INFORMATION CARRIER SELECTION SYSTEM

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References Cited

UNITED STATES PATENTS
3,073,313 1/1963 Mittag..............................................209/111.8
3,339,849 9/1967 Paulus.............................................208/80.5 X

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ABSTRACT

An apparatus for positively separating preselected information carriers from an arrangement of similar carriers, includes a frame and a container, and is adapted to be used with a plurality of selector tabs releasably suspended from the frame and releasably suspending the container. A plurality of information carriers are symmetrically supported within the container and are respectively connected in sliding frictional relation to the selector tabs. Each selector tab has an edge configuration of alternative lands and notches that is coded to identify a respectively connected carrier by removing preselected of such lands. To make a selection, appropriate selector bars on the frame are actuated to a blocking position within corresponding notches of the coded selector tabs, and the container is shifted one notch pitch. The selected carrier selector tabs, i.e., those which have lands removed adjacent the actuated selector bars, will move with the shifted container and will remain fixed thereto while releasing from the frame. However, the selector tabs of the nonselected carriers will each have at least one of their lands blocked by an actuated selector bar. The blocked selector tabs will be prevented from moving with the shifted container and will release therefrom while remaining suspended from the frame. The selected carriers whose selector tabs have been released from the frame are then positively separated from the suspended arrangement of nonselected carriers in response to movement of the container away from such arrangement.

10 Claims, 6 Drawing Figures
INFORMATION CARRIER SELECTION SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention
The present invention relates to information handling, and more particularly to a new and improved system for selectively separating individual information carriers from an arrangement of a plurality of similar carriers.

The present invention is useful in indexing and filing systems wherein it is desired for a particular information carrier to be extracted from an arrangement of similar carriers by means of an independent selection system. The present invention is particularly useful in the kind of indexing system wherein the information carriers are stored in random fashion without regard to the customary consecutive numbering or lettering which is required in usual indexing systems.

2. Description of the Prior Art
There are known systems for extracting a desired information carrier from a random arrangement of similar carriers. For instance, it has previously been suggested that each information carrier in the arrangement to be provided with metallic tabs and vertically suspended from magnetic bars that extend transversely of the arranged carriers. By deenergizing predetermined ones of the bars, certain information carriers will become detached and fall out of the arrangement. The disadvantage of this system lies in the fact that a selected information carrier which has been released from the magnetic bars may nevertheless become wedged between contiguous ones of the nonselected carriers and therefore fail to drop out of the arrangement. It takes relatively slight frictional contact between contiguous carriers to overcome the relatively slight gravitational pull on a released carrier due to the fact that the weight of a carrier is negligible. Thus, in such a system the entire arrangement of information carriers must be sufficiently agitated so that a released carrier will not be wedged in position by the friction of its nonselected neighbors. A further disadvantage of this system is that the contiguous carriers tend to develop electrostatic forces therebetween which can prevent a released carrier from dropping out of the agitated arrangement.

One recent system that attempts to overcome the shortcomings of the prior art is disclosed in U.S. Pat. No. 3,073,313. Such a system includes a plurality of information carriers that are vertically stored in a stacked arrangement, each arranged carrier being releasably suspended from a frame. Information carrier selection is achieved by means of selector bars which engage binary coded selector tabs (or notches) extending along an edge of each of the arranged carriers. Electromagnetic means are used to release selected carriers from the frame, and at the same time to partially spread apart contiguous carriers in order to minimize frictional contact therebetween. However, the system disclosed in U.S. Pat. No. 3,073,013 as in prior art systems, relies exclusively on gravity to extract each selected carrier released from the frame. And as there may be some frictional contact between selected and nonselected carriers, the former can become wedged in position so that gravity will fail to extract them from the arrangement.

Thus it can be seen that presently known systems for extracting selected information carriers from a random arrangement of similar carriers utilize gravitational forces for such extraction, some with magnetic or other means for agitating the arrangement. Means for agitating the arrangement of information carriers add to the complexity and expense of the extraction system. Moreover, even with the addition of such agitating means selected carrier extraction is not reliably effected as file agitation may be insufficient to satisfactorily abate frictional contact between all of the contiguous carriers in the arrangement or electrostatic forces may act to prevent the selected carriers from dropping out of the arrangement.

