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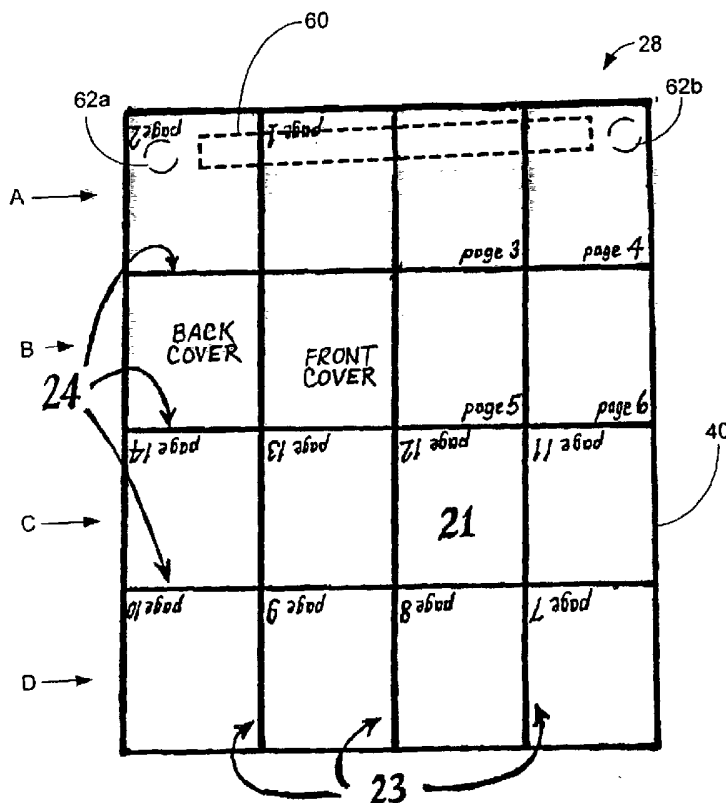
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ance Notes on Codes and Abbreviations" appearing at the begin-  
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(54) Title: COMBINED POSTER BOOK SYSTEM AND METHOD



(57) Abstract: A flat sheet of paper, or other thin flexible material, has information (52) printed on one side in the form of a plurality of discrete panels (29a, 29b, 34a, 34b, 36a, 36b, 38a, 38b) or areas of text or images, while the entire side is taken up by a large-scale, poster-like pattern. The panels or areas of text or images, are defined by crease lines (29, 34, 36, 38) created by folding the sheet of material. These creases are formed using a perpendicular fold method described in detail in this application. Each fold is perpendicular to the previous fold, creating a grid-like pattern (40), with each panel in the grid pattern containing a discrete quantity of text or images. When the invention is at its most folded state it has a relatively compact size. As the invention is unfolded, the panels of text or images are revealed in a specific sequence in order to tell a story or communicate some other type of sequentially ordered information. Once the entire sequence of information has been unfolded, the poster-like pattern on the back side of the sheet of material is unfolded and can be viewed and/or displayed.

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## COMBINED POSTER BOOK SYSTEM AND METHOD

## PRIORITY CLAIM TO PROVISIONAL APPLICATION

The present application claims priority to provisional patent application entitled,  
5 "Posterbook," filed on March 21, 2002 and assigned U.S. Application Serial No.  
60/366,304, the entire contents of which are incorporated by reference

## FIELD OF THE INVENTION

The invention relates to dual-sided single sheet printed information, which is  
10 folded to a compact size.

## BACKGROUND OF THE INVENTION

Patents have been granted to a variety of inventions for single sheet, dual sided  
printed matter, which is folded accordion style. These include U. S. Pat. No. 4,801,157  
15 issued on Jan. 31, 1989 to Sink for a map folded in an accordion style. U.S. Pat. No.  
5,234,231 was granted to Hollander et al. on Aug. 10, 1993 for a poster and catalog  
combination with accordion folds. And U.S. Pat. No. 4,538,833 issued to Trikilis on  
Sept. 3, 1985 for a publication capable of being read in a manner similar to a magazine  
that is folded in an accordion style.

20 The accordion style folded sheet imposes serious limitations in the manner in  
which the printed matter presented can be read. Accordion style folds are usually created  
in parallel, meaning that the entire sheet must be completely unfolded to read the last  
panels in the sequence. This means that readers are either forced to hold a large and  
bulky sheet in their hands as they read, or the readers are required to refold the sheet as  
25 they read. Furthermore, in an accordion style fold, an indicator is not present to inform  
the reader of a starting place when unfolding the sheet to begin to read. The reader could  
start on any one of the pleats in the zigzag accordion fold. Because of the lack of  
organization and complexity of the accordion style fold, usually much space is needed to  
read the sheet when it is unfolded. This necessity for space makes the accordion style  
30 fold unsuitable for small quarters such as in the space of volume of a car, plane, etc.  
Another problem with the accordian style fold is it is difficult to gain access to particular

sections that are at the bottom of a folded sheet. Often, the entire sheet must be open to gain access to sections at the bottom of the folded sheet.

Also, when the panels are intended to be a specifically sequenced series of panels of text and images, the accordion style fold is not the ideal form of presentation because  
5 of the problems mentioned above.

Unrelated to the problems associated with the accordion style folded sheets are problems associated with book publishing. Currently, book publishing expenses frequently deter potential authors from communicating their written word to audiences. Book publishing can be expensive because of the complex procedures and requisite  
10 materials needed to make a book. For example, book manufacturing often involves complex paper cutting procedures and binding methods. In addition to the costs associated with book publishing are expenses associated with shipping published books. Books are often large and bulky and not amenable for compact storage.

