

[54]

SKIP FRAME VISUAL DISPLAY DEVICE

[72]

Inventor: Ronald D. Alleman, 526th Maint Co., APO, San Francisco, Calif. 96248

[22]

Filed: Nov. 4, 1969

[21]

Appl. No.: 873,921

[52]

U.S. Cl.....40/78.07, 40/65

[51]

Int. Cl.....G09f 11/30

[58]

Field of Search.....40/78.5, 78.7, 78.9, 78.11, 40/64, 65, 33, 32, 36

[56]

References Cited

UNITED STATES PATENTS

594,506

11/1897

Wheeler

40/78.07

1,611,926

12/1926

McDonald.....

40/36

547,592

10/1895

Turner.....

40/78.09

1,201,243

10/1916

Blair

40/36

1,458,227

6/1923

Freemon et al.....

40/78.07

Primary Examiner—Robert W. Michell

Assistant Examiner—J. H. Wolff

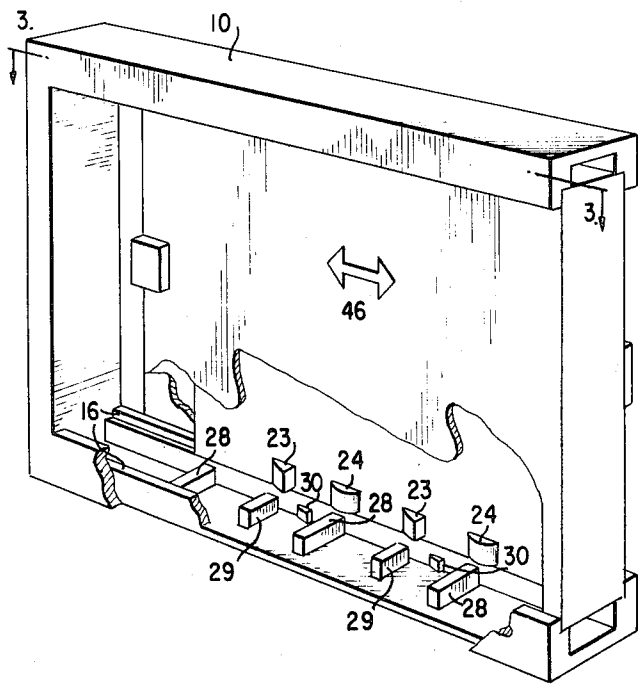
Attorney—Ronald D. Cohan, Donald A. Kettlestrings, Martin Fleit, Jim W. Gipple, Harvey B. Jacobson, Jr. and John S. Hale

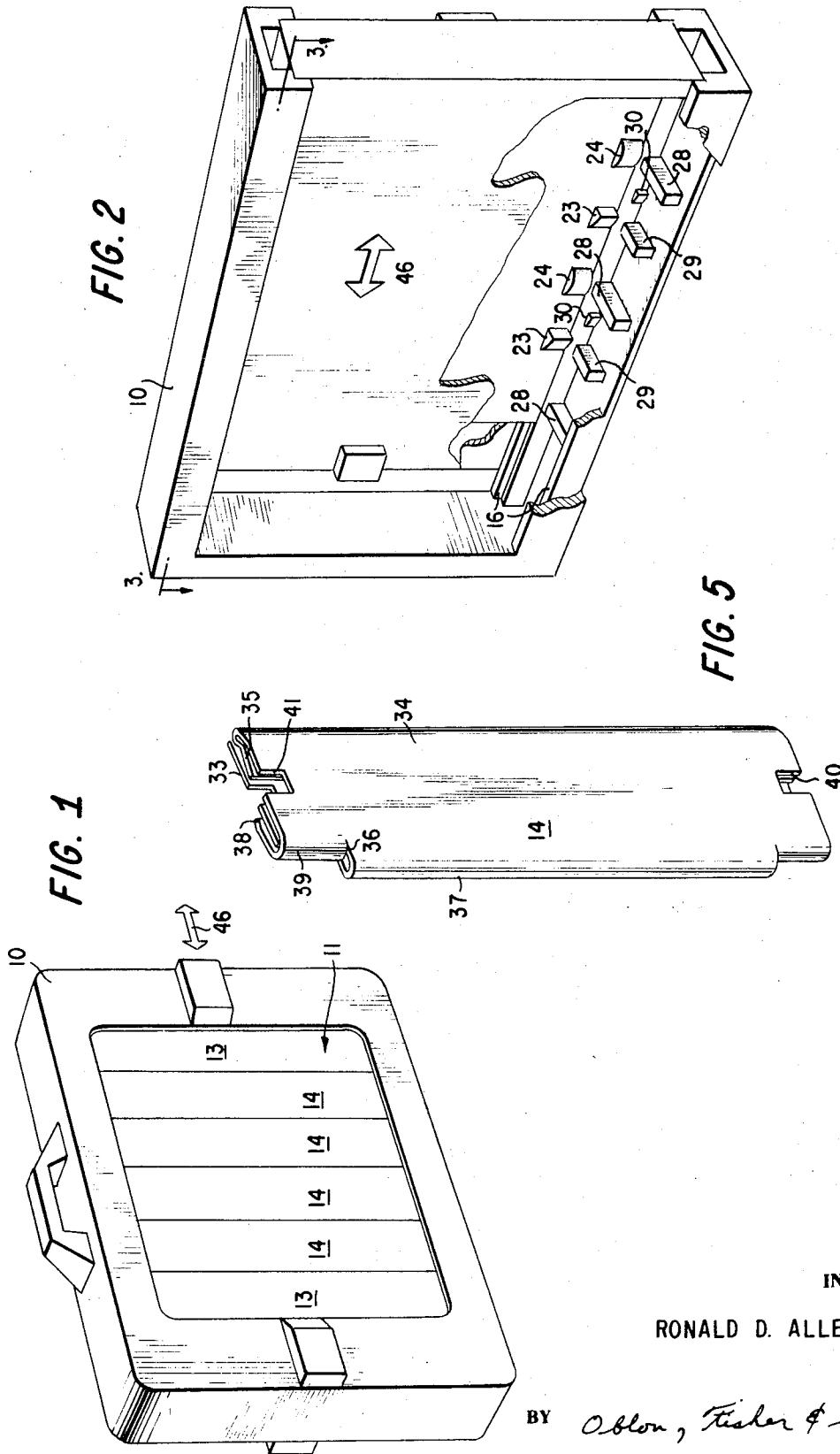
[57]

ABSTRACT

A viewing device in which successive cards of a series are removed from one end of a stack or supply and deposited at the end of the same or another stack or supply and a transfer mechanism for indexing such cards one at a time such that on every other transfer or given number of transfers, the illustration shown, respectively, by any two or corresponding given number of adjacent stacks is completely changed. The cards are peculiarly constructed to cooperate with the transfer mechanism and to maintain the correct sequence of such cards within the stacks.

11 Claims, 28 Drawing Figures





INVENTOR

RONALD D. ALLEMAN

BY *Oblon, Fisher & Spivack*
ATTORNEYS

FIG. 3

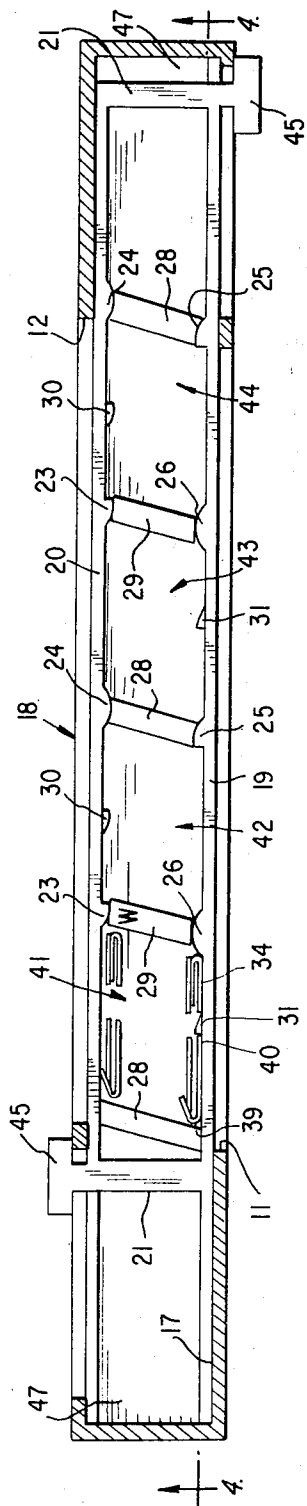
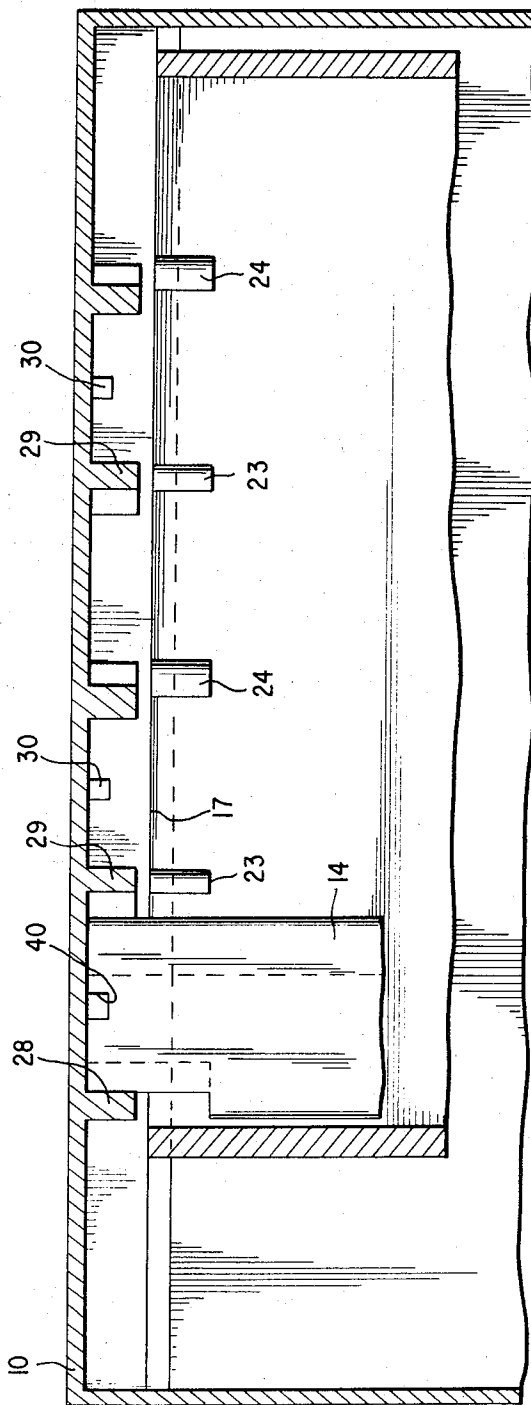


