp unit such that the selected press unit can be removed from one of its trays and arranging the selected press unit together with other selected press units in a press device. Then, the press device can be operated to print or impress the symbols formed on the selected press units on the substrate, for example by pressing the formed symbols against a surface of the substrate, either directly or via an intermediate layer comprising ink or other coloring materials.

30 **[0034]** At least two of the stamp units may include two wheels, and the first wheel may be adjusted by rotation by one press unit when the second wheel has been adjusted by a full rotation. Alternatively, two of the stamp units may include two linear stack arrangements of press units, wherein the first linear stack arrangement is shifted by one press unit when the second linear stack arrangement has been shifted between the press units positioned at opposite ends of the second linear stack arrangement. In the latter case, the respective shifting between the press units positioned at opposite ends of the second linear stack arrangement may include a plurality of shifting procedures between adjacent press units, wherein the corresponding string of press units is printed or impressed after each shifting between adjacent press units, in particular in a series production.

SHORT DESCRIPTION OF THE FIGURES

45 **[0035]**

Fig. 1 is a schematic illustration of a mechanical press according to the present invention comprising a plurality of stamp units and an adjustment unit,

50 Fig. 2 is a schematic illustration of stamp units representing wheels comprising press units arranged along the lateral area of the wheels,

Fig. 3 is a schematic illustration of stamp units comprising a plurality of trays in a linear stack arrangement or in a wheel arrangement,

55 Fig. 4 is a schematic illustration of a removable press unit which is adapted to be received by a tray of the stamp unit, and which comprises two inner surfaces each formed with a positive and a negative image of a symbol, respectively,

- Fig. 5 is a schematic illustration of a plurality of stamp units representing wheels, wherein each of the wheels comprises a plurality of trays,
- Fig. 6 is a schematic illustration of a plurality of stamp units each representing linear stacks of trays,
- Fig. 7 is a schematic illustration of a plurality of stamp units each representing linear stacks of trays, wherein selected press units have been removed from trays,
- Fig. 8 is a schematic illustration of a plurality of stamp units each representing linear stacks of trays, wherein the selected press units are arranged on a working platform for preparing printing or impressing,
- Fig. 9 is a schematic illustration of a plurality of stamp units each representing linear stacks of trays, wherein a license plate is being arranged between inner surfaces of the press units,
- Fig. 10 is a schematic illustration of a plurality of stamp units each representing linear stacks of trays, wherein the license plate is being pressed for impressing symbols of selected press units,
- Fig. 11 is a schematic illustration of a plurality of stamp units each representing linear stacks of trays, wherein the process of impressing the license plate is completed,
- Fig. 12 is a schematic illustration of a plurality of stamp units each representing linear stacks of trays, wherein the license plate has been removed from the press units,
- Fig. 13 is a schematic illustration of a plurality of stamp units each representing linear stacks of trays, wherein the press units are being re-arranged for insertion into their respective trays, and
- Fig. 14 is a schematic illustration of a plurality of stamp units each representing linear stacks of trays, wherein the press units are being received by their respective trays for preparing the processing of a subsequent license plate.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0036] For the purposes of promoting an understanding of the principles of the invention, reference will now be made to the preferred embodiments illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, such alterations and further modifications in the illustrated devices and method and such further applications of the principles of the invention as illustrated therein being contemplated therein as would normally occur now or in the future to one skilled in the art to which the invention relates.

[0037] Fig. 1 is a schematic illustration of a mechanical press 10 according to the invention comprising a plurality of stamp units 20 and an adjustment unit 30. In this embodiment, the mechanical press 10 is adapted to produce license plates 50. Fig. 2 illustrates how the plurality of stamp units 20 represent wheels having press units 40 arranged in a peripheral series along the lateral portion of the wheels 20. The press units 40 have a surface formed by letters or numbers, respectively, and are integrated into the respective wheels 20. Thus, in this embodiment, the press units 40 are integrated into and fixed to the respective wheel, whereas different embodiments of press units 40 are discussed below in connection with Figs. 3 and 4.

[0038] As illustrated in Figs. 1 and 2, the stamp units 20 comprised by the mechanical press 10 are of different sizes and include different numbers of press units 40. In this example, a stamp unit 20 may comprise press units formed by symbols, wherein the symbols may represent the complete set of alphabetic letter A-Z or only a subset thereof, or only the decimal numerical set 0-9 to name a few examples. The selection of the respective number and type of symbols provided by each of the wheels depends on national rules and legislations setting out the allowable string format of license plates. For example, as illustrated in Fig. 1, the first four symbols of the allowable string format of license plates may include alphabetic letters, wherein the stamp units 20 allocated to the third and fourth symbols provide a larger selection of symbols than the first and second stamp units 20. For example, national rules and legislations may prescribe that the alphabetic letters of the first two stamp units 20 should be used for regional indication of the registered vehicle and are thus based on only a subset of alphabetic letters. Hence, the third and fourth stamp units 20 shown in Fig. 1 comprise a larger number of press units 40 than the first and second stamp units 20. Moreover, national rules and legislations may set out that the last three string symbols of license plates should comprise decimal numbers 0-9. Thus, it follows that the three rightmost stamp units 20 comprise an even smaller number of press units 40 formed by different

decimal numbers.

[0039] Hence, the adjustment unit 30 illustrated in Fig. 1 is adapted to adjust stamp units 20 comprising a different number of press units 40. In other words, the adjustment unit 30 is adapted to rotate 60 the wheels 20 such as to select for each of the wheels 20 one of the press units 40 comprised by the wheel 20 for impressing the license plate 50. In Fig. 1, the respective selected press items 40 are arranged by rotation 60 at the bottom of the wheels 20, such as to select the string of symbols "LJKS230" formed on the respective selected press items 40. For the purpose of selecting the symbols, the adjustment unit 30 is adapted to receive a series of consecutive identifier numbers 70 and to adjust the stamp units 20 accordingly by rotation 60. It follows that a corresponding selected string of symbols is impressed on the license plate 50, wherein a different string of symbols is used for each of the received identifier numbers 70. Hence, the impressed symbols are comprised by the press units 40 which are selected by rotating 60 stamp units 20 in accordance with each of the received identifier numbers 70. Furthermore, the adjustment unit 30 illustrated in Fig. 1 is adapted to adjust the respective stamp units 20 by selecting an adjacent press unit 40 of a stamp unit 20 when the adjustment unit 30 receives each of the consecutive identifier numbers 70. Hence, when the adjustment unit 30 receives a new consecutive number 70, a new string of symbols must be selected for producing the next license plate 50 carrying a different and unique license number. Thus, at least one of the stamp units 20 must be rotated 60 such as to select a different symbol in the string. According to the invention, this adjustment of the respective stamp unit 20 is performed by selecting an adjacent press unit 40 of the stamp unit 20. In other words, if a stamp unit needs to be adjusted, the adjustment is limited to a minimum adjustment of rotating the respective wheel 20 such as to select an adjacent press unit 40 of the stamp unit 20. It follows that because the distance between adjacent press units 40 is lower than the average distance between press units 40, the mechanical press 10 according to the invention requires only a minimum adjustment of stamp units 20 to arrange the symbols for each subsequent printing or pressing of distinguishing strings of symbols. Consequently, the selection of symbols improves mechanical and system related characteristics of the mechanical press 10, in particular for performing series production, such as for example to achieve faster processing, less mechanical wear and for lowering power consumption. It follows that the above consecutive identifier numbers 70 received by the adjustment unit 30 must unambiguously define the string of symbols to be impressed on each of the license plates 50. Hence, the consecutive identifier numbers 70 must be based on a mathematical numerical system which allows identifications of each possible combination of symbols which are achievable by rotating 60 the stamp units 20.

