Dec. 1, 1953 F. F. C. RIPPON 2,661,259

CONTAINER FOR MOVABLY STORING ARTICLES

Filed Sept. 8, 1948 2 Sheets-Sheet 1

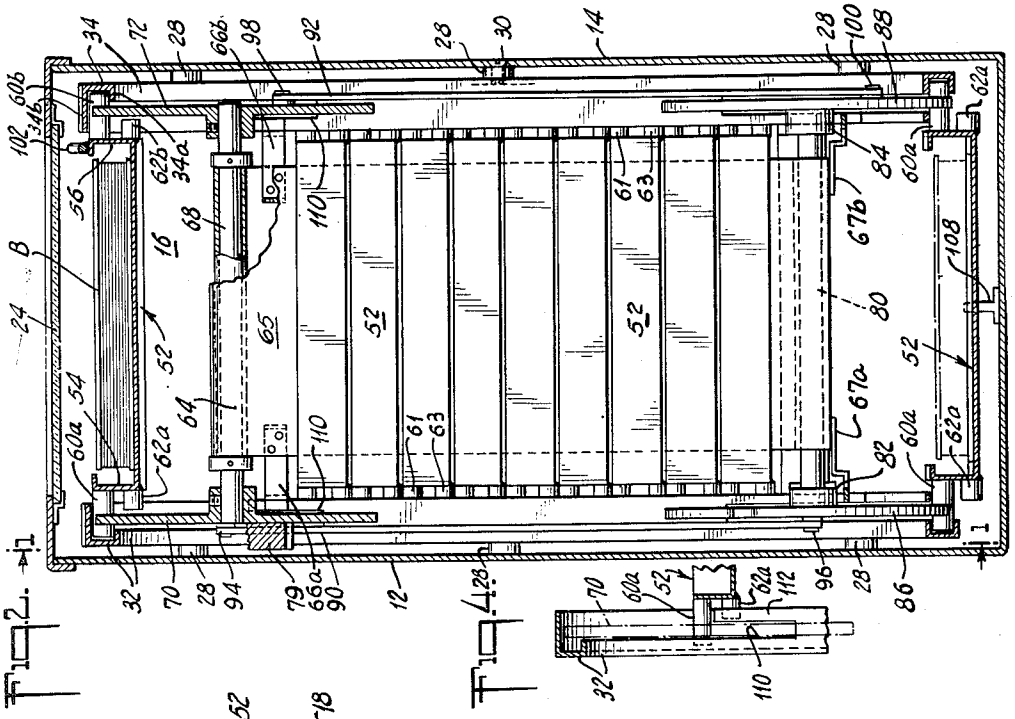


FIG. 2.

FIG. 4.