Accordingly, there is a need in the art for presenting printed matter on a medium  
15 in an organized fashion where the medium is not bulky and does not require significant expense to manufacture. Another need exists in the art for presenting printed matter on a medium that can be folded and unfolded without confusing the reader.

#### SUMMARY OF INVENTION

This invention can comprise a series of perpendicular folds in order to solve the  
20 problems of the conventional accordion-fold design. The perpendicular-fold method of the present invention can provide an improved way for a story to be told through a single sheet folded booklet design. This invention can be designed for printed matter which tells a story, but the design can be applicable to any printed matter that requires a specific  
25 sequence of discrete portions of information, such as pages in a book.

The present invention can provide an appropriate and simple way to read a story or other sequence of information as told by a series of panels printed on the same side of a sheet of paper and folded into a booklet, forming a combined poster book. When the reader first receives a booklet, which is produced using the perpendicular fold method,  
30 the booklet can be in its most compact state. The reader can then unfold the booklet,

revealing new panels in a specific sequence. The way in which a reader can unfold and read this invention is quite unique.

With each subsequent unfolding, the booklet grows in size in the readers hand, yet never becomes so large as to be unmanageable. Furthermore, the reader usually does not  
5 need to make any extra refoldings or turnings of the booklet: each subsequent unfolding immediately presents the set of panels that the reader can read next in the sequence.

This invention offers readers an advantageous way to read a story or other printed material. Unfolding the book and poster combination of the present invention can be fun and interesting, particularly for children. Once the reader has finished reading the  
10 booklet, the booklet can be fully unfolded to reveal a full-size poster comprising printed matter suitable for display. According to one exemplary aspect, the full-size poster comprises information that can be related to the story on the opposing side. For example, the poster can relate to a theme of the story.

#### 15 BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a sheet of thin, flexible material in an uncreased state that is suitable for folds according to one exemplary embodiment of the present invention.

FIGS. 2-10 illustrate one exemplary set of steps in the perpendicular fold method according to one exemplary embodiment of the present invention.

20 FIG. 11 illustrates an exemplary resulting grid pattern of panels after a series of four perpendicular folds according to one exemplary embodiment of the present invention.

FIG. 12 illustrates an exemplary front plan of the cover sheet of a sheet folded according to one exemplary embodiment of the present invention that also comprises  
25 printed matter arranged in a predetermined sequence.

FIGS. 13-20 illustrate the sequence for unfolding a completed embodiment of the invention.

FIG. 21 illustrates a side of a combined poster book that is opposite to the side of the combined poster book illustrated in FIG. 18.

FIG. 22 illustrates an exemplary front plan view of a completely unfolded sheet, showing the side on which the discrete panels containing text or images are defined by fold lines according to one exemplary embodiment of the present invention.

FIG. 23 illustrates a rear plan view of the unfolded sheet showing an exemplary poster according to one exemplary embodiment of the present invention.

#### DETAILED DESCRIPTION OF THE DISCLOSURE

Referring now to FIG. 1, this figure illustrates a sheet **20** of thin flexible material which is in an uncreased state. FIG. 2 to FIG 10 illustrate one exemplary fold process of taking an uncreased sheet **20** of thin flexible material and folding it using a perpendicular fold method to render an embodiment of the present invention. The flexible material of the present invention can comprise paper, and specifically, plasticised paper. However, other flexible materials are not beyond the scope of the present invention. Other flexible materials can include, but are not limited to fabric or cloth materials, plastic, metal, cardboard, and combinations thereof that can be folded and unfolded in accordance with the present invention. For a non-limiting example, the flexible material could comprise mylar or other foil-like materials that can support printed matter.

In FIG. 2, a transverse or latitudinal first crease **29** can be made in the sheet **20** of material, dividing it in half and into upper and lower sections **29a** and **29b**. Each crease discussed herein has less fold-resistance than uncreased material but each crease also has enough strength to be folded and unfolded numerous times with minimal or reduced tearing. It is desirable that the material of the sheet **20** does not tear but it is recognized that with age of any sheet of folded material at some point failure or tearing can occur.

FIG 3 illustrates the sheet **20** of material being folded about the first crease **29**. Once the fold is complete, the upper half section **29a** of the first side surface is in an inwardly facing direct contacting relationship with the lower half section **29b** of the first side surface. Specifically, the lower half section **29b** is moved in an upward manner and closed along the first crease **29** towards the upper half section **29a** such that the upper half section **29a** remains stationary during this fold subprocess.

FIG. 4 illustrates the sheet **20** after the first fold along first crease **29** (shown in FIG. 5). As seen FIG. 4, the original sheet **20** of material has been folded once such that

it is two sheets thick. The top edge of FIG. 4 is the crease 29 from FIGs. 2 and 3. A second crease 34 is then made in sheet 20 dividing it in half and into first and second side sections 34a and 34b. The second crease 34 is a longitudinal crease that is oriented at ninety degrees relative to the first transverse or latitudinal crease 29.

5 FIG. 5 illustrates the sheet 20 of material being folded about the second crease 34 where the first side section 34a is moved or closed along the second crease 34 towards the second side section 34b, the second side section 34b remaining stationary during this fold subprocess. Once the fold is complete, the first side section 34a is in an inwardly facing direct contacting relationship with the second side section 34b. FIG. 6 illustrates  
10 the sheet 20 after the second fold along second crease 34 (shown in FIG. 5). As seen in FIG. 6, the original sheet 20 of material has been folded twice such that it is four sheets thick. The side edge of FIG. 6 is the second crease 34 from FIGs. 4 and 5.