SUMMARY OF THE INVENTION
Accordingly it is an object of the present invention to provide a new and improved method and apparatus for selectively separating particular information carriers from an arrangement of a plurality of similar carriers.
Another object of the present invention is to provide a method and an apparatus for information carrier selection that positively, i.e., affirmatively, extracts selected carriers from an arrangement of similar carriers regardless of any frictional contact or electrostatic forces between contiguous ones of the arranged carriers.
Yet another object of the present invention is to provide a new and improved selector tab and information carrier.

In accordance with one embodiment of the present invention there is illustrated an apparatus for positively separating preselected information carriers from an arrangement of similar, randomly sequenced carriers. The illustrated apparatus includes a frame and a container, and is adapted to be used with a plurality of selector tabs releasably suspended from the frame and releasably suspending the container. Each selector tab can be connected in sliding frictional relation to a carrier and has an alternative land and notch configuration extending along a longitudinal edge thereof. By removing preselected of its lands, a given selector tab can be uniquely coded to identify the information on a particular carrier. Carriers in the arrangement are connected to respective ones of the coded selector tabs and are symmetrically supported within the container. The coded selector tabs respectively suspend the arranged carriers from the frame. To make a selection, appropriate selector bars on the frame are actuated to a blocking, i.e., engaging, position within corresponding notches of the coded selector tabs, and the container is shifted a given distance equal to one notch pitch. The selected carrier selector tabs, i.e., those which have lands removed adjacent the actuated selector bars, will move one notch pitch with the shifted container and will remain vertically fixed thereto while releasing from the frame. However, the selector tabs of the nonselected carriers will each have at least one of their lands blocked by an actuated selector bar. The blocked selector tabs will be prevented from moving with the shifted container and will release therefrom while remaining suspended from the frame. The selected carriers whose selector tabs have been released from the frame may then be positively, i.e., affirmatively, separated from the susnected arrangement of the nonselected carriers whose selector tabs have been released from the container, in response to movement of the container away from such arrangement.

BRIEF DESCRIPTION OF THE DRAWING

The above-mentioned and other features and objects of the present invention and the manner of attaining them will become more apparent by reference to the following detailed description of a preferred embodiment of the present invention taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a simplified perspective view of the apparatus in accordance with the present invention, showing a portion of the apparatus cut away to illustrate the operation thereof, and also showing the container already shifted to the left one notch pitch;
FIG. 2 is a cross-sectional view of the apparatus depicted in FIG. 1, through showing the container before it is shifted one notch pitch;
FIG. 3 is a front view of a selector tab;
FIG. 4 is a view of a portion of the apparatus depicted in FIG. 1 taken along the line 4--4 and showing a selector bar and the mechanism for moving the selector bar to its blocking position;
FIG. 5 is a top view of the frame, showing a portion of the mechanism depicted in FIG. 4 extending through a slot in the frame's top surface; and
FIG. 6 shows a modified embodiment of the apparatus depicted in FIG. 1.
DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings and in particular to FIG. 1, there is shown a frame 10, a plurality of selector tabs 20 releasably suspended from the frame, a container 30 releasably suspended from the selector tabs, and a plurality of similar-type information carriers C randomly filed and vertically arrayed and stacked within the container, each carrier being slidingly frictionally connected to a respective one of the selector tabs.

The frame 10 as shown in FIGS. 1 and 2, has a pair of spaced, parallel rails 14 and 15 extending along opposite edges and transversely of the entire file of arranged information carriers C and the plurality of releasably suspended selector tabs 20. Rail 14 is of rodlike configuration, and rail 15 is L-shaped with a horizontal portion 15' extending toward the file. A pair of spaced, parallel frame portions 11 and 19 have corresponding U-shaped notches 12 formed therein for seating the respective ends of selector bars B0, B1, B2 ... B9 which are described more fully hereinafter. The frame 10 is open around its sides and bottom and has a top portion 13 in which a slot 16 is formed (FIG. 8).

