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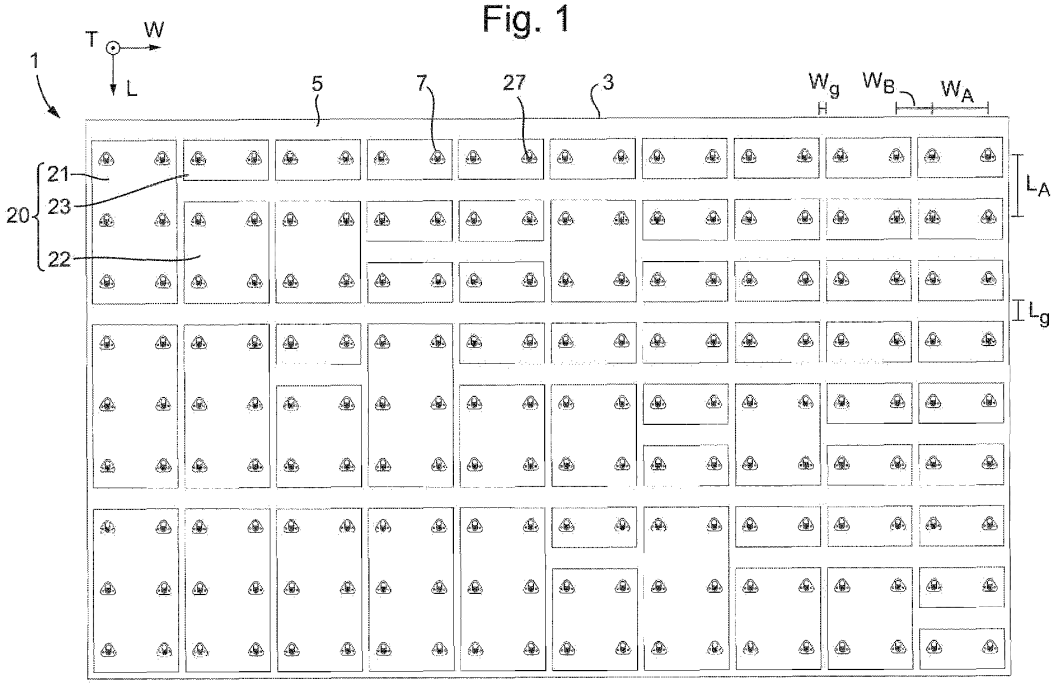
(54) A STORAGE SYSTEM AND METHOD

(57) A storage system 1 for storing items 20, the storage system comprising: a storage area 5 extending in a length direction L; a first item 21 having a first length; and a plurality of further items 22, 23 each having length less than the first length, wherein the storage area is configured to interchangeably store: the first item in a first arrangement in which the first length extends in the length direction; and the plurality of further items in a further arrangement in which further item lengths extend along the length direction and adjacent further items are spaced apart along the length direction by a fixed separation L_g, wherein the first length is substantially equal to the sum of further item lengths and the at least one fixed separation. A method (40, Fig. 4) of interchanging items 20 is also provided.

Fig. 1



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Description

Technical Field

[0001] The present disclosure relates to a storage system and is particularly, although not exclusively, concerned with a storage system for interchangeably storing items of different lengths.

Background

[0002] It is common to store items on a wall or stand such that the whereabouts of each item can be determined and the items readily accessed. Similarly, it is common to display items (e.g., in a shop) on a display stand such that those items can be viewed, removed, inspected and replaced.

[0003] Such items to be stored or displayed may have a variety of dimensions, such that the means for storing the items may be bespoke to the items stored. Accordingly, when the items are replaced by other items of differing dimensions, and/or when the arrangement of the items changes, this may entail the replacement of the existing bespoke storage means by a further bespoke storage means. The previous storage means may therefore become redundant which can lead to material wastage.

[0004] Additionally, it is often time-consuming to assemble a storage means (e.g., when fitting-out a new retail premises). Further, it is often time-consuming to exchange or rearrange items stored by a storage means (e.g., when a range of products is changed in part or in full).

[0005] Improvements are therefore desired in the art of item storage.

Statements of Invention

[0006] It is desirable to be able to store and display items of differing dimensions interchangeably on the same stand or as part of the same system, such that the stand need not be modified according to the dimensions of each set of items to be displayed.

[0007] According to an aspect of the present disclosure, there is provided a storage system for storing items. The storage system may comprise a display system. The storage system may comprise: a storage area extending in a length direction; a first item having a first length; and a plurality of further items each having length less than the first length. The storage area may be configured to store (e.g., store interchangeably) the first item in a first arrangement in which the first length extends in the length direction and/or the plurality of further items in a further arrangement in which further item lengths extend along the length direction and adjacent further items are spaced apart along the length direction by a fixed separation. The first length may be substantially equal to the sum of further item lengths and the at least one fixed separation. The items may be substantially quantised in length (e.g., such that each item may have a length selected from a set of discrete values). This aspect may form part of and/or be used in conjunction with any of the other aspects.

[0008] According to another aspect of the present disclosure, there is provided a storage system for storing items, the storage system comprising: a storage area extending in a length direction; a first item having a first length; and a plurality of further items each having length less than the first length, wherein the storage area is configured to interchangeably store: the first item in a first arrangement in which the first length extends in the length direction; and the plurality of further items in a further arrangement in which further item lengths extend along the length direction and adjacent further items are spaced apart along the length direction by a fixed separation, wherein the first length is substantially equal to the sum of further item lengths and the at least one fixed separation. This aspect may form part of and/or be used in conjunction with any of the other aspects.

[0009] The storage area may extend in a width direction. The first item may have a first width. Each further item may have the first width. In the first and further arrangements, the items may be stored such that the first widths of the items extend in the width direction. In the further arrangement, the further items may be aligned in the width direction such that the further items may be spaced apart in the length direction only.

[0010] The first item and the further items may comprise a uniform first thickness. The first item and the further items may be substantially planar.

[0011] The stand and/or the storage area may be providable (e.g., may be provided) in a substantially vertical plane (e.g., on a wall). The storage area may be configured to store or retain the items in a vertical plane. In the first and the further arrangements, the first item and the plurality of further items may be retained in a substantially vertical plane, e.g., parallel to the plane of the storage area.

[0012] The storage area may comprise a plurality of engagement features. The engagement features may be configured to engage (e.g., engage directly) co-operating engagement features provided on the first and further items. The engagement features provided on the storage area may be substantially recessed and/or may comprise female engagement features. The storage area may comprise a back plate or planar surface. The storage area may be flat.

[0013] The storage area may comprise an array of engagement features. The array may comprise a regular periodicity in the length direction. The array may comprise an alternating periodicity in the width direction. In the width direction, the array may alternate between a longer period and a shorter period. The regular periodicity in the length direction may be greater than (e.g., substantially and/or significantly greater than) the dimensions of each engagement feature in the length direction.

For example, each engagement feature may be spaced from an adjacent engagement feature in the length direction by multiple times (e.g., at least 3, such as at least five, such as at least 10, such as 20 times) the dimensions of each engagement feature (e.g., the dimensions of each engagement feature in the length direction or width direction). The engagement features may be discrete/distinct/non-contiguous from one another (e.g., such that no two engagement features may adjoin).