A third crease 36 is then made in sheet 20 dividing it in half and into first and second half sections 36a and 36b. The third crease 36 is a transverse or latitudinal  
15 crease that is oriented at ninety degrees relative to the second longitudinal crease 34.

FIG. 7 illustrates the sheet 20 of material being folded about the third crease 36 where the upper section 36a is moved or closed along third crease 36 towards the lower section 36b, the lower section 36b remaining stationary during this folding subprocess. Once the fold is complete, the first upper section 36a is in an inwardly facing direct  
20 contacting relationship with the second lower section 36b. FIG. 8 illustrates the sheet 20 after the third fold along third crease 36 (shown in FIG 7). As seen FIG. 8, the original sheet 20 of material has been folded three times such that it is eight sheets thick. The top edge in FIG. 8 is the crease 36 from FIGs. 6 and 7.

A fourth crease 38 is then made in sheet 20 dividing it in half and into first and  
25 second half side sections 38a and 38b. The fourth crease 38 is a longitudinal crease that is oriented at ninety degrees relative to the third latitudinal or transverse crease 36.

FIG. 9 illustrates the sheet 20 of material being folded about the fourth crease 38 where the first side section 38a is moved or closed along the fourth crease 38 towards the second side section 38b, the second side 38b section remaining stationary during this fold  
30 subprocess. Once the fold is complete, the first side section 38a is in an inwardly facing direct contacting relationship with the second side section 38b. FIG. 10 illustrates the

sheet 20 after the fourth fold along fourth crease 34 (shown in FIG. 8). As seen in FIG. 10, the original sheet 20 of material has been folded four times such that it is sixteen sheets thick. The side edge in FIG. 10 is the crease 38 from FIGs. 8 and 9.

FIG. 11 illustrates an exemplary grid pattern 40 resulting from four perpendicular creases made in accordance with an exemplary embodiment of the present invention. It is noted that the invention is not limited to four perpendicular folds. The number of folds chosen is simply based on the number of panels desired in the finished product. Four folds were chosen as an example since it is a simple example to illustrate. In summary, FIGs. 1-9 illustrate an exemplary folding process where each fold made is perpendicular to a previous fold and where each fold reduces the surface area of the booklet by fifty-percent.

Referring now to FIGs. 12-21, these figures illustrate the process of unfolding a combined poster book 28 according to one exemplary embodiment of the present invention. In Figure 12, a cover 50 of the combined poster book 28 is illustrated. The cover 50 has printed matter 52 that is oriented such that it can be read. In the folded state illustrated in FIG. 12, the combined poster book 28 of the exemplary embodiment illustrated is sixteen pages in thickness. However, those skilled in the art will appreciate that the present invention can have any number of folds and therefore, the thickness could be increased or decreased when the combined poster book 28 is in its most compact state as illustrated in FIG. 12.

Referring now to FIG. 13, this figure illustrates the opening of the combined poster book 28 along a fourth crease 38 that comprises a fold in the combined poster book 28. The cover 50 can be opened similar to a book. That is, the cover 50 can be turned so that an opposite side 53 comprising page 1 of some printed matter can be read as illustrated in FIG. 14. FIG. 14 further illustrates a page 2 of printed matter that is on an opposite side of the fourth crease 38. Perpendicular to the fourth crease 38 and located on a top portion of pages 1 and 2 is a third crease 36.

FIG. 15 illustrates the opening of the combined poster book 28 along the third crease 36 that comprises a fold in the combined poster book 28. Pages 1 and 2 can be turned so that an opposite side of pages 1 and 2 comprising pages 3 and 4 of some printed matter can be read as illustrated in FIG. 16. FIG. 16 further illustrates pages 5 and 6 of

printed matter that is on an opposite side of the third crease 36. While pages 3, 4, 5, and 6 are oriented such that they can be read from left to right, and then row by row, it is not beyond the scope of the present invention to sequence the printed matter such that the reading order would be page 3, 5, 4, and 6 or top-down, column by column. Any number of orientations of the printed matter can be used without departing from the scope and spirit of the present invention. Perpendicular to the third crease 36 and parallel to the fourth crease 38 and located on a side portion of pages 3 and 5 is a second crease 34.

FIG. 17 illustrates the opening of the combined poster book 28 along the second crease 34 that comprises a fold in the combined poster book 28. Pages 3, 5, 4, and 6 can be turned as a unit or whole page so that an opposite side of this grouped set of pages comprising pages 7, 8, 11, and 12 of some printed matter can be read as illustrated in FIG. 18. FIG. 18 further illustrates pages 9, 10, 13, and 14 of printed matter that is on an opposite side of the second crease 34. While pages 7, 8, 9, 10, 11, 12, 13, and 14 are oriented such that they can be read from left to right, and then row by row, it is not beyond the scope of the present invention to sequence the printed matter such that the reading order could comprise page 7, 11, 8, 12, 9, 13, 10 and 14 or top-down, column by column. Any number of orientations of the printed matter can be used without departing from the scope and spirit of the present invention. Perpendicular to the second crease 34 and located on a bottom portion of pages 11, 12, 13, and 14 is a first crease 29.

FIG. 19 illustrates the opening of the combined poster book 28 along the first crease 29 that comprises a fold in the combined poster book 28. Pages 7, 8, 9, 10, 11, 12, 13, and 14 can be turned as a unit or whole page so that an opposite side of this grouped set of pages comprising a poster 27 of some printed matter can be read as illustrated in FIG. 20.