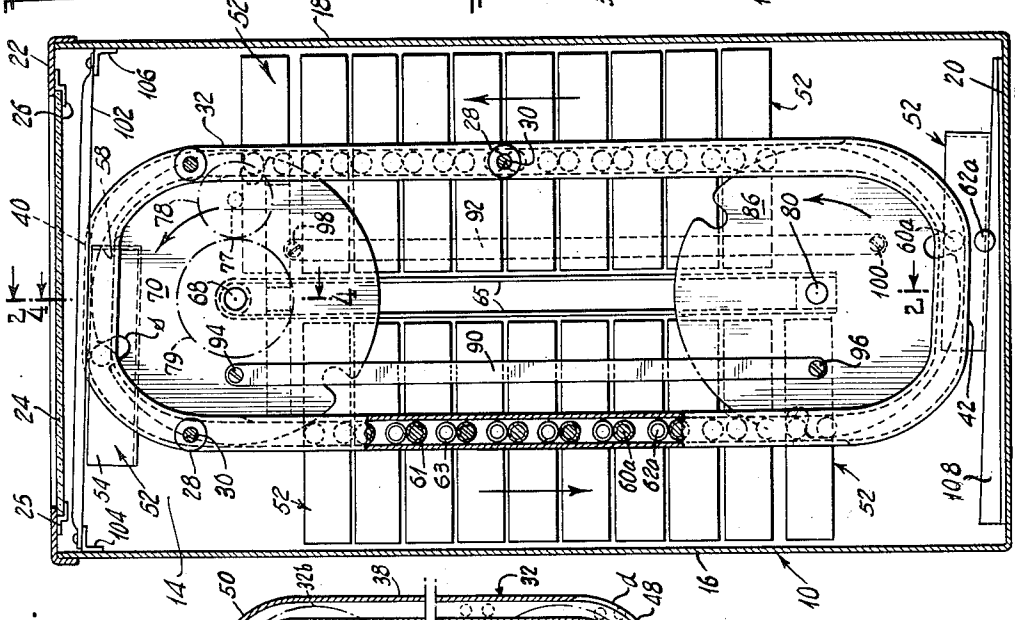


FIG. 1.

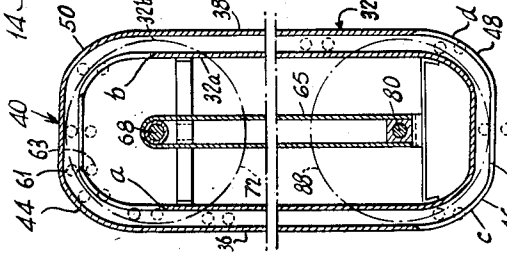


FIG. 3.

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Fig. 5.

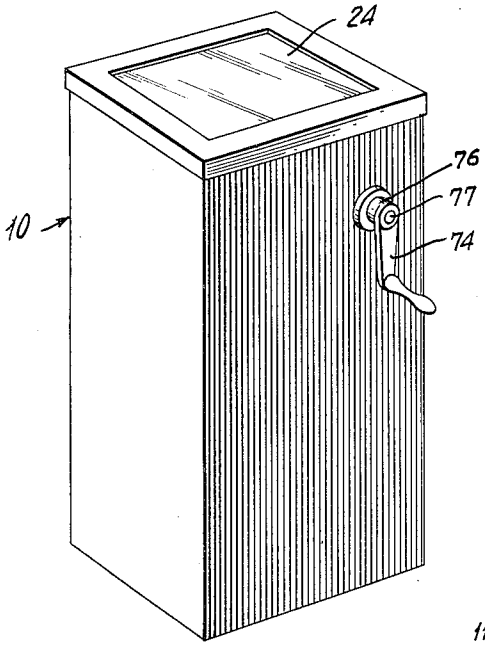


Fig. 7.

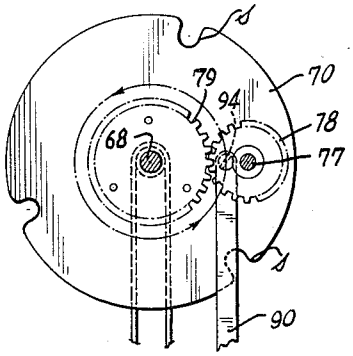


Fig. 8.

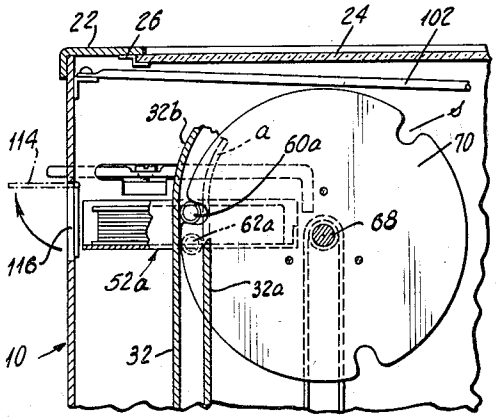


Fig. 6.