[0040] Generally speaking, mathematics allow for an infinite number of different numerical systems which can be described by the notation:

$$(a_n a_{(n-1)} \dots a_1 a_0)_b = \sum_{k=1}^n (a_k b^k)$$

[0041] Here, the base b defines the underlying numerical systems which may include binary, ternary, quaternary, quinary, decimal or hexadecimal systems to name a few examples. Thus, such a simple numerical system can be defined by selecting an appropriate base b. For example, if b = 2, we are speaking of a binary system, if it is three, we are speaking of a ternary system, etc.

[0042] However, such conventional numerical systems adhere to the characteristic that any number must belong to a single numerical system. In other words, a number can for example be decimal or binary, but cannot be both at the same time and cannot include parts belonging to different numerical systems.

[0043] As mentioned above by reference to Fig. 1, the adjustment unit 30 is adapted to receive a consecutive identifier number 70 such as to adjust accordingly the stamp units 20 comprising a different number of press units 40. Hence, as the stamp units 20 comprise different numbers of press units 40, the above conventional notation of a numerical system does not provide an intuitive and transparent selection of a base b to be used for defining an appropriate numerical system. For example, although the decimal base b = 10 may seem appropriate for defining the three rightmost numerical symbols 0-9 of the license plate, it is not well suited for identifying the different number of alphabetic symbols included in the remaining stamp units 20.

[0044] In view of this deficit, an embodiment of the invention provides a different numerical system for defining the consecutive identifier numbers 70, wherein the numerical system allows numbers to be defined based on many different numerical bases b_j. More specifically, the consecutive identifier number 70 is defined by the notation:

$$(a_n a_{(n-1)} \dots a_1 a_0)_{(b_n b_{(n-1)} \dots b_1 b_0)} = \sum_{k=1}^n \left(a_k \left(\prod_{j=0}^{k-1} b_j \right) \right) + a_0$$

wherein different basis b_j are used to define the numerical basis of the stamp units 20.

[0045] Moreover, by applying the expression

$$\prod_{j=0}^{k-1} b_j = B_k,$$

the above formula can be simplified as follows:

$$(a_n a_{(n-1)} \dots a_1 a_0)_{(b_n b_{(n-1)} \dots b_1 b_0)} = \sum_{k=1}^n (a_k B_k) + a_0$$

[0046] In other words, B_k denotes the weight of the respective numerical digit k , wherein conventional numerical systems defines $B_k = b^k$, whereas the numerical system used in accordance with the embodiment of Fig. 1 defines:

$$B_k = \prod_{j=k-1}^{n-1} b_j$$

[0047] In this respect, if j is defined to represent an arbitrary whole number greater than zero, and wherein $b_j = b_{(j-1)}$ then

$$\prod_{j=0}^k b_j = b^k$$

[0048] Hence, the above mathematical expression changes to:

$$(a_n a_{(n-1)} \dots a_1 a_0)_b = \sum_{k=1}^n (a_k b^k) + a_0$$

[0049] This formula corresponds to the above mathematical notation of a conventional numerical system having base b . In this respect, it should be noted that $a_0 b^0 = a_0$.

[0050] Hence, the general numerical system used in the embodiment of Fig. 1 is not only more general than any conventional numerical system based on a single basis b , but it also includes any such conventional numerical system as a subset.

[0051] It follows that the more general numerical system used in accordance with the embodiment of Fig. 1 allows the base b_j to change arbitrarily with the position j (digit location) of the identifier number. Conventionally, each digit of the identifier number has exactly b symbols and the above weighting for each integer base for a digit k can be calculated using the formula

$$B_k = b^k$$

[0052] However, as the more general numerical system used in accordance with the embodiment of Fig. 1 allows the base b_j to change arbitrarily with the digit position j , the weighting of a digit k corresponds to the mathematical formulation:

$$B_k = \prod_{j=k-1}^{n-1} (f(j))$$

[0053] Here, the function $f(j)$ depends on b_j and must be selected to exist for all integers j and b greater than zero. It follows that such a universal numerical system is unlimited and can be used to express arbitrary integers. However, since the number of characters on license plates is limited, only limited numerical systems need to be used in the production of registration plates.

5 [0054] In the following example, the consecutive identifier number is determined in accordance with the embodiment shown in Fig 1 to represent the string of symbols »LJ XM-345«. Here, the alphabetic characters »L«, »J«, »X« and »M« belong to a basis comprising the following set of characters:

$$10 \quad \{ \text{»A«}_0, \text{»B«}_1, \text{»C«}_2, \text{»D«}_3, \text{»E«}_4, \text{»F«}_5, \text{»G«}_6, \text{»H«}_7, \text{»I«}_8, \text{»J«}_9, \\ \text{»K«}_{10}, \text{»L«}_{11}, \text{»M«}_{12}, \text{»N«}_{13}, \text{»O«}_{14}, \text{»P«}_{15}, \text{»R«}_{16}, \text{»S«}_{17}, \text{»T«}_{18}, \text{»U«}_{19}, \\ \text{»V«}_{20}, \text{»Z«}_{21}, \text{»X«}_{22}, \text{»Y«}_{23}, \text{»W«}_{24} \}$$

15 [0055] Thus, the characters listed in the parentheses are each given a sequential index. The space and minus characters of the above string of symbols »LJ XM-345« have no identification purpose and can thus be omitted. It follows that the registration mark can be expressed as »LJXM345«.

[0056] Applying the above set of characters as a basis, the sequential value of symbols used in the identification is equal to their index. It follows that $J=9$, $L=11$, $M=12$, and $X = 22$.

20 [0057] The symbols 3, 4 and 5 belong to a different basis comprising the ten characters used in the decimal numerical system. Hence, the symbol '3' has a sequential value of 3, the symbol '4' has a sequential value of 4 and the symbol '5' has a sequential value of 5, as can be seen from the following decimal system basis.

$$25 \quad \{ \text{»0«}_0, \text{»1«}_1, \text{»2«}_2, \text{»3«}_3, \text{»4«}_4, \text{»5«}_5, \text{»6«}_6, \text{»7«}_7, \text{»8«}_8, \text{»9«}_9 \}$$

[0058] The corresponding value of the notation »LJXM345« is calculated according to the general numerical system by using the parameters:

$$30 \quad a_0 = 5, b_0 = 10, B_k = 1 \\ a_1 = 4, b_1 = 10, B_k = 10 \\ a_2 = 3, b_2 = 10, B_k = 100 \\ a_3 = 12, b_3 = 25, B_k = 1000 \\ a_4 = 22, b_4 = 25, B_k = 25000 \\ 35 \quad a_5 = 9, b_5 = 25, B_k = 625000 \\ a_6 = 11, b_6 = 25, B_k = 15625000$$

[0059] Thus, the consecutive identifier number 70 received by the adjustment unit 30 is calculated as follows:

$$40 \quad a_6(b_5 b_4 b_3 b_2 b_1 b_0) + a_5(b_4 b_3 b_2 b_1 b_0) + a_4(b_3 b_2 b_1 b_0) + a_3(b_2 b_1 b_0) + a_2(b_1 b_0) + a_1(b_0) + a_0 = \\ = 11 * (25 * 25 * 25 * 10 * 10 * 10) + 9 * (25 * 25 * 10 * 10 * 10) + 22 * (25 * 10 * 10 * 10) + 12 * (10 * 10 * 10) + 3 * (10 * 10) + 4 * (10) + 5 \\ = 178062345$$

45 [0060] It follows that the respective conversion allows expressing as a value any ordered combination of characters complying with the above sets of characters. An ordered combination of characters means that the sequence of characters is set (for example: »0,1,2,3,4,5,6,7,8,9,A,B,C«) and that we adhere to the rule that a character at a certain position in the numerical system changes into the following character only when the prior positions have exchanged all possible sequential combinations of characters.