The term information carrier is intended to generically include information-bearing elements, such as cards, film sheets and the like having information thereon, and jackets, aperture cards and the like in which an information strip or chip such as microfilm is housed. For the purpose of illustration there is shown an arrangement of similar-type transparent, flexible information carriers C of the jacket variety. Each carrier C' has spaced, parallel pockets C'1 ... C'2 therein which open along carrier edges C'g ... C'2 and are separated by divider C'w. Pockets C'2 ... C'5 may be used to respectively house information strips (not shown), and the use of pocket C'1 will be described hereinafter.

Container 30 as shown in FIGS. 1 and 2, is of a boxlike construction and has a pair of spaced, parallel rails 36 and 37 which extend transversely of the entire vertical file of arranged information carriers C. The rails 36 and 37 are L-shaped and include respective horizontal portions 36' and 37' that extend to the right as viewed in FIG. 2. The container is closed except for an open top portion located in the plane defined by the horizontal rail portions 36' and 37', and has an interior surface 35 shaped to maintain the arranged information carriers in an aligned, i.e., symmetrical, relation.

Referring now in particular to FIGS. 2 and 3, it can be seen that each container comprises a flat plate 22, and that the plate has a pair of opposed carrier support fingers 21 and 23 which extend towards each other. The pocket C', each information carrier C' is complementarily shaped and constructed with respect to each pair of the carrier support fingers 21 and 23 for reception of the latter within its respective pocket openings along carrier edges C'1 and C'2. Because each information carrier is flexible, a pair of carrier support fingers can readily be inserted or removed from the carrier pocket C'.

Thus, it becomes apparent that each selector tab 20 and each information carrier C' can be respectively connected in sliding frictional relation, so that movement therewithin is between a linear path, the direction of which is determined by the direction of such sliding movement. In FIG. 2, it can be seen that the linear path extends in a horizontal direction as that is the direction in which the selector tab and the information carrier are oriented for movement with respect to each other.

Each selector tab 20 has a pair of frame-engaging fingers 24 and 25 located at the opposite ends of the tab's upper longitudinal axis as shown in FIG. 3. Frame-engaging fingers 24 is L-shaped and includes a horizontal portion 24' that extends to the right as does frame-engaging finger 25. The frame-engaging fingers are constructed relative to the rails 14 and 15 of the frame 10 so that each selector tab 20 can be releasably suspended from such rails in the manner shown by FIG. 2.

Each pair of L-shaped container-engaging fingers 26 and 27 that include respective horizontal portions 26' and 27' extending to the left as shown in FIG. 3. The container-engaging fingers are constructed relative to the L-shaped rails 36 and 37 of the container 30 so that the container can be releasably suspended by each of the selector tabs 20 as shown in FIG. 2.

Referring now to FIGS. 1 and 2, it can be seen that in order to release the suspended arrangement of information carriers C from the frame 10, the container 30 and each of the arranged carriers must be shifted left a given distance to be described hereinafter, in the direction indicated by the arrow 38 and in conjunction with the plurality of selector tabs 20, until each selector tab's frame-engaging fingers 24 and 25 are released from respective ones of the rails 14 and 15 of the frame. Because the arranged information carriers are symmetrically supported by the container as shown in FIG. 1, a movement of the latter in the direction indicated by the arrow 38 effects a like movement of the former. Thereafter, the shifted container of arranged information carriers and the shifted selector tabs can be withdrawn downwardly or if not supported are allowed to fall free of the frame under the force of gravity. As each selector tab 20 is respectively connected to an information carrier C', and the container's rail portions 36' and 37' remain respectively engaged with the container-engaging fingers 26 and 27 of each of the selector tabs, it can be seen that the selector tabs, in combination with the container will be vertically lowered as a unit with respect to the frame. It is to be noted that the container will only release from a selector tab if the former is moved relative to the latter at least the given distance and in the direction indicated by the arrow 38 (FIGS. 1 and 2).