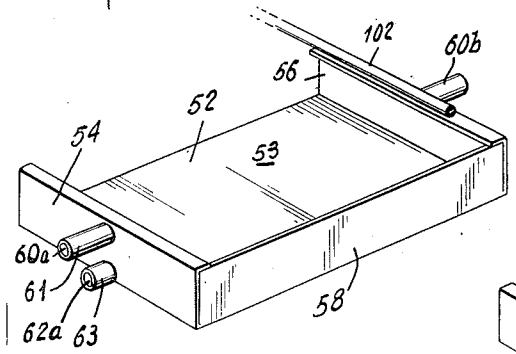
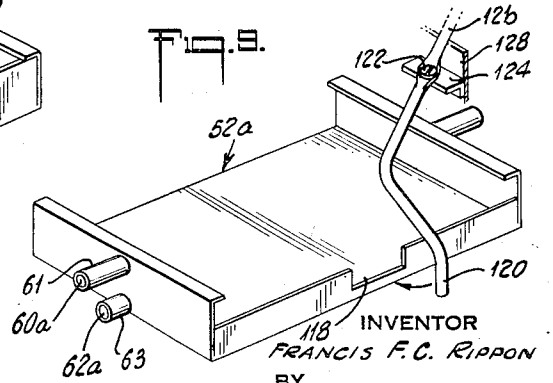


Fig. 9.



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CONTAINER FOR MOVABLY STORING ARTICLES

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6 Claims. (Cl. 312—267)

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This invention relates to a device wherein articles of a wide variety may be stored in movable containers and brought to a predetermined position. The device preferably comprises a closed cabinet having a number of object supporting trays and a sight glass in a portion thereof through which the contents of each tray may be seen when brought to a predetermined position within the cabinet and in this form may be usefully employed to successively display a number of objects. If desired the device may be accompanied by a vending mechanism whereby a selected object may be discharged from the housing when the proper coin has been deposited in the vending mechanism, but obviously the device may be employed without such vending mechanism or the sight glass. For example the device may be provided with a removable top which may be removed to give access to the contents of a tray brought into position beneath the top of the cabinet.

In another form the device may be equipped with selector mechanism and employed as a device for storing and selecting records and the like.

An object of the invention is to provide a device of the above mentioned kind in which a number of objects may be stored and supported in such a way that they may be successively brought to an inspection point.

Another object of the invention is to provide a simple, practical device of the above mentioned kind.

Another object of the invention is to provide a device of the above mentioned kind in which the number of moving parts is reduced to a minimum.

Another object of the invention is to provide such a device with means whereby a desired object may be manually ejected from the cabinet.

Another object is to provide such a device wherein the moving parts are counterbalanced.

Other objects of the invention will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, arrangements of parts, and in the several steps and relation and order of each of said steps to one or more of the others thereof, all as will be pointed out in the following description, and the scope of the application of which will be indicated in the following claims.

The invention will best be understood if the following description is read in connection with the drawings, in which,

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Figure 1 is a side elevational view partly in cross section taken on the line 1—1 of Figure 2;

Figure 2 is a vertical cross section taken on the line 2—2 of Figure 1;

Figure 3 is a diagrammatic view in cross section of the track arrangement broken away at the center;

Figure 4 is a detail cross sectional view taken on the line 4—4 of Figure 1;

Figure 5 is a perspective view of one modification of the device;

Figure 6 is a perspective view of a tray unit;

Figure 7 is a detail view of the drive assembly;

Figure 8 is a fragmental view similar to a portion of Figure 1 modified by the addition of dispensing means; and

Figure 9 is a perspective view of a modified form of the tray used with the dispensing means indicated in Figure 8.

In the embodiment of the invention shown herein the device comprises a casing indicated generally by the numeral 10 and including the side frame members 12 and 14, the end frame members 16 and 18, the bottom frame member 20, and the top frame member 22 which is desirably hinged or removable and may include a transparent portion which is shown herein as comprised by a sight glass 24 supported on bracket members 25 and 26. Supported from the side walls 12 and 14, as by the spacing members 28 and the screws 30, are the guideways or tracks 32 and 34 respectively. Guideways 32 and 34 are substantially U-shaped in cross section providing an endless guideway for a series of trays as will be described. Each guideway defines roughly a rectangle having relatively long side portions 36 and 38 extending vertically and having at the top and bottom shorter horizontally extending portions 40 and 42 joined to the vertical portions by curved portions 44, 46 and 48, 50, as illustrated in Figure 3. The tracks 32 and 34 are mounted in aligned opposed position on the inside of the side frame members respectively.

