

BOOK CONSTRUCTION

This invention relates to the art of book construction.

The invention relates more particularly to books where the interior leaves are made of thick paperboard rather than thin paper. Such books, known as board books, primarily are for use by small children. A problem encountered with such board books heretofore available has been the difficulty in having them remain opened when placed in such opened condition on a flat surface. It would, therefore, be highly desirable to provide such a book which will open to 180 degrees and remain in such opened condition when placed or rested on a flat surface. This must be accomplished, of course, in a book construction which is convenient and economical to manufacture.

The present invention consists in a book comprising a body of interior leaves and a binding, wherein said interior leaves of said body are formed by a plurality of sections, each comprising a sheet of stiff paperboard folded upon itself to have inner facing surfaces and outer surfaces facing in opposite directions, said body comprising a plurality of said sections in adjacent side-by-side relation, the outer surface of each section being joined by adhesive to the outer surface of the adjacent section, the folded edges of the sheets defining an end of the body about which said leaves are moved during opening and closing of the book, said binding comprising a continuous sheet of stiff paperboard defining front and back covers for said book, a pair of scores in said



sheet substantially mutually parallel and spaced apart a distance such that when said sheet is folded along said scores upon itself to have inner facing surfaces said body comprising said interior leaves fits between said inner facing surfaces of said folded sheet and said end of said body is adjacent the region between said scores thereby defining a spine for said book, said spine and front and back covers for said book being defined in said continuous sheet of stiff paperboard, at least one supplementary score in said sheet substantially parallel to said spine scores and spaced from the region between said spine scores; and means for joining said sheet to adjacent portions of said body except in the region between said spine scores and the region between said supplementary score and said spine region, said joining means comprising adhesive in areas between said body and portions of said sheet defining said front and back covers, each area extending from an edge of said sheet disposed substantially parallel to said supplementary score and terminating adjacent said supplementary score, whereby said spine scores and said supplementary score define a space between said sheet and said body which changes in shape and size as said spine scores and supplementary score fold concurrently during opening and closing of the said book which enables each spread of said book to open substantially 180 degrees, said continuous sheet being of the same paperboard and the same

thickness as the sheets forming said interior leaves.

In a book of relatively small thickness measured between the spine scores, there may be provided one supplementary score in the front or back cover portion of the sheet in neighbouring relation to one of the spine scores. In a relatively thicker book, two supplementary scores may be provided, one in each of the front and back cover portions of the sheet and in neighbouring relation to corresponding spine scores.

The invention will now be described, by way of example, with reference to the accompanying drawings in which:

Fig. 1 is a perspective view of a book construction according to one embodiment of the present invention;

Fig. 2 is a plan view of the continuous sheet providing the front and back covers of the book of Fig. 1;

Fig. 3 is a cross-sectional view with parts removed and taken about on a line substantially perpendicular to the spine of the book of Fig. 1;

Fig. 4 is a cross-sectional view similar to Fig. 3 but showing the book in a position open to 180 degrees;

Fig. 5 is a plan view of the continuous sheet providing the front and back covers of a book according to another embodiment of the present invention;

Fig. 6 is a cross-sectional view with parts removed and taken about on a line substantially perpendicular to the spine of a book according to the embodiment of Fig. 5; and

Fig. 7 is a cross-sectional view similar to Fig. 3 but showing the book in a position open to 180 degrees.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to Fig. 1, there is shown a book 10 according to one embodiment of the present invention which includes a binding portion 12 and a body portion 14 including a plurality of interior leaves or pages. The interior leaves are joined by suitable means in a manner defining an edge or end 16 about which the leaves are moved during opening and closing of the book. The binding portion 12 comprises a continuous sheet or board 20 which defines front and back covers for the book. As shown in Fig. 1, there is a front cover 22, a back cover 24 and a spine portion 28 between the front and back covers. Sheet 20 is provided with a pair of scores 30, 32 in the outer surface thereof which are substantially mutually parallel and spaced apart a distance corresponding to the spine portion 28. The scores 30, 32 extend along the entire dimension, i.e. width, of the sheet 20. In other words, the front cover 22 meets the spine portion

28 along the score 30, and similarly the back cover 24 meets the spine portion 28 along the score 32. The scores 30,32 are of a cross-sectional size, i.e. width and depth, sufficient to facilitate folding or creasing of the sheet 20 along and about the scores.