FIG. 4



INVENTOR

RONALD D. ALLEMAN

BY

Ablon, Fisher & Spivack

ATTORNEYS

FIG. 6

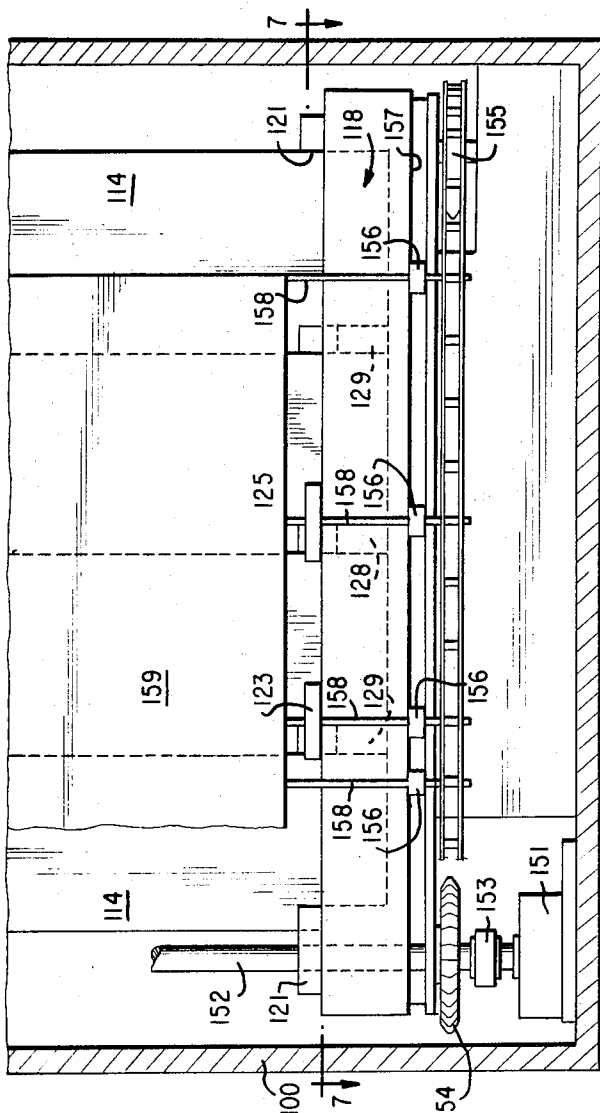


FIG. 7

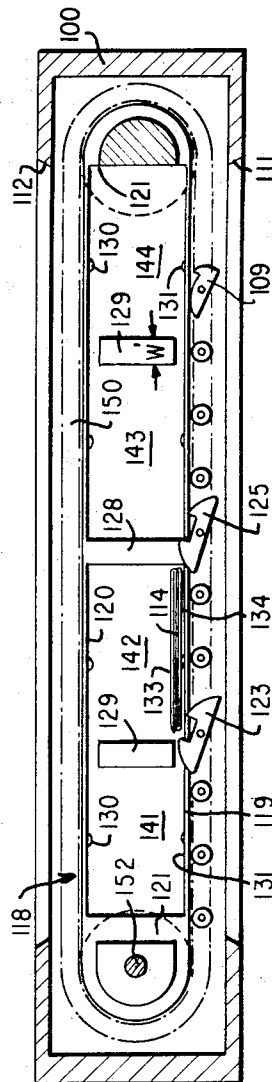
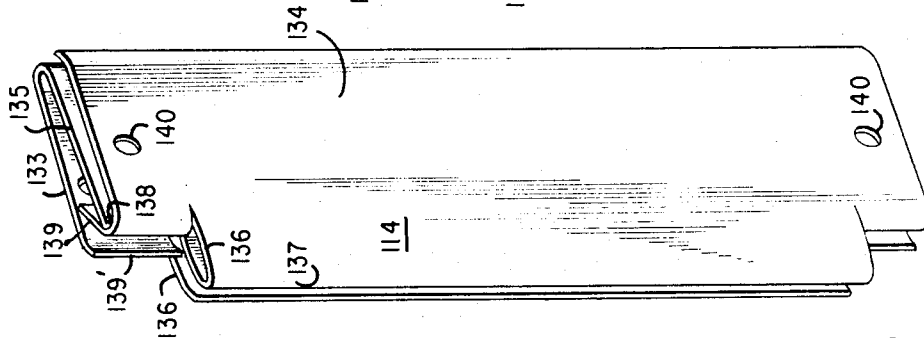


FIG. 8

INVENTOR

RONALD D. ALLEMAN

BY *Oblon, Fisher & Spivak*

ATTORNEYS

FIG. 9

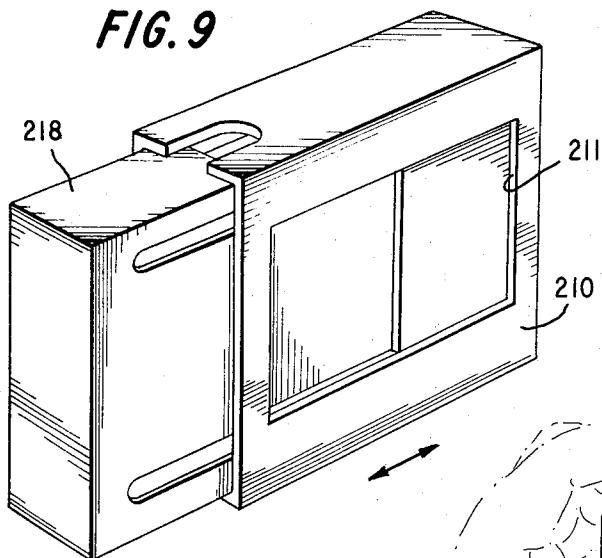


FIG. 10

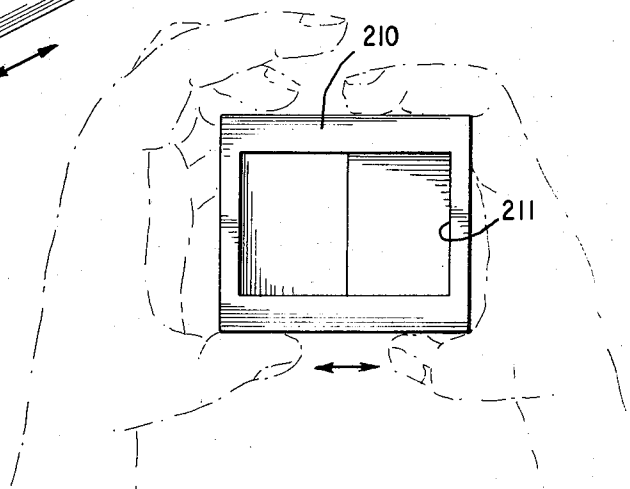
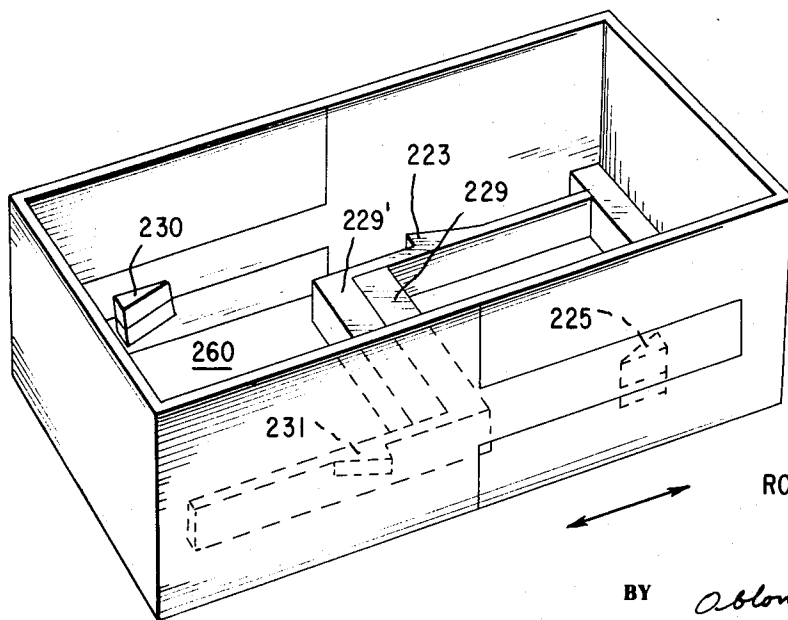