Referring to FIG. 21, this figure illustrates the opposite side of pages 7, 8, 9, 10, 11, 12, 13, and 14 when the combined poster book 28 is in folded state where the only remaining fold is along the first crease 29. This opposing side can be viewed if the side comprising pages 7, 8, 9, 10, 11, 12, 13, and 14 is rotated by 180 degrees.

Referring now to FIG. 22, this figure illustrates a first side of an exemplary combined poster book 28 according to one exemplary embodiment of the present invention wherein the combined poster book 28 is in an unfolded state. The combined



poster book 28 comprises a sheet of thin flexible material with a plurality of both longitudinal and latitudinal creases 23 and 24. FIG. 22 illustrates the orientation of the printed matter relative to each other as the poster book would be made prior to folding. The printed matter can comprise text, images, or a combination thereof. The printed matter can be arranged according to the page numbers discussed below so that information can be presented to a reader and logical and comprehensible manner similar to that of a book.

The order or sequence of the printed matter in combination with the perpendicular folding comprises one inventive aspect of the present invention where the printed matter on the panels is arranged such that when the poster book 20 is unfolded, the panels are in a prearranged or predetermined order as illustrated in FIG. 22.

Specifically, pages 1, 2, 3 and 4 are located in a first row A comprising cells of a grid pattern 40 where page 2 is positioned in the first column in a first cell; page 1 is positioned in the second column in a second cell; page 3 is positioned in the third column in a third cell; and page 4 is positioned in the fourth column in a fourth cell. Pages 1 and 2 are positioned such that their printed matter is oriented upside down or 180 degrees relative to pages 3 and 4 that are oriented in right-side up or correct readable orientation.

The back cover and front cover and pages 3 and 4 are located in a second row B of cells in the grid pattern 40 where the cover is positioned in the first column in the first cell; the back cover is positioned in the second column in the second cell; page 5 is positioned in the third column in the third cell; and page 6 is positioned in the fourth column in the fourth cell. For this second row B, the back cover and front cover as well as pages 3 and 4 are oriented in a right-side up or correct readable orientation relative to other printed matter on the same surface.

Pages 11, 12, 13 and 14 are located in a third row C of cells in the grid pattern 40 where page 14 is positioned in the first column in the first cell; page 13 is positioned in the second column in the second cell; page 12 is positioned in the third column in the third cell; and page 11 is positioned in the fourth column in the fourth cell. All pages in third row C are positioned such that their printed matter is oriented upside down or 180 degrees relative to other printed matter on the same surface.

Pages 7, 8, 9 and 10 are located in a fourth row **D** of cells in the grid pattern 40 where page 10 is positioned in the first column in the first cell; page 9 is positioned in the second column in the second cell; page 8 is positioned in the third column in the third cell; and page 7 is positioned in the fourth column in the fourth cell. Like the third row **C**, all pages in fourth row **D** are positioned such that their printed matter is oriented upside down relative to other printed matter on the same surface.

As noted above, the number and sizes of the cells are not limited to those illustrated in the figures. More or fewer cells as well as smaller or larger cells are not beyond the scope of the present invention.

Also illustrated in FIG. 22 are various optional mechanical structures that can be used to fasten the poster book 28 to a surface once it is unfolded so that the poster 27 illustrated on the opposite side can be displayed. One optional mechanical structure comprises a transparent strip or region of an adhesive 60 that can be applied to the poster book during manufacture. The adhesive can have a strength such that it can support the weight of the poster book 28 on a flat surface. However, the strength of the adhesive should not be strong enough as to prevent folding and unfolding of the poster book 28 prior to hanging the unfolded poster 27.

Another optional mechanical structure comprises apertures 62a and 62b. The apertures can be dimensioned so as to receive mechanical fasteners such as screws, nails, tacks, etc. The orientation, number, and size of the apertures 62a and 62b as well as the adhesive 60 are not limited to those shown in FIG. 22. Other orientations, numbers, and sizes of the apertures 62a and 62b as well as the adhesive 60 are not beyond the scope of the present invention.

Referring now to FIG. 23, this figure illustrates a second side of the exemplary combined poster book 28 illustrated in FIG. 22 wherein the combined poster book 28 is in an unfolded state. This figure illustrates an optional orientation of the poster 27 comprising printed matter that is displayed on the entire second side. Other orientations of the poster 27 comprising the printed matter can be made without departing from the scope and spirit of the present invention. If the poster 27 was rotated 180 degrees about longitudinal axis X-X, then the side of combined poster book 28 illustrated in FIG. 22 would be visible. As mentioned above, the relative orientation of the printed matter as

well as the number of folds and the size of the unfolded, combined poster book 28 can be adjusted or changed without departing from the scope and spirit of the present invention.

Exemplary applications for the combined poster book 28 include children's stories, instructional manuals, greeting cards, promotional materials, sales materials and conference announcements. For children's books, children can enjoy the unique physical way in which the story unravels as well as the layout of images and text inherent to the combined poster book design. Children can also enjoy being able to put a poster up on their wall after finishing a poster book story.

For commercial marketing pamphlets, the combined poster book 28 can also be extremely useful as a pamphlet for a variety of companies from grocery stores to outdoor retailers. For example, suppose that a grocery store wants to explain and describe the different classifications of traditional, free range and organic chicken. A poster book 28 could be designed to explain these differences by way of a story with text and illustrations. The poster side of the poster book 28 could then have a large format illustration of the different categories of chicken which could be posted in the supermarket.

