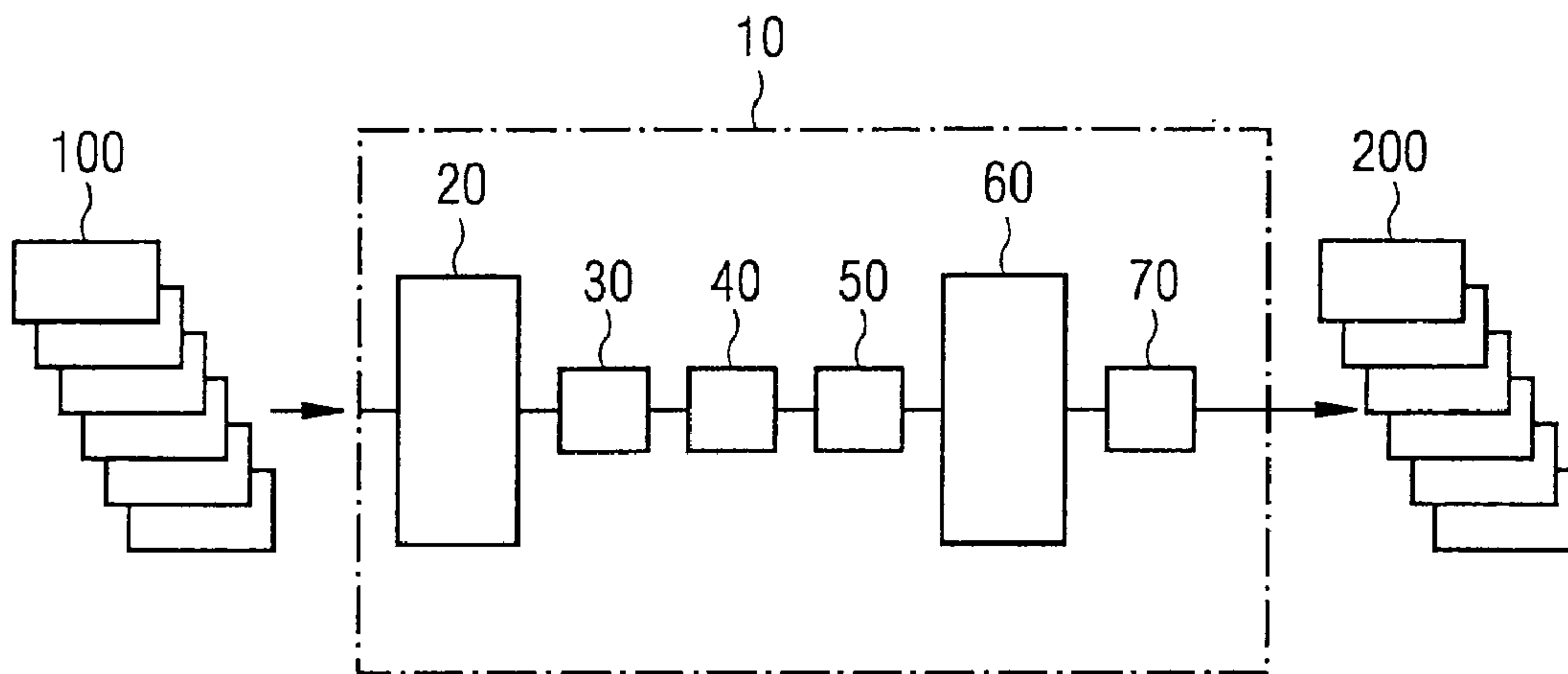




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(54) Titre : METHODE ET APPAREILLAGE DE PERSONNALISATION DE CARTES
(54) Title: METHOD AND APPARATUS FOR PERSONALIZING CARDS



(57) **Abrégé/Abstract:**

In a card personalization machine (10) with a plurality of production stages (30, 40, 50, 70), cards (100), e.g. chip cards, ID cards, etc, are individually personalized in dependence on a total set of possible processing parameters, individual ones of the processing parameters being variable without a reset of the machine, and others of the processing parameters being variable only when for this purpose the machine is reset. For this purpose the cards are grouped in a grouping unit (20; 60) to card groups and the card groups are personalized separated from each other, the grouping of the cards being effected such that card groups result therefrom, which are not or at least not all to be personalized with the same processing parameters, the different processing parameters of which, however, at least for one production stage (30, 40, 50, 70) do not require a resetting of the machine (10).