[0014] The storage area being configured to store items interchangeably may comprise being able to replace a first item by a plurality of further items in the same space, e.g., using the same engagement features and/or without requiring a change to the storage area, whilst maintaining the fixed separation.

[0015] The length direction may be defined as being a direction perpendicular to the width direction, e.g., perpendicular to a direction in which all items have the same dimension. The length direction may be parallel with the line of gravity.

[0016] The plurality of further items may comprise a plurality of items having quantised lengths. The plurality of further items may comprise a second item (e.g., having a second length) and/or a third item (e.g., having a third length). The second length may be less than the first length. The third length may be less than the second length. The further arrangement may comprise one fixed separation (e.g., in the length direction of the storage area) provided between the second and third items.

[0017] The plurality of further items may comprise three third items each having a third length less than the first length. The further arrangement may comprise two fixed separations (e.g., in the length direction of the storage area). One fixed separation may be provided between adjacent third items, such that the fixed separations and third items alternate along the length direction.

[0018] The plurality of further items may comprise two third items each having a third length less than the first length. The further arrangement may comprise one fixed separation

The first item may be a long item (e.g., the longest of three), the second item may be a medium-length item (e.g., the medium length item of three), the third item may be a short item (e.g., the shortest item of three).

[0019] The spacing dimension may be fixed such that items are spaced apart by the same distance regardless of the composition of the plurality of further items. In the length direction, items may be spaced apart by the fixed separation only (e.g., by a distance no greater than the fixed separation).

[0020] The items may comprise male engagement features, e.g., extending from a rear surface thereof. The male engagement features may be configured to co-operate with female engagement features provided on the storage area. For example, the male engagement features may be provided in an array corresponding to, or configured to engage, that of the storage area.

[0021] The items may comprise sample door and/or drawer frontals for a kitchen or bedroom. The items may comprise (e.g., be formed from) wood.

[0022] The first length may be greater than the period of the array (e.g., the regular period of the array in the length direction). The first length may be greater than two periods of the array. The first item may comprise engagement features (e.g., two engagement features) spaced apart by twice the period of the array. The first item may comprise engagement features provided only at two longitudinal co-ordinates, optionally the two longitudinal co-ordinates being spaced apart by substantially twice the period of the array. The first item may comprise engagement features at three longitudinal co-ordinates respectively spaced apart by substantially the period of the array. The first item may comprise a pair of engagement features at each longitudinal co-ordinate.

[0023] The second length may be greater than the period of the array. The second item may comprise engagement features (e.g., two engagement features) spaced apart along the length direction by substantially the period of the array. The second item may comprise a pair of engagement features at each longitudinal co-ordinate.

[0024] The third length may be less than the period of the array. The third item may comprise engagement features at only a single longitudinal co-ordinate. The third item may comprise a pair of engagement features at the longitudinal co-ordinate.

[0025] Pairs of engagement features may be spaced apart by the longer period of the array in the width direction.

[0026] The item lengths may be quantised. The item lengths may be quantised based on (e.g., as a function of) integer multiples of the array spacing in the length direction.

[0027] The item widths may be quantised. The item widths may be quantised based on (e.g., as a function of) integer multiples of the array spacing in the width direction.

[0028] The storage area may be configured to store a plurality of first items having length along the length direction and spaced apart along the length direction, adjacent first items being spaced apart along the length direction by the fixed separation.

[0029] The alternating period of the array in the width direction, combined with the pairs of engagement feature at each longitudinal co-ordinate, may restrict the lateral positioning of any items on the storage area. The regular period of the array in the length direction may mean that items can engage any engagement feature along the length direction.

[0030] The first length : second length : third length : fixed separation : spacing of the array may be provided approximately (e.g., substantially) in the ratios 571 : 356 : 140 : 75 : 216. Alternatively, they may be provided approximately or substantially in the ratio 597 : 356 : 140 : 75 : 216.

[0031] The first length may be approximately or substantially equal to 571 mm (e.g., 570 mm to 575 mm,

preferably 570 to 572 mm). The second length may be approximately or substantially equal to 356 mm. The third length may be approximately or substantially equal to 140 mm. The fixed separation may be approximately or substantially equal to 75 mm. The spacing of the array may be approximately or substantially equal to 216 mm. The tolerance of the ratios and/or lengths may be determined by the accuracy of a human eye at a typical viewing distance of at least a few metres.

[0032] The storage area may comprise a substantially flat and/or planar surface. The storage area may comprise a continuous, contiguous and/or unitary surface comprising an array of engagement features having a regular periodicity in the length direction. If the storage area is divided into multiple back plates or panels, each panel may have a continuous/contiguous/unitary surface comprising an array of engagement features (e.g., having a regular periodicity in the length direction). The storage area may comprise female or recessed engagement features (e.g., only female or recessed engagement features).

[0033] The engagement features may comprise (e.g., consist of) point fixings or point attachment features (e.g., may not comprise an elongate slot). A point fixing may not substantially extend in the length and/or width directions. The engagement features may be engaged by a push/insertion and slide mechanism (e.g., the slide distance may be no greater than the dimensions of the aperture for receiving the insertion of the engagement feature). The engagement features may comprise button fixings (e.g., male and female portions thereof). The items may be supported by the engagement features only (e.g., point fixings only), provided only on the rear surface of each item, e.g., such that their edges may not be obstructed and/or obscured. For example, the engagement features (e.g., male) may be provided at a minimum margin from the edges of each item, e.g., to allow a user to engage the rear surface of the item. The minimum margin may be configured (e.g., dimensioned) to receive and/or be engaged by a digit of a user.

[0034] The items may be stored having a fixed clearance (e.g., perpendicular to the storage area and/or in the horizontal direction) from the storage area behind. For example, a fixed clearance or separation may be defined between (e.g., directly between) the storage area (e.g., a front surface of the storage area) and a rear surface of each item. The fixed clearance or separation may be for receiving (e.g., configured or dimensioned to receive) a user's hand or digits, e.g., such that a user may grasp the front and rear surfaces of an item stored in the storage area, and optionally thereby manipulate the item such as by removing the item from the storage area or allowing a user to remove their digits after storing an item in the storage area. The fixed clearance may be a void or empty space.

[0035] The margin between the edges of the items and the engagement features may be greater than the fixed clearance between the items and the storage area.

[0036] The margin between the edge of each item and the engagement features; the dimensions of the fixed clearance; and/or the fixed separation between items, may be determined in accordance with the resistance provided by the engagement features. For example, stiffer engagement features may require greater force for removal or engagement, and so a greater space for receipt of a user's digits may be required. Alternatively, softer engagement features may require less space as less force may be required from a user.

[0037] The margin between the edge of each item and the engagement features; the dimensions of the fixed clearance; and/or the fixed separation between items, may be such that the engagement features in the further arrangement(s) are obscured by an adjacent item (e.g., the engagement features may be obscured and/or inaccessible in the first and further arrangements).

[0038] The first item may span (e.g., extend over at least) two periods of the array in the length direction and/or three engagement features spaced apart in the length direction of the array. The second item may span one period of the array and/or two engagement features spaced apart in the length direction of the array. The third item may span less than one period of the array and/or only one engagement in the length direction. In a stored position, all engagement features provided on the items may engage engagement features provided in the storage area (e.g., but not all engagement features provided in the storage area may engage engagement features provided on items).