Another exemplary application for the hotel book could include using it as a training manual. For example, employees of a hotel who handle food must go through lengthy training programs to learn about proper methods of cleanliness. A poster book 28 could be a valuable learning tool for these types of classes. The methods of cleanliness could be explained in the unraveling of the poster book 28 and an illustrated list of rules could be printed on the poster and hung up for a highly visible reminder.

While preferred embodiments of the invention have been shown and described in detail, other modifications will be readily apparent to those having ordinary skill in this art. Accordingly, this disclosure should be regarded as exemplary rather than limiting, and the scope of the invention should be considered to be defined solely by the following claims.

What is claimed is:

1. A combined poster book comprising:

a sheet (20) of flexible material comprising a first surface (21), a second  
5 surface (27), and a plurality of creases;

the first surface (21) comprising printed matter arranged in a  
predetermined sequence, the predetermined sequence presenting a logical flow of  
information such that when the sheet is in a folded state, each unfolding of the booklet  
reveals the printed matter in the predetermined sequence and in a comprehensible manner  
10 without any additional refolding or turning of the combined poster book; and

the second surface (27) comprising printed matter.

2. The combined poster book of claim 1, wherein the printed matter comprises at  
least one of text and images.

3. The combined poster book of claim 1, wherein the printed matter on the first  
surface comprises text of a story.

4. The combined poster book of claim 1, wherein the printed matter on the first  
20 surface comprises images of a story.

5. The combined poster book of claim 1, wherein the printed matter on the  
second surface comprises a poster.

6. The combined poster book of claim 1, wherein each crease has less fold-  
25 resistance than uncreased material but having enough strength to be folded and unfolded  
numerous times with minimal or reduced tearing.

7. The combined poster book of claim 1, wherein the creases in the sheet form a  
30 grid when the sheet is in an unfolded state.

8. The combined poster book of claim 1, wherein the sheet comprises a substantially rectangular shape when in a folded state and in an unfolded state, the rectangular shape of the unfolded state being larger than the rectangular shape of the folded state.

5

9. The combined poster book of claim 1, further comprising an attachment mechanism.

10. The combined poster book of claim 9, wherein the attachment mechanism comprises one of an adhesive (60) and an aperture (62a, 62b).

11. The combined poster book of claim 1, wherein the creases are formed by a perpendicular folding method.

15 12. The combined poster book of claim 1, wherein when the sheet is in a most compact folded state, one side of the sheet comprises printed matter of a front cover to a story and another side of the sheet comprises printed matter of a back cover to a story.

20 13. The combined poster book of claim 1, wherein the material comprises one of paper, plasticised paper, fabric, cloth, plastic, metal, cardboard, and combinations thereof.

14. A method for conveying information to a reader comprising:

unfolding a sheet of material in a folded state such that printed matter on a first surface of the sheet is revealed in a logical sequence in according with each unfolding action, each unfolding action increasing the surface area of the sheet; and

5 after a last unfolding action, conveying information to the reader on a second surface of the of the entire sheet.

15. The method of claim 14, wherein during each unfolding of the sheet occurs along a crease that is ninety degrees relative to a previous fold.

10

16. The method of claim 14, further comprising the step of attaching the sheet to a flat surface such that the first surface faces the flat surface.

17. A sheet of material comprising:

a plurality of folds that form a grid of cells when the sheet of material is in an unfolded state; and

printed matter positioned on a first surface of the sheet of material in each cell,  
5 wherein a first row of cells comprises printed matter of a first four pages of a story, the second page of the story being positioned in a first cell, the first page of the story being positioned in a second cell adjacent to the first cell, the third page of the story being positioned in a third cell adjacent to the second cell, and the fourth page of the story being positioned in a fourth cell adjacent to the third cell;

10 and printed matter positioned on a second surface of the sheet of material that is independent of the cells.

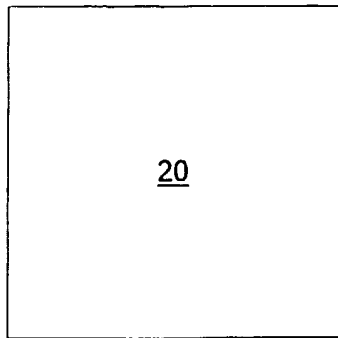
18. The sheet of claim 17, wherein the printed matter of the first and second pages of the story are oriented at one-hundred and eighty degrees relative to the printed  
15 matter of the third and fourth pages of the story.

19. The sheet of claim 17, further comprising a second row of cells comprising printed matter of a back cover of the story, a front cover, a fifth page of the story, and a sixth page of the story, the back cover being positioned in a first cell, the front cover of  
20 the story being positioned in a second cell adjacent to the first cell, the fifth page of the story being positioned in a third cell adjacent to the second cell, and the sixth page of the story being positioned in a fourth cell adjacent to the third cell.

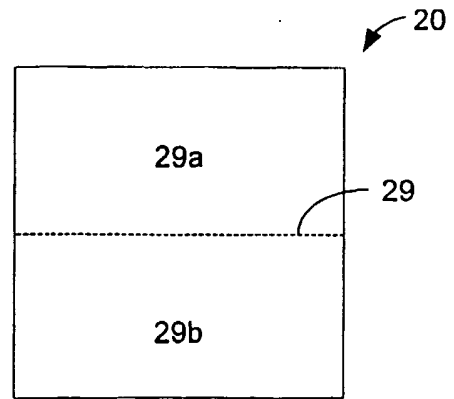
20. The sheet of claim 17, wherein the printed matter for the back cover, the front  
25 cover, the fifth page, and sixth page are oriented in the same direction.

21. The sheet of claim 17, wherein the printed matter on the second surface comprises information that is related to the printed matter on the first surface.