Abstract

In a card personalization machine (10) with a plurality of production stages (30, 40, 50, 70), cards (100), e.g. chip cards, ID cards, etc, are individually personalized in dependence on a total set of possible processing parameters, individual ones of the processing parameters being variable without a reset of the machine, and others of the processing parameters being variable only when for this purpose the machine is reset. For this purpose the cards are grouped in a grouping unit (20; 60) to card groups and the card groups are personalized separated from each other, the grouping of the cards being effected such that card groups result therefrom, which are not or at least not all to be personalized with the same processing parameters, the different processing parameters of which, however, at least for one production stage (30, 40, 50, 70) do not require a resetting of the machine (10).

(Fig. 1)

Method and apparatus for personalizing cards

[0001] The invention relates to the personalization of cards, in particular ID cards, check cards, cash cards, credit cards and the like in the form of chip cards, smart cards, magnetic cards and other cards made of plastic material or paper, and card personalization machines for this purpose.

[0002] The cards are personalized before they are issued to the user either by the manufacturer of the cards or by the authority issuing the cards, e.g. a bank or a health insurance. For this purpose the cards are fed to a personalization process, in which the personalization is successively carried out in a plurality of production stages. Here the way of processing in the individual production stages depends on various parameters, which can be different for each card or for groups of cards. Such processing parameters can be e.g. : the card body material, the chip type, the magnetic track layout, the high-embossing method to be used, the laser setting to be used, the enclosures to be enclosed with a finished card in the lettershop etc.

[0003] Processing cards with different processing parameters requires a frequent resetting of the card personalization machine. Resetting the machine is connected with a downtime of the machine, which interrupts the normal operating sequence. Therefore, for personalizing, those cards with identical processing parameters are manually gathered in groups, so-called lots, and fed one after the other to the card personalization machine for personalizing. The logical information to be transferred to the cards during the personalization of the cards, which is different for each card or groups of cards anyway, is not to be regarded as processing parameter within this meaning, since it does not require any special adjustments of the card personalization machine.

[0004] The consequence of dividing the cards into groups of cards with identical processing parameters is a large number of mini-lots, which results from the great variability of the demands made on the cards and the processing parameters. The personalization of groups gathered in lots, too, still requires a permanent resetting and thus is connected with a substantial downtime of the machine. Therefore, these machines by far do not achieve the throughput that is technically possible. A

throughput of for example 1500 cards per hour at continuous operation without resetting may easily be reduced by the factor 20 because of the described occurrence of mini-lots with lot quantities of 1 to 100, each lot requiring resetting the machine.

[0005] It is the problem of the present invention to optimize the personalization of cards by card personalization machines in a fashion which permits to increase the throughput of the card personalization machines.

[0006] This problem is solved by a method and an apparatus having the features of the independent claims. In the claims dependent thereon advantageous embodiments and developments of the invention are specified.

[0007] The invention is based on the fundamental idea, that individual processing parameters are variable, without a resetting of the machine becoming necessary, and others of the processing parameters are variable only when for this purpose the machine is reset. According to the invention, therefore, the cards are not only gathered in lots with identical processing parameters, but the cards or the lots are gathered to card groups, the processing parameters of which not necessarily are identical, but which permit that the entire card group can be processed by the card personalization machine at least for one production stage, preferably for a plurality of and, optionally, for all production stages, without resetting. The method according to the invention has the advantage, that the machine can be operated without resetting longer than hitherto possible, since the card groups formed, in general, are distinctly greater than the lots with identical processing parameters. A resetting of the machine thus is necessary less often. The sum of downtimes of the machine is distinctly shortened.