50 [0061] Thus, by incrementing the above identifier number by one, a new consecutive identifier number is generated which can be used to define a new string of symbols complying with the above plurality of bases of symbols.

[0062] More specifically, any consecutive identifier number received by the adjustment unit 30 corresponds to a unique string of symbols, wherein the respective string of symbols complies with having the above different sets of characters apply for different symbols of the string. This can be advantageously used to mirror for example national rules and legislations concerning the production of license plate into the definition of distinguishing character sets applying for different symbols of strings. Consequently, the adjustment unit 30 is only required to receive an intuitive and transparent series of consecutive identifier numbers, and can still comply with national rules and legislations.

[0063] Also in this respect, any consecutive identifier number received by the adjustment unit 30 can be converted "back" to the unique string of symbols by the following method:

1. Symbol a_n is achieved by x whole number division by B_n : $a_n = x \div B_n$
2. Calculate the remainder of division x by B_n :
3. Symbol $a_{(n-1)}$ is achieved by o_n dividing by $B_{(n-1)}$: $a_{(n-1)} = o_n \div B_{(n-1)}$
4. Perform the operation *modulo* as a whole number operation providing the remainder from the division.
5. Repeat procedure up to a_0 .

[0064] For example, the string of seven symbols indexed {6, 5, 4, 3, 2, 1, 0} used for a license plate may be required to fulfill that the symbols carrying indexes {4, 2, 0} belong to the set {«0«₀, »1«₁, »2«₂, »3«₃, »4«₄, »5«₅, »6«₆, »7«₇, »8«₈, »9«₉} which is termed NUM, and that the symbols carrying indexes {6, 5, 3, 1} belong to the follows set ALFA:

$$\{ \text{«}A\text{«}_0, \text{«}B\text{«}_1, \text{«}C\text{«}_2, \text{«}D\text{«}_3, \text{«}E\text{«}_4, \text{«}F\text{«}_5, \text{«}G\text{«}_6, \text{«}H\text{«}_7, \text{«}I\text{«}_8, \text{«}J\text{«}_9, \\ \text{«}K\text{«}_{10}, \text{«}L\text{«}_{11}, \text{«}M\text{«}_{12}, \text{«}N\text{«}_{13}, \text{«}O\text{«}_{14}, \text{«}P\text{«}_{15}, \text{«}R\text{«}_{16}, \text{«}S\text{«}_{17}, \text{«}T\text{«}_{18}, \text{«}U\text{«}_{19}, \\ \text{«}V\text{«}_{20}, \text{«}Z\text{«}_{21}, \text{«}X\text{«}_{22}, \text{«}Y\text{«}_{23}, \text{«}W\text{«}_{24} \}$$

[0065] In this example, the identifier number 188368622 is used to define a unique string of seven symbols, wherein the string can be determined as follows based on the above method:

The above numerical system is set out as follows:

$$\begin{aligned} b_0 &= 10, B_0 = 1 \\ b_1 &= 25, B_1 = 10 \\ b_2 &= 10, B_2 = 250 \\ b_3 &= 25, B_3 = 2500 \\ b_4 &= 10, B_4 = 62500 \\ b_5 &= 25, B_5 = 625000 \\ b_6 &= 25, B_6 = 15625000 \end{aligned}$$

[0066] Considering that the first digit holds a symbol with index 0, we get:

$$x = 188368622$$

$$a_6 = x \div B_6 = 188368622 \div 15625000 = 12 \rightarrow \text{symbol with index 12 in the ALFA set is «M«}$$

$$o_6 = x \text{ modulo } B_6 = x - (x \div B_6) * B_6 = 188368622 - (188368622 \div 15625000) * 15625000 = 868622$$

$$a_5 = o_6 \div B_5 = 868622 \div 625000 = 1 \rightarrow \text{symbol with index 1 in the ALFA set is «B«}$$

$$o_5 = o_6 \text{ modulo } B_5 = o_6 - (o_6 \div B_5) * B_5 = 868622 - (868622 \div 625000) * 625000 = 243622$$

$$a_4 = o_5 \div B_4 = 243622 \div 62500 = 3 \rightarrow \text{symbol with index 3 in the NUM set is «3«}$$

$$o_4 = o_5 \text{ modulo } B_4 = o_5 - (o_5 \div B_4) * B_4 = 243622 - (243622 \div 62500) * 62500 = 56122$$

$$a_3 = o_4 \div B_3 = 56122 \div 2500 = 22 \rightarrow \text{symbol with index 22 in the ALFA set is «X«}$$

$$o_3 = o_4 \text{ modulo } B_3 = o_4 - (o_4 \div B_3) * B_3 = 56122 - (56122 \div 2500) * 2500 = 1122$$

$$a_2 = o_3 \div B_2 = 1122 \div 250 = 4 \rightarrow \text{symbol with index 4 in the NUM set is «4«}$$

$$o_2 = o_3 \text{ modulo } B_2 = o_3 - (o_3 \div B_2) * B_2 = 1122 - (1122 \div 250) * 250 = 122$$

$$a_1 = o_2 \div B_1 = 122 \div 10 = 12 \rightarrow \text{symbol with index 12 in the ALFA set is «M«}$$

$$o_1 = o_2 \text{ modulo } B_1 = o_2 - (o_2 \div B_1) * B_1 = 122 - (122 \div 10) * 10 = 2$$

$$o_0 = o_1 \div 1 = 2 \rightarrow \text{symbol with index 2 in the NUM set is »2«.}$$

5 **[0067]** Thus, the string of symbols is determined as »MB3X4M2«.

[0068] Similarly, the respective conversion to a string of symbols can be described as follows by reference to the mechanical press illustrated in Fig. 1. Here, a_k denote an index of the symbol which is selected by adjusting a stamp unit $su(k)$ 20 to select a press unit 40 formed by one of the symbols and b_j denotes the total number of press units 40 comprised by the stamp unit $su(j)$ 20. More specifically, and as explained above, the rotational positions of the stamp unit 20 define the selected press units 40 and can thus be noted as offset values $\{sup(0) \dots sup(n)\}$ from an initial position. Accordingly, the method for calculating the sequence $\{sup(0) \dots sup(n)\}$ can be based on the following inductive formulas:

$$15 \quad sup(n) = C * ID \text{ mod } \left(\prod_{j=0}^{j=n-1} b_j \right)$$

$$20 \quad sup(n-1) = C * \left(ID - \left(sup(n) * \left(\prod_{j=0}^{j=n-1} b_j \right) \right) \right) \text{ mod } \left(\prod_{j=0}^{j=n-2} b_j \right).$$

25 wherein the operator mod() calculates the respective remainder of integer division and the constant C applies to define the corresponding adjusting positions of the press units 40 (C can be 1 or any real number).

[0069] As mentioned above, the press units 40 illustrated in Figs. 1 and 2 have a surface formed by letters or numbers, respectively, and are integrated into the wheels 20. Thus, in this embodiment, the press units 40 are integrated into and fixed to the stamp units 20.