To obtain the release of only selected ones of the plurality of arranged information carriers C from the frame 10, there is further provided a plurality of like projections 0, 1, 2 ... 9 that are formed by a uniform alternative land and notch configuration extending along the upper longitudinal edge of each selector tab 20 as shown in FIG. 3, one notch pitch being the straight-line distance between corresponding points on a pair of adjacent projections such as 8 and 1, and being equal to the given distance previously discussed. By removing preselected of its projections, i.e., its lands, a given selector tab can be coded to identify the information carrier to which it is slidingly connected (FIG. 2). It should be understood that the number of projections removed from each one of the coded selector tabs in the arrangement shown in FIG. 1 can be the same or may vary, and follows a known coding technique. Projections other than those illustrated would be removed as required. Thus, in FIG. 2, the selector tab 20' is shown with its projections 8 and 8 removed. It will also be appreciated that a greater or smaller number of projections may be used depending on the size of the arrangement of information carriers, and that many other code systems can be used without departing from the spirit of the invention as disclosed.

Respectively cooperative with each one of the projections 0, 1, 2 ... 9 on the selector tabs 20 there are provided a plurality of spaced, parallel, selectively movable blocking elements or selector bars B0, B1, B2 ... B9. The selector bars, as shown in FIG. 1, have their respective ends seated in the U-shaped notches 12 and extend transversely across each of the coded selector tabs that are releasably suspended from the frame 10. Springs 31 and 39 described hereinafter normally maintain the selector bars in an upper position spaced from the projections as is illustrated by the raised bars B0-B4, B6-B7 and B9, shown in FIG. 2. However, the selector bars are adapted to be selectively actuated to a lower position in blocking, i.e., engaging, relation with the selector tab projections, as is illustrated by the lowered bars B5 and B8 blocking projections 5 and 8 respectively (FIG. 2). Each one of the selector bars can be moved to its lower position by an individual cam mechanism 40 respectively associated therewith and more fully described below.

As is apparent from FIGS. 1 and 2, when a particular selector bar is moved from its upper to its lower position it will block a suspended selector tab from movement to the left, i.e., in the direction indicated by the arrow 38, unless the selector tab is missing its projection to the immediate right of the
lowered selector bar. Those selector tabs free to move left the given distance, i.e., one notch pitch, in conjunction with the container will release from the fixed frame as described above. Those selector tabs blocked from movement to the left one notch pitch will remain suspended from the frame while releasing from the shifted container (FIG. 1). It is to be noted that the friction between slidingly connected ones of the selector tabs and the arranged information carriers should be greater than the friction between contiguous selector tabs in the arrangement. Also, as is obvious from the above description, respectively connected ones of the selector tabs and the information carriers must be able to slide relative to each other for the given distance, i.e., one notch pitch.

Referring now in particular to FIG. 4, it can be seen that each cam mechanism 40 located within the fixed frame 10 includes an associated pair of cam members 42 and 44 pivotally mounted about parallel extending rods 43 and 45 respectively. It should be understood that the cross-sectional area of each rod is located off-center of the curve formed by the edge of a respective one of the cam members. Link 46 interconnects the associated pair of cam members 42 and 44 by pivotally coupling thereto at joint 47 and 48 respectively. Cam member 42 includes a handle 41 extending through the slot 16 in the top 13 of the frame 10. As shown in FIG. 4, the cam handle is pivotable about rod 43 between positions A and B, positions A and B being ones wherein the cam handle abuts slot edges 17 and 18 respectively, thereby defining the range of travel of such handle. Thus, it becomes apparent that when the cam handle 41 is moved in the direction indicated by the arrow 49 from position A to position B, cam members 42 and 44 will pivot clockwise, and the selector bar respectively associated therewith will correspondingly be moved from its upper position shown in full lines in FIG. 4 to its lower position shown in broken lines in FIG. 4.

As can be seen from FIGS. 1, 2 and 4, rod 43 has rotatably mounted thereon a series of parallel-spaced cam members each indicated by the reference numeral 42 (and not all shown). Rod 45 has rotatably mounted thereon a series of parallel-spaced cam members each indicated by the reference numeral 44 (FIG. 2). Thus, it becomes apparent that each one of the selector bars B0, B1, B2, B3 is respectively associated with a cam mechanism 40.

Referring now to FIGS. 1 and 4, it can be seen that each pair of springs 31 and 39 respectively interconnect the frame portion 11 and 19 with the respective ends of a selector bar, and urge that selector bar to its upper position spaced from the projections of the coded selector tabs. Thus, when the cam handle 41 of a particular cam mechanism 40 is moved from position A to position B as described above, an associated pair of springs will be extended as shown by the appropriate broken lines in FIG. 4. When the same cam handle is thereafter returned to position A, the associated pair of springs will contract as shown by the appropriate full lines in FIG. 4 to retract the associated selector bar to its upper position.