FIG. 11

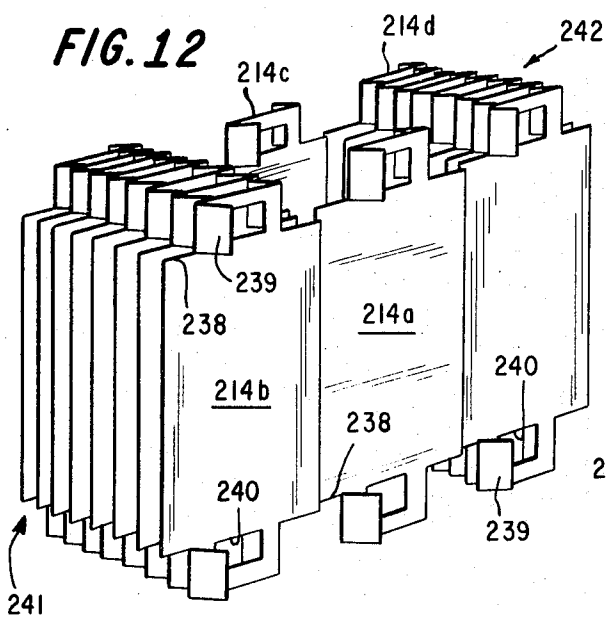
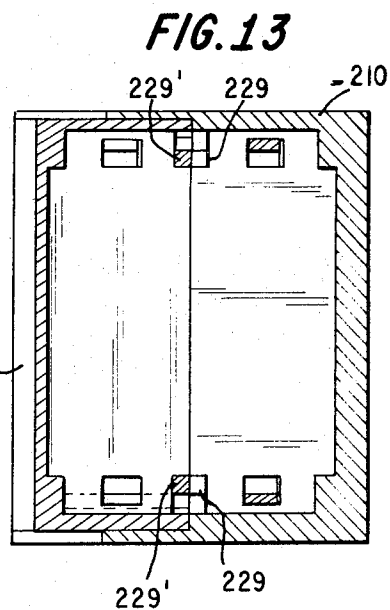
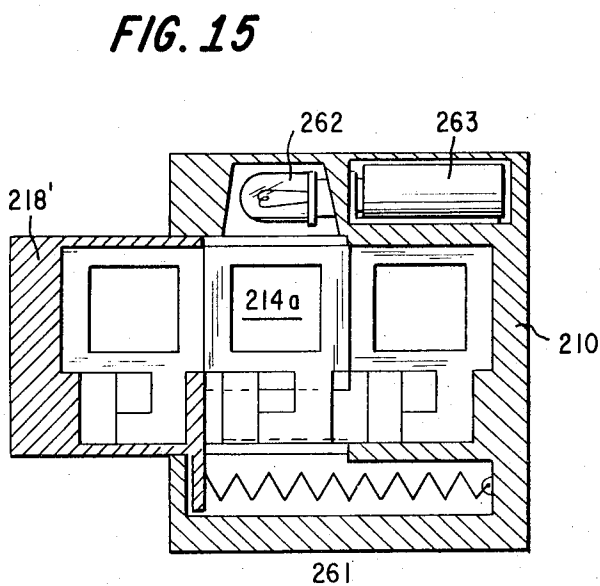
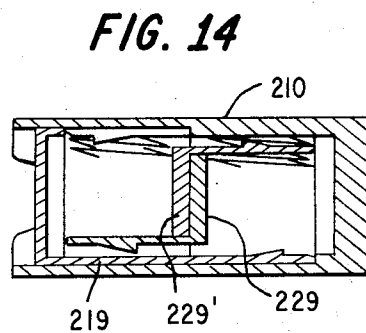
INVENTOR

RONALD D. ALLEMAN

BY

Ablon, Fisher & Spivak

ATTORNEY



INVENTOR

RONALD D. ALLEMAN

BY *Oblon, Fisher & Spivak*
ATTORNEYS

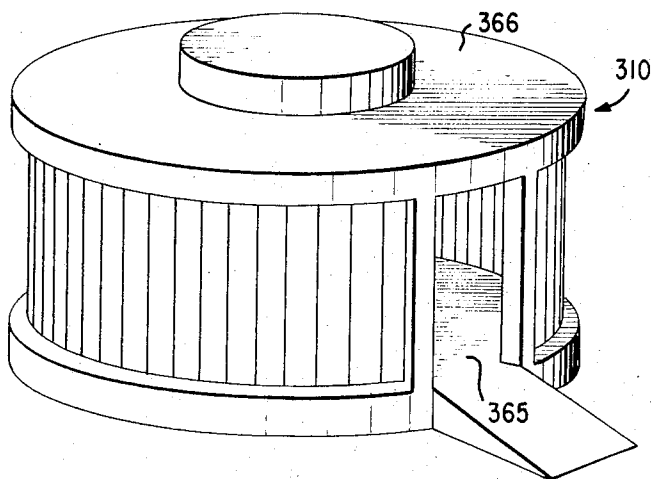


FIG. 16

FIG. 17

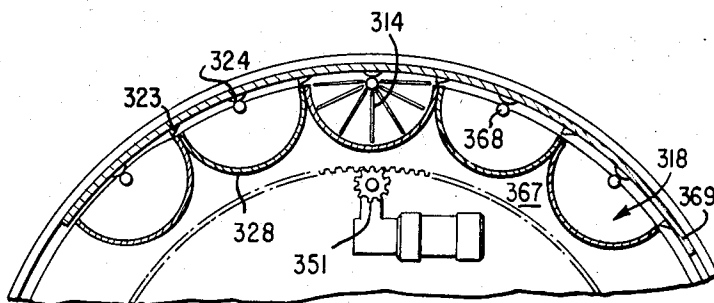
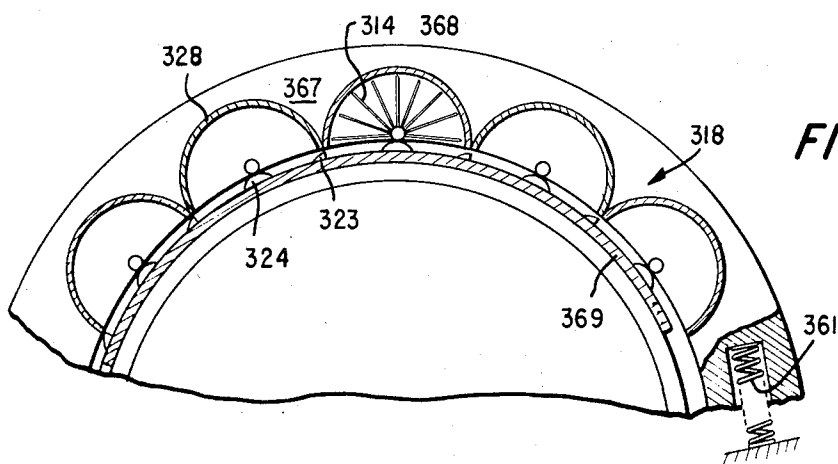