30 **[0070]** Fig. 3 illustrates alternative embodiments of stamp units 40 comprising a plurality of trays 80, wherein the trays 80 can be arranged in a linear stack arrangement or in a circular arrangement along the lateral area of a wheel. In either case, the trays 80 are adapted to receive a press unit 40, wherein the press unit 40 is removable from the respective tray 80. Fig. 4 illustrates a corresponding removable press unit adapted to be received by a tray 80 of the stamp unit 20. The press unit 40 comprises two inner surfaces 90 each formed with a positive and a negative image of a symbol, respectively. It follows that a license plate 50 can be arranged between the two surfaces 90 of the press unit 40 for impressing the shape of the symbol from both sides. In other words, the license plate 50 is sandwiched between surfaces 90 of the press unit 40 and the shape of the symbol is impressed by clamping the license plate 50 from both sides. Consequently, the license plate is fixed in a steady and efficient manner for conducting a robust and precise press processing.

35 **[0071]** Fig. 5 shows a corresponding illustration of a plurality of stamp units 20 representing wheels 20 adapted to be rotatable about a common axis of rotation 100. In this way, the wheels 20 are arranged in a compact manner, which saves space and simplifies maintenance work. Further, the plurality of rotatable wheels 20 may be mechanically coupled in an ordered series, such that a full rotation of one of the wheels 20 in the series causes a rotation of a next wheel 20 in the series by one press unit 40 formed by a symbol. Consequently, the adjustment unit 30 can adjust a plurality of the wheels 20 by rotating only one or a few of the wheels 20. This arrangement allows a simpler and robust implementation of the adjustment unit 30 by exploiting mechanical coupling between wheel elements 20, e.g. for reducing the number of actuators being applied for wheel adjustments. In Fig. 5, the wheels 20 comprise trays 80 which are arranged in a circular arrangement along the lateral area of the wheels 20. Each of the trays 80 carries a press unit 40 which is removable from the respective tray 80. Thus, in order to select a press unit 40 for pressing or impressing, the corresponding stamp unit 20 is rotated such as to align the tray 80 carrying the press unit 40 with a working platform 110. Then, the selected press units 40 are removed from the respective tray 80 and arranged on the working platform 110 for further processing. This method of working with removable press units 40 is discussed below in connection with Figs. 6 to 14.

40 **[0072]** Fig. 6 illustrates an alternative embodiment of a plurality of stamp units 20, wherein each of the stamp units 20 represents a linear stack of trays 80. Each of the stamp units 20 may be adjusted by linearly shifting 120 the stamp unit 20 in the direction of the linear stack arrangement. Also in this case, each of the trays 80 carries a press unit 40 which is removable from the respective tray 80. In order to select a press unit 40 for printing or impressing, the stamp unit 20 is shifted 120 such as to align the tray 80 carrying the press unit 40 with a working platform 110. Then, as illustrated in Fig. 7, the selected press units 40 are removed from the respective tray 80 and arranged on the working platform 110 for further processing. As illustrated in Fig. 8, the arranging of the selected press units 40 on the working platform 110

can include positioning the press units 40 in accordance with physical dimensions of the license plate 50.

[0073] As illustrated in Fig. 9, the license plate 50 is inserted between surfaces 90 of the selected press units 40 for conducting the press processing. Fig. 10 shows how the working platform 110 carrying the selected press units 40 and license plate 50 is arranged inside a press device 130. The press device comprises two pressure applying surfaces and is adapted to impress the symbols formed on surfaces of the press units 40 on the license plate 50. Hence, the license plate 50 is pressed against the symbols of the press units 40 by clamping the license plate 50 between the positive and negative images of the symbol, which are formed on the inner surfaces 90 of the selected press units 40. Fig. 11 shows how the press device 130 completes the impressing of symbols by reducing the pressure applied and thus releases the working platform 110 carrying the selected press units 40 and license plate 50. Then, the license plate 50 comprising the respective impressed string of symbols is removed from the press units 40 as shown in Fig. 12. The final steps of the press processing are illustrated in Figs. 13 and 14, wherein the selected press units 20 are re-arranged on the working platform 110 such as to align with their respective trays 80, and the selected press units 20 are then received by the respective trays 80 in order to complete the process. Consequently, as discussed above, stamp units 20 may then be adjusted by linearly shifting 120 the stamp unit 20 by one press item 40 in the direction of the linear stack arrangement, such as to prepare the mechanical press 10 for the series production of the subsequent license plate 50.

[0074] The embodiments described above and the accompanying figures merely serve to illustrate the method and devices according to the present invention, and should not be taken to indicate any limitation thereof. The scope of the patent is solely determined by the following claims.

LIST OF REFERENCE SIGNS

[0075]

10,	mechanical press
20,	stamp unit
30,	adjustment unit
40,	press unit
50,	license plate / substrate
60,	rotational movement of a stamp unit
70,	consecutive identifier numbers
80,	trays
90,	inner surfaces of a press unit
100,	axis of rotation of stamp units
110,	working platform
120,	linear shifting of a stamp unit
130,	press device

Claims

1. A mechanical press (10) for printing or impressing a plurality of symbols on a substrate (50), comprising:

a plurality of stamp units (20), each comprising a plurality of press units (40) having at least one surface (90) formed by a symbol,

an adjustment unit (30) adapted to adjust at least one of the stamp units (20) to select one of the plurality of press units (40) of the stamp unit (20) for printing or impressing,

characterized by

at least two of the plurality of stamp units (20) comprising a different number of press units (40),

the adjustment unit (30) being adapted to receive a series of consecutive identifier numbers (70), and to adjust the at least one stamp unit (20) based on each of the received identifier numbers (70) such as to print or impress a string of symbols of selected press units (40) on a substrate (50), and

wherein the adjustment unit (30) is adapted to adjust at least one of said stamp units (20) by selecting an adjacent press unit (40) of the stamp unit (20) when the adjustment unit (30) receives each of the consecutive identifier numbers (70).

2. The mechanical press (10) according to claim 1, wherein the substrate (50) is a printing material made of a sheet of paper, carton, wood, plastic or metal plate, in particular a number plate or license plate.

3. The mechanical press (10) according to claim 1 or 2, wherein at least one of the stamp units (20) comprises a plurality of trays (80), wherein each of the trays (80) is adapted to receive one of the press units (40), and wherein the adjustment unit (30) is adapted to select a press unit (40) by adjusting the at least one stamp unit (20) comprising a plurality of trays (80) and removing the press unit (40) from one of its trays (80).
- 5
4. The mechanical press (10) according to claim 3, wherein the trays (80) of the at least one stamp unit (20) are linearly stacked and wherein the adjustment unit (30) is adapted to linearly shift the position of the at least one stamp unit (20) in the direction of tray stacking.
- 10
5. The mechanical press (10) according to claim 1 or 2, wherein at least one of the stamp units (20) includes a wheel having said press units (40) arranged in a peripheral series along at least a portion of the lateral area of the wheel (20), wherein the press units (40) are integrated into the wheel (20) or wherein the wheel (20) comprises a plurality of trays (80) for receiving the press units (40), and wherein the wheel (80) is rotatably adjustable by the adjustment unit (30).
- 15
6. The mechanical press (10) according to claim 5, wherein the rotatable wheels (20) are arranged in a side-by-side manner and are each configured to be rotatable about an axis of rotation (100), wherein the axis of rotation (100) of at least two of the wheels (20) are parallel to each other or represent the same axis of rotation (100).
- 20
7. The mechanical press (10) according to claim 5 or 6, wherein a plurality of said rotatable wheels (20) are mechanically coupled in an ordered series, such that a full rotation of one of the wheels (20) in the series causes a rotation of a next wheel (20) in the series by one symbol.
- 25
8. The mechanical press (10) according to any of the preceding claims, wherein the symbols formed on the press units (40) of a first stamp unit (20) comprises numbers and/or letters and wherein the symbols formed on the press units (40) of a second stamp unit (20) comprises numbers and/or letters.
- 30
9. The mechanical press (10) according to any of the preceding claims, wherein the adjustment unit (30) is adapted to receive an identifier number (70) which is embedded in a linked data object, in particular wherein the series of identifier numbers (70) represents a series of linked data objects.
- 35
10. The mechanical press (10) according to any of the preceding claims, wherein the adjustment unit (30) is adapted to receive identifier numbers (70) belonging to a set of consecutive integer numbers such that each of the integer numbers corresponds to a different constellation of press units (40) selected by the adjustment unit (30).
- 40
11. The mechanical press (10) according to claim 8, wherein the adjustment unit (30) is adapted to select a string of symbols by adjusting $(n+1)$ stamp units (20) $\{su(0) \dots su(n)\}$ for printing or impressing the symbols of selected press units (40) on the substrate (50), wherein the selection of press units (40) is based on the integer number ID (70) received by the adjustment unit (30) and corresponds to the formula:

$$ID = a_0 + \sum_{k=1}^n \left(a_k \left(\prod_{j=0}^{k-1} b_j \right) \right)$$