[0039] The array may comprise at least three engagement features in the length direction. The array may comprise an integer multiple of three engagement features in the length direction, e.g., nine engagement features. The array may comprise at least two engagement features in the width direction. The array may comprise an integer multiple of two engagement features in the width direction, e.g., 20 engagement features.

[0040] According to an aspect of the present invention, there is provided a method comprising: providing the storage system of any aspect; removing from the storage area one of the first item and the plurality of further items; replacing the removed one of the first item and the plurality of further items by the other of the first item and the plurality of further items. This aspect may form part of and/or be used in conjunction with any of the other aspects.

[0041] According to an aspect of the present invention, there is provided a storage system for storing items, the storage system comprising: a storage area extending in a length direction; a first set of items each having a length; and a second set of items each having a length, wherein the storage area is configured to interchangeably store: the first set of items item in a first arrangement in which the lengths of the items of the first set extend along the length direction; and the second set of items in a second arrangement in which the lengths of the items of the second set extend along the length direction, wherein in the

first and second arrangements, adjacent items (e.g., of the same set) are spaced apart along the length direction by a fixed separation, wherein the sum of the lengths of the items in the first arrangement and any fixed separations therebetween is substantially equal to the sum of the lengths of the items in the second arrangement and any fixed separations therebetween. This aspect may form part of and/or be used in conjunction with any of the other aspects. For example, no single item of the first set may be replaced by an integer number of items of the second set - the items of the second set may instead extend beyond the length dimensions of every individual item of the first set. In other words, in the second arrangement the items of the second set may span the fixed separations of the first arrangement.

[0042] The total lengths of items of the first set may be different from the total lengths of items of the second set. The first set may comprise the first item (e.g., the first item only) and/or the second item (e.g., the second item only). The second set may comprise a plurality of items (e.g., second and third items or only third items).

[0043] According to an aspect of the present invention, there is provided a method comprising: providing the storage system of the previous aspect; removing from the storage area one of the first set of items and the second set of items; replacing the removed one of the first and second sets of items by the other of the first and second sets of items. This aspect may form part of and/or be used in conjunction with any of the other aspects.

[0044] According to an aspect of the present invention, there is provided a storage system configured to interchangeably store items in any arrangement covering an array of at least two by two engagement features substantially as described with reference to and as illustrated in the accompanying drawings. This aspect may form part of and/or be used in conjunction with any of the other aspects.

[0045] According to an aspect of the present invention, there is provided a storage system for storing items, the storage system comprising:

a storage area comprising a plurality of first fixings aligned in substantially horizontal rows and substantially vertical columns, the columns being spaced apart by a horizontal separation W_A and the rows being spaced apart by a vertical separation L_A;

a first item having a single row of second fixings, each second fixing being spaced from the adjacent second fixing by a distance equal to W_A;

a second item having at least two rows of second fixings, each second fixing in a respective row being spaced from the adjacent second fixing by a distance equal to an integer multiple of W_A (e.g., a distance equal to W_A) and successive rows of second fixings being spaced apart by a distance LA, such that the first item or the second item can be attached to the storage area with all second fixings engaged with corresponding first fixings. This aspect may form part of and/or be used in conjunction with any of the other aspects.

[0046] The storage area may comprise a backing board to which the first fixings are attached.

[0047] To avoid unnecessary duplication of effort and repetition of text in the specification, certain features are described in relation to only one or several aspects or embodiments of the invention. However, it is to be understood that, where it is technically possible, features described in relation to any aspect or embodiment of the invention may also be used with any other aspect or embodiment of the invention.

Brief Description of Drawings

[0048] For a better understanding of the present invention, and to show more clearly how it may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 is a front view of a storage system according to the present invention in a storage arrangement;

Figure 2 is a front view of a storage stand of the system of Fig. 1;

Figure 3 is a reverse perspective view of a plurality of items of the storage system of Fig. 1; and

Figure 4 is an example method according to the present invention.

Detailed Description

[0049] Fig. 1 is a front view of a storage system 1 comprising a storage stand 3 and a plurality of items 20 in an assembled configuration. In particular, Fig. 1 is an x-ray view of the storage system 1, such that components (e.g., the engagement features 7, 27) which would ordinarily be obscured in an assembled configuration are visible.

[0050] Fig. 2 is a front view of the storage stand 3 of Fig. 1 in the absence of the items 20.

[0051] With reference to Figs. 1 and 2, a storage system 1 for storing items 20 is described. The storage system 1 comprises a storage stand 3 having a storage area 5 for receiving items 20. The storage area 5 has a plurality of engagement features 7 provided in an array having a regular periodicity L_A in the length direction L and an alternating periodicity W_A, W_B in the width direction W. In particular, in the width direction W, the array comprises an alternating periodicity in which every other period W_B is approximately half the dimension of the intervening period W_A.

[0052] In the embodiment shown, the array comprises nine rows of engagement features 7 and twenty columns

of engagement features 7. However, it will be understood by the skilled person that alternative numbers of columns and rows may be provided according to the present invention.

[0053] Each engagement feature 7 is configured to co-operate with a corresponding engagement feature 27 (Fig. 3) provided on an item 20, such that the item 20 is retained by the engagement feature 7 (optionally in combination with other engagement features 7) in the storage area 5. In the embodiment shown, each engagement feature 7 provided in the storage area 5 comprises a female portion 7 (e.g., a female portion of a button fixing) which is configured to receive a male portion 27 (e.g., a male portion of a button fixing) provided on an item 20 to be stored.

[0054] The engagement features 7 are substantially recessed within the storage area 5 such that the storage area 5 is substantially planar.

[0055] The storage stand 3 may be supportable on a wall and/or supportable on a floor, such that the stand 3 and the storage area 5 may be provided in a substantially vertical plane. The stored items 20 may thereby be readily visible from a range of angles and distances as well as readily accessible. The storage stand 3 may be used as a display stand, e.g., in a shop, for displaying products.

[0056] The female button fixings 7 may be engaged by insertion in a direction perpendicular to the plane of the storage area 5 (e.g., into the page of Fig. 1), followed by sliding downwards along the length direction (e.g., in the direction of gravity and in the plane of the page of Fig. 1). Although the female button fixings 7 permit the insertion then the sliding of the male button fixings 27, the sliding distance is short, and so the female button fixings 7 may still be considered point fixings. A point fixing may be distinct from a slot which is substantially elongate in relation to width. Point fixings may be easier to engage and so may improve the speed of exchange of items. Further, point fixings may be smaller than larger fixings and so permit more room for the receipt of a user's hand or digits.

Items

[0057] With reference to Fig. 3, the items 20 configured to be stored in the storage area 5 are described.

[0058] Fig. 3 shows a plurality of items 20 from a reverse angle, such that the locations and characteristics of the male portions 27 of the button fixings are visible. The items 20 are shown as if supported by the storage area 5 and as if viewed through the storage area 5, but with the storage area 5 omitted. The items 20 of Fig. 3 are thereby provided in three columns 31, 32, 33 each of which relates to an arrangement according to the present invention.

[0059] The items 20 comprise a first item 21, a second item 22, and a third item 23.

[0060] The first item 21 is substantially planar and has a first length, a first width, and a first thickness defined in relation to the right-angular axes W, L, T.