[0008] The card groups formed in this way are fed to the card personalization machine preferably in an order, which keeps low the resetting effort and thus the duration of downtimes of the machine. For this purpose the card groups are sorted such that from one group to the next group as few as possible processing

parameters requiring a resetting change and/ or that with each required resetting as few as possible production stages are concerned. In this way the resetting effort between two successive card groups is reduced, since such effort is approximately proportional to the number of processing parameters requiring a resetting.

[0009] Grouping the cards and/or sorting the card groups, advantageously, can be carried out separately for an individual and/or a group of individual production stages of the card personalization machine. Such a procedure helps to reduce very complex resetting processes for individual production stages.

[0010] In the following the invention is described by way of example with reference to the accompanying figures.

[0011] Fig. 1 shows a schematic representation of a card personalization machine,

[0012] Fig. 2 schematically shows a set of cards to be personalized K1 to K9, each with the processing parameters determining the personalization,

[0013] Fig. 3 schematically shows a set of cards to be personalized K1 to K9, each with the processing parameters determining the personalization, and

[0014] Fig. 4 schematically shows the result of a clustering of the card set shown in Figure 2 according to the set system X in Figure 3.

[0015] An embodiment of the invention is explained in more detail in the following. Figure 1 shows a card personalization machine 10 with a first grouping unit 20 and a second grouping unit 60 and some production stages 30 (e.g. chip initialization station), 40 (e.g. laser marking station), 50 (e.g. printing station), 70 (e.g. lettershop). The cards 100 to be personalized are fed to the first grouping unit for grouping, go through the production stages 30, 40, 50, then, optionally, are

regrouped in the second grouping unit 60, e.g. gathered to larger groups, and in the end leave the machine as completely personalized cards 200.

[0016] Figure 2 shows cards K1 to K9 to be personalized with their respective processing parameters referred to with the letters A to M. In the embodiment the cards are gathered to card groups, which then are successively fed to the machine for personalizing, in such a way that a card group can be personalized by the machine without resetting one single production stage. Additionally, these card groups are to be as great as possible, so that the machine can be operated as long as possible without resetting or must be reset as infrequent as possible.

[0017] The grouping of the cards is carried out with the help of a cluster process. Cluster processes are, expressed in simplified terms, methods to divide up a set of elements in so-called clusters, i.e. groups, whereby the elements of the set, which lie within a cluster, are to be similar and the similarity of elements in different clusters is to be low. I.e., that before the clustering a similarity concept appropriate to the application has to be necessarily defined. For determining a suitable similarity concept on the set of all cards to be personalized the process is as follows:

[0018] - determining the maximum sets M_i of processing parameters, which can be processed by the machine without resetting. Here X shall be the union of all these sets M_i . In Figure 3 an illustrative example can be seen: Set M_1 contains e.g. processing parameters A, B, C, D, E and K. This means, that the machine can personalize all cards, the personalization requirements of which depend on these processing parameters, or on partial sets thereof, without resetting.

[0019] - defining the similarity of two cards: two cards are defined to be similar, when there is a set M_i in X , the defining processing parameters of which comprise those of the two cards. In the contrary case, the two cards are defined to be dissimilar. As an example, in Figure 4 the cluster C2 is shown, which comprises

cards K5 and K6. These two cards are similar, since the set M_2 of Figure 3 comprises all processing parameters required by K5 and K6.

[0020] - defining the similarity of two groups of cards similar to each other: Analogous to the case of two cards, two groups of cards similar to each other are defined as similar, when there is a set M_j in X , the defining processing parameters of which comprise those processing parameters which are comprised by the two groups. In the contrary case, the two groups of cards are defined to be dissimilar. As an example, in Figure 4 is shown the cluster C3, which comprises the two groups of cards (K7, K8) and (K4, K9) similar to each other, since the union of all processing parameters of the two groups is a partial set of the defining processing parameters for the set M_3 of Figure 3.