45

50 wherein a_k denotes an index of the symbol selected by adjusting the stamp unit $su(k)$ (20) to select a press unit (40) formed by one of the symbols and b_j denotes the total number of press units (40) comprised by the stamp unit $su(j)$ (20).

- 55
12. The mechanical press (10) according to any of the preceding claims, wherein the adjustment unit (30) comprises a control unit and at least one actuator, wherein the control unit is adapted to control the at least one actuator and the at least one actuator is configured to adjust said stamp units (20).
13. A method of operating a mechanical press (20) for printing or impressing a plurality of symbols on a substrate (50), comprising the steps of:

adjusting at least one of a plurality of stamp units (20), each comprising a plurality of press units (40) having at least one surface formed by a symbol, wherein the adjustment of each of the stamp units (20) selects one of the plurality of press units (40) of the stamp unit (20) for printing or impressing, printing or impressing a string comprising symbols of the selected press units (40) on a substrate (50),

characterized by

receiving a series of consecutive identifier numbers (70),

adjusting the plurality of stamp units (20) based on each of the received identifier numbers (70) such that adjacent press units (40) of the stamp units (20) are selected when each of the consecutive identifier numbers (70) are received, wherein at least two of the plurality of stamp units (20) comprise a different number of press units (40).

14. The method according to claim 13, wherein at least one of the stamp units (20) comprises a wheel having press units (40) arranged in a peripheral series along at least a portion of the lateral area of the wheel (20) and wherein said adjusting the stamp unit (20) comprises rotating the wheel (20); or wherein at least one of the stamp units (20) comprises a linear stack arrangement of press units (40), and wherein said adjusting the stamp unit (20) comprises linearly shifting (120) the stamp unit (20) in the direction of the linear stack arrangement, wherein two of the stamp units (20) preferably represent two wheels and wherein the first wheel (20) is adjusted by rotation (60) by one press unit (40) when the second wheel (20) has been adjusted by a full rotation (60); or wherein two of the stamp units (20) preferably represent two linear stack arrangements of press units (40) and wherein the first linear stack arrangement (20) is shifted (120) by one press unit (40) when the second linear stack arrangement (20) is shifted between press units (40) positioned at opposite ends of the second linear stack arrangement (20).

15. The method according to any of claims 13 to 14, further comprising the step of selecting a string of symbols by adjusting (n+1) stamp units {su(0)... su(n)} (20) based on a received identifier number ID (70) and corresponding to the formula:

$$ID = \sum_{k=1}^n \left(a_k \left(\prod_{j=k-1}^{n-1} b_j \right) \right) + a_0,$$

wherein ID is a received integer number (70), a_k denotes an index of the symbol selected by adjusting the stamp unit su(k) (20) to select a press unit (40) formed by one of the symbols and b_j denotes the total number of press units (40) comprised by the stamp unit su(j) (20).