Within the closure provided by the frame members a number of trays 52 are provided. These may take any form and may have a flange around the entire periphery or may be of the kind shown in Figure 2 comprising a bottom 53, the sides 54 and 56 and the back 58. Projecting from the side walls 54 and 56 respectively are stud means 60^a, 62^a and 60^b, 62^b, which desirably may include rotatable anti-friction sleeves 61, 63 as shown in Figure 6. The studs 60^a and 60^b are longer than the studs 62^a and 62^b respectively and are continuously engaged in the slide-

ways 32 and 34. Studs 62a and 62b are engaged in the portions of the slideways having side flanges not reduced in height. The side flanges are reduced in height adjacent the top and bottom permitting the studs 62a and 62b to move out of the slideways during a portion of their travel as will be explained.

As shown herein the size and shape of the trays is related to the size of the cabinet and to the position of a partition member 65 so that the open side of the trays 52 is adjacent a side wall of the cabinet or the partition during upward and downward movement, said side walls and the partition thus cooperating with the trays to prevent accidental discharge of the contents of the trays.

The trays may be prevented from tipping while passing across the top and bottom of the cabinet by means which will be described.

Mounted for rotation in the bearing 64, provided in the central partition member 65, which is supported adjacent the top from the inside flanges of the guideways 32 and 34 respectively (Figure 2) on angle brackets 66a and 66b and adjacent the bottom on similar angle brackets 67a and 67b, is the shaft 68 on which are mounted two circular disk members 70 and 72, fixed on shaft 68 in any suitable manner for rotation therewith. The disk members 70 and 72 rotate in planes at right angles to the studs 60a and 60b and each of the members 70 and 72 has a plurality, preferably three, reentrant slots *s* extending inward radially from the periphery of the disk. As the members 70 and 72 rotate the slots *s* therein register with and engage the studs 60a and 60b respectively of a tray which has been elevated to a given position. The brackets 66a, 66b and 67a, 67b are disposed outside or beyond the respective sides of the trays 52 and on the inside of disk members 70 and 72.

Shaft 68 may be rotated by a handle 74 having at one end a hub 76 fitting over and fixed on one end of shaft 77 which has thereon small gear 78 which meshes with larger gear 79 fixed on shaft 68. Spaced below shaft 68 and in vertical alignment therewith is the shaft 80 mounted for rotation in bearing 81, which like bearing 64 may be provided in the central frame member 65. Shaft 80, has mounted thereon the circular disk members 86 and 88, similar to the disk members 70 and 72 and having reentrant slots also identified by the letter *s*, similar in number to the number of slots *s* in the disks 70 and 72 respectively.

Disk 70 on shaft 68 and disk 86 on shaft 80 are interconnected by rod 90, and similarly disk 72 on shaft 68 and disk 86 on shaft 80 are interconnected by rod 92. Rod 90 is connected to disk 70 by pivotal connection 94 and to disk 86 by pivotal connection 96. Similarly rod 92 is connected to the disks 72 and 88 by the pivotal connections 98 and 100 respectively. It will be noted that pivots 94 and 98 are not disposed in alignment on opposite sides of shaft 68 and that the same is true with respect to the positions of pivotal connections 96 and 100 relative to shaft 80, the intention being to prevent the corresponding pivotal connections of the two connecting rods from coming to rest on "dead center" thus making it more difficult to actuate the device particularly when it is powered by hand operation.