[0021] With the such defined simple similarity function on the set of cards, subsequently, the clustering, i.e. the grouping of the cards in groups of in-pairs similar cards, can be performed. For this purpose many different known cluster processes can be used. A suitable class are the hierarchical cluster processes, the proceeding of which can be described as follows:

[0022] Starting out from the set of all cards, regarded as a cluster each having one element, in each step two clusters, which are similar to each other (according to the above defined similarity), are merged to form a new greater cluster. This process is carried out as long as possible. In Figure 4 the result of an exemplary clustering process is shown, the course of which can be sketched as follows: In the first step K1 and K2 are gathered according to M_1 to form a cluster, which in the next step is extended by K3 to form C1. In the following steps, according to M_3 , the cluster C3 results from the two subclusters (K4, K9) and (K7, K8), which resulted first and are shown in Figure 4, in the end C2 results from the merging of K5 and K6 according to M_2 , the order of the steps not being unique. Finally, one obtains a set of clusters of similar elements, i.e. in this concrete case of application, a set of card groups such that each of these card groups can be personalized by the card

personalization machine without resetting, and that they have a maximum size with this property.

[0023] Furthermore, it is possible to define more distinguished similarity functions on the card set, and other cluster processes can also be applied. I.e. in this way card groups of a maximum size can be formed, which can be personalized by the card personalization machine without resetting, which substantially decreases the downtime of the machine and therefore distinctly increases the throughput.

[0024] In an embodiment the card groups, before they are fed to the machine for personalizing, are sorted with the aim to keep the resetting effort between two successive card groups as low as possible, by defining those card groups to be successive, the differences in processing parameters of which - and thus the resulting resetting effort - are as small as possible. For this purpose on the set of card groups to be sorted a distance function is defined as follows: The distance of two card groups is calculated as the number of processing parameters, which would require a resetting of the machine, when the machine after the processing of the one card group had to process the other card group as next card group. With the such defined distance now an order of the card groups can be determined in such a way, that the distance of two respective successive card groups is as small as possible, or that the total distance from the first to the last card group is a minimum, which corresponds to a minimum number of reset-relevant processing parameters. This can be solved, in dependence on the number of card groups, exactly by enumeration or approximatively by approximate method, by e.g., when starting out from a card group, always defining the nearest card group, with the above defined distance concept, as the following card group in the order to be determined (nearest neighbor heuristics). An order of card groups determined in this way guarantees a smallest possible resetting effort between two card groups fed to the machine for personalizing and thus additionally reduces the resetting-related downtime of the machine.

Patent Claims

1. A method for personalizing a plurality of cards with the help of a resettable card personalization machine with at least one grouping unit and a plurality of production stages for an individual personalization of the cards, wherein the card personalization machine is able to individually personalize cards in dependence on a total set of possible processing parameters, individual ones of the processing parameters being variable without having to reset the machine, and others of the processing parameters being variable only when for this purpose the machine is reset, comprising the following steps:
 - grouping the cards to card groups and
 - personalizing the card groups separated from each other,wherein the grouping of the cards is effected by the at least one grouping unit to such card groups, which are not or at least not all to be personalized with the same processing parameters, the different processing parameters of which, however, at least for one production stage do not require a resetting of the machine.
2. The method according to claim 1, further comprising a step of sorting the card groups to a series of card groups in such a way, that as few as possible processing parameters between one card group and the subsequent card group require a resetting of the machine, the step of personalizing the card groups being effected separated from each other successively according to the sorted series of card groups.
3. The method according to claim 1 or 2, wherein the step of grouping the cards to card groups is carried out with the help of a cluster process.
4. The method according to claim 3, wherein the cluster process is a hierarchical cluster process.