[0061] The first item 21 comprises at least two male engagement features 27 (e.g., male button fixings) which protrude from the rear surface of the of the first item 21. The at least two male engagement features 27 are spaced apart along the length of the item 21 by a distance substantially equal to an integer multiple of the regular period L_A of the array of the storage area 5. The male engagement features 27 provided on the first item 21 are configured to engage the female engagement features 7 provided in the storage area 5.

[0062] In the embodiment shown, the first item 21 comprises three pairs of male button fixings 27 at three longitudinal co-ordinates, the spacing between the longitudinal co-ordinates being substantially equal to L_A. Within each pair at the same longitudinal co-ordinate, the male button fixings 27 are provided with a fixed width substantially equal to the period W_A of the array of the storage area 5 in the width direction. The male button fixings 27 may thereby be provided in an array on the rear surface of the item 21 which mirrors the periodicities L_A, W_A of the array in the storage area 5.

[0063] In an alternative embodiment not shown, the first item 21 may comprise only an uppermost pair and a lowermost pair of male button fixings 27 spaced apart by twice the period L_A, such that the middle pair may be omitted. Additionally or alternatively, the male button fixings 27 may not be provided in pairs, such that the item 21 may comprise only individual male button fixings 27 at each longitudinal co-ordinate.

[0064] The uppermost and lowermost engagement features 27 are provided at a pre-determined distance from the respective upper and lower edges of the item 21. This distance is chosen in combination with the period of the array L_A and the overall length of the first item 21, such that upon storage of the item 21 in the storage area 5, the distance in the length direction between adjacent items is fixed (described later).

[0065] Similarly, the engagement features 27 are provided at a pre-determined distance from the respective left and right edges of the item 21. The distance is chosen in combination with the periods W_A, W_B of the array and the width of the item 21, such that upon storage of the item 21 in the storage area 5, the distance in the width direction between adjacent items is fixed (described later).

Second item

[0066] The second item 22 is substantially planar and has a second length, the first width and the first thickness defined in relation to the axes W, L, T. The first length is greater than the second length.

[0067] The second item 22 comprises at least two male engagement features 27 (e.g., male button fixings) which protrude from the rear surface of the second item 22. The at least two male engagement features 27 are spaced apart along the length of the item 22 by a distance sub-

stantially equal to the regular period L_A of the array in the length direction of the storage area 5. The male engagement features 27 provided on the first item 21 are configured to engage the female engagement features 7 provided in the storage area 5.

[0068] In the embodiment shown, the second item 22 comprises two pairs of male button fixings 27 at two longitudinal co-ordinates, the spacing between the longitudinal co-ordinates being substantially equal to L_A. Within each pair at the same longitudinal co-ordinate, the male button fixings 27 are provided with a fixed width substantially equal to the period W_A of the array of the storage area 5 in the width direction. The male button fixings 27 may thereby be provided in an array on the rear surface of the item 22 which mirrors the periodicities L_A, W_A of the array in the storage area 5.

[0069] In an alternative embodiment not shown, the male button fixings 27 may not be provided in pairs, such that the item 22 may comprise only individual male button fixings 27 at each longitudinal co-ordinate.

[0070] The engagement features 27 are provided at a pre-determined distance from the respective upper and lower edges of the item 22. This distance is chosen in combination with the period of the array L_A and the overall length of the second item 22, such that upon storage of the item 22 in the storage area 5, the distance in the length direction between adjacent items is fixed (described later). The pre-determined distance for the second item 22 is the same as the corresponding pre-determined distance for the first item 21.

[0071] Similarly, the engagement features 27 are provided at a pre-determined distance from the respective left and right edges of the item 22. The distance is chosen in combination with the periods W_A, W_B of the array and the width of the item 22, such that upon storage of the item 21 in the storage area 5, the distance in the width direction between adjacent items is fixed (described later). The pre-determined distance for the second item 22 is the same as the corresponding pre-determined distance for the first item 21.

Third item

[0072] The third item 23 is substantially planar and has the first width, the first thickness and a third length defined in relation to the right-angular axes W, L, T. The first and second lengths are greater than the third length.

[0073] The third item 23 comprises at least one male engagement feature 27 (e.g., male button fixing) which protrudes from the rear surface of the third item 23. The at least one male engagement feature 27 is provided at only a single longitudinal co-ordinate. The single longitudinal co-ordinate is centred relative to the length of the third item 23. The at least one male engagement feature 27 is configured to engage at least one female engagement feature 7 provided in the storage area 5.

[0074] In the embodiment shown, the third item 23 comprises a pair of male button fixings 27 at a single longitudinal co-ordinate. The spacing in the width direction of the pair of button fixings 27 is substantially equal to the period W_A of the array of the storage area 5 in the width direction.

[0075] In an alternative embodiment, the male button fixings 27 may not be provided in pairs, such that the item 22 may comprise only a single male button fixing 27 at a single longitudinal co-ordinate (e.g., centred relative to the length and width directions of the third item 23).

[0076] The engagement features 27 are provided at a pre-determined distance from the respective upper and lower edges of the item 23. This distance is chosen in combination with the period of the array L_A and the overall length of the third item 23, such that upon storage of the item 22 in the storage area 5, the distance in the length direction between adjacent items is fixed (described later). The pre-determined distance for the third item 23 is the same as the corresponding pre-determined distances for the first and second items 21, 22.

[0077] Similarly, the engagement features 27 are provided at a pre-determined distance from the respective left and right edges of the item 23. The distance is chosen in combination with the periods W_A, W_B of the array and the width of the item 22, such that upon storage of the item 21 in the storage area 5, the distance in the width direction between adjacent items is fixed (described later). The pre-determined distance for the third item 23 is the same as the corresponding pre-determined distances for the first and second items 21, 22.

Quantised lengths

[0078] The items 20 are effectively quantised in length based on how many periods L_A of the array in the storage area 5 they span. As such, the length of each item 20 is defined according to the equation:

$$Length = 2p + nL_A$$

where p is the pre-determined distance from the upper and lower edges of each item 20 to the nearest engagement feature 27 in the length direction, n is the integer number of array periods spanned by the engagement features 27, and L_A is the regular period of the array in the length direction.

[0079] For example, the third item 23 doesn't span a whole period L_A, and so n = 0 for the third item 23. Similarly, the first item 21 spans two periods L_A, and so n=2 for the first item 21.

[0080] In view of the foregoing, it will be evident that additional items spanning greater than two periods L_A may be provided. Further, it will be evident that items of width greater than the array width spacing W_A may be provided based on considerations similar to those for the length dimensions.

Assembled configuration

[0081] In the assembled configuration of Fig. 1, the substantially planar items 21, 22, 23 are provided having their length dimensions aligned with the length direction of the storage area 5, and their width dimensions aligned with the width direction of the storage area 5. The items 20 are thereby substantially in parallel with the plane of the storage area 5.

[0082] The male fixings 27 of the items 20 engage the female fixings 7 of the storage area 5, by the insertion and sliding mechanism previously described, such that the female fixings 7 bear the weight of the respective items 20 via the male fixings 27. The items 20 are thereby retained in the storage area 5. When the storage stand 3, and thus the storage area 5, is provided in a vertical plane, the items 20 are retained in a vertical plane (e.g., a parallel vertical plane).