When shaft 68 is rotated, as for example by means of handle 74, disks 70 and 72 thereon will

be rotated and through connecting rods 90 and 92 the circular disks 86 and 88 on shaft 80 will be simultaneously and synchronously rotated. As the disks 70—72 revolve the slots *s* extending inwardly from the periphery of the disks will successively engage the longer tray studs, 60a and 60b, of the tray at the top of the ascending column of trays. Similarly as the disks 86—88 revolve their slots *s* will engage the longer tray studs 60a and 60b of the tray at the bottom of the descending column of trays. Since the pairs of disks 70—72, and 86—88 are mounted so that the slots in the disks of each pair are horizontally aligned, disks 70—72 will simultaneously engage the studs 60a and 60b respectively of the tray which is at the top of the right hand column of trays shown in Figure 6 and lift it across the top of the machine and deposit it on the top of the left hand or descending column of trays shown in Figure 6, and exert a downward force on the whole descending column of trays. Similarly disks 86 and 88, by means of their aligned slots *s*, engage the studs 60a and 60b respectively of the lowermost tray of the left hand column of trays shown in Figure 6 and carry the tray around the bottom of the closure and lift it up into contact with the right hand or ascending column of trays shown in Figure 6, and raise the column of trays before disengaging said lowermost tray, thereby bringing the uppermost tray into position where it is engaged by the slots of the members 70 and 72 and carried over the top as has been described. Since the studs 60a and 60b extend into the guideways 32 and 34 they will be held against lateral movement with respect to the guideways and will be moved about an endless path and transferred successively from the ascending column of trays shown in the right hand column in Figure 1 to the descending column of trays shown in the left hand column of trays in Figure 1.

When the studs 60a and 60b of the lowermost tray in the right hand column of trays are disengaged from the corresponding slots *s* of disks 86 and 88 they will ride on the periphery of the disk members respectively and are thus held between the periphery of the disk and the side walls of the guideways respectively and prevented from falling within the closure until the next tray has been lifted up into contact with it, after which said next tray will support the column of trays, first through the engagement of its studs 60a and 60b in slots *s* of disks 86 and 88, and then by the engagement of said studs on the periphery of the disks respectively, which support in combination with the slideway prevents the tray from falling as has been described.

Referring now particularly to Figure 3 wherein a front elevation of track or guideway 32 is shown it will be seen that the inner flange 32a of the guideway is cut down, or made of reduced elevation around the top, from *a* to *b*. As the trays move around the upper portion of the guideways the longer studs 60a and 60b, which penetrate further into the guideways respectively than the studs 62a and 62b respectively, ride on the upper surface of the inside side members 32a while the shorter members 62a and 62b respectively pass out of the guideways beyond *b* and thus remain aligned vertically with the studs 60a and 60b and reenter the guideways before reaching point *a*.

To keep the trays from tipping while they are moving over the top of the closure from one column of trays to the other, tilt-limiting mem-

ber 102 is provided extending between the end walls 16 and 18. As shown in Figure 1 member 102 is supported on brackets 104 and 106 secured on the end walls, bracket 104 being positioned slightly higher than bracket 106 so that member 102 is inclined in the direction in which the trays are travelling sufficiently to limit the tilting of the trays as may be required. It will be seen that as a tray member 52 moves across the top of the device it is in close proximity to member 102 and any substantial tilting of the tray is limited by contact with member 102.

The outer guideway 32^b is reduced in height throughout its lower interconnecting portion 42 and the adjoining curved portions 46 and 48, thereby permitting the shorter stud members 62^a and 62^b to move out of the guideways and stay in alignment vertically with the longer stud members 60^a and 60^b, which, because of their greater length, continue in the guideways and contact and ride on the upper surface of flange 32^b. The tray members 52 are thus able to maintain their horizontal position while travelling around the lower end of the track, and any tilting of a tray is limited by the inclined cross bar 108 which rests on the base member 20 and is inclined in the direction of travel of the trays.

The inner side 32^a of guideways 32 and 34 may be provided for a distance, around the upper and lower curved ends of said guideways, with a slot 110 to accommodate the upper circular disks 70 and 72 and lower circular disks 86 and 88 respectively. Studs 60^a and 60^b being supported in the slots *s* of said circular disk members 70 and 72 it is necessary for the periphery of said disk members to extend through the inside wall of the guideway in order to bring the extensions 60^a and 62^a into said guideways respectively. When the projections 60^a and 60^b extend into said guideways the projections 62^a and 62^b will travel under but in close proximity to the outer, uncutaway portions of the side member 32^a of the guideway as is illustrated in Figure 4 where the projection 62^a is shown travelling under the tongue-like extension 112 of the side 32^a of the guideway.