5. The method according to any one of claims 1 to 4, wherein it is only separately applied to one or a plurality of individual and/or one or a plurality of groups of production stages of the card personalization machine.
6. A resettable card personalization machine, comprising one or a plurality of production stages for the individual personalization of a plurality of cards in dependence on a total set of possible processing parameters, the machine being adaptable to individual changing processing parameters without a resetting of the machine, and being adaptable to different changing processing parameters only when for this purpose at least one production stage is reset, at least one grouping unit for grouping the cards to card groups to be personalized separated from each other, the grouping unit being arranged to group the cards to such card groups, which are not or at least not all to be personalized with the same processing parameters, the different processing parameters of which, however, at least for one production stage do not require a resetting of the machine.
7. The card personalization machine according to claim 6, further comprising a first and at least one further such grouping unit located downstream of the first grouping unit, the further grouping unit being disposed between two production stages and arranged to regroup the cards for the next production stage.
8. The card personalization machine according to claim 6 or 7, wherein the production stages comprise one or a plurality of the following production stages: chip initialization station, magnetic stripe coding station, high-embossing station, laser marking station, printing station, lettershop.

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FIG 1

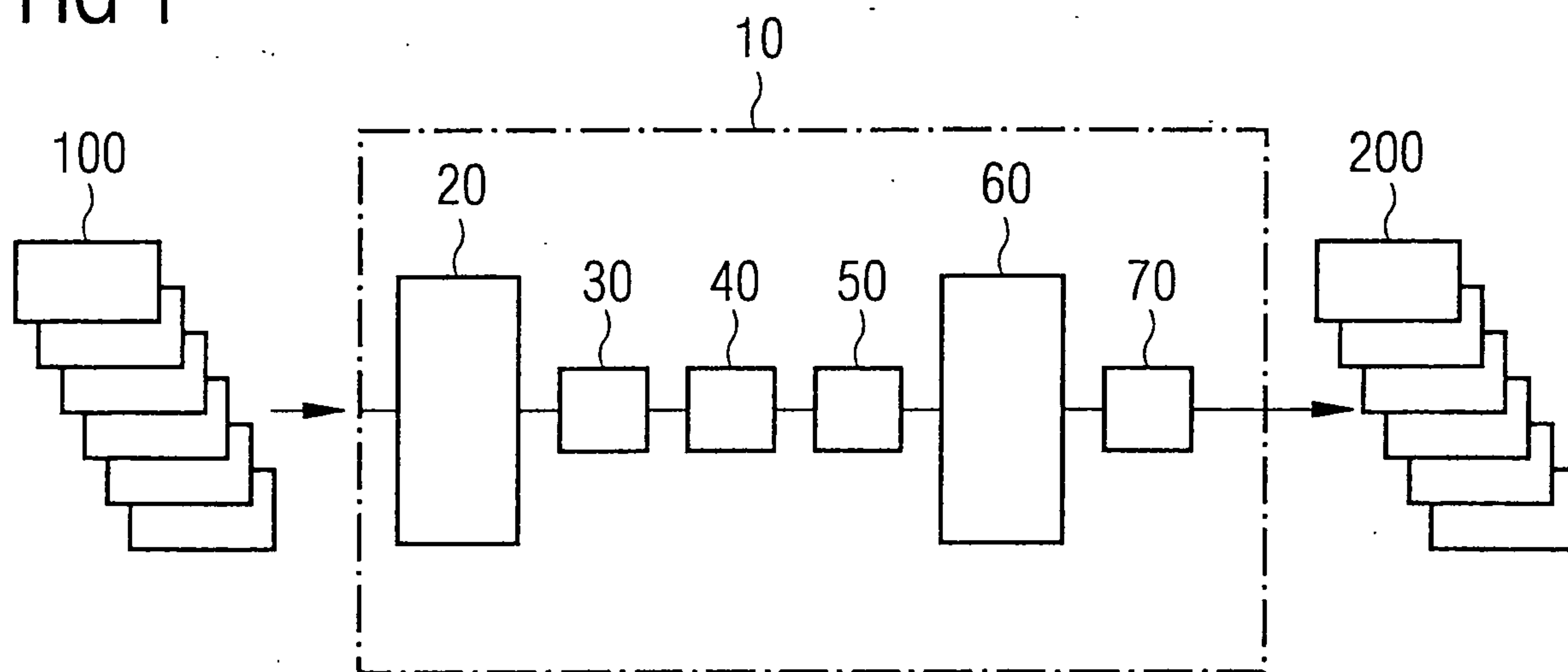
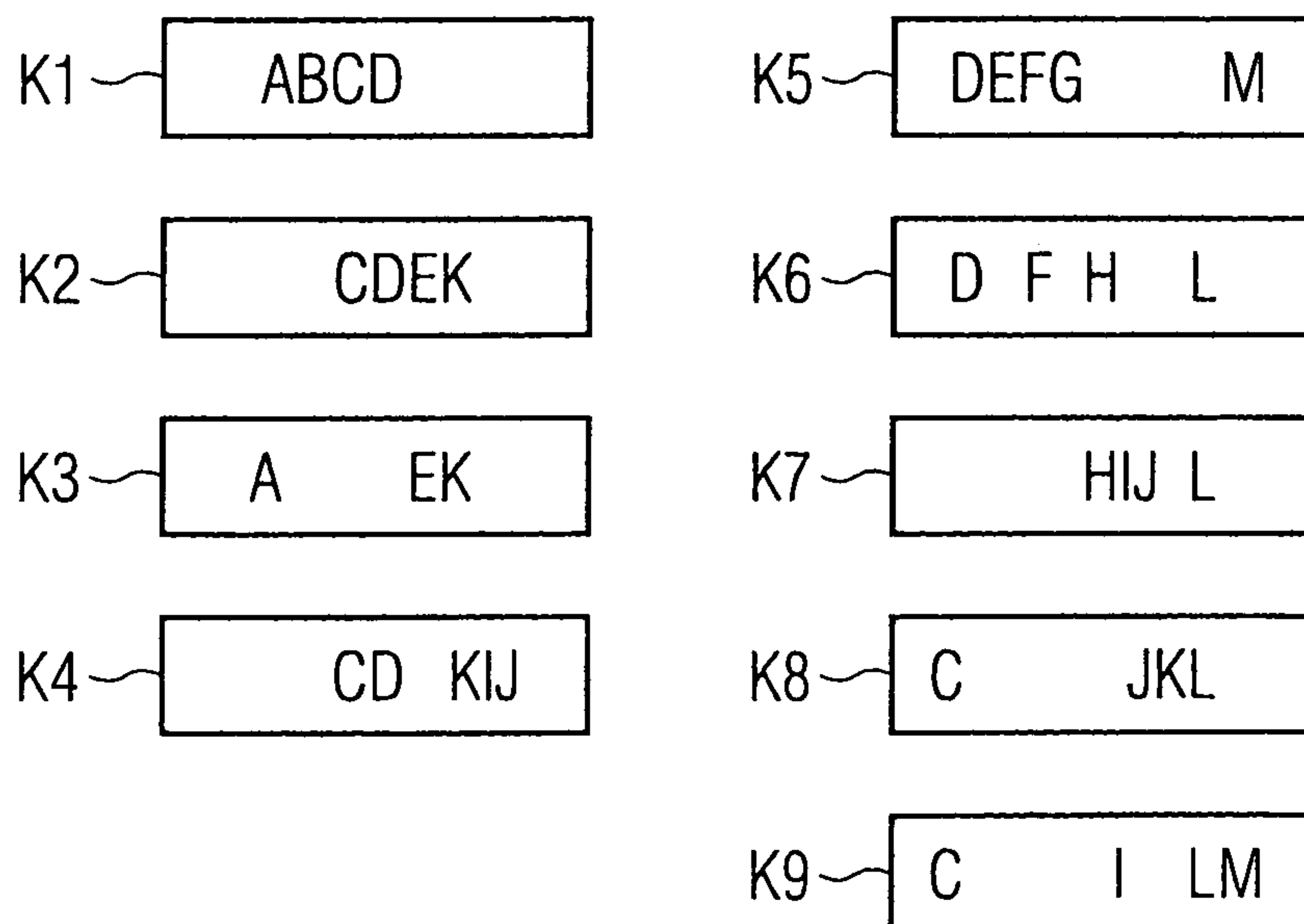