To make a selection, predetermined selector bars on the frame are actuated to their lower blocking positions within the corresponding notches of uniquely coded selector tabs that are releasably suspended from the frame and slidably connected to respective ones of the arranged information carriers. The container of arranged carriers is then shifted left one notch pitch. By virtue of the frictional connection between respective ones of the selector tabs and the carriers, the selector tabs of the selected carriers, i.e., those which have projections removed adjacent the actuated selector bars, will move left one notch pitch in conjunction with the shifted container. Those selector tabs displaced to the left one notch pitch remain vertically fixed to the shifted container and are released from the frame as described above. However, the selected carriers of the selected carriers each have at least one of their projections, i.e., lands, engaged by those selector bars actuated to the lower blocking position, so that the blocked, i.e., engaged, selector tabs are prevented from moving left with the shifted container. Both selected and nonselected ones of the arranged carriers are moved one notch pitch with the shifted container. Thus, it becomes apparent that the blocked selector tabs will release from the shifted container as described above, while remaining suspended from the frame and respectively connected to the nonselected carriers. The selected carriers whose selector tabs have been released from the frame are then positively, i.e., affirmatively, extracted from the suspended arrangement of nonselected carriers in response to lowering of the container away from such arrangement. It is to be noted that the weight of the container is sufficient to overcome any friction between contiguous ones of the selected and nonselected carriers. Thereafter, the lowered container of selected carriers may be transported out of the frame by a suitable conveyor system (not shown).

Referring now in particular to FIG. 6, there is shown a modification of the embodiment illustrated in FIG. 1. Instead of manually shifting the container 30 of arranged information carriers C one notch pitch in the direction indicated by the arrow 38 (FIG. 1), actuation means 50, such as the solenoid shown in FIG. 6, is used to automatically shift the container. Also, the modification shown in FIG. 6 includes an assembly 60 for automatically withdrawing the shifted container downwardly away from the suspended arrangement of nonselected carriers. The assembly comprises four container arms 61 (not all shown), four rollers 62 (not all shown) respectively located on the free end of each of the container arms, spring return frame walls 63 and 64 each having a pair of L-shaped roller guide slots 65 formed therein, and four tension springs 66 (not all shown) respectively interconnecting the rollers and the frame walls. Rollers 62 each have a peripheral groove 67 (not all shown) formed therein to facilitate roller movement in the respective guide slots. As is apparent from FIG. 6, when the container is shifted one notch pitch in the direction indicated by the arrow 38 upon actuation of the means 50, rollers 62 will each move from a horizontal portion of the respective guide slots to a vertical portion thereof, so that the tension springs can then draw the container downward. A suitable conveyor system (not shown) may be used to move the vertically lowered container away from the frame 10.

It can now be appreciated that the present invention provides an improved information carrier selection system that includes simple means which can be used to positively, i.e., affirmatively, extract selected information carriers from an arrangement of similar carriers, regardless of any frictional contact between contiguous carriers in the arrangement.

It should be understood that the container can be supported in orientations other than as illustrated. For example, rather than suspending the container 30 from the frame 10 as shown in FIGS. 1, 2 and 6, it can instead be supported for horizontal movement by means (not shown) located on the frame, and merely be engagable with (as opposed to suspending from) each selector tab. In such a case, means (not shown) would be provided for horizontally extracting the selected carriers from the arrangement of nonselected carriers.

It should also be understood that the plurality of selector tabs are not intended to be exclusively a part of the apparatus, and that each selector tab can be slidingly connected to an information carrier in a permanent manner so as to form a single unit, rather than the separable selector tab and information carrier fully described above.