FIG. 18

INVENTOR

RONALD D. ALLEMAN

BY

Oblon, Fisher & Spivak

ATTORNEYS

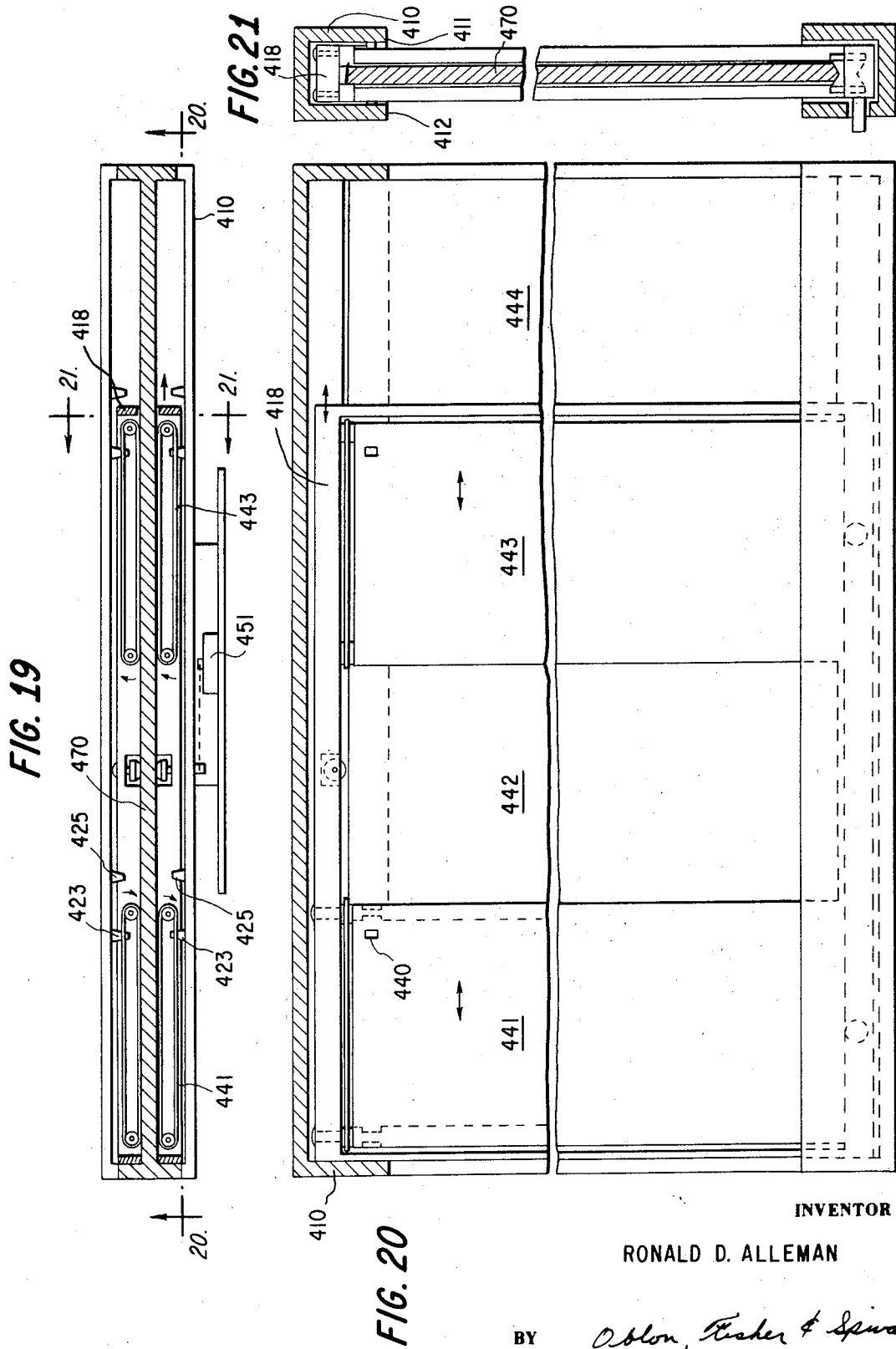


FIG. 22

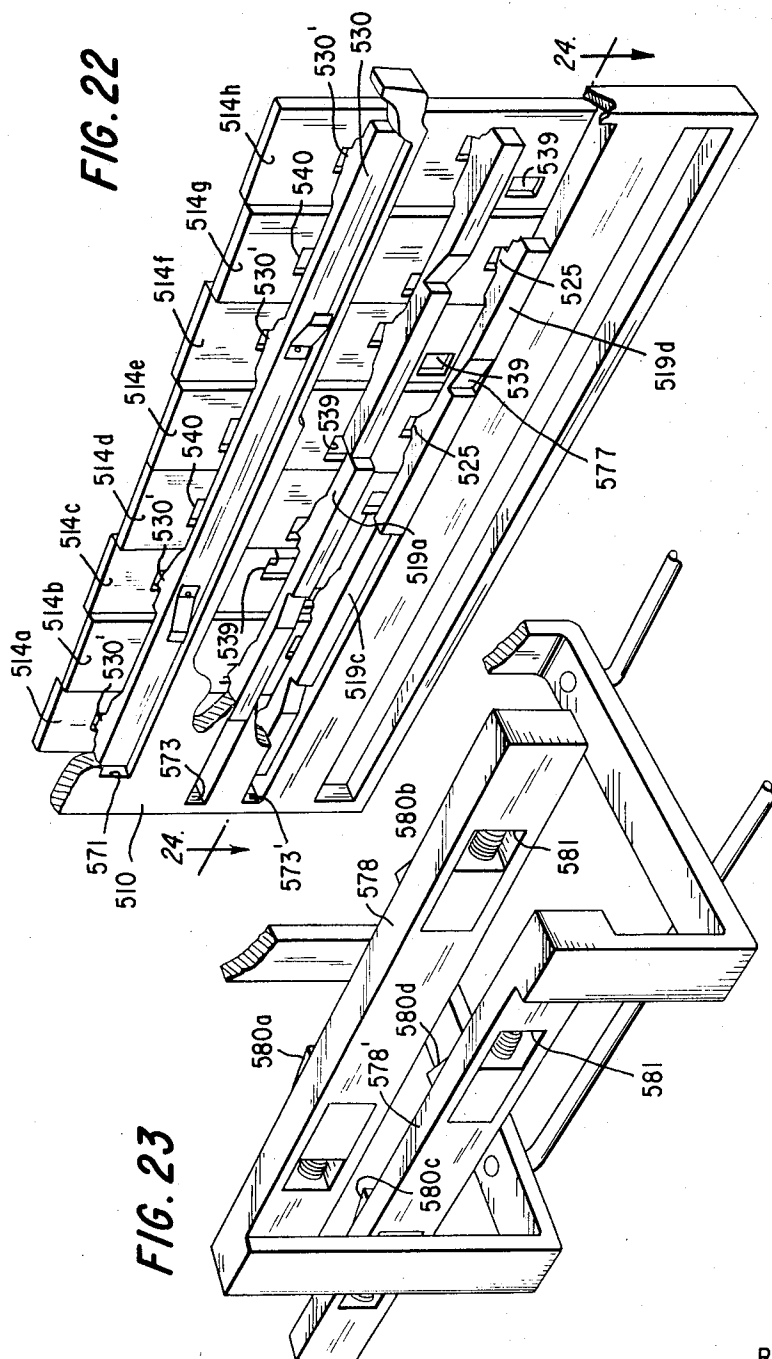
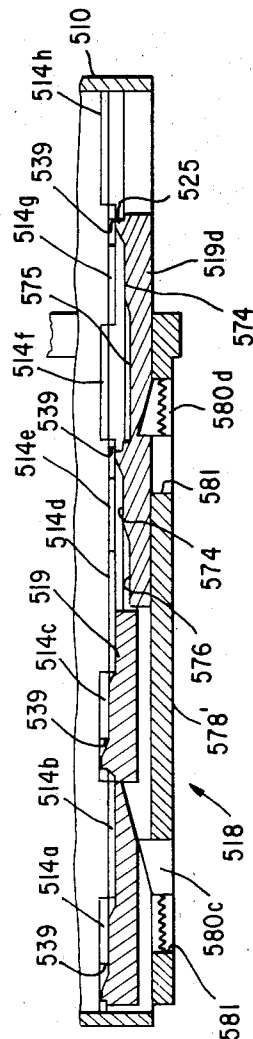


FIG. 23

FIG. 24



INVENTOR

RONALD D. ALLEMAN

BY

Oblon, Fisher & Spivack

ATTORNEYS

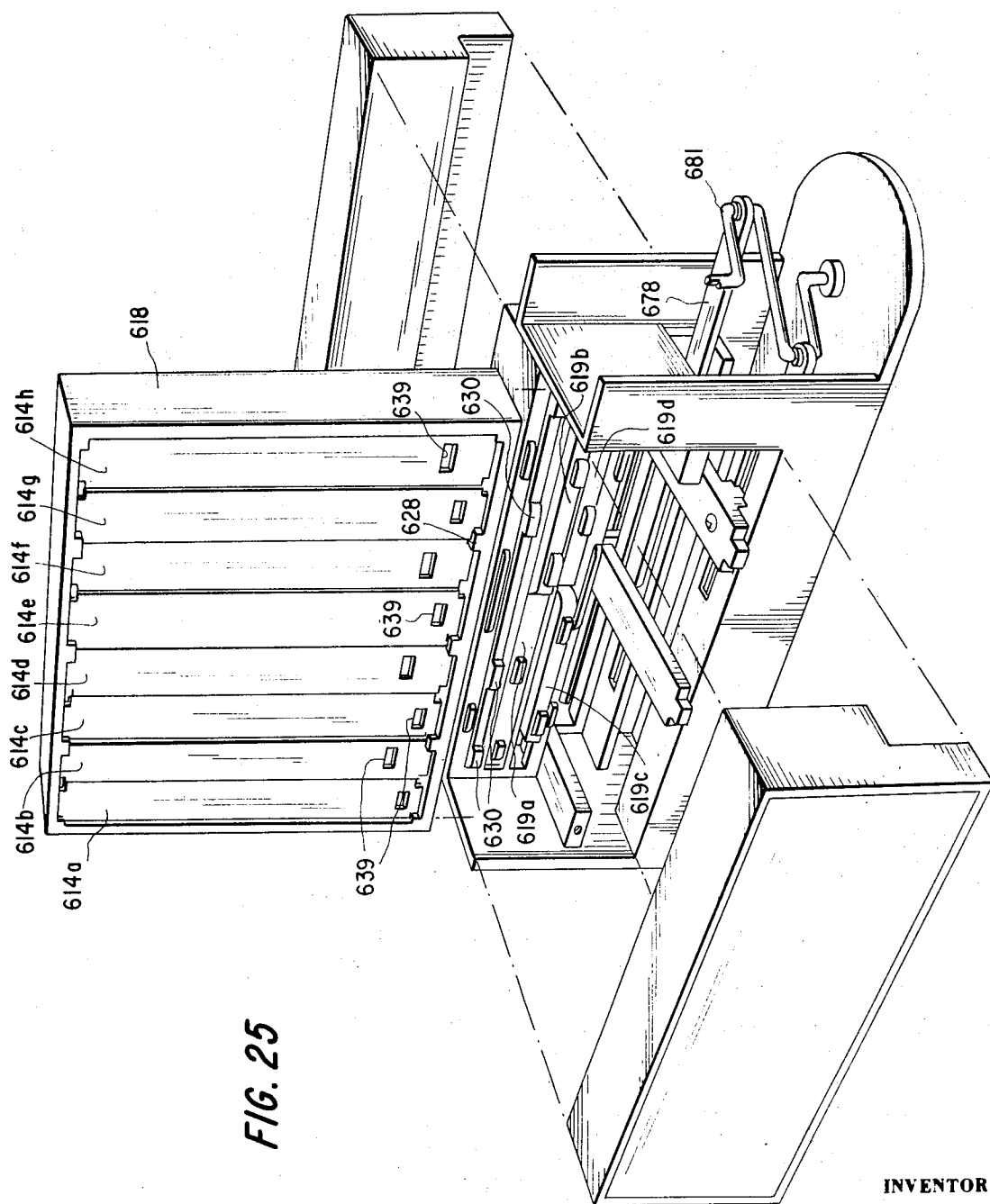


FIG. 25

INVENTOR

RONALD D. ALLEMAN

BY

Olson, Fisher & Spink

ATTORNEYS

FIG. 26

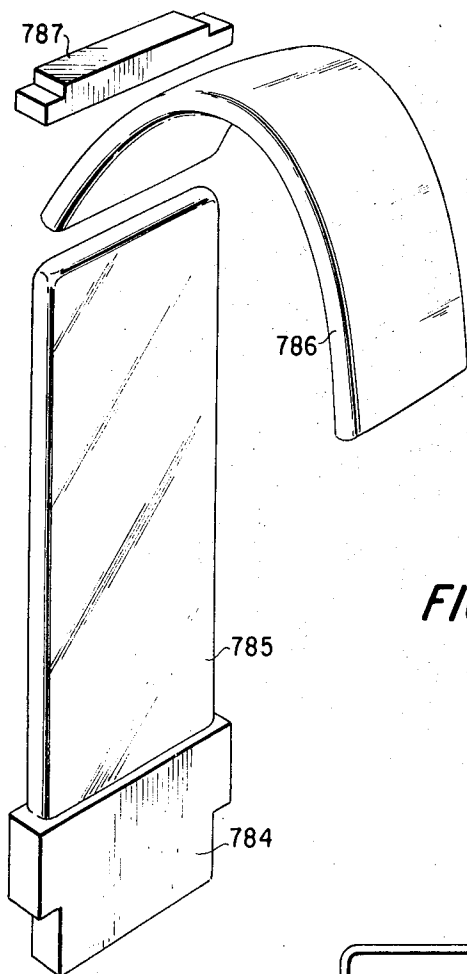


FIG. 27

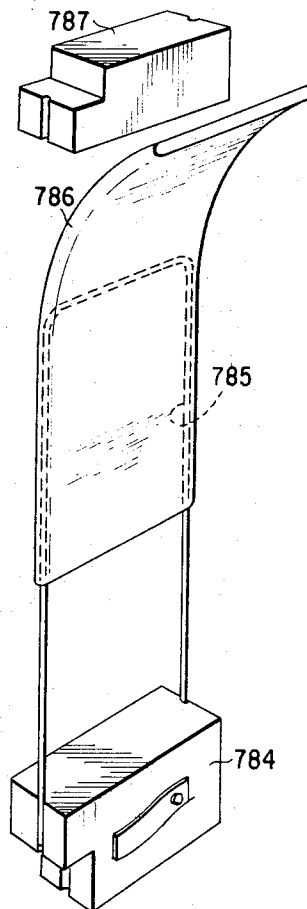
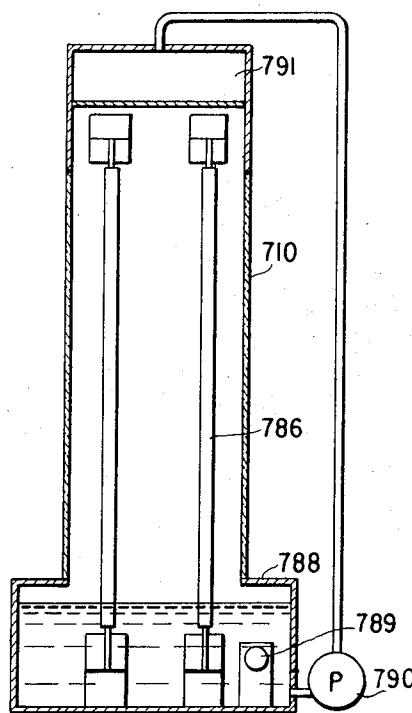


FIG. 28



INVENTOR
RONALD D. ALLEMAN

Ablon, Fisher & Spivak
ATTORNEYS

SKIP FRAME VISUAL DISPLAY DEVICE

BACKGROUND OF THE INVENTION

This invention relates to visual display devices and more particularly to a mechanism for presenting a predetermined unit of coherent information for viewing by selectively concealing from or incoherently presenting to the viewer portions only of such intelligence within a given sequence or series in a manner which allows the concealed or skipped information to later be presented coherently as a continuation of the basic sequence or as an independent series.