[0083] As shown in Fig. 1, a first item 21 as stored in the storage area 5 spans two periods L_A in the length direction, and the longitudinal co-ordinates of three pairs female engagement features 7 in the length direction.

[0084] Similarly, a second item 22 as stored in the storage area 5 spans a period L_A in the length direction and thus the longitudinal co-ordinates of two pairs female fixings 7 in the length direction.

[0085] A third item 23 as stored in the storage area 5 spans less than one period and thus the longitudinal co-ordinates of a single pair of female fixings 7.

[0086] In the embodiment (not shown) that the first item 21 comprises no middle engagement feature 27 (e.g., no middle pair of button fixings 27), then the first item 21 may engage only the upper and lower female engagement features 7. The middle pair of female engagement features 7 would remain in the regular array. This is permitted by the provision of female engagement features on the array, such that the omission of male engagement features does not affect the functioning of adjacent engagement features 7, 27.

[0087] A first item 21 as stored in the storage area 5 occupies a first length of the storage area 5 which is substantially equal to the length of the first item. This may be termed a first arrangement. The first length is substantially equal to the sum of the lengths of a second item 22 and a third item 23 having a fixed separation L_g along the length direction therebetween (e.g., as shown in the left and middle arrangements 31, 32 in Fig. 3).

[0088] Similarly, a first item 21 as stored in the storage area 5 occupies a length substantially equal to the sum of the lengths of three third items 23 having two fixed separations interspersed therebetween (e.g., as shown in the left and right arrangements 31, 33 in Fig. 3).

[0089] Further, a second item 22 as stored in the storage area 1 occupies a length substantially equal to the length of two third items 23 having a fixed separation L_g therebetween (e.g., as shown in the lower part of the middle and right arrangements 32, 33 in Fig. 3).

[0090] Along the length direction, the spacing between adjacent items is fixed at L_g such that all items 20 have the same space above and below them in the length direction. Along the width direction, the spacing between adjacent items is fixed at W_g such that all items 20 have the same spacing to their left and right. The spacing between adjacent items 20 in the length and width directions may not be equal. In the example shown, the spacing L_g along the length direction is greater than in the width direction W_g.

[0091] As all items 20 comprise substantially the same width, any arrangement of items occupying the same length will also occupy the same two-dimensional space. The storage area 5 is thereby configured to interchangeably store different combinations of items 20. In effect, any two-dimensional space having length equal to a first length is able to store either: a first item; or a second item and a third item with a fixed separation L_g therebetween; or three third items with two fixed separations L_g interspersed therebetween. Similarly, any two-dimensional space having length equal to a second length is able to store either: a second item; or two third items having a fixed separation Lg therebetween. Similar considerations apply for items which have length greater than the first length.

[0092] The items 20 may be supported only by the engagement features 7, 27 such that the items 20 are not obscured or obstructed at their edges. Further, the engagement between the engagement features 7, 27 may retain the items 20 in parallel with, but spaced apart from, the plane of the storage area 5 (e.g., spaced apart in the thickness direction).

[0093] By providing space around the items 20 (e.g., uniformly around and behind all items 20), a user may readily interact with the items 20 by grasping them (e.g., to add or remove the item from the storage area 5). In particular, the space behind an item 20 may permit a user to place their fingers behind the item so as to grasp it. Further, the space above and below an item may permit a user to grasp the upper and lower edges of the item 20 with their palm. The accessibility of the items 20 when stored in the storage area 5 is thus improved according to the present invention.

[0094] In a preferred example, the first length is substantially equal to 571 mm, the second length is substantially equal to 356 mm, the third length is substantially equal to 140 mm, the dimension L_g is substantially equal to 75 mm, the period L_A of the array is substantially equal to 216 mm and the distance from the edge of an item 20 to an engagement feature 27 along the length direction is substantially equal to 70 mm. The period of the array W_A may be selected according to user preference, as long as it is constant. Similarly, the period of the array W_B may be selected according to user preference, as long as it is constant.

[0095] In the nine by twenty array of Fig. 1 (i.e., nine rows of engagement features 7 by twenty columns of engagement features 7), there is illustrated a variety of item arrangements which are possible according to the

present invention. For example, any portion of the array spanning two by two engagement features may be able to interchangeably store a second item or a plurality of third items with a fixed separation L_g therebetween.

[0096] Similarly, any portion of the array spanning at least three (rows) by two (columns) of engagement features 7 may be able to store a first item 21; or a second item 22 and a third item 23 with a fixed separation L_g therebetween; or three third items 23 with two fixed separations L_g interspersed therebetween. Similarly, any two-dimensional space having length equal to a second length is able to store either: a second item 22; or two third items 23 having a fixed separation L_g therebetween.

[0097] It will be evident to the skilled person that a similar consideration may be performed for any portion of the overall nine by 20 array of Fig. 1. For example, any nine by two portion, or any three by four or three by six portion of the array may be considered as an area configured to store a plurality of items interchangeably.

Method

[0098] With reference to Fig. 4, an example method 40 of the present invention is described. The method 40 comprises providing 42 the storage system 1. The method 40 further comprises removing 44 from the storage area 5 a first item 21. Replacing 46 the removed first item 21 by a second item 22 and a third item 23 or by three third items 23.

[0099] Alternatively, the method 40 comprises removing 44 from the storage area 5 a second item 22 and a third item 23 adjacent one another. The method 40 further comprises replacing 46 the removed items 22, 23 by a first item 21 or by three third items 23.

[0100] Alternatively, the method 40 comprises removing 44 from the storage area 5 three third items 23 adjacent one another in the length direction. The method 40 further comprises replacing 46 the removed items 23 by a first item 21 or by a second item 22 and a third item 23.

[0101] Alternatively, the method 40 comprises removing 44 from the storage area 5 a second item 22. The method 40 further comprises replacing 46 the removed item 22 by two third items 23.

[0102] Alternatively, the method 40 comprises removing 44 from the storage area 5 two third items 23 adjacent one another in the length direction. The method 40 further comprises replacing 46 the removed items 23 by a second item 22.

Additional embodiments

[0103] Although in Fig. 1 the nine rows of engagement features 7 appear effectively divided into three sets of three rows by the illustrated item arrangements (e.g., between the third and fourth rows of engagement features 7 and between the sixth and seventh rows of engagement features 7 there is a continuous spacing of dimension L_g running from left to right which is not obstructed by an item 20), it will be understood that this is not an essential feature of item arrangements of the present invention.

[0104] Further, although the first item 21 spans two periods L_A of the array, it will be understood that a longer item spanning at least three periods L_A of the array of the storage area 5 may be provided.

[0105] Further still, although illustrated as being substantially planar and having the same thickness, items 20 may instead have differing thickness dimensions or be non-planar.

[0106] The provision of female and male engagement features 7, 27 on the storage area 5 and the items 20 respectively may be reversed without departing from the teaching of the present disclosure.

Statements

[0107] The invention may be defined by the following statements which form part of the present disclosure:

Statement 1. A storage system for storing items, the storage system comprising:

a storage area extending in a length direction;

a first item having a first length; and

a plurality of further items each having length less than the first length,

wherein the storage area is configured to interchangeably store:

the first item in a first arrangement in which the first length extends in the length direction; and

the plurality of further items in a further arrangement in which further item lengths extend along the length direction and adjacent further items are spaced apart along the length direction by a fixed separation,

wherein the first length is substantially equal to the sum of further item lengths and the at least one fixed separation.