In the embodiment of the invention shown in Figures 1–3 it will be noticed that the guideways 32 and 34 are flattened at top and bottom, in the portions identified as 40 and 42 in Figure 3. This has the effect of causing the shorter studs 62^a and 62^b to move laterally out of the guideways at *b* faster and later than they would if the guideways were not flattened, with the result that less of flanges 32^a and 34^a need to be cut down, and by limiting lateral movement of studs 62^a and 62^b respectively they serve to restrain the trays from tilting. The trays are therefore closer to the tilt-limiting bar 102 before movement of the studs 62^a and 62^b out of the guideways with the result that the degree to which the trays may tilt while studs 62^a and 62^b are out of their guideways is reduced. If it is desired to still further limit the degree to which the tray may tilt when the studs 62^a and 62^b are freed from the restraint imposed by the sides of the guideway by passing out of the guideway beyond point *b* the ends of the guideways may be further flattened thereby bringing the points *a* and *b* closer to the tilt-limiting bar 102.

In Figures 8 and 9 a modified structure is shown for discharging and dispensing the contents of the trays. An infinite variety of articles may be stored within the device shown herein and carried around on the trays 52 as shown herein.

In the embodiments of the invention shown herein the tray-like members are employed to support books B for display. As shown in Figure 8 in the front wall of closure 10 a flap 114 may be provided adapted to swing outwardly with respect to the closure thus opening a port 116. In Figure 9 a modified form of tray is shown having a cutout 118 in its back panel 58 to accommodate the movement of an elongated finger 120 which may be pivotally mounted by pivot 122 to a portion of the frame indicated as 124 and having a handle portion 126 extending out through the side wall 128 of the housing. According to this modification of the invention when a tray 52^a is aligned horizontally with the flap 114 the object supported in said tray may be ejected from the housing through port 116 by finger 120 by swinging the handle 126.

An advantage of the structure shown herein is found in the fact that the weight of the ascending column of trays is counterbalanced by the weight of the descending column of trays, and the force required in raising one column of trays is counter-balanced by the weight of the descending column of trays and the force exerted thereon in transferring a tray onto the top of the descending column from the ascending column. The slots *s* in the disks 70 and 72 are so arranged that as one tray is lifted up to the bottom of the ascending column of trays another tray is being deposited on the top of the descending column of trays. Thus the force actuating the descending column of trays comprises both the weight of the trays and the force with which the upper tray of the descending column is urged downward by the rotation of disk 70 and this combined force substantially counterbalances the force required to transfer a tray from the bottom of the descending column to the bottom of the ascending column of trays and then to lift it together with the trays above it to the position in which the top tray of the ascending column is engaged in a slot of disk 70.

It will thus be seen that there has been provided by this invention apparatus in which the various objects hereinabove set forth together with many thoroughly practical advantages are successfully achieved. As various possible embodiments might be made of the mechanical features of the above invention and as the art herein described might be varied in various parts, all without departing from the scope of the invention, it is to be understood that all matter hereinbefore set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

What I claim is:

1. A storage and display cabinet comprising a closure, a pair of cross rods disposed in vertical alignment within said closure, means for rotatably mounting said rods adjacent the upper and lower ends of the closure respectively, a number of trays within said closure each having projection means extending outwardly from opposite ends thereof, and disk members mounted on said cross rods respectively and having notches extending inwardly from their peripheries respectively at equal distances, whereby, when the trays are disposed within said closure one on another in two columns, one of which is descending and the other ascending, one of said columns will be supported by the engagement of the projections of the lowermost of its trays in one of the horizontally aligned pairs of notches of said lower pair of disks, and the other of said column of

trays will be supported by the engagement of the projections of its lowermost tray in another of the horizontally aligned pairs of notches on said lower pair of disks, and, simultaneously with the transfer of the lowermost tray from the descending column of trays to the bottom of the ascending column of trays the uppermost tray of the said ascending column will be transferred to the top of the descending column of trays by engagement of its projection means respectively in the horizontally aligned notches of said upper pair of disks, while the remaining trays of each of said columns remain stationary.