Such skip frame animation or illustration, wherein successive cards of a series are removed from one portion of a stack or supply and deposited at another position in a manner such that a continuously repetitive sequence of pictures or information is presented either singularly or in plurality to a viewer and after viewing, each card comes to assume its original serial position as the stack or supply thereof becomes exhausted by such manipulative means, permits maximum utilization to be made of the storage space for viewed and unviewed panels or cards while presenting previously unviewed material whereby a mechanism employing such method may consist almost entirely of viewable information which would be useful as an exhibit component.

Skip frame viewing mechanisms are envisioned to be useful for many purposes where it is desirable to transmit more than one message to the viewer such as, for example, as an educational tool, a visual aid for lecturers, an advertising sign, a varying display in an exhibit, a toy, and many others. Although multiple messages are continuously and repetitively provided by generally well known viewing mechanisms operating under the basic method, it is not believed that the full range and scope of utility to which the skip framing principle is applicable has heretofore been realized by these mechanisms.

SUMMARY OF THE INVENTION

Accordingly, one object of the present invention is to provide a skip frame viewing mechanism which permits viewing a continuous repetitive sequence of a plurality of different pictures or information from both the front and rear faces thereof.

Another object of the present invention is to provide a skip frame viewing mechanism having no break in the visible picture or information for card dividers or the like.

Still another object of the present invention is to provide a portable skip frame viewing mechanism which is readily operable by hand for presenting a continuously repetitive sequence of unbroken pictures or information.

Yet another object of the present invention is to provide a skip frame viewing mechanism for viewing a continuously repetitive sequence of unbroken pictures or information on a substantially curved surface such as the concave or convex, inner and outer walls, respectively, of a circular structure.

A further object of this invention is to provide a skip frame viewing mechanism of the type described which is automatically operable for presenting a continuously repetitive sequence of unbroken pictures or information.

A still further object of this invention is to provide a novel card for use in a skip frame viewing mechanism.

Yet a further object of this invention is to provide a novel card which permits the showing of an unbroken picture or information when shown side-by-side with another such card in a skip frame viewing device.

According to one aspect of the present invention, the foregoing and other objects are attained by a viewing case for storing at least two stacks of information-bearing cards and having a transfer mechanism reciprocally disposed therein and operable for moving the cards in a predetermined sequence from one stack to another in order to display a continuously repetitive series of coherent information formed by the simultaneous side-by-side illustration of at least two of such cards. The transfer mechanism has a novel divider between the stacks which is cooperatively formed with the cards in such a manner that the cards may be viewed in full when so placed in such side-by-side relation. Both sides of the cards may contain information for permitting the case to be viewed from either the front or the rear face thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

Still other objects and many of the attendant features and advantages of the present invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, wherein like reference numerals indicate like or corresponding parts throughout the several views and in which:

FIG. 1 is a perspective view of a display case embodying the teachings of the present invention;

FIG. 2 is another perspective view, partly in section, of the display case shown in FIG. 1;

FIG. 3 is a view, partly in section, taken along the line 3—3 of FIG. 2;

FIG. 4 is a partial view in section taken along the line 4—4 of FIG. 3;

FIG. 5 is a perspective view of a C-shaped, information-bearing card formed according to this invention;

FIG. 6 is a partial front view of another embodiment of the present invention having a motorized transfer mechanism;

FIG. 7 is a sectional view taken along the line 7—7 of FIG. 6;

FIG. 8 is a perspective view of another card, having an S-configuration, formed according to this invention;

FIG. 9 is a perspective view of another embodiment of the present invention showing the transfer mechanism in a withdrawn position.

FIG. 10 is another view of the embodiment illustrated in FIG. 9 showing manual manipulation thereof;

FIG. 11 is another view, partly broken away, of the lower portion of the display case shown in FIG. 9, but having the transfer mechanism repositioned within the case;

FIG. 12 is a perspective view of a plurality of Z-shaped, information-bearing cards as they are disposed when the transfer mechanism is withdrawn as shown in FIG. 9;

FIG. 13 is a front sectional view of the device shown in FIG. 10;

FIG. 14 is a plan view in section of the device illustrated in FIG. 13;

FIG. 15 is a front view, partly in section, of a modification of the device, illustrated in FIGS. 9—14, and adapted for use as a slide viewer;

FIG. 16 is a perspective view of an exhibit in-the-round wherein the present invention may be employed for presenting displays on the inner and outer walls thereof;

FIG. 17 is a plan view in section of a convex display according to this invention;

FIG. 18 is a plan view in section of a concave display; such as might be used in the exhibit shown in FIG. 16.

FIG. 19 is a top sectional view of another embodiment featuring a non-skip, display-dissolve device formed according to the teachings of the present invention;

FIG. 20 is a sectional view taken along the line 20—20 of FIG. 19;

FIG. 21 is a sectional view taken along the line 21—21 of FIG. 19;

FIG. 22 is a perspective view, partly broken away, of another embodiment of this invention featuring rigid panels;

FIG. 23 is an enlarged perspective view of an actuator mechanism for device shown in FIG. 22;

FIG. 24 is a sectional view taken along the line 24—24 of FIG. 22;

FIG. 25 is an expanded view in perspective of another embodiment similar in arrangement and operation to that of the embodiment shown in FIGS. 22—24;

FIG. 26 is a perspective view showing the assembly of an illuminated form of the invention;

FIG. 27 is a perspective view of another illuminated panel member;

FIG. 28 is a schematic showing the arrangement of another form of the invention featuring an illuminated waterfall effect;

FIG. 29 is a perspective view of another card adaptable for skip-frame operation in the round-form;

FIG. 30 is a diagrammatic illustration of a semi-spherical display case using the information-bearing card shown in FIG. 29;

FIG. 31 is a perspective view of a round, tire-shaped display device using the information-bearing card shown in FIG. 29 and showing the card and the transparent round covers therefor removed from the device;

FIG. 32 is a diagrammatic illustration of another round display device utilizing a quarter-round configuration of the card illustrated in FIG. 29;

FIG. 33 is a diagrammatic illustration of another round display device employing square, rigid panels or transparencies;

FIGS. 34 and 35 are schematic views of a stereo viewer employing Z-cards in a semi-cylindrical configuration;

FIG. 36 is another round presentation having a spherical transfer and storage compartment;

FIGS. 37 through 41 illustrate various other contours and shapes which the cards may assume, such as the forms, respectively, of a convex card in a cylindrical storage compartment, a concave card, a convex card in a spherical storage compartment, a convex card in a longitudinal storage tray and a Z-card having one edge narrower than the other for arrangement in a fan-like pattern;

FIG. 42 is a perspective view of a special hanger designed for supporting panels or curtain members of great length;

FIG. 43 is a diagrammatic view showing how the hanger of FIG. 42 may be supported from a wall of a room; and,

FIG. 44 is a perspective view of another hanger having a round configuration.

DESCRIPTION OF ILLUSTRATED EMBODIMENTS

Referring now to the drawings and more particularly to the FIGS. 1—4 thereof, an embodiment of the instant invention is shown wherein a portable display case 10 is provided with front and rear face, substantially rectangular-shaped openings 11 and 12, respectively, for displaying in each a pair of stationary sign strips 13 and a plurality of sign strips 14 disposed therebetween in vertical, side-by-side relationship and movable in a manner to be set forth for changing the display formed thereby in the openings. The display case 10 also has lower horizontally disposed, parallel grooves or tracks 16 positioned on the inner surfaces of the front and rear faces thereof and spaced a predetermined distance above the bottom, as shown in FIG. 2. Similar grooves or tracks 17 are provided near the upper surface of the case 10.

A box-like sign strip-transfer mechanism 18 having a rectangular-shaped forwardly disposed framework 19 and a parallel, corresponding rear framework 20 joined at the ends thereof by side framing legs 21 is slidably disposed along a horizontal, reciprocable path within the case 10 in the grooves 16 and 17. Disposed on the inner surfaces of the horizontal top and bottom legs of the rear frame 20 in equally spaced and alternately disposed relation on each are a pair of indexing tabs 23 and a pair of inwardly directed rounded projections 24. Each of the tabs 23 and projections 24 is vertically aligned with the corresponding tab or projection on the other horizontal leg of the frame. A similar arrangement of a set of indexing tabs 25 and rounded projections 26 on the forward frame 19 is different only in that the tabs 25 on the front frame 19 lie opposite the rounded projections 24 of the rear frame 20, and the rounded projections 26 of the front frame lie opposite the indexing tabs 23 on the rear frame. This arrangement is most clearly illustrated in FIG. 3. Each of the indexing tabs 23 and 25 is preferably configured like a section of corner-round, having a sharp ridge or line projecting from the frame leg and an arcuate or curved portion extending therefrom through a 90° return to the leg.

Fixed to the inner surfaces of the top and bottom of the case 10 and disposed substantially transversely between the front and rear faces thereof are a plurality of equally-spaced divider elements 28, which abut both the front and rear face inner surfaces of the case 10, and divider elements 29, which are disposed midway between each adjacent pair of dividers 28 and are spaced from each of the case faces by a distance substantially equal to the thickness of one of the movable strips 14. In the case of the bottom edge of the case 10, the dividers 28 and 29 are disposed below the level of the grooves 16 and thereby below the tabs 23, 25 and the projections 24, 26 on the horizontal bottom legs of the frames 19 and 20, whereas for the top edge of the case 10, they are disposed above the level of the grooves 17 and thereby above the tabs and projections on the horizontal top legs of the front and rear frames, 19 and 20, respectively. The bottom dividers 28, shown three in number, are vertically aligned with the corresponding top dividers 28 and the dividers 29, shown

two in number, are similarly vertically aligned with the corresponding upper set of dividers 29. Disposed on the inner surface of the rear face of the case 10 between each divider 28 and the divider 29 on the one side thereof is a hold-back tab or finger 30, and on the inner surface of the front face of the case between each divider 28 and the divider 29 on the other side thereof is a similar hold-back tab or finger 31. Thus, the hold-back fingers 30 and 31 are disposed at the top and bottom edges of each stack of movable sign strips 14 on alternating sides, respectively, thereof. The fingers 30 and 31 are smaller but preferably are similar in shape to the indexing tabs 23 and 25.