FIG 2



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FIG 3

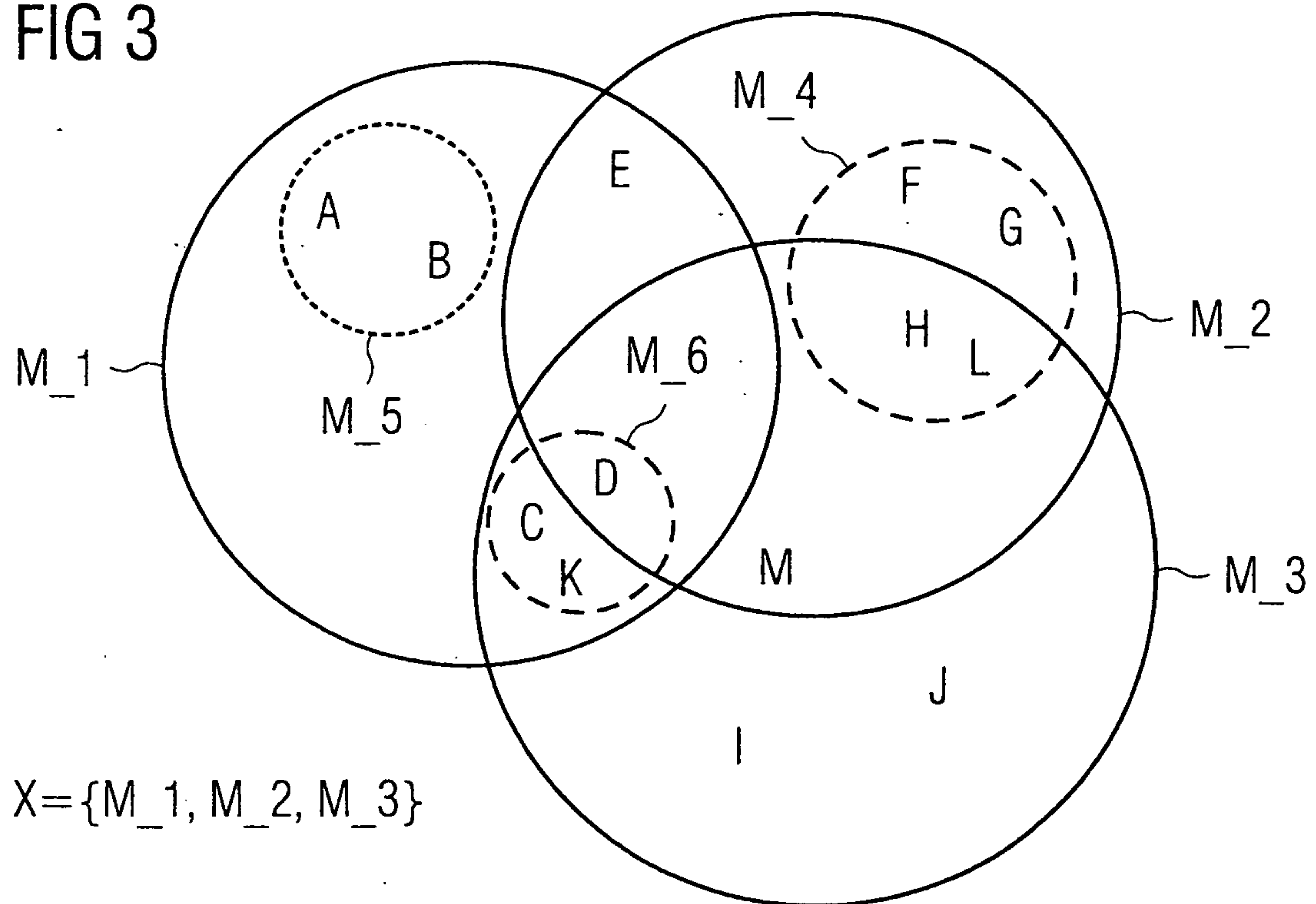


FIG 4