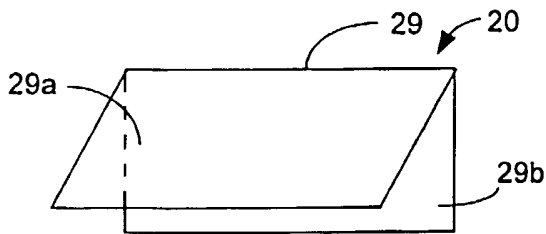
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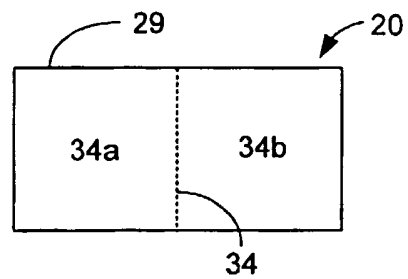
**FIG. 1**



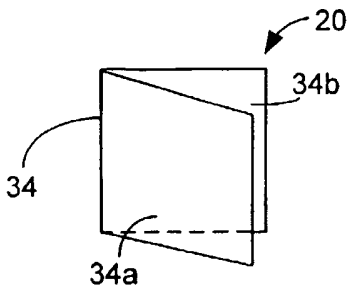
**FIG. 2**



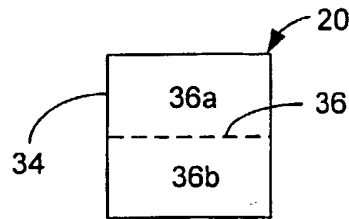
**FIG. 3**



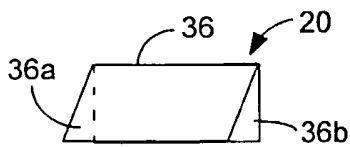
**FIG. 4**



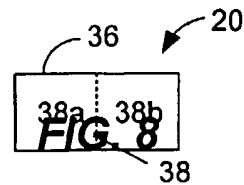
**FIG. 5**



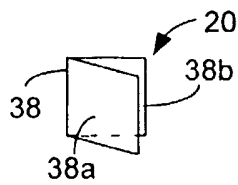
**FIG. 6**



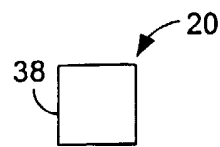
**FIG. 7**



**FIG. 8**



**FIG. 9**



**FIG. 10**



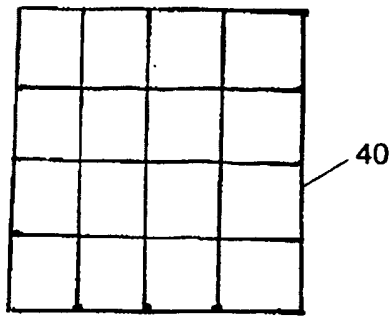


FIG. 11

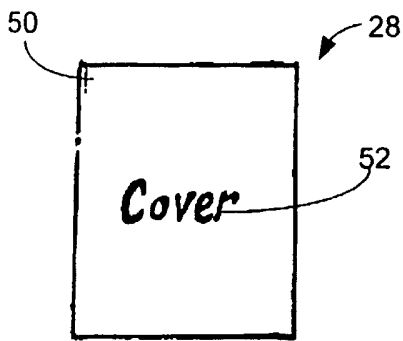


FIG. 12

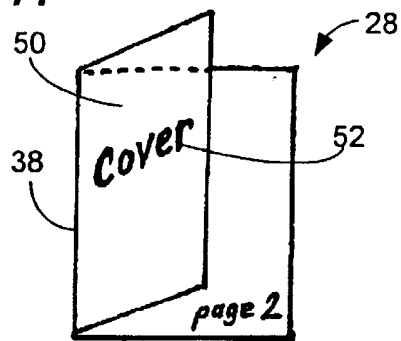


FIG. 13

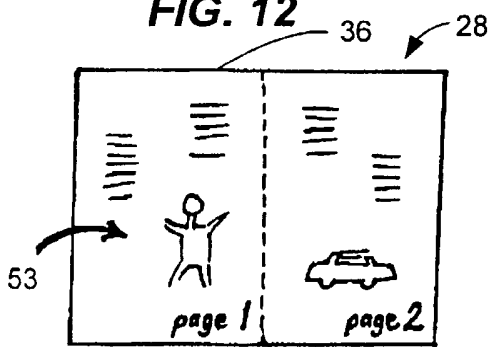


FIG. 14