Referring now to FIG. 5, a novel closed C-type card or sign strip 14 especially adapted for use with the portable display embodiment 10 is illustrated which is formed from a single strip of material, such as plastic or the like, by folding it over itself to form opposite sides 33 and 34, upon which portions of a sign or picture may be printed, and tucking one end 35 inwardly between the sides 33 and 34. Upper and lower cuts 36 in the strip transverse to the fold 37 between sides 33 and 34, and cuts 38 from the top and bottom edges of side 33 to the cuts 36 permit portions 39 to be folded inwardly of the fold 37, whereby the upper and lower edge portions of the sign strip 14 are reduced in width from the main intermediate area thereof by an amount substantially equal to the width W of one of the dividers 28 or 29. A notch 40 is cut in both the upper and lower edges of each card or strip 14 substantially midway along the width thereof. When manufactured of plastic and folded as indicated, a readily compressible and substantially resilient card is produced. Although not illustrated, it is to be understood that it is the top and bottom portions of the card 14 which require the compressible folds, and therefore the main body of the card might just as well be substantially flat and rigid, so long as the top and bottom edges are formed substantially as shown.

The cards or sign strips 14 are arranged vertically on edge in stacks at 41, 42, 43 and 44. When so disposed, the folded portions 39 of the stacked cards 14 engage the dividers 28 and 29, whereby the cards 14 visible through the front and rear openings 11 and 12, respectively, in the case 10 rest flat, edge-to-edge, with the main portion thereof overlapping the dividers and thereby presenting a complete, uninterrupted display formed by the four adjacent cards.

The notches 40 in the forward sign strip 14 of stacks 41 and 43, as illustrated in FIG. 3, are engaged by the hold-back fingers 31 and the same notches in the rear-most sign strip 14 of stacks 42 and 44 are engaged by the hold-back fingers 30.

In practice, therefore, when the transfer mechanism 18 is operated by grasping either the forward or rear handle 45, it may be moved horizontally along a reciprocable path as indicated by the arrow 46. A dead space 47 on either side of the transfer mechanism 18 in the case 10, behind the stationary sign strips 13, if desired, provides for such movement. On the other hand, the case structure itself may shield the dead spaces 47, whereupon there is no need for the stationary sign strips 13.

Thus, referring to FIG. 3, upon moving the transfer mechanism to the left, the indexing tabs 25 engage the

forward card 14 in stacks 42 and 44 and slide these cards to the left through the clearance provided between the dividers 29 and the case frame. The way is cleared for placing these cards in the front of the stacks 41 and 43 by the curved projections 26 riding up over the cards therein and compressing them. During this movement, the rear-most cards 14 in each of the stacks is engaged by a curved surface of the indexing tabs 23 and projections 24, whereby no transfer of any cards visible in the rear opening 12 takes place.

In recocking the transfer mechanism 18, however, by moving it to the right, the rearwardly disposed cards 14 in the stacks 41 and 43 are carried to the stacks 42 and 44 by the indexing tabs 23. At the same time, only the curved surfaces of the indexing tabs 25 and the projections 26 on the front frame portion 19 engage the cards in the various stacks, whereby no transfer occurs. Because there is an extra card in stacks 41 and 43 at the beginning of this recocking step, the curved projections 26 might tend to carry the front card with it, but this is prevented by the hold-back tabs 31, while the projections 26 slide up and over the cards 14.

At this point, only half the picture or sign has been changed, two of the cards 14 from the original display still being viewable on both the front and rear openings of the display case. Thus, the term "skip-framing." By recycling again as described, a whole new picture will have been formed, and by properly sequencing the cards 14 in the various stacks, any number of displays are possible.

The dividers 28 and 29 are shown herein as being angled within the case 10 to prevent light from being transmitted through a crack between the stacks. The device may be motorized, if desired, by using gear and friction combinations with springs, solenoids alone or in combination with a spring, or pneumatic power. Also, forward and reverse movement of the cards is possible by using alternate and retractable hold tabs in combination with closed C-type cards and a magnetic pick-up and delivery mechanism.

In FIGS. 6 and 7 there is illustrated a motorized embodiment of the present invention, which otherwise is similar in appearance and operation to the manually operated device shown in FIGS. 1-4. In this case, a stationary magazine or frame 118 is provided which comprises like upper and lower horizontally disposed sections being secured in the top and bottom portions, respectively, of a display structure 100 having a front opening 111 and a rear opening 112 therein for viewing the display from either side. The bottom section of the magazine 118 will be described, it being understood that the top section is similarly arranged.

The magazine 118 is designed to accommodate a plurality of stacks, shown four in number, namely stacks 141, 142, 143 and 144, of indicia bearing cards 114 standing on a bottom edge and arranged with the vertical edges thereof side-by-side with such edges of the cards 114 in adjacent stacks. Elongate bar-like dividers 129 for separating the two pairs of stacks formed by 141, 142 and 143, 144, respectively, are disposed transversely of the front and rear walls 119 and 120, respectively, of the magazine 118 and are spaced therefrom a predetermined distance substantially equal to the thickness of a card 114, whereby a card may be moved past such dividers between the

stacks in a given pair of such stacks. An elongate bar-like divider 128 extends full-length between the walls 119 and 120 for preventing such transfer of cards 114 from the one pair of stacks 141 and 142 to the other pair of stacks 143 and 144, and side or end walls 121 of the magazine 118 prevent displacement of the cards 114 from the magazine itself.

Disposed about the magazine 118 and mounted within the display case structure 100 for continuous motion around the magazine 118 in either a forward or reverse direction is an endless chain or belt 150. The chain 150 is driven by a motor 151 which is mounted in the base of the structure 100 and operates through a drive shaft 152, a clutch mechanism 153 and a sprocket wheel 154 for moving the chain 150 about the sprocket wheel 154 at one end of the magazine 118 and an idler wheel 155 at the other end of the magazine.

A plurality of bearings 156, shown four in number, which are engagingly movable in a channel 157 in the outer peripheral surface of the magazine 118, are carried by the sprocket chain 150. The bearings 156 support rods 158, upon two of which are mounted freely pivoted indexing claws 123 and 125. As shown in FIG. 7, each claw comprises a flat, semi-circular body having a notch formed centrally in the peripheral edge of its arcuate portion.

An S-shaped sign strip or card 114 especially adapted for the magazines 118 is illustrated in FIG. 8. The card 114 is formed from a single strip of firm but flexible material, such as plastic or the like, by folding it over itself twice whereby it is provided with two outwardly disposed, oppositely facing sides 133 and 134, upon which portions of a sign or picture may be printed, and an intermediate covered portion 135. Upper and lower cuts 136 in the card transverse to the fold 137 between the side 134 and the portion 135 and in the edge of side 133, and cuts 138 from the top and bottom edges of the portion 135 to the cuts 136 permit tab-like portions 139 to be tucked inwardly between the side 133 and the intermediate portion 135 and the tab-like edge 139' of side 133 to be bent or crimped thereover, whereby the upper and lower portions of the card 114 are reduced in width from the main intermediate body thereof by an amount substantially equal to the width W' of one of the dividers 128 or 129. A hole 140 is cut in both the upper and lower edges of the faces 133 and 134 of each card 114 substantially midway along the width thereof. As with the C-type card, the main intermediate body portion of this card may be a single rigid panel connected at its upper and lower ends to the folded and resilient S-shaped configuration shown.

Thus, when a plurality of cards 114 are compressed between the front and rear walls 119 and 120 of a magazine 118 in each stack and arranged therein in an appropriate predetermined manner, it may be seen that upon actuation of the motor 151 for driving the chain 150 in a counterclockwise direction, as viewed in FIG. 7, the forward or advance claw 125 engages the front card 114 in the stack 141 and indexes it into the stack 142. A clearance cam or one-way claw 109 previews the claw 125 for compressing the cards in the stacks 142 and 144 to permit the transfer of cards to the front of each of these stacks by the claw 125 from the stacks 141 and 143. Because the card now abuts against the

divider 128, further movement thereof is prevented. Thus, the claw 125 pivots about the lower indented edge of the card and moves therealong, slightly compressing the cards in the stack as it passes, and then engages the indented edge of the front card in the stack 143. Meanwhile, the follower claw 123 has engaged the new front card in the stack 141 and indexed it past the divider 129 and placed it at the front of the stack 142. This is the position of the apparatus illustrated in FIG. 7.

As the chain continues to move, the front card in the stack 143 is indexed into the stack 144 by the claw 125. Further movement of the front card in stack 142 being prevented by its abutment with the divider 128, the claw 123 pivots thereabout and moves on to engage the front card newly placed in the stack 143. When this card is indexed by the divider 129 and into the stack 144, it may be observed that a whole new series of cards 114 have been placed in the front of each of the stacks.

Movement of the advance and follower claws 125 and 123, respectively, around the end of the magazine 118 and to the back side 120 thereof by the endless chain 150 will initiate a similar change of the sign displayed through the rear opening 112 of the display structure 100.

Referring now to FIG. 6 for an additional feature of this embodiment, a shutter or screen 159 having a width substantially equal to the width of three cards 114 is shown being conveyed by the other support rods 158, which are positioned relative to the claw-supporting rods 158 for covering the display while a change is being made so that at no time will a half-picture of the previously shown display be viewable with a half of the new display. Rather, by moving the shutter 159 in front of the transferring cards, the appearance will be given of the old display being wiped clean by the shutter 159 and a new display being automatically presented for viewing.