Statement 2. The storage system of statement 1, wherein the storage area extends in a width direction, the first item having a first width and each further item having the first width, wherein in the first and further arrangements, the items are stored such that the first widths of the items extend in the width direction.

Statement 3. The storage system of statement 2, wherein in the further arrangement, the further items are aligned in the width direction such that the further items are spaced apart in the length direction only.

Statement 4. The storage system of any preceding statement, wherein the first item and the further items comprise a uniform first thickness, the first and further items being substantially planar.

Statement 5. The storage system of any preceding statement, wherein the storage area is provided in a substantially vertical plane.

Statement 6. The storage system of any preceding statement, wherein in the first and the further arrangements, the first item and the plurality of further items are retained in a substantially vertical plane.

Statement 7. The storage system of any preceding statement, wherein the storage area comprises an array of engagement features having a regular periodicity in the length direction, the engagement features configured to engage co-operating engagement features provided on the first and further items.

Statement 8. The storage system of any preceding statement, wherein the plurality of further items comprises:

a second item having a second length less than the first length and a third item having a third length less than the third length, the further arrangement comprising one fixed separation;

three third items each having a third length less than the first length, the further arrangement comprising two fixed separations; or

two third items each having a third length less than the first length, the further arrangement comprising one fixed separation.

Statement 9. The storage system of any preceding statement, wherein the fixed separation is the same regardless of the composition of the plurality of further items.

Statement 10. The storage system of any preceding statement, wherein the first length is greater than the period of the array, optionally wherein the first length is greater than two periods of the array

Statement 11. The storage system of statement 10, wherein the first item comprises two engagement features spaced apart by twice the period of the array

Statement 12. The storage system of any of statements 8 to 11, wherein the second length is greater than the period of the array, optionally wherein the second item comprises two engagement features spaced apart along the length direction by the period of the array

Statement 13. The storage system of any of statements 8 to 12, wherein the third length is less than the period of the array, optionally wherein the third item comprises engagement features at only a single length coordinate.

Statement 14. The storage system of any preceding statement, wherein the storage area comprises an array of engagement features having an alternating periodicity along the width direction, each engagement feature configured to co-operate with a corresponding engagement feature of an item.

Statement 15. The storage system of any preceding statement, wherein the storage area is configured to store a plurality of first items having first item lengths along the length direction, adjacent first items being spaced apart along the length direction by the fixed separation.

Statement 16. The storage system of any of statements 8 to 15, wherein the first length : second length : third length : fixed separation : spacing of the array are provided approximately in the ratios 571 : 356 : 140 : 75 : 216

Statement 17. The storage system of any of statements 8 to 16, wherein the first length is substantially equal to 571 mm; the third length is substantially equal to 356 mm; the third length is substantially equal to 140 mm; the fixed separation is substantially equal to 75 mm; and/or the spacing of the array is substantially equal to 216 mm.

Statement 18. The storage system of any of statements 7 to 17, wherein the engagement features comprise button fixings.

Statement 19. The storage system of any preceding statement, wherein in the first and/or further arrangements, the items have a fixed clearance from the storage area.

Statement 20. The storage area of any preceding statement, wherein in the first and further arrangements, the edges of the items are not obscured or obstructed.

Statement 21. A method comprising:

providing the storage system of any preceding statement;

removing from the storage area one of the first item and the plurality of further items;

replacing the removed one of the first item and the plurality of further items by the other of the

first item and the plurality of further items.

Statement 22. A storage system for storing items, the storage system comprising:

a storage area extending in a length direction;

a first set of items each having a length; and

a second set of items each having a length,

wherein the storage area is configured to interchangeably store:

the first set of items item in a first arrangement in which the lengths of the items of the first set extend along the length direction; and

the second set of items in a second arrangement in which the lengths of the items of the second set extend along the length direction,

wherein in the first and second arrangements, adjacent items are spaced apart along the length direction by a fixed separation,
wherein the sum of the lengths of the items in the first arrangement and any fixed separations therebetween is substantially equal to the sum of the lengths of the items in the second arrangement and any fixed separations therebetween.

Statement 23. The storage system of statement 22, wherein the total lengths of items of the first set is different from the total lengths of items of the second set.

Statement 24. A method comprising:

providing the storage system of statements 22 or 23;

removing from the storage area one of the first set of items or the second set of items;

replacing the removed one of the first and second sets of items by the other of the first and second sets of items.

It will be appreciated by those skilled in the art that although the invention has been described by way of example, with reference to one or more exemplary examples, it is not limited to the disclosed examples and that alternative examples could be constructed without departing from the scope of the invention as defined by the appended claims.

Claims

1. A storage system for storing items, the storage system comprising:

a storage area extending in a length direction;
a first item having a first length; and
a plurality of further items each having length less than the first length,

wherein the storage area is configured to interchangeably store:

the first item in a first arrangement in which the first length extends in the length direction; and
the plurality of further items in a further arrangement in which further item lengths extend along the length direction and adjacent further items are spaced apart along the length direction by a fixed separation,
wherein the first length is substantially equal to the sum of further item lengths and the at least one fixed separation,
wherein the storage area comprises a plurality of engagement features, the engagement features configured to engage co-operating engagement features provided on the rear surfaces of the first and further items such that in the first and further arrangements a fixed clearance is provided between the items and the storage area.

2. The storage system of claim 1, wherein the storage area comprises a continuous surface having an array of engagement features with a regular periodicity in the length direction.

3. The storage system of claims 1 or 2, wherein the storage area comprises an array of point fixings having a regular periodicity in the length direction, each item comprising a corresponding array of point fixings configured to engage the point fixings of the storage area

4. The storage system of any preceding claim, wherein the engagement features provided on the rear surfaces of the items are provided at a minimum margin from the edges of the items, the margin being greater than the fixed clearance between the items and the storage area in the first and further arrangements.

5. The storage system of any preceding claim, wherein the engagement features of the storage area are non-contiguous.

6. The storage system of any preceding claim, wherein the engagement features of the storage area are spaced apart along the length direction by a distance

at least three times greater than the dimensions of the engagement features in the length direction.

7. The storage system of any preceding claim, wherein the storage area extends in a width direction, the first item having a first width and each further item having the first width, wherein in the first and further arrangements, the items are stored such that the first widths of the items extend in the width direction.

8. The storage system of any preceding claim, wherein the plurality of further items comprises:

a second item having a second length less than the first length and a third item having a third length less than the first length, the further arrangement comprising one fixed separation;
three third items each having a third length less than the first length, the further arrangement comprising two fixed separations; or
two third items each having a third length less than the first length, the further arrangement comprising one fixed separation.

9. The storage system of any preceding claim, wherein the first length is greater than two periods of the array, wherein the first item comprises two engagement features spaced apart by twice the period of the array.

10. The storage system of any of claims 8 or 9, wherein the second length is greater than the period of the array, optionally wherein the second item comprises two engagement features spaced apart along the length direction by the period of the array, and wherein the third length is less than the period of the array, optionally wherein the third item comprises engagement features at only a single length coordinate.

11. The storage system of any preceding claim, wherein the storage area comprises an array of engagement features having an alternating periodicity along the width direction, each engagement feature configured to co-operate with a corresponding engagement feature of an item.