Sheet 20 has inner surfaces which face inwardly when the sheet is folded about the scores 30,32 to the form of Fig. 1. As shown in Fig. 2, the front cover 22 has an inner surface 36, and the back cover 24 has an inner surface 38. Scores 30,32 are spaced apart a distance such that when sheet 20 is folded along the scores 30,32 upon itself so that the inner surfaces 36,28 are facing each other as in Fig. 1, the body 14 comprising the interior leaves fits between or occupies the spaced between the inner facing surfaces 36,38 of the folded sheet 20 and the edge 16 is adjacent the region between scores 30,32 thereby defining a spine for the book including the portion 28 of the sheet 20.

The interior leaves can be formed and joined together in a suitable manner, and one example is shown in Fig. 3. Briefly, in the illustrative arrangement shown, the interior leaves are formed by a plurality of board sections, each comprising a sheet folded upon itself to have inner facing surfaces and outer surfaces facing in opposite directions. As shown in detail in Fig. 3, a first sheet or board 44 is folded about a central or medial score 46 upon itself to define two sections 44a and 44b and has inner facing surfaces 48,50 and outer, opposite facing surfaces 52,54. The folded sheet terminates in edges 56,58 at the end opposite the fold 46 which edges 56,58 are substantially flush or co-planar. The side edges of the folded sheet



(not shown in Fig. 3) which join and are disposed perpendicular to the fold 46 and the edges 56,58 also are flush and substantially co-planar.

The manner in which surface 52 of sheet 44 is joined to the inner surface 36 of front cover 22 will be described presently. The opposite, outer surface 54 is joined to a neighboring or adjacent sheet in the following manner. A neighboring or adjacent sheet 64 preferably identical in size to sheet 44 is folded about a central or medial score 66 upon itself to define two sections 64a and 64b and has inner facing surfaces 68,70 and outer, opposite facing surfaces 72,74. The folded sheet terminates in edges 76,78 at the end opposite the fold 66 which edges 76,78 are substantially flush or co-planar. The side edges of the folded sheet (not shown) which join and are disposed perpendicular to the fold 66 and edges 76,78 also are flush and substantially co-planar.

The sheets 44,64 are joined in the following manner. The outer surface 54 of sheet portion 44b is joined to the outer surface 72 of sheet portion 64a by adhesive 80. The adhesive area 80 extends along both surfaces 54 and 72 from the corresponding edges 58 and 76 to a point near the corresponding folds 46,66 and also between the side edges. The edges 58,76 are flush or co-planar as are the side edges. Thus, the joined portions 44b and 64a provide an interior leaf or page of the book. The adhesive 80 can be applied in any known, suitable manner.

As shown in Fig. 3 there are additional sheets included in the body portion of the book which are folded and arranged

with the edges co-planar and with the side edges co-planar. Adjacent portions of the sheets are joined in a manner similar to sheet portions 44b, 64a described hereinabove to provide additional interior leaves or pages of the book. Thus, in the illustrative book shown in Fig. 3, there are additional sheets 84, 104, 124, 144 and 164 each of which is folded and arranged in a manner similar to sheets 44, 64. The outer surface of sheet portion 64b is joined by adhesive 100 to the outer surface of one portion of sheet 84 to provide another interior leaf. The outer surface ^{of} the other portion of sheet 84 is joined by adhesive 120 to the outer surface of one portion of sheet 104 to provide another interior leaf. Likewise, the outer surface of the other portion of sheet 104 is joined by adhesive 140 to the outer surface of one portion of sheet 124 to provide another interior leaf. Similarly, the outer surface of the other portion of sheet 124 is joined by adhesive 160 to the outer surface of one portion of sheet 144 to provide another interior leaf. Also, the outer surface of the other portion of sheet 144 is joined by adhesive 180 to the outer surface of one portion of sheet 164. In each of the foregoing arrangements, the adhesive is applied in a suitable known manner in the region from the end edges back to about the locations of the folds and between the side edges. The manner in which the outer surface of the other portion of sheet 164 is joined to the inner surface 38 of the back cover 24 will be described in detail presently.