Although this embodiment has been described by reference only to the bottom driving means and support apparatus, it is to be understood that an upper chain drive and divider assembly are also included therein. Also, as in the previously described embodiment, the cards 114 overlap the dividers 128 and 129 and the one end 121 of the magazine 118 for permitting an unbroken display to be presented. In addition, hold-back buttons 130 and 131 on the rear and front surfaces, respectively, of the magazine 118 engage the holes 140 in the cards 114 and thereby prevent any undesirable movement of the cards. Another hold-back or transport means which is contemplated is the combination of permanent magnets installed on the magazine 118 or in place of claws 123 and 125 and pieces of ferrous metal crimped to the cards in the place of the holes 140.

Another manual embodiment of the present invention wherein skip-frame animation is achieved by moving a complete stack of cards during each cycling motion is illustrated in FIGS. 9-14. In this embodiment, a display case 210 suitable for being held in the hands of the operator is provided with a slidable transfer mechanism 218. Referring more particularly to FIG. 11, the base of the case 210 has secured thereto a transverse divider 229 and an integral combination for-

wardly-facing hold-back piece and lateral divider 231 at a right angle thereto. Also, on one side of the rear wall of the case 210 and positioned near the base thereof is another hold-back tab 230.

The slidable transfer mechanism 218 includes a base 260 and has secured thereto an integral right-angled piece comprising a combination lateral divider and indexing finger 223 and a transverse divider 229', which normally abuts the other divider 229 along the length thereof and is movable in a direction perpendicular to the longitudinal axes thereof, whereby the dividers 229 and 229' are always parallel to each other. On the one side of the transfer mechanism 218 diagonally opposite the side of the case having hold-back tab 230 thereon, with the apparatus in the closed position, is an indexing finger 225.

In FIG. 12 there is shown another sign strip or card 214 which is especially adapted for use with the case 210 and transfer mechanism 218. The strip 214 is generally rectangular in configuration and is provided with Z-shaped upper and lower edges formed by making transverse cuts 238 in each side edge thereof and folding the severed portions 239 in opposite directions. Holes 240 are punched or cut in the upper and lower edges of the cards 214 between the folded portions 239. When placed vertically on edge and arranged in stacks 241 and 242 in the manner shown in FIG. 12, the Z-folds provide sufficient resilience to urge the cards 214 outward in the forward and rearward directions. Also, for this embodiment, one edge of the front card 214 in the stack 241 is placed in overlapping relation with the front card in the stack 242 and, in the cocking position shown in FIG. 12, when a card 214 is moved forward from the displaced stack 241, it is placed so that its edge overlaps that of the card formerly disposed at the front of the stack.

In practice, when the magazine frame 218 is withdrawn from the case 210 in the manner illustrated in FIG. 9, the entire stack 241, with the exception of the front card, is moved therewith, principally by the divider 229'. The Z-tab of the rear card 214 in the stack 242 is engaged by the indexing finger 223 for moving that card laterally with the magazine frame 218 until the hole 240 therein is engaged by the hold-back tab 230. At the forward end of the device, movement of the front card in the stack 241 is prevented by the engagement of the hole 240 of that card with the hold-back tab 231. The inclined surface of the indexing finger 225 faces in the direction of withdrawal of the transfer mechanism 218, thereby permitting it to easily slide away from the front card in the stack 242 without moving the card. In this fully withdrawn position of the transfer unit 218, the front card of the displaced stack 241 and the rear card of the remaining stack 242 are urged forwardly and rearwardly, respectively, by the resilience of the stacked cards into engagement with the forward frame wall 219 of the transfer unit 218 and the rear wall base of the case 210. The cards 214 are now arranged substantially in the order shown in FIG. 12.

Upon reinsertion of the transfer mechanism 218 into the case 210, the indexing finger 225 on the transfer unit 218, having engaged the hole 240 in the card 214a, moves this card freely from the inclined surface of 231 and places it in front of the stack 242. Simultaneously,

the Z-tabs of the card 214b are engaged by the frame end members 221 and transferred to the right until the hole 240 therein receives the hold-back piece 231. At the back end of the case 210, the hold-back tab 230 prevents moving the card 214c engaged thereon and the stack 241 is slidably repositioned between the card 214c and the card 214b. The inclined surface of the hold-back tab 223 slides freely over the card 214d at the rear of the stack 242 and becomes engaged with the hole 240 therein. The display at this point has undergone a half-change, that is, half of the original picture or sign is still presented for viewing. Recycling the transfer mechanism 218 again will complete the change as in the manner with all skip-framing devices.

It is to be understood, of course, that additional stages may be provided in this embodiment within the skip-framing technique of the present invention. Thus, two or more cards might be present between the stacks 241 and 242 in side-by-side relation. Also, a light might be employed in the void between the front and rear of such cards if this were the case.

For purposes of clarity, this embodiment also has been described by reference only to the bottom dividers and Z-tab engagement parts. It is to be understood, however, that corresponding upper elements are included in the device. In addition, although a front viewing opening 211 only is shown, a rear opening is also contemplated for making use of both faces of the cards 214.

A modified non-skip transfer mechanism 218' of the slidable type hereinabove described and adapted for use as a slide viewer is illustrated in FIG. 15. The same mode of transfer is employed, but only the center slide, corresponding to card 214a in FIG. 12, is viewable. Thus, changing of the slide is accomplished merely by pushing the transfer mechanism 218' inwardly of the viewer 210. Return of the transfer 218' for recocking the viewer is accomplished automatically by a spring 261, which is compressed upon actuation of the transfer mechanism. A light 262 positioned above the viewable slide is powered by a batter 263.

Of course, a three-dimensional viewer may be constructed by the same principle, using a second unit at the same time and viewing two slides.

Turning now to FIGS. 16, 17, and 18, it may be seen that the skip-frame animation techniques described herein may be applied in large exhibit structures, such as the round exhibit 310 having a base or floor 365 and a header 366. The header 366 may contain the necessary motor and drive mechanism and may be connected to the floor 365 through a central column in the exhibit 310.

In FIG. 17, a convex display as may be viewed from outside the exhibit 310 is illustrated, and in FIG. 18, there is shown a concave arrangement for viewing from within the structure. Obviously, the two might be combined for simultaneously presenting both displays.

Magazines 318 having ring-like bases 367 and similar tops (not shown) and a plurality of adjacent semi-circular dividers 328 thereon are provided. The dividers 328 have a width substantially equal to the indentation on the base and top edges of the sign strips or cards 314, which may be either the "S" or "Z" type cards illustrated in FIGS. 8 and 12, for accommodating such cards and permitting a display having no breaks therein

for supporting structure, guides or the like. An axially disposed column 368 within each divider provides a circular path of movement within the magazine 318 for each set of cards 314.

The magazines 318 are reciprocally movable or rotatable about the axes thereof, being driven by a motor 351 in one direction through a suitable gear reducing network and, if desired, returned to the original position by a spring 361. A suitable ratchet mechanism is contemplated in this case. Other conventional devices for reciprocating the magazine may also be employed.

As shown, a stationary ring-shaped transport plate 369 is provided with alternating rounded projections 324 and indexing tabs 323 on one surface thereof and is positioned adjacent the magazine 318. Upon movement in one direction through an arc equal to the distance between an indexing tab 323 and an adjacent projection 324, the magazine will cause a card 314 to be displaced from the front on one side of the column 368 to the front on the other side thereof by the tab 323. After being returned to the original position, the magazine may again be cycled to complete an entire display change.

Another embodiment featuring a non-skipping, dissolve and display arrangement is shown in FIGS. 19, 20, and 21. In this arrangement, a display structure 410 is provided with front and rear openings 411 and 412, respectively, for viewing through each four separate pictures or signs 441, 442, 443 and 444. Two of these units, namely, 441 and 443, are movably disposed on the structure 410 and are capable of presenting another side thereof for viewing when so moved.

Thus, an elongate substantially rectangular frame 418 is reciprocally disposed within the structure 410, driven in such path by a motor 451 and a suitable driving connection. Supported on each face of the frame 418 is a pair of endless belts 441 and 443 of such proportions to present full signs or pictures. Each belt 441 and 443 is provided with notches or cut-outs 440 for receiving projections 423 and 425 fixed on the structure 410 adjacent the path of the frame 418.

Upon movement of the frame 418 to the right, as viewed in FIGS. 19 and 20, the belts 441 and 443 are rotated by the projections 423 as they are moved by the projections, which engage the notches 440. This movement displaces the belts 441 and 443 to the right and turns a different face of such belts to the front, or rear, as the case may be. Simultaneously, a different picture on an elongated rectangular center piece 470 is uncovered from behind each of the displaced belts. When returned to the original positions, the belts are again turned, this time by projections 425, and the original display is again presented.

Several modifications of this embodiment are contemplated, such as, for example, moving the center piece 470 and maintaining the belt units stationary. On the other hand, both may move, or the center piece 470 might be constructed as a separate set of belt units. Also, the center piece may be a transparent light box and the belt units opaque material or such units may be employed in skip-frame structures.

A skip frame animation unit using flat and rigid substantially rectangular-shaped panels or cards, instead of the resilient, foldable types hereinbefore described, is

shown in FIGS. 22, 23 and 24, wherein the pick-up holes on the panels are programmed to be transport mechanism.

A plurality of panels, shown eight in number and designated by the numerals 514 a through h for purposes of clarity in describing the operation of the display unit, are the front or end panels of a plurality of stacks of such cards or panels. It is to be understood that only the lower or bottom portions of the panels 514, which contain the various openings and such features cooperative with the transfer and mechanism generally indicated by the numeral 518 and disposed in the bottom of the display cabinet 510, are shown in FIG. 22. Each of the panels 514 has a hold-back opening or cut-out 540 positioned midway of its width at a predetermined distance from its bottom edge, and a pair of indexing holes or cut-outs 539 disposed therebelow at vertically diagonal positions thereon. The panels 514 are arranged so that half the number are set back one panel-thickness from the other half in order to provide for ready transfer of the forwardly disposed panels, namely, 514b, 514d, 514e and 514g, to the front of the set-back panels, 514a, 514c, 514f and 514h, respectively. Also, it may be observed that the diagonal cut-outs 539 of the cards or panels 514 in each stack are alternately arranged, first with the upper hole or cut-out at the right and the lower hole at the left, then with the upper hole at the left and the lower hole at the right.