12. A method comprising:

providing the storage system of any preceding claim;
removing from the storage area one of the first item and the plurality of further items;
replacing the removed one of the first item and the plurality of further items by the other of the first item and the plurality of further items.

13. A storage system for storing items, the storage system comprising:

a storage area extending in a length direction;
a first set of items each having a length; and
a second set of items each having a length,

wherein the storage area is configured to interchangeably store:

the first set of items item in a first arrangement in which the lengths of the items of the first set extend along the length direction; and
the second set of items in a second arrangement in which the lengths of the items of the second set extend along the length direction,
wherein in the first and second arrangements, adjacent items are spaced apart along the length direction by a fixed separation,
wherein the sum of the lengths of the items in the first arrangement and any fixed separations therebetween is substantially equal to the sum of the lengths of the items in the second arrangement and any fixed separations therebetween,
wherein the storage area comprises a plurality of engagement features, the engagement features configured to engage co-operating engagement features provided on the rear surfaces of the items such that in the first and second arrangements a fixed clearance is provided between the items and the storage area.

14. The storage system of claim 13, wherein the total lengths of items of the first set is different from the total lengths of items of the second set.

15. A method comprising:

providing the storage system of claims 13 or 14;
removing from the storage area one of the first set of items or the second set of items;
replacing the removed one of the first and second sets of items by the other of the first and second sets of items.