Thus, the adhesive sections or areas 80, 100, 120, 140, 160 and 180 join the interior leaves or pages of the book

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in a manner defining the end 16 of the book body portion 14 about which end 16 the interior leaves are moved during opening and closing of the book. The number of interior leaves or pages shown in the example of Fig. 3 is purely illustrative and will vary depending upon the nature of the book and its contents. Graphic information including written and pictorial material is applied to the exposed surfaces of the interior leaves on pages according to any of a number of conventional printing procedures, preferably on both sides of the interior leaves or pages and preferably to the sheets prior to folding of the sheets and applying adhesives thereto.

In accordance with the present invention, the sheet or board 20 of the binding portion 12 is provided with at least one supplementary or additional score substantially parallel to the spine scores 30,32 and spaced from the region between the spine scores, and there is provided means for joining sheet 20 to adjacent portions of body 12 except in the region between spine scores 30,32 and except in the region between the supplementary score and the spine region. As a result, the spine scores 30,32 and the supplementary score define an open space or region between the sheet 20 and the body which changes in shape and volume during opening and closing of the book which enables the book to remain open and lie substantially flat when placed on a flat surface. In other words, the supplementary score folds concurrently with the spine scores and creates a hollow moving pocket which allows each double spread of the book to open to 180°.

In the embodiment illustrated in Figs. 1-4 there are two supplementary scores. There is a first supplementary score 200 in the outer surface of the front cover portion 22 of sheet 20. Score 200 is substantially parallel to spine score 30, spaced a relatively short distance therefrom and extends along the entire width of the sheet 20 between the side edges thereof. Score 200 is of a cross-sectional size, i.e. width and depth, sufficient to facilitate folding or creasing of the sheet 20 along and about the score. There is a second supplementary score 204 in the outer surface of the back cover portion 24 of sheet 20. Score 204 is substantially parallel to spine score 32, spaced a relatively short distance therefrom and extends along the entire width of the sheet 20 between the sides thereof. The spacing between supplementary score 204 and spine score 32 is substantially the same as the spacing between supplementary score 200 and spine score 30. Score 204 also is of a cross-sectional size, i.e. width and depth, sufficient to facilitate folding or creasing of the sheet 20 along and about the score.

The spacing or distance between the supplementary score and the neighboring spine score depends upon the thickness of the book, i.e. the distance between the spine scores. Generally, the distance between a supplementary score and neighboring spine score will be no greater than the thickness of the book. In the illustrative book shown in Figs. 1-4, the distance between supplementary score 200 and spine score 30, measured along a line substantially perpendicular to both scores, is about one-half the thickness of the book measured between spine scores 30 and 32. Similarly, the distance between

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supplementary score 204 and spine score 32, measured along a line substantially perpendicular to both scores, is about one-half the thickness of the book measured between spine scores 30 and 32.

Sheet 20 is joined to adjacent portions of the book body 12 except in the region between spine scores 30,32 and except in the region between supplementary score 200 and spine score 30 and except in the region between supplementary score 204 and spine score 32. In particular, as shown in Fig. 3, surface 52 of sheet portion 44a is joined to inner surface 36 of front cover portion 22 of sheet 20 by adhesive 206.

The adhesive 206 is in an area or region extending from the edge 56 of sheet portion 44a (and the adjacent co-planar edge of cover portion 22) between the side edges to a point of termination adjacent the supplementary score 200. In other words, the area including adhesive 206 terminates along a line disposed in substantially the same plane as supplementary score 200. This is illustrated also in Fig. 2.

Adhesive 206 is applied in a known, suitable manner.

