

[54] **METHOD OF MANUFACTURING A SET-UP BOX**

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93/55.1 P

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93/12 C, 54 R, 55.1 R, 55.1 P, 55; 229/43,
51 DB; 156/286

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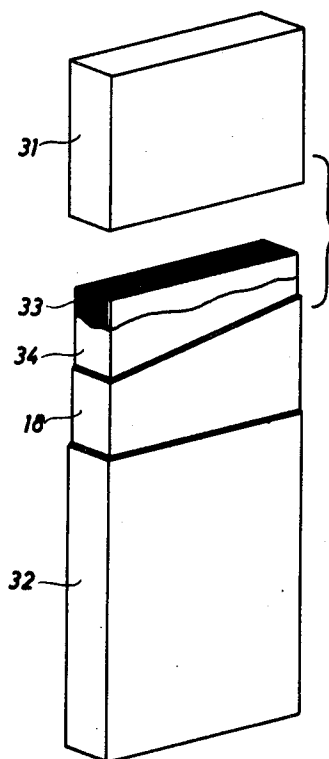
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[57]

ABSTRACT

A method of manufacturing a set-up paperboard box of the type having a base and a separate lid formed as short tubes closed at one end and of the same cross-sectional dimensions, and a sleeve fixed into and projecting from the base to receive the lid. Contrary to conventional boxes, the base and the lid of which are manufactured as separate items and are separately covered with covering sheet material, the present method comprises the manufacturing and the covering of a closed box, cutting the box thus formed and covered in two parts, and fixing a sleeve into one box portion.