Fig. 1

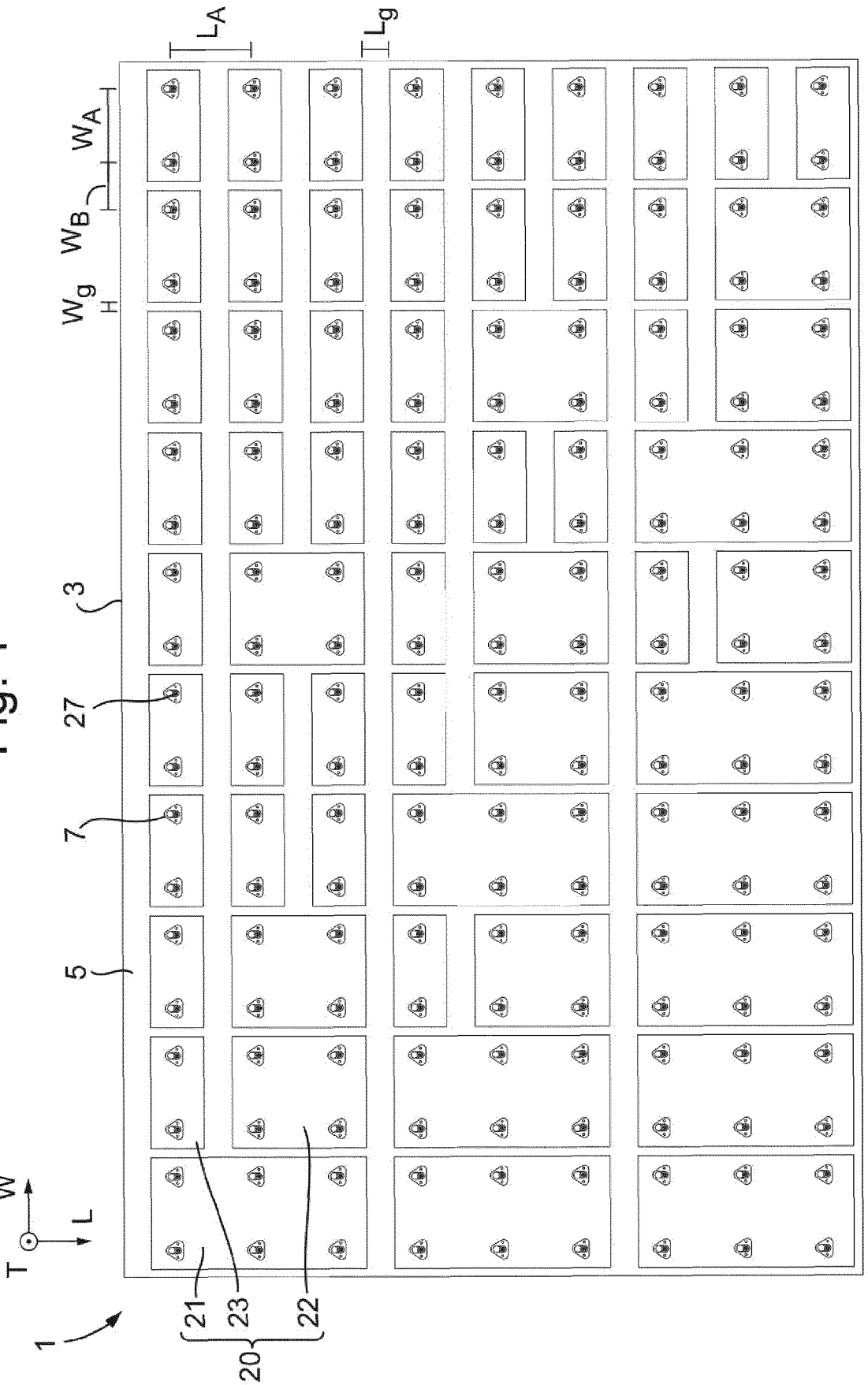


Fig. 2

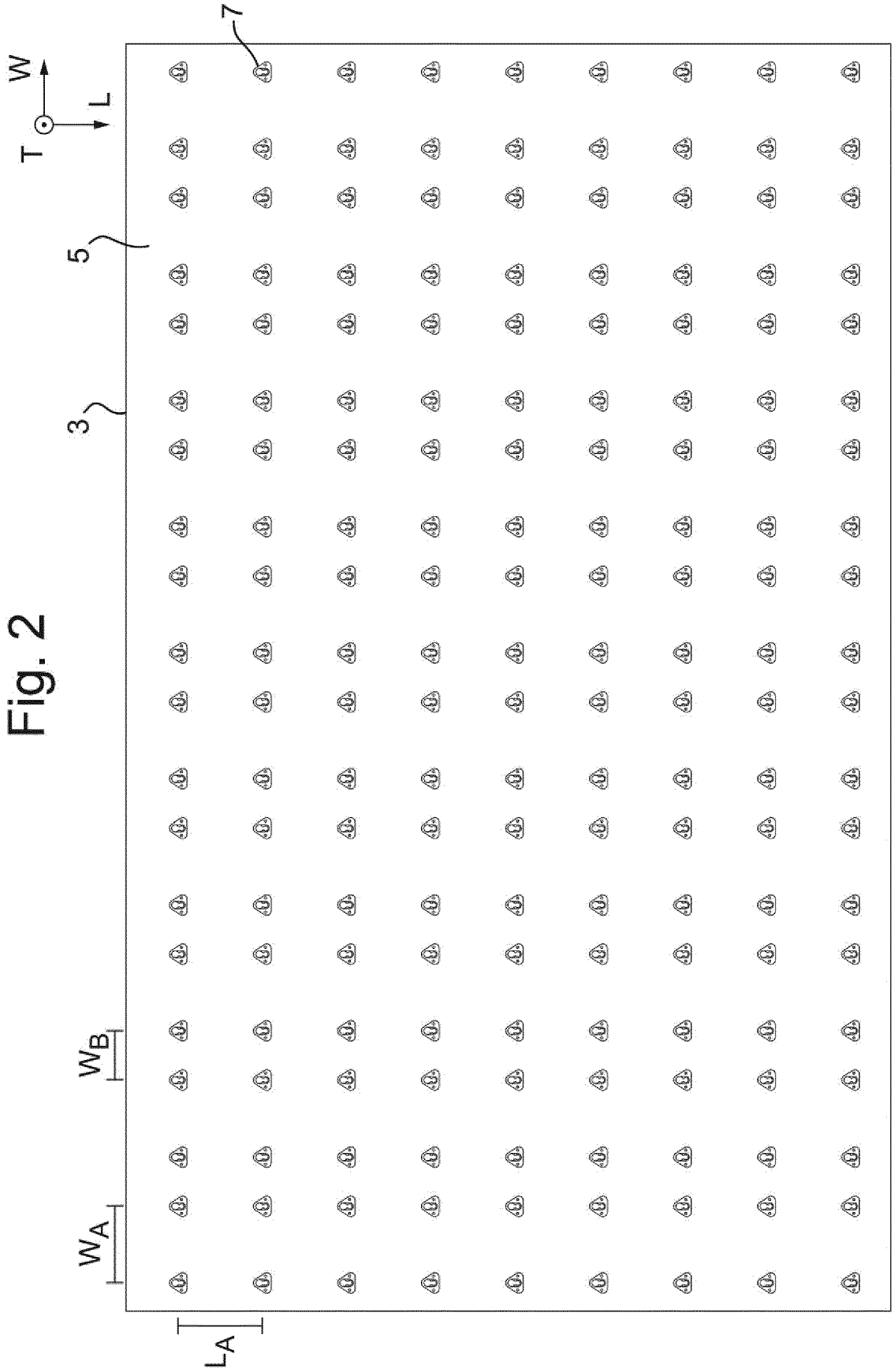


Fig. 3

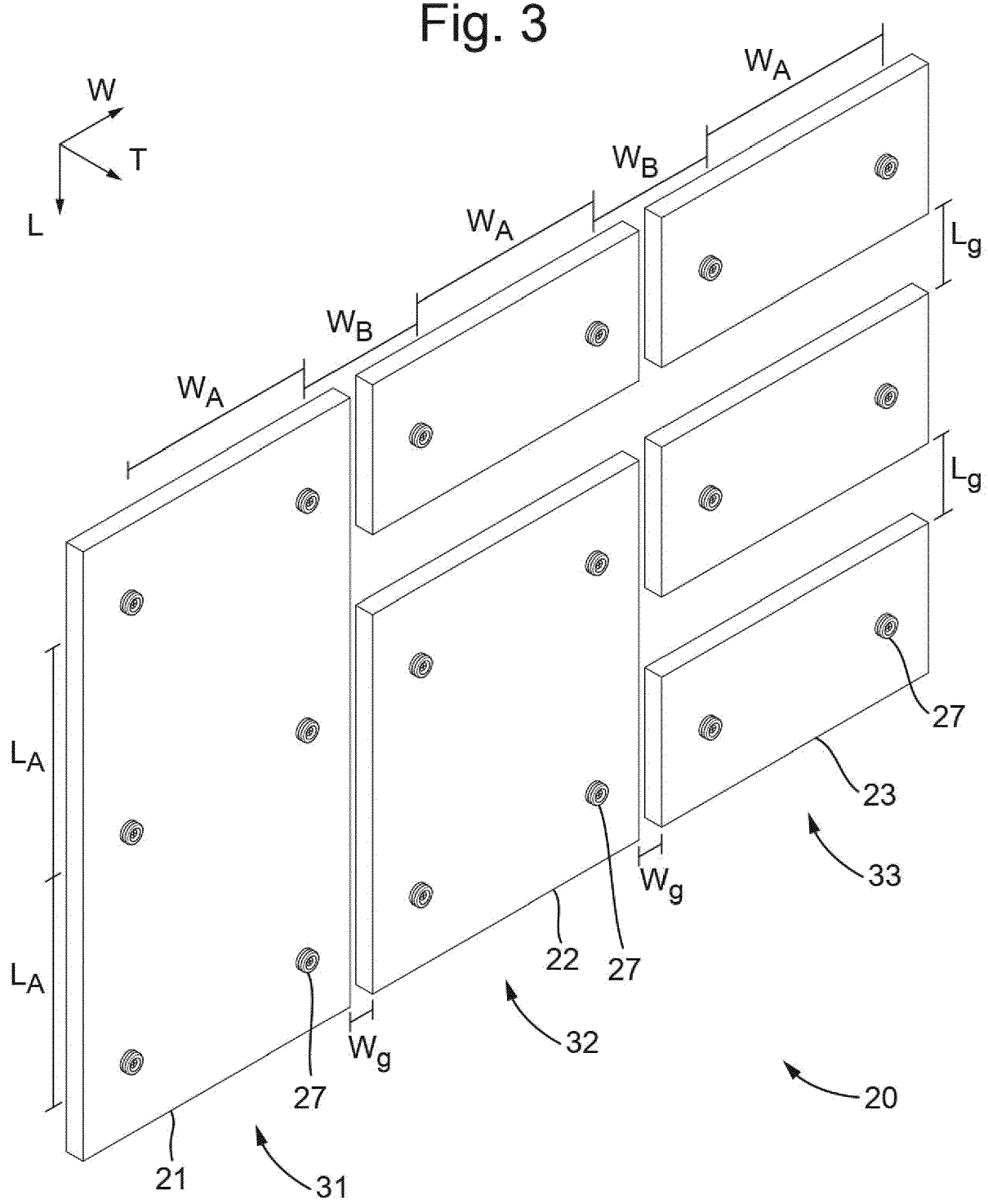
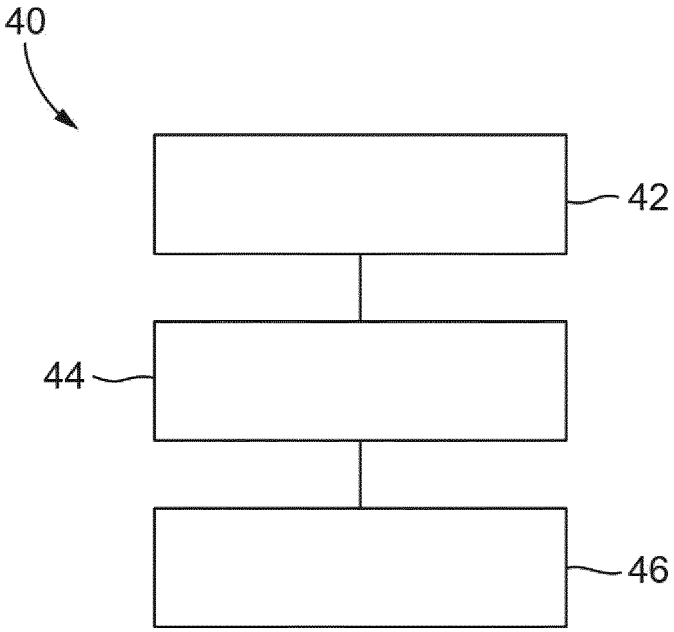


Fig. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 24 15 0878

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A47F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	17 May 2024	Jacquemin, Martin

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