Similarly, the outer surface of the portion of sheet 164 is joined to inner surface 38 of rear cover portion 24 of sheet 20 by adhesive 208. The adhesive 208 is in an area or region extending from the outer edge of the portion of sheet 164 and the adjacent co-planar edge of cover portion 24 between the side edges to a point of termination adjacent the supplementary score 204. In other words, the area including adhesive 208 terminates along a line disposed in substantially the same plane as supplementary score 204. This is illustrated also in Fig. 2. Adhesive 208 is applied in a

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suitable known manner.

Thus, the application of adhesive to bind the cover sheet to the interior leaves is patterned so that it covers only the area from the edge of the book to the supplementary score. As the book is opened, the supplementary scores 200, 204 fold concurrently with the spine scores 30, 32 and create a hollow moving pocket. This, in turn, accommodates the opening of any double spread of the book to 180 degrees.

Fig. 4 illustrates the book of Figs. 1 and 3 in a double spread condition open to 180 degrees. In this connection, the flexible end 16 is folded upon itself as shown. The hollow moving pocket 210 between the binding sheet and body according to the present invention allows each double spread of the book to open to 180 degrees. In other words, any adjacent interior leaves can be spread open to 180 degrees to place the book in a flat open condition similar to that illustrated in Fig. 4. In the condition of each double spread open to 180 degrees, the hollow pocket or space 210 defined by spine scores 30, 32 and supplementary scores 200, 204 in relation to end 16 is of maximum size or volume. Thus, the space or pocket 210 moves between the conditions of minimum and maximum size as illustrated in Figs. 3 and 4, respectively, during opening and closing of the book. In addition, the book is allowed to close in a normal manner, and the binding or cover can be made from a continuous sheet of paperboard. Furthermore, the binding or cover may be fabricated from the same paperboard material as the interior leaves.

By way of example, in an illustrative book construction according to the embodiment of Figs. 1-4, with five interior leaves or pages, each having a thickness of about 1.3 millimeter, the distance between spine scores 30,32 is about 11.0 millimeters, the distance from supplementary score 200 to spine score 30 is about 7.0 millimeters, and the distance from supplementary score 204 to spine score 32 is about 7.0 millimeters. Thus, in the foregoing example, the continuous sheet or board corresponding to sheet 20 would have a thickness of 0.65 millimeter, and the adjacent sheet sections bound together by adhesive to form the interior leaves or pages each would have sheet thickness of 0.65 millimeter.

In the foregoing example and embodiment the scores or grooves 30, 32, 200 and 204 are formed in a suitable manner, such as by means of knife-edge ridges in a die used to cut out the sheets 20 or by means of an appropriate scoring or grooving tool operating on the sheets 20 subsequent to the cutting operation.

Figs. 5-7 illustrate a book construction having a binding according to another embodiment of the present invention. As compared to the book shown in Figs. 1-4, the book 10' of Figs. 5-7 is relatively thinner, i.e. has a smaller distance between spine scores 30',32'. Accordingly, in the embodiment of Figs. 5-7 only a single supplementary score 216 is employed. In Figs. 5-7, for convenience in description, portions of book 10' similar to book 10 of Figs. 1-4 are identified by the same reference numerals provided with a prime designation. Thus, book 10' of

Figs. 5-7 has a binding portion including a continuous sheet or board 20' having a front cover portion 22', a back cover portion 24' and a spine portion 28' therebetween. The sheet 20' is provided with a pair of mutually parallel scores 30', 32' in the outer surface thereof spaced apart a distance corresponding to spine portion 28' extending along the entire width of sheet 20' and of a width and depth sufficient to facilitate folding or creasing of sheet 20' along and about the scores.

As shown in Fig. 5, the front cover 22' has an inner surface 36', and the back cover 24' has an inner surface 38'. Scores 30', 32' are spaced apart a distance such that when sheet 20' is folded along the scores 30', 32' upon itself so that the inner surfaces 36', 38' are facing each other, the book body comprising the interior leaves fits between or occupies the space between the inner facing surfaces 36', 38' of the folded sheet 20' and the edge 16' of the book body is adjacent the region between the scores 30', 32' thereby defining a spine for the book including the portion 28' of sheet 20'.