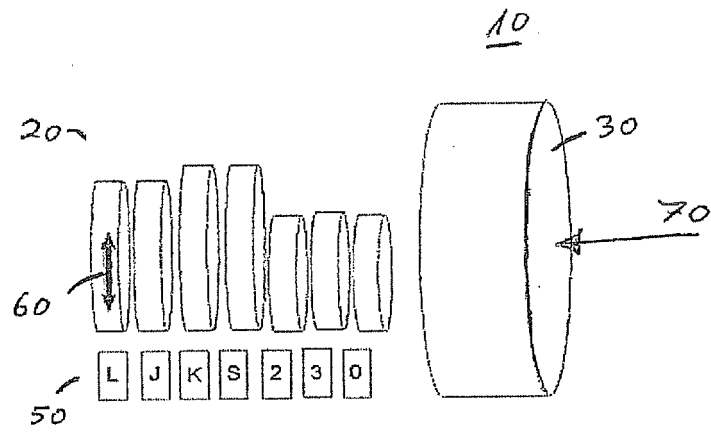


Fig. 1

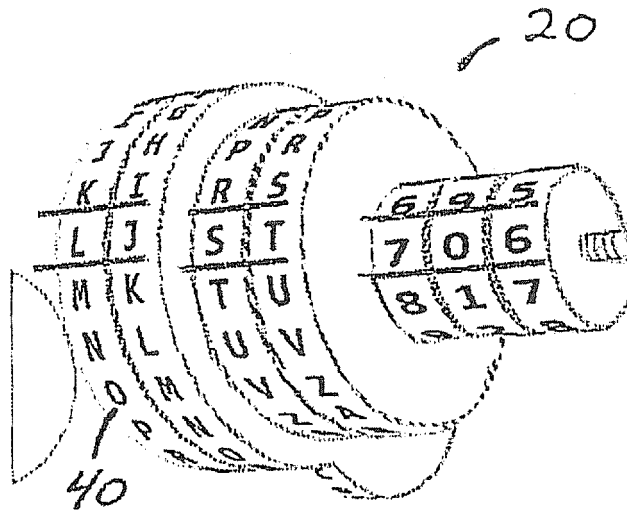


Fig. 2

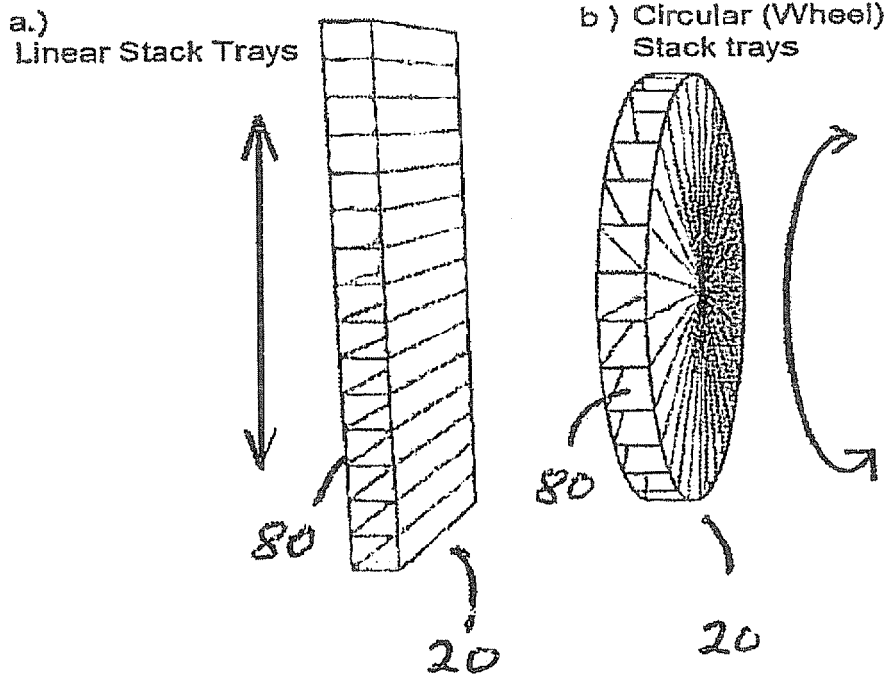


Fig. 3

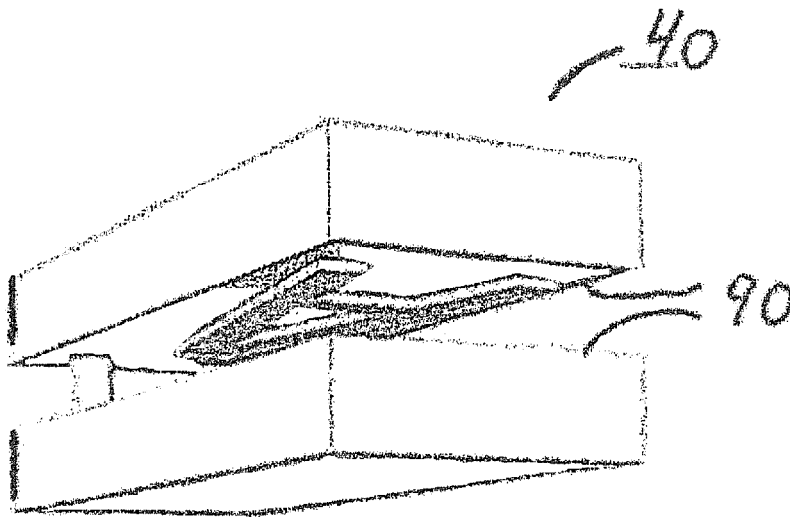


Fig. 4

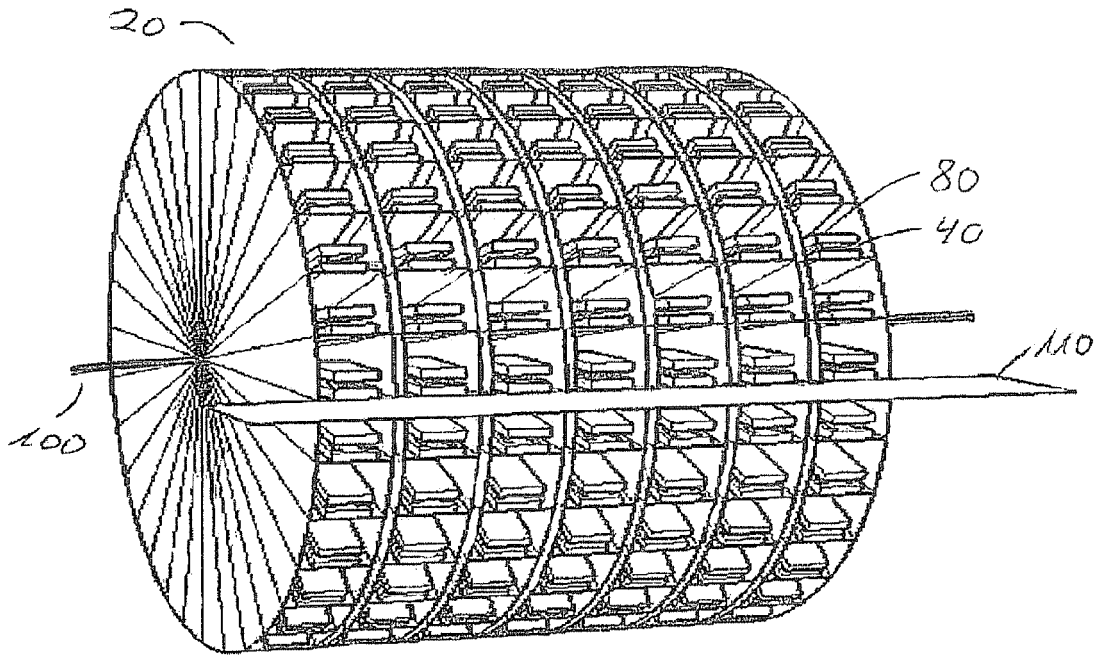


Fig. 5

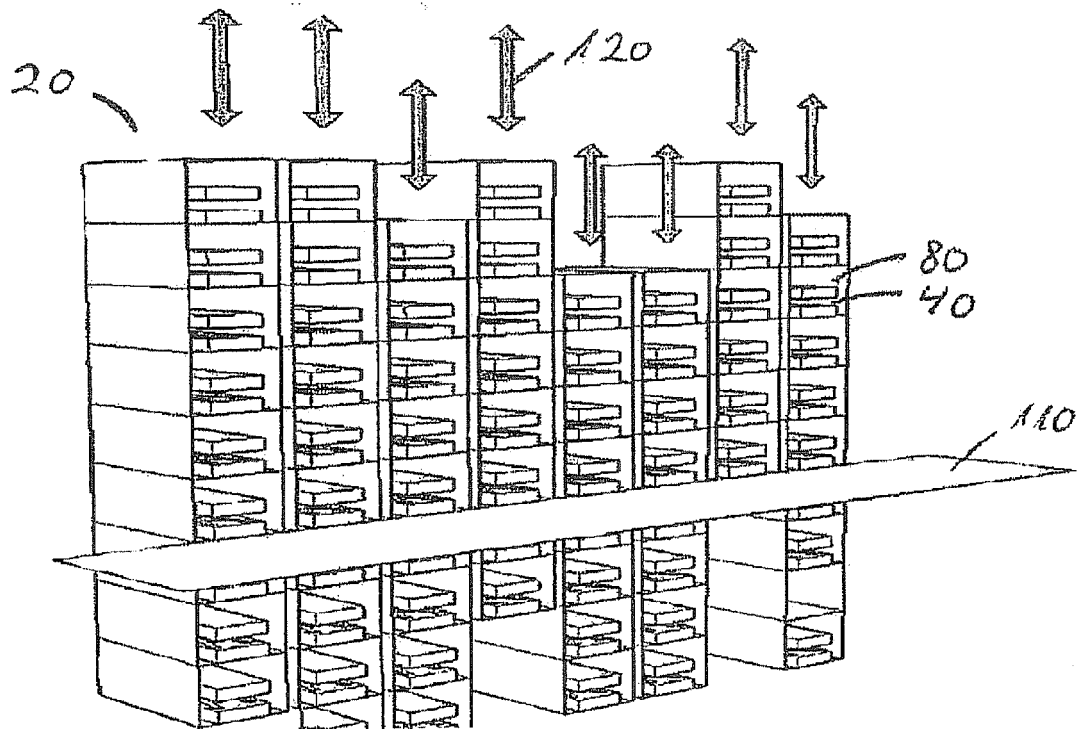


Fig. 6

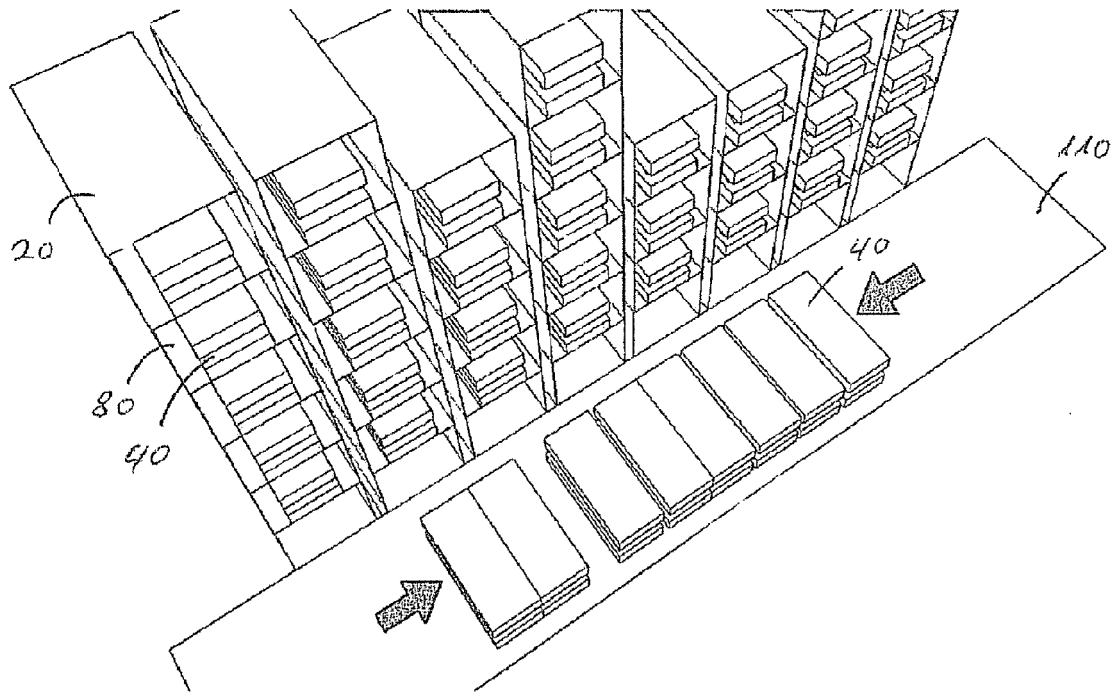


Fig. 7

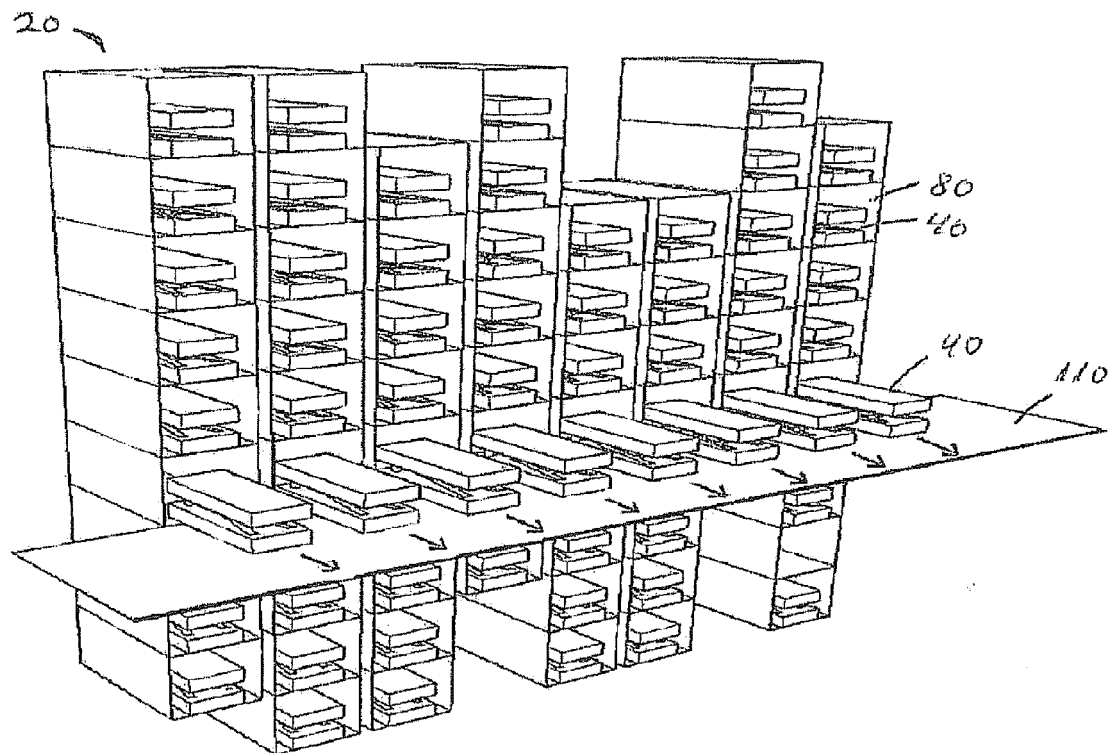