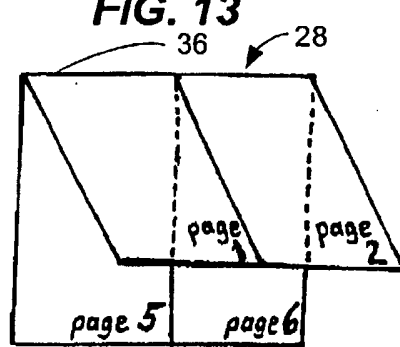


FIG. 15

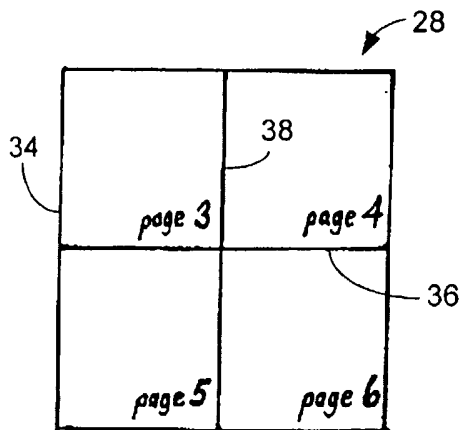


FIG. 16

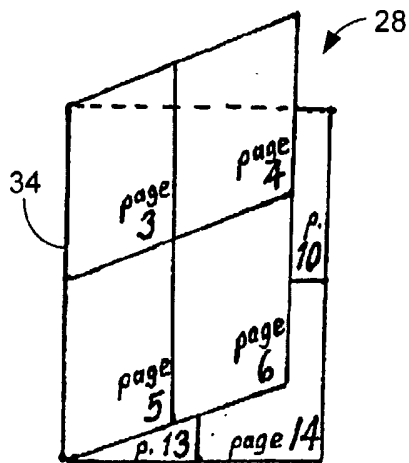


FIG. 17

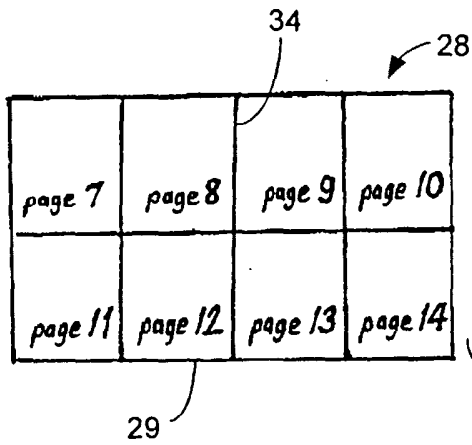


FIG. 18

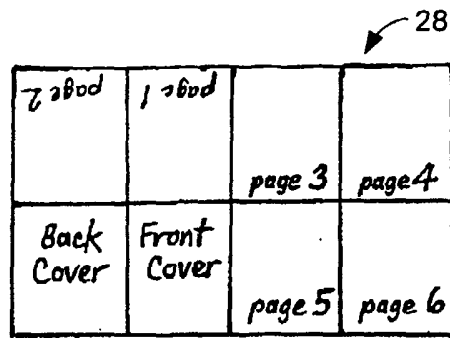


FIG. 21

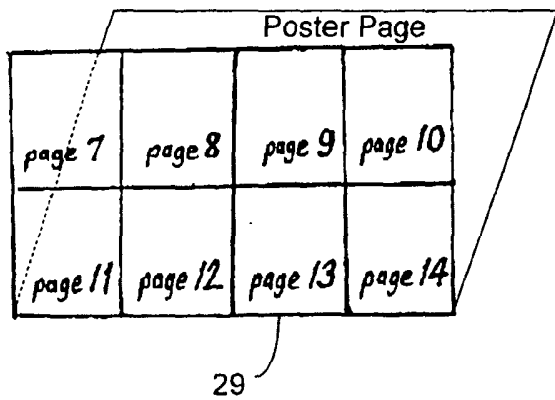


FIG. 19

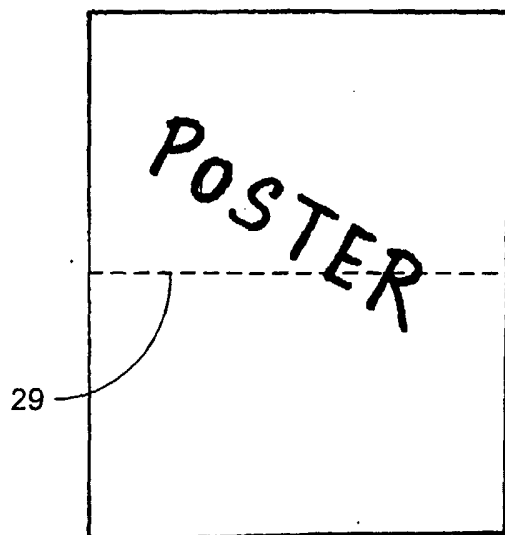


FIG. 20

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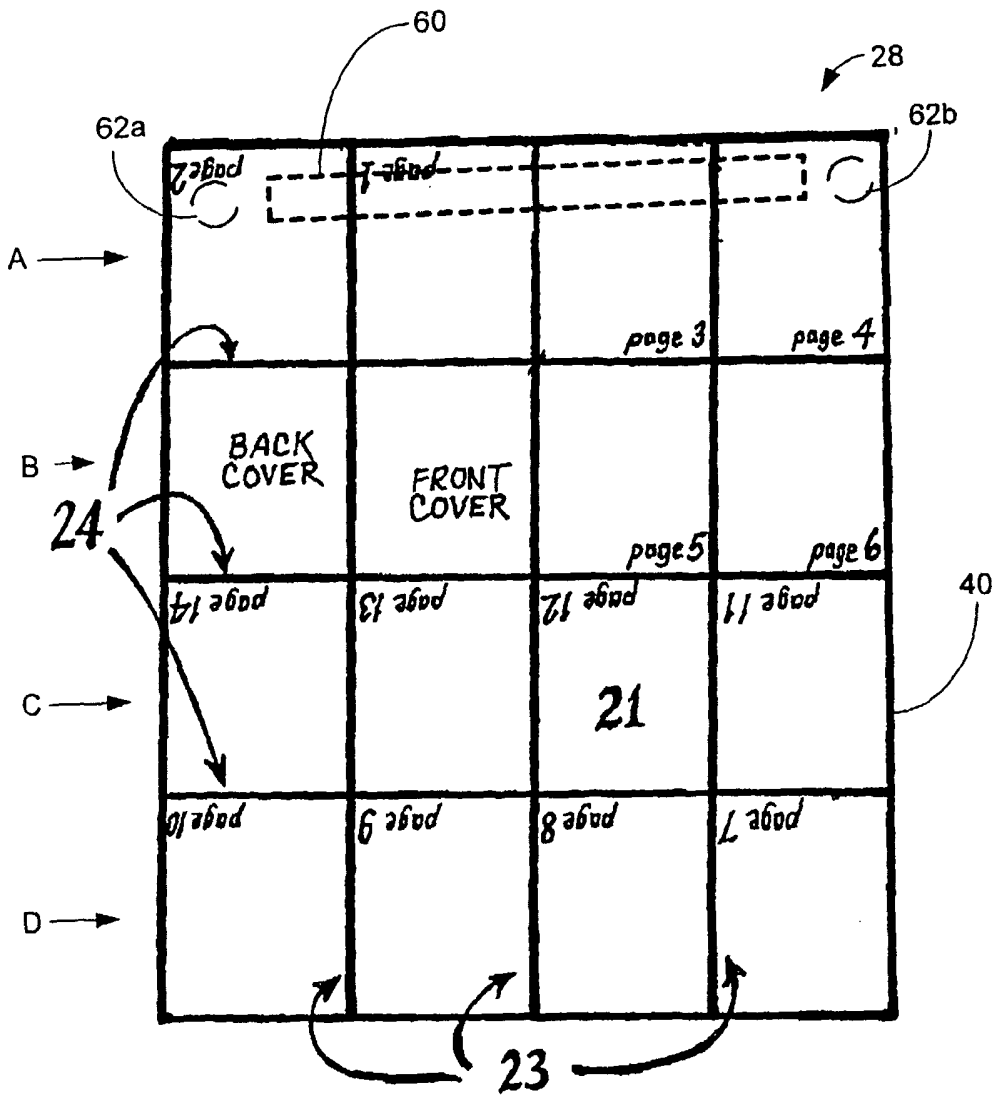


FIG. 22

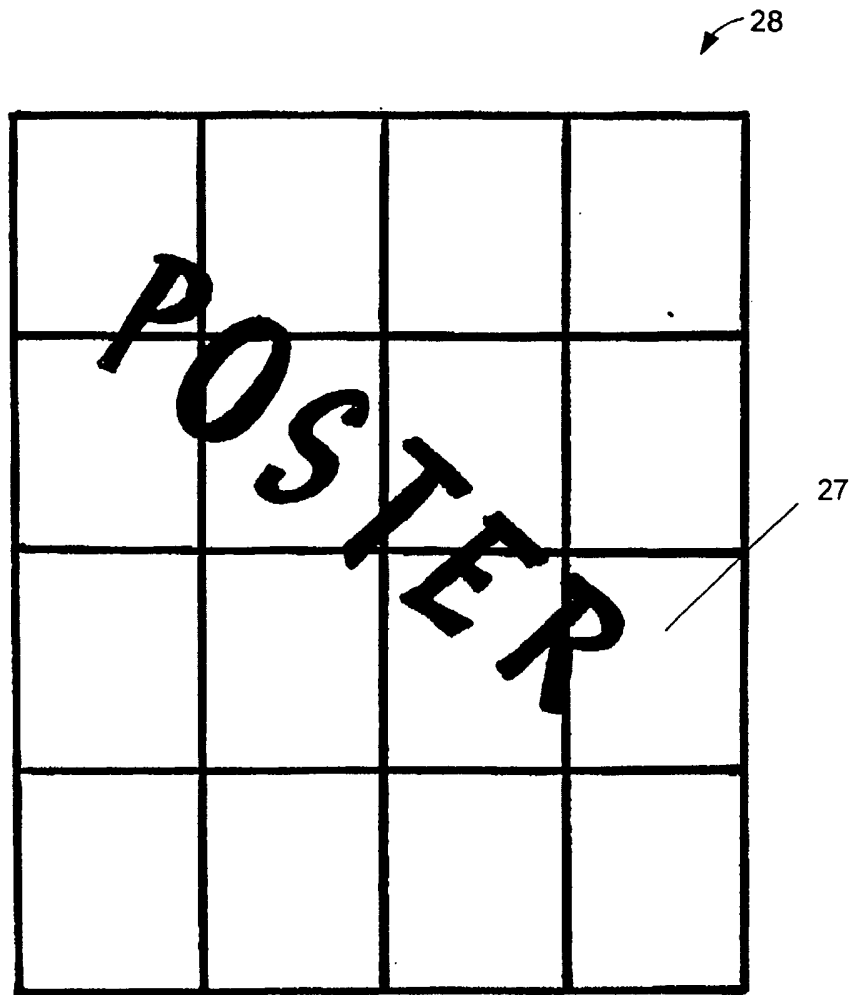


FIG. 23

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US03/08282

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) : G09B 29/00; B42D 15/00  
 US CL : 283/34, 106

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
 U.S. : 283/34, 106

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,156,898 A (McDONALD) 20 October 1992, Fig. 1-4	1-21
Y, P	US 6,410,114 B1 (McDONALD) 25 June 2002, Fig. 4, 8 and 9.	1-21
Y	US 6,273,471 B1 (ZANARDI) 14 August 2001, Fig. 1, 8-13.	1-21
Y	US 5,234,231 A (HOLLANDER et al) 10 August 1993, Fig. 1-4.	1-21
Y	US 6,007,895 A (McDONALD) 28 December 1999, Fig. 26-29	1-21

Further documents are listed in the continuation of Box C.  See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"E" earlier application or patent published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search: 08 May 2003 (08.05.2003)  
 Date of mailing of the international search report: 20 MAY 2003

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