The present invention has been described in detail with particular reference to a preferred embodiment thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

I claim:

1. For use with an arrangement of a plurality of similar elements, each element comprising a selector tab and an information carrier connected so as to provide relative movement therebetween also of a linear path and each selector tab having first, second and third engageable portions, apparatus for positively separating preselected of such elements from such an arrangement, said apparatus comprising:
a. first means for movably supporting an arrangement of such elements by engaging the first engageable portions of the selector tabs in a manner such that the elements are aligned with their predetermined linear paths parallel to a first direction and are each movable in said first direction;
b. second means for selectively engaging the second engageable portion of at least one of the selector tabs in an arrangement of such elements movably supported by said first means, and for preventing movement of a selector tab in said first direction when so engaged; and
c. third means, movable with the information carriers of the supported arrangement in said first direction, for engaging the third engageable portions of the selector tabs in such arrangement, and for positively extracting from the supported arrangement, in response to movement of said third means in a first direction, those elements which are not engaged by said second means.

2. Apparatus as recited in claim 1, further comprising means for moving said third means with the information carriers of the supported arrangement in said first direction.

3. For use with an arrangement of a plurality of similar elements, each element comprising a selector tab and an information carrier connected so as to provide relative movement therebetween along a predetermined linear path for at least a predetermined distance and each selector tab having:
a. a first portion engageable to prevent movement of such selector tab in a first direction intersecting the predetermined linear path and releasable from such engagement upon movement of the selector tab for the predetermined distance in a second direction parallel to the predetermined linear path;
b. a second, select tab identifying, portion uniquely located on such selector tab and engageable to prevent movement of the selector tab in the second direction; and
c. a third portion engageable to prevent movement of such selector tab in a direction opposite the first direction and releasable from such engagement upon movement of the selector tab for the predetermined distance in a direction opposite the second direction,

apparatus for positively separating preselected of such elements from such an arrangement, said apparatus comprising:
1. a frame;
2. first means, located on said frame, for movably supporting an arrangement of such elements by engaging the first portions of their selector tabs in a manner such that the elements are aligned with their predetermined linear paths parallel and are each movable relative to said frame in the second direction for the predetermined distance;
3. second means, located on said frame, for selectively engaging the second portion of at least one of the selector tabs in an arrangement of such elements movably supported by said first means, and for preventing movement of a selector tab relative to said frame in the second direction when so engaged; and
4. third means, movable with the information carriers of the supported arrangement, for engaging the third portions of the selector tabs in such arrangement, and for positively extracting from the supported arrangement upon movement of said third means relative to said frame in the first direction, those selector tabs engaged thereby which are not engaged by said first means.

4. Apparatus as recited in claim 3, wherein said first means is constructed to release the first portion of a selector tab engaged thereby upon movement of the selector tab relative to said frame in the second direction for the predetermined distance while retaining selector tabs in the supported arrangement which are prevented from such movement by said second means.

5. Apparatus as recited in claim 4, wherein said third means is constructed to release from engagement with the third portion of a selector tab in the supported arrangement upon movement of said third means relative to the selector tab in the second direction for the predetermined distance.

6. Apparatus as recited in claim 3, wherein said second means includes a plurality of selector tabs independently actutable to a position for engaging the second portion of at least one of the selector tabs in the supported arrangement and means for independently actuating each of said selector tabs to their engaging position.

7. Apparatus as recited in claim 3, wherein said third means includes a container constructed to symmetrically support information carriers within its interior when the third portions of their respective selector tabs are engaged by said third means.

8. Apparatus as recited in claim 3, wherein said third means includes a container having an interior constructed to maintain information carriers of the supported arrangement aligned with their predetermined linear paths parallel to the second direction when the third portions of their selector tabs are engaged by said third means, and said container has means defining an opening constructed for withdrawal of information carriers from said interior in the direction opposite the first direction when said third means is released from the third portions of the selector tabs in the supported arrangement and said third means is moved relative to said frame in the first direction.

9. Apparatus as recited in claim 3, further comprising means for moving said third means with the information carriers of the supported arrangement relative to said frame in the second direction for the predetermined distance when said third means engages the third portions of the selector tabs in such arrangement.

10. Apparatus as recited in claim 3, further comprising means for sequentially moving said third means with the information carriers of the supported arrangement relative to said frame in the second direction for the predetermined distance when said third means engages the third portions of the selector tabs in such arrangement; and thereafter moving said third means relative to said frame in the first direction. 
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