6 Claims, 9 Drawing Figures



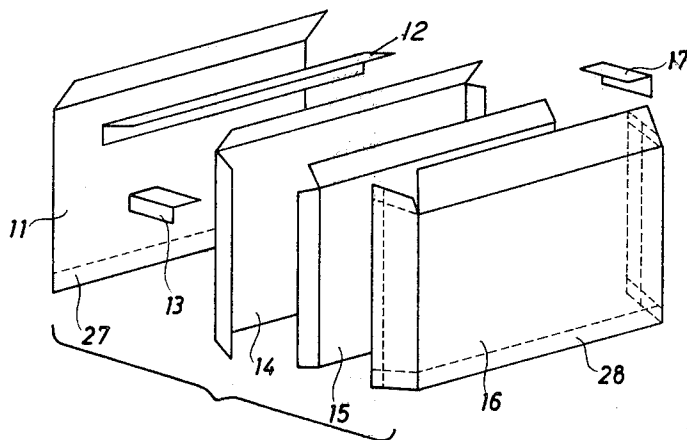


Fig. 1 *PRIOR ART*

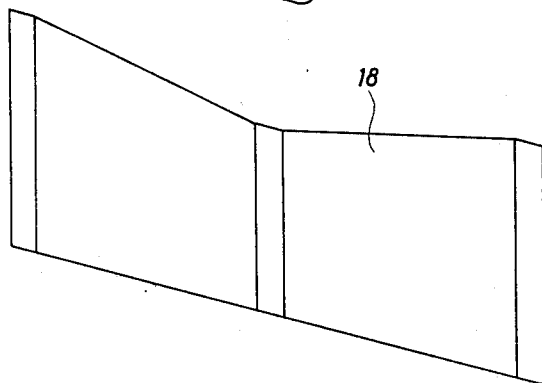


Fig. 2 *PRIOR ART*

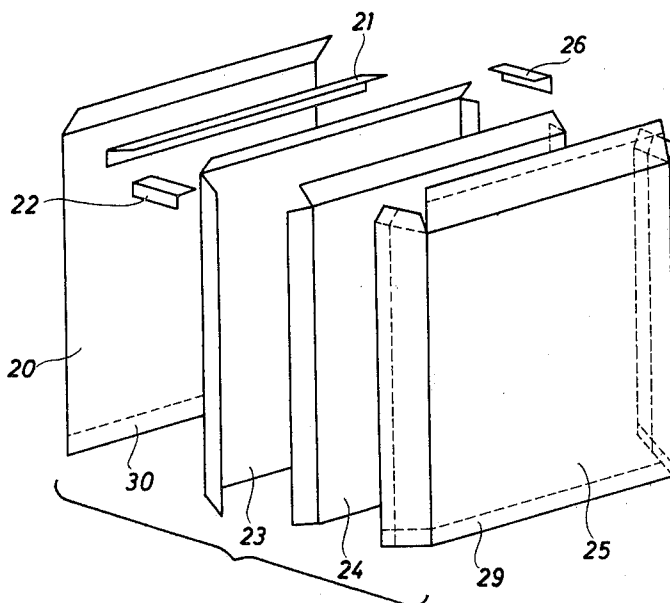


Fig. 3 *PRIOR ART*

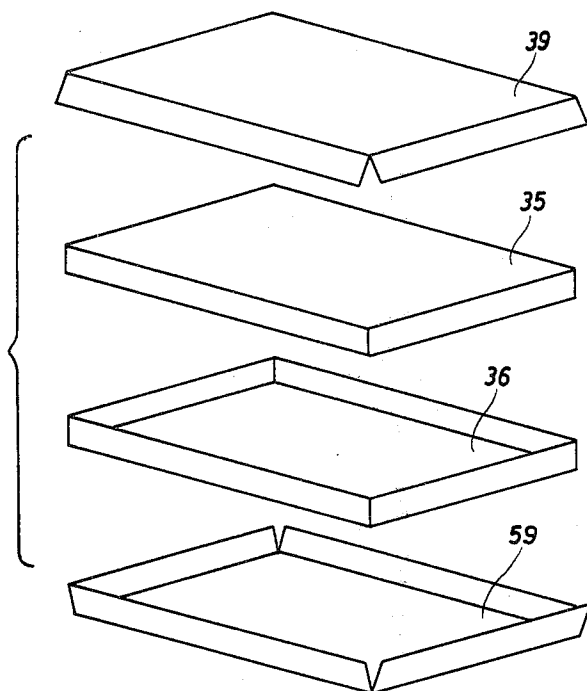


Fig. 5

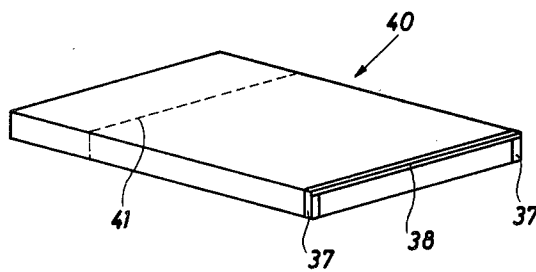


Fig. 6

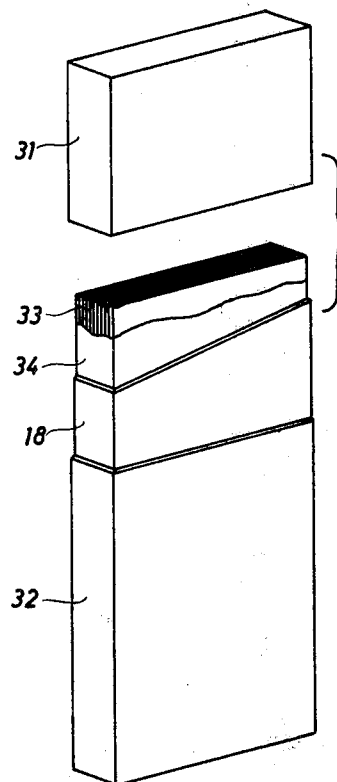
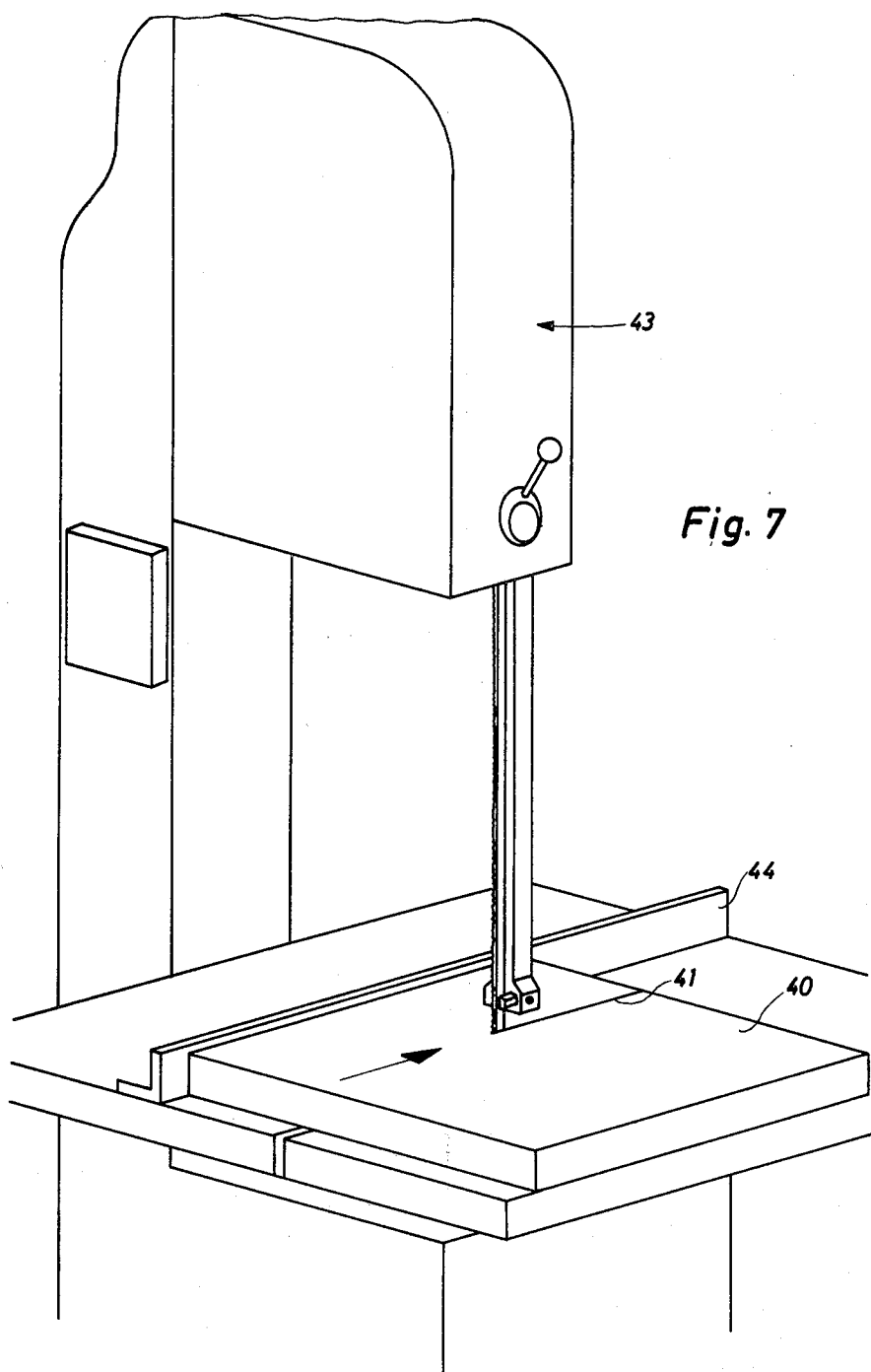


Fig. 4