The interior leaves can be formed and joined together in a suitable manner, and one example is shown in Fig. 6. As in the embodiment of Figs. 1-4, the interior leaves are formed by a plurality of board sections, each comprising a sheet folded upon itself to have inner facing surfaces and outer surfaces facing in opposite direction. As shown in Fig. 6, a first sheet or board 220 is folded about a central or medial fold upon itself to define two sections and has inner facing surfaces and outer surfaces facing in opposite directions. The folded sheet terminates in edges at the end

opposite the fold which are substantially flush or co-planar with each other and the neighboring edge of cover portion 22'. The side edges of the folded sheet (not shown) also are substantially flush or co-planar with each other and the neighboring side edges of cover portion 22'. The outer surface of the one portion of sheet 220 is joined to the inner surface 36' of front cover 22' by adhesive 224. Adhesive 224 is applied in a suitable, known manner, and the area of adhesive 224 extends from the corresponding end edges of the sheet portion 220 and cover 22' to a point near the central fold in sheet 220 and between the side edges of the sheet 220. There is another folded sheet 226 having the outer surface of one portion joined by adhesive 228 to the outer surface of the other portion of sheet 220 to provide an interior leaf or page of the book. Another folded sheet 230 has the outer surface of one portion thereof joined by adhesive 232 to the outer surface of the other portion of sheet 226 to provide another interior leaf of the book. The areas including adhesive 228, 232 are substantially the same as the area including adhesive 234, the adhesive 228, 232 likewise being applied in a suitable, known manner.

In accordance with this embodiment of the present invention, the sheet or board 20' of the book binding portion is provided with the single supplementary score 216 substantially parallel to the spine scores 32', 30' and spaced from the region between the spine scores, and there is provided means for joining sheet 20' to adjacent portions of the book body except in the region between spine scores 30', 32' and except in the region between supplementary score

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216 and the spine region. As a result, the spine scores 30', 32' and the supplementary score 216 define an open space or region between sheet 20' and the book body which changes in shape and volume during opening and closing of the book which enables the book to remain open and lie substantially flat when placed on a flat surface. In other words, the supplementary score 216 folds concurrently with the spine scores 30', 32' and creates a hollow moving pocket which allows each double spread of the book to open to 180 degrees.

In the illustrative book shown, supplementary score 216 is in the outer surface of the rear cover portion 24' of sheet 20'. Alternatively, the single score 216 could be provided in the outer surface of the front cover portion 22' of sheet 20'. Score 216 is substantially parallel to spine score 32', spaced a relatively short distance therefrom and extends along the entire width of sheet 20' between the side edge thereof. In the illustrative book shown in Figs. 5-7, the distance between supplementary score 216 and spine score 32', measured along a line substantially perpendicular to both scores, is substantially equal to the thickness of the book measured between spine scores 30', 32'. Score 216 is of a cross-sectional size, i.e. width and depth, sufficient to facilitate folding or creasing of sheet 20' along and about the score.

Sheet 20' is joined to adjacent portions of the book body except in the region between spine scores 30', 32' and except in the region between supplementary score 216 and spine score 32'. As shown in Fig. 6, the outer surface of the portion of sheet 230 is joined to inner surface

36' of rear cover portion 24' of sheet 20' by adhesive 234. The adhesive 234 is in an area or region extending from the end edge of the portion of sheet 230 (and the adjacent coplanar edge of cover portion 24') between the side edges to a point of termination adjacent the supplementary score 216. In other words, the area including adhesive 234 terminates along a line disposed in substantially the same plane as supplementary score 216. This is illustrated also in Fig. 5. Adhesive 234 is applied in a known, suitable manner.

Thus, the application of adhesive to bind the cover sheet to the interior leaves is patterned so that it covers only the area from the edge of the book to the supplementary score. As the book is opened, the supplementary score 216 folds concurrently with the spine scores 30', 32' and creates a hollow moving pocket. This, in turn, accommodates the opening of any double spread of the book to 180 degrees.