Fig. 8

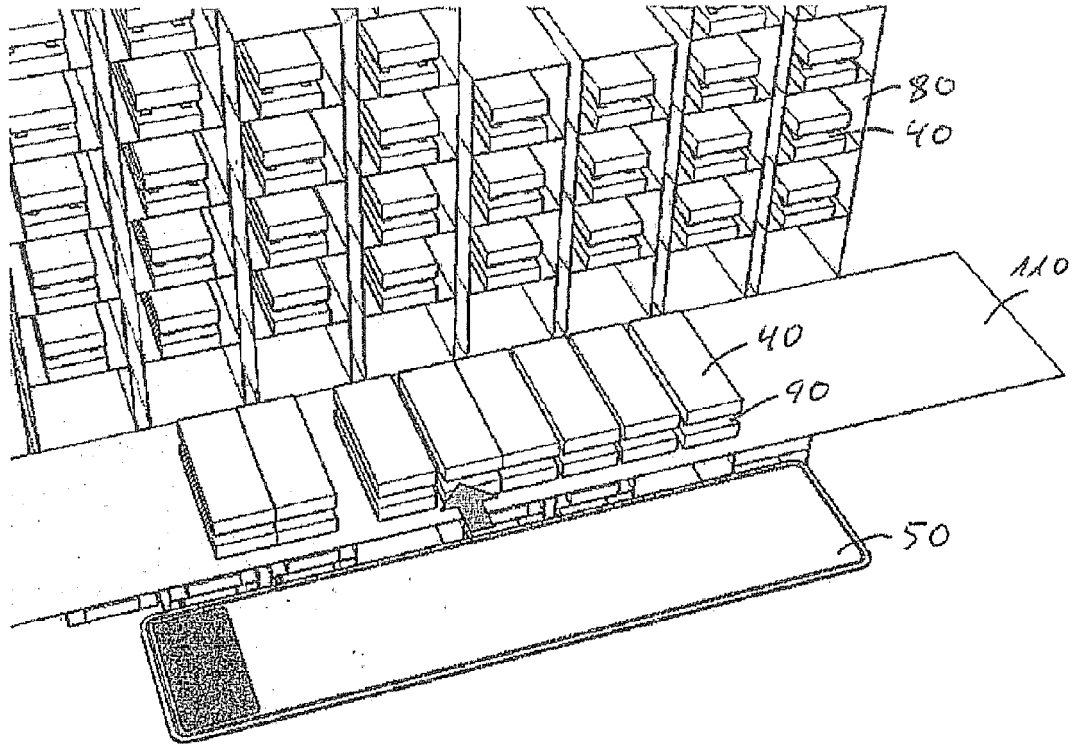


Fig. 9

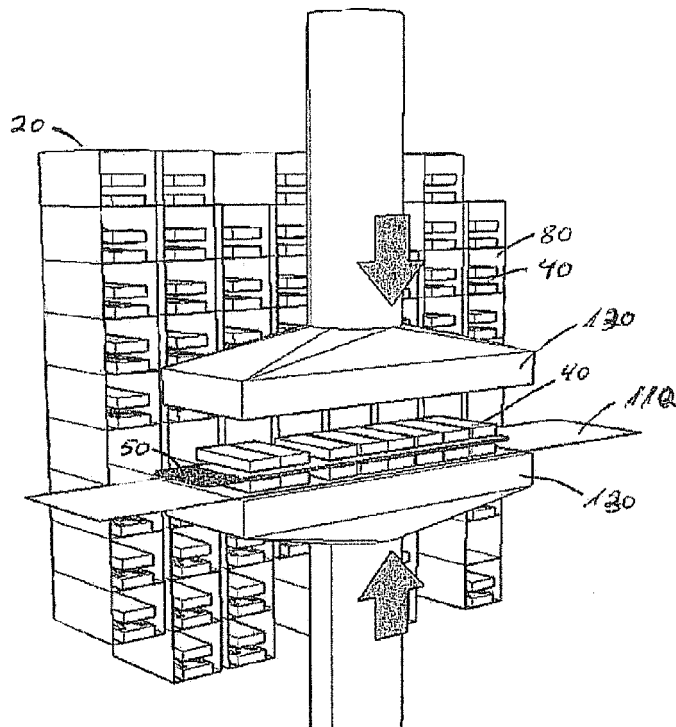


Fig. 10

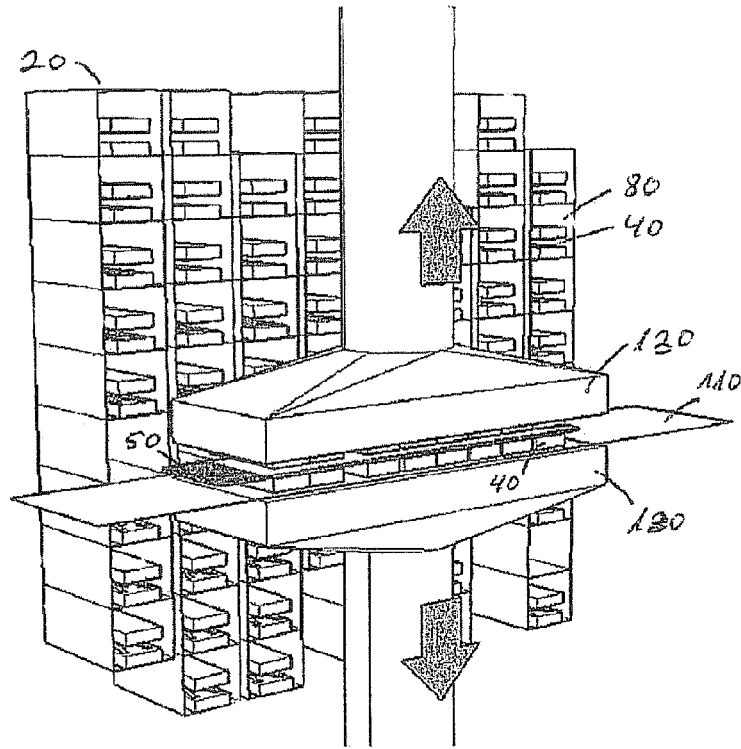


Fig. 11

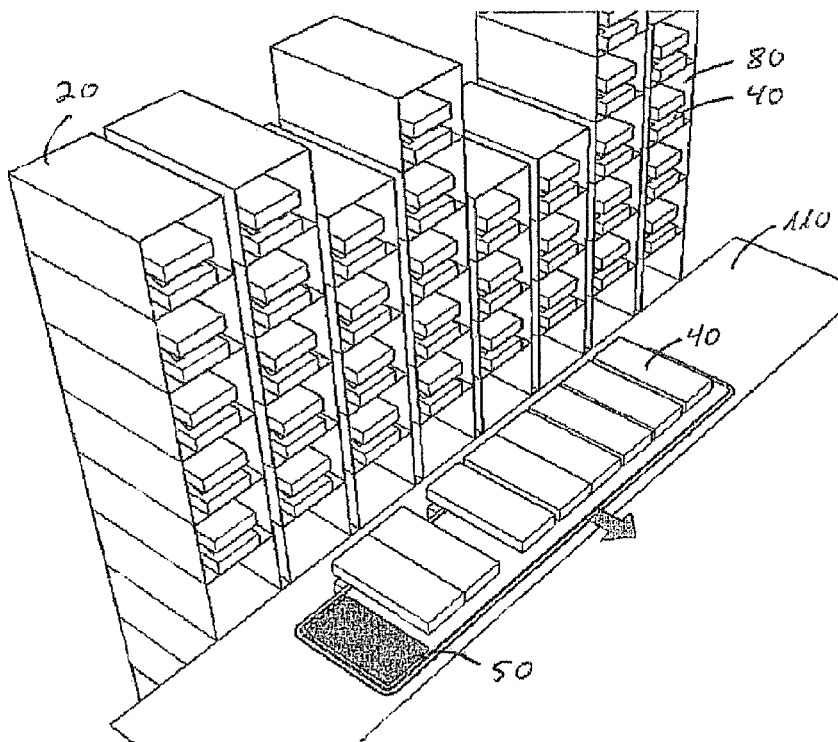


Fig. 12

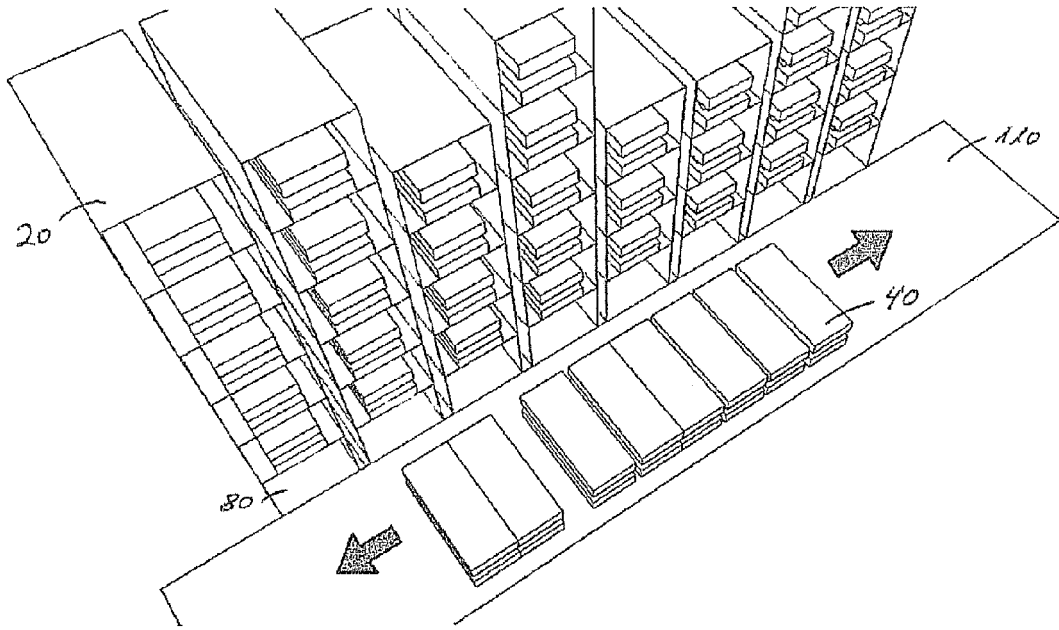


Fig. 13



Fig. 14



EUROPEAN SEARCH REPORT

Application Number
EP 15 15 2365

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 3 987 721 A (ALEXANDER DONALD R ET AL) 26 October 1976 (1976-10-26) * abstract * * column 1, line 49 - column 2, line 52 * * column 4, line 40 - column 6, line 17 * * column 11, line 40 - column 24, line 18 * * figures 1-47 *	1,2,5-15	INV. B41K1/10 B41K1/12 B41K1/14 B41K1/16 B41K3/06 B41K3/08 B41K3/10 B41K3/26
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