Disposed on a cut-out shelf or channel 571 in the cabinet 510 is a panel hold-back element 530 having corner round-configured, hold-back tabs 530', being shown four in number, thereon, two of which are shown in FIG. 22 engaging the holes 540 in the panels 514a and 514c for preventing movement thereof in the direction of panels 514b and 514d, respectively, and two of which engage the holes 540 in panels 514f and 514h for preventing movement thereof in the opposite direction. The hold-back element 530 is urged in the direction of the stacks of panels 514 by the engagement of flat spring members 572 on one edge thereof with the inner surface of another part of the frame, not shown, of the cabinet 510.

Similar elongate and parallel, horizontally extending shelves or channels 573 and 573' are cut out from the cabinet 510 below the channel 571 for housing upper and lower sets of camming and indexing elements 519, designated for purposes of clarity in understanding the invention, as the upper elements 519a and 519b and the lower elements 519c and 519d. Each of the elements 519 includes an elongate structure substantially square in cross-section, having on one longitudinal surface thereof facing the panels 514, a pair of indexing tabs 525 for engaging the holes 539 in the panels 514, a flat surface 574 adjacent each tab 525 for flushly bearing against the panel engaged by the respective tab, an intermediate flat surface 575 for bearing against the panel 514 disposed between the two panels engaged by the tabs 525 thereon, and an end flat surface 576 for bearing against a part of the panel adjacent thereto. On the opposite longitudinal surface of the element 519, there is cut thereinto a notch 577 having one surface perpendicular to the longitudinal outer surface and another sloped surface therefrom to such outer longitudinal surface in the direction in which the indexing tabs

525 thereof move the panels which they engage. The upper and lower surfaces of the horizontally disposed elements 519 are flat for being slidably received in the channels 573 and 573', which are of a length substantially equal to the width of all the stacks of panels placed side-by-side, in the case shown, as wide as eight panels, whereas the elements 519 are as long as about 3½ panels 514 are wide.

In FIG. 23, there is shown an enlarged actuator mechanism for the camming and indexing elements 519 which comprises upper and lower bars 578 and 578', respectively, movably disposed in opposite reciprocable paths within the cabinet 510 against the back surface of the frame structure into which the channels 573 and 573' are cut, by any suitable mechanical driving device. Each of the reciprocable bars 578, 578' is provided with a pair of spring-loaded camming blocks 580 having limited movement within cut-out, rectangular slots 581 thereon. To aid in the explanation of the operation of the device, the camming blocks are labeled 580a, 580b, 580c, 580d to relate the same to the corresponding indexing elements 519.

In practice, and starting with the elements in the positions illustrated herein, the upper actuator bar 578 is moved first to the left and the lower actuator bar 578' is simultaneously moved to the right. Thus, the block 580a moves out of the notch 577 in element 519a and cams or presses the element 519a inwardly toward the panels 514 so that the tabs 525 thereon engages the panels 514b and 514d. The block 580b slips into the notch 577 in element 519b, allowing it to withdraw from the retracted position shown in FIG. 22 under the push-back action on the reverse side, and upon further movement to the left, moves the element 519b and 519a therewith, thereby indexing the panels 514d and 514b, respectively, in front of the panels 514c and 514a.

At the same time, the block 580c, moving to the right, drops into the notch 577 in element 519c, allowing it to retract from the position shown in FIGS. 22 and 24, and block 580d rides out of the notch 577 in element 519d, camming or pressing that element inwardly to have the tabs 525 engage the panels 514e and 514g. Upon further movement of the bar 578', the block 580c moves the elements 519c and 519d therewith, whereby the panels 514e and 514g are transferred to the front of panels 514f and 514h.

When the movement in the reciprocable path is reversed, so that the upper actuator bar 578 moves to the right and the lower actuator bar 578' moves to the left, the same panel stacks are indexed to complete the skip-framing animation or changing of an entire picture or presentation, but in this case the upper element 519b causes the panels 514e and 514g to be indexed, whereas the lower element 519c causes the panels 514d and 514b to be indexed.

Although it has not been described, it is to be understood that a similar arrangement is provided on the opposite end of the panel stacks for indexing the panels 514a, 514c, 514f and 514h to the front face on the opposite end of the panel stacks 514b, 514d, 514e and 514g, respectively.

Referring now to FIG. 25, another embodiment similar in arrangement and mode of operation to that just described, and also using non-spring, rigid panels

or cards having pick-up or indexing holes therein which are programmed to the transfer mechanism, is shown in an expanded state. In this case, however, each of the panels 614 is provided with only a single hole 639, but the holes of adjacent panels either in the same stack or in the stack next to are disposed in vertically diagonal positions thereon as viewed from the front. Thus, when the device 681 is driven, the rod 678 thereon carries camming blocks or similar devices which are operative to first move the upper indexing elements 619a and 619b in one direction and the lower indexing elements 619c and 619d in the opposite direction, then vice-versa.

In this manner, upon movement of the rod 678 back into the cabinet 610, the element 619a is pressed forward to engage the panels 614a and 614c on the back side of the magazine 618 and the element 619d is pressed into engagement with the panels 614f and 614h, whereby these panels are transferred, respectively, to the panel stacks 614b, 614d, 614e and 614g. The same transfer is effected by elements 614b and 619c upon movement of the rod 678 in the opposite direction. Hold-back tabs 530 engage the vertical edges of the panels 614b, 614d, 614e and 614g, having a curved surface thereof facing the transferring stacks to permit easy passage thereover during transfer. As in the previous embodiment, a similar arrangement of parts exists on the opposite face of the panel stacks for transferring the opposite panels in the preselected manner.

Also, it may be clearly observed in FIG. 25 that the panels 614 are formed with cut-out portions in the corner edges thereof for fitting over divider element 628 and providing an uninterrupted message or picture when viewed collectively.

An embodiment is illustrated in FIG. 26 which may be used with either strip or dissolve devices and which features a special illumination arrangement. In this case, a lower support or carriage panel 784 supports an upright, substantially rectangular-shaped, fluorescent, neon or electroluminescent panel 785 over which is fitted a paper or cloth sleeve 786. An upper cap member 787 attaches to the top end of the sleeve. Another version of this embodiment is shown in FIGS. 27 and 28, wherein the sleeve 786 having lucite vertical strands is fitted over an inverted, U-shaped wire frame 785 and supported on a carriage 784 that is immersed in a water trough 788. A source of illumination 789 is disposed within the water and the water is continuously recirculated by a pump 790 to another trough 791 carried above the frame structure 710 and spilled over the sleeves 786.

Obviously, many modifications and variations of the present invention are possible in light of the above teachings. For example, skip frame arrangements as disclosed herein may be employed in a toy television set for creating a wide variety of animated presentations, or an educational question and answer display may be illustrated. Many other uses are envisioned. Accordingly, it is to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A skip frame viewing device comprising: a frame having top, bottom, front and rear wall sections connected together;

a plurality of folded information bearing cards disposed within said frame, each of said folded cards having vertical edge portions and furthermore being vertically supported on their respective end portions in at least two side-by-side stacks, said folded cards within each of said respective stacks exerting a pressure against each other and said frame thus maintaining said cards in their respective stacks,

means in said frame for dividing said stacks and normally maintaining the cards of each stack aligned with all the other cards in each of said stacks; and indexing means for engaging said edge portions of cooperating end cards and for sliding said cooperating cards individually in a predetermined sequence from the end of one stack to the corresponding end of an adjacent stack,

whereby a completely new piece of information depicted by the end cards in adjacent stacks is formed and displayed upon each transfer of two cards from one stack to the other.

2. A device according to claim 1 wherein said front and rear wall sections of said frame comprise front and rear viewing openings having top and bottom edges for permitting the end cards of said stacks to be viewed simultaneously.

3. A device according to claim 2 wherein said dividing means comprises:

vertically aligned divider elements secured to the top and bottom wall sections of said frame and disposed between said front and rear wall sections and in contacting relation with the front and rear wall sections each of said stacks being positioned adjacent one of said vertically aligned divider elements and

further vertically aligned divider elements secured to the top and bottom sections of said frame and disposed between said front and rear wall sections in spaced relation from said front and rear wall sections a distance substantially equal to the thickness of one of said information-bearing cards; said divider and said further divider elements having a vertical dimension less than the distance between the top and bottom of the viewing openings and the top and bottom wall section, respectively, of the frame.

4. A device according to claim 3 wherein said divider elements all are disposed obliquely between said front and rear wall sections for providing slanted stacks therein and thereby eliminating the passage of light between stacks.

5. A device according to claim 1 wherein said indexing means comprises a member reciprocably disposed in said frame in a direction transverse to said stacks and a pair of indexing tabs on said reciprocably disposed member for each pair of adjacent stacks,

one of said tabs being adapted to engage the end card on one side of one stack only for transferring said

card to the other stack upon movement of said indexing means in one direction,

the other of said tabs being adapted to engage the end card on the other side of the other stack in said adjacent pair of stacks for transferring said card to the first stack upon movement of said indexing means in a direction opposite to said one direction.

6. A device according to claim 5, further comprising additional means on said frame for engaging at least one of said end cards in each of said stacks for preventing said cards from being transferred during movement of said transferring means.

7. A device according to claim 6 wherein said card indexing means further comprise a pair of rounded projections on said reciprocably disposed member for each pair of adjacent stacks to facilitate compressing of the cards within the stacks.

8. A device according to claim 1, wherein each of said cards has a C-shaped cross-sectional configuration at least at its top and bottom edges and is formed from at least a single piece of firm, flexible material, the width at its upper and lower edges being smaller than at its intermediate main body area upon which said information is displayed.

9. A skip frame method of displaying information comprising the steps of:

arranging a plurality of folded cards on edge within a frame in at least two side-by-side stacks, each of said cards having thereon only a portion of a unit of information;

compressing said folded cards in each stack to hold the cards in position within the stacks in cooperating relationship with said frame and with end cards of each of said stacks abutting adjacent end cards; displaying the front cards of at least two of said stacks as an uninterrupted unit of information;

first sliding a front card by means of a reciprocable element from at least one of said stacks to the front of another of said stacks, whereby portions only of different units of information are displayed; and subsequently transferring another front card from said at least one of said stacks to the front of said another of said stacks by means of said reciprocable element, whereby a complete new unit of uninterrupted information is formed and displayed.

10. A method according to claim 9 comprising the further steps of:

sliding the backmost card from said another of said stacks to the back of said at least one of said stacks following said first sliding operation and

sliding another back panel from said another of said stacks to the back of said at least one of said stacks following said subsequent sliding operation.

11. A method according to claim 10 further comprising:

displaying the back cards of at least two of said stacks for forming an uninterrupted unit of information.

* * * * *