Fig. 7 illustrates the book of Fig. 6 in a double spread condition open to 180 degrees. The hollow, moving pocket 240 between the binding sheet and body according to the present invention allows each double spread of the book to open to 180 degrees. Any adjacent interior leaves can be spaced open to 180 degrees to place the book in a flat open condition as illustrated in Fig. 7. The space or pocket 240 defined by spine scores 30', 32' and supplementary score 216 in relation to end 16' moves between minimum and maximum sizes shown in Figs. 6 and 7, respectively, during opening and closing of the book. As in the preceding embodiment, the book is allowed to close

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in a normal manner, the binding or cover can be made from a continuous sheet of paperboard, and the binding or cover may be fabricated from the paperboard material as the interior leaves.

By way of example, in an illustrative book construction according to the embodiment of Figs. 5-7, with four interior leaves or pages, each having a thickness of about 1.0 millimeter, the distance between spine scores 30', 32' is about 7.0 millimeters, and the distance from supplementary score 216 to spine score 32' is about 7.0 millimeters. Thus, in the foregoing example, the continuous sheet or board corresponding to sheet 20' wall has a thickness of about 0.5 millimeter and the adjacent sheet sections bound together by adhesive to form the interior leaves or pages each would have a sheet thickness of about 0.5 millimeter. In the foregoing example and embodiment, the scores or grooves 30', 32' and 216 are formed in a suitable manner as mentioned in connection with the preceding embodiment and example.

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CLAIMS:

1. A book comprising a body of interior leaves and a binding, wherein:
 - i) said interior leaves of said body are formed by a plurality of sections, each comprising a sheet of stiff paperboard folded upon itself to have inner facing surfaces and outer surfaces facing in opposite directions, said body comprising a plurality of said sections in adjacent side-by-side relation, the outer surface of each section being joined by adhesive to the outer surface of the adjacent section, the folded edges of the sheets defining an end of the body about which said leaves are moved during opening and closing of the book,
 - ii) said binding comprising:
 - a) a continuous sheet or stiff paperboard defining front and back covers for said book,
 - b) a pair of scores in said sheet substantially mutually parallel and spaced apart a distance such that when said sheet is folded along said scores upon itself to have inner facing surfaces said body comprising said interior leaves fits between said inner facing surfaces of said folded sheet and said end of said body is adjacent the region between said scores thereby



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- defining a spine for said book, said spine and front and back covers for said book being defined in said continuous sheet of stiff paperboard,
- c) at least one supplementary score in said sheet substantially parallel to said spine scores and spaced from the region between said spine scores; and
 - d) means for joining said sheet to adjacent portions of said body except in the region between said spine scores and the region between said supplementary score and said spine region, said joining means comprising adhesive in areas between said body and portions of said sheet defining said front and back covers, each area extending from an edge of said sheet disposed substantially parallel to said supplementary score and terminating adjacent said supplementary score,
 - e) whereby said spine scores and said supplementary score define a space between said sheet and said body which changes in shape and size as said spine scores and supplementary score fold concurrently during opening and closing of the said book which enables each spread of said book to open substantially 180 degrees,

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iii) said continuous sheet being of the same paperboard and the same thickness as the sheets forming said interior leaves.

2. A book according to claim 1, wherein said supplementary score is provided in the outer surface of said sheet.

3. A book according to claim 1, wherein a single supplementary score is provided in said sheet in the outer surface of either said front or back cover.

4. A book according to claim 1, wherein two supplementary scores are provided, one in the outer surface of each of said front and rear covers.

5. A book according to any preceding claim, wherein said end of said body is disposed in a plane substantially parallel to said spine when said book is closed and when said book is opened to substantially 180 degrees said end is folded upon itself defining two portions thereof in substantially abutting relation.

6. A book constructed substantially as described with reference to, and as shown in, Figures 1 to 4 or Figures 5 to 7 of the accompanying drawings.