2. A device of the kind described comprising a closure having therein in combination, a pair of endless guideways mounted in opposition in spaced relation within the closure, a pair of cross rods mounted for rotation within said closure, a pair of disks mounted on each of said cross rods, spaced apart and disposed adjacent to said guideways respectively, each of said disks being notched at intervals around its periphery, and a number of trays each having projecting from its ends respectively members receivable in said guideways and in the notches of said disks, said trays being disposed one resting directly upon another within said closure, in an ascending column and a descending column whereby, when said disks are rotated, the top tray of the ascending column and the bottom tray of the descending column are transferred successively from one column to the other by engagement of their said projecting members in the said notches while being guided by travel of said members within said guideways respectively, while all of the other trays comprising said columns remain stationary.

3. The device claimed in claim 2 wherein said closure is divided by vertical partition means extending part way from top to bottom of said closure, and said track means extend around said partition, the said disks being of a size relative to said guideways such that the notches in said disks are aligned horizontally with said guideways respectively during a portion of each rotation of said disks.

4. The device claimed in claim 2 wherein each of said guideways comprises two straight and substantially parallel portions joined together at their respective ends by curved portions, the notches of the upper disks being disposed to engage with the projecting members of the uppermost tray of the ascending column of trays, and the notches of the lower of said disks being disposed to engage successively the projecting members of the lowermost tray of said descending column of trays, and by simultaneous engagement of the said projecting members of said trays in said guideways and said notches to carry said trays successively around the guideways from one column to another, the movement of said uppermost and lowermost trays from one column to another and the movement of the whole columns of trays being in successive steps.

5. A device of the kind described comprising a closure, a number of trays within said closure disposed in two columns side by side with the trays of each column resting on one another except while being transferred from one column to another, each of said trays having end projection members, endless guideways at the opposite ends of said closure into which said projection members respectively extend, a pair of disks rotatably mounted within said closure adjacent its top and adjacent said guideways respectively, said disks having notches around their peripheries disposed to be aligned with a portion of said guideways during part of each rotation of said disks, and a pair of disks rotatably mounted adjacent the bottom of said closure and adjacent to the said guideways respectively, said disks having notches around their peripheries disposed to be aligned with a portion of the said guideways during part of each rotation of said disks, and spaced apart a distance to permit a tray from each column to be separated from the columns respectively and transferred to the other column while the remainder of the trays remain stationary.

6. A storage and display cabinet comprising a closure, a pair of cross rods mounted for rotation within said closure and disposed in vertical alignment one above the other, a pair of disks fixedly mounted on each of said cross rods, slots extending inward from the periphery of said disks respectively, each of said disks being equal in diameter and having the same number of said slots and the same spacing between the said slots, a number of trays movable in an endless path within said cabinet, each of said trays having projecting members extending outwardly from opposite ends thereof, and endless track means adjacent opposite walls of said cabinet positioned to receive therein respectively the said projecting members, the disks comprising said lower pair of disks being disposed with respect to the disks comprising said upper pair of disks so that its slots are rotated angularly with respect to the slots of said upper pair of disks to cause a pair of horizontally aligned slots in said lower pair of disks to be engaged by the projecting members of the lowermost tray of the descending column of trays simultaneously with the engagement of the projecting members of the topmost tray of the ascending column of trays in a horizontally aligned pair of slots in said upper pair of disks respectively, each disk of said upper pair of disks being connected by a tie-rod with a disk comprising said lower pair of disks, whereby rotation of the cross rod supporting one of said pair of disks will cause rotation of the cross rod supporting the other of said pair of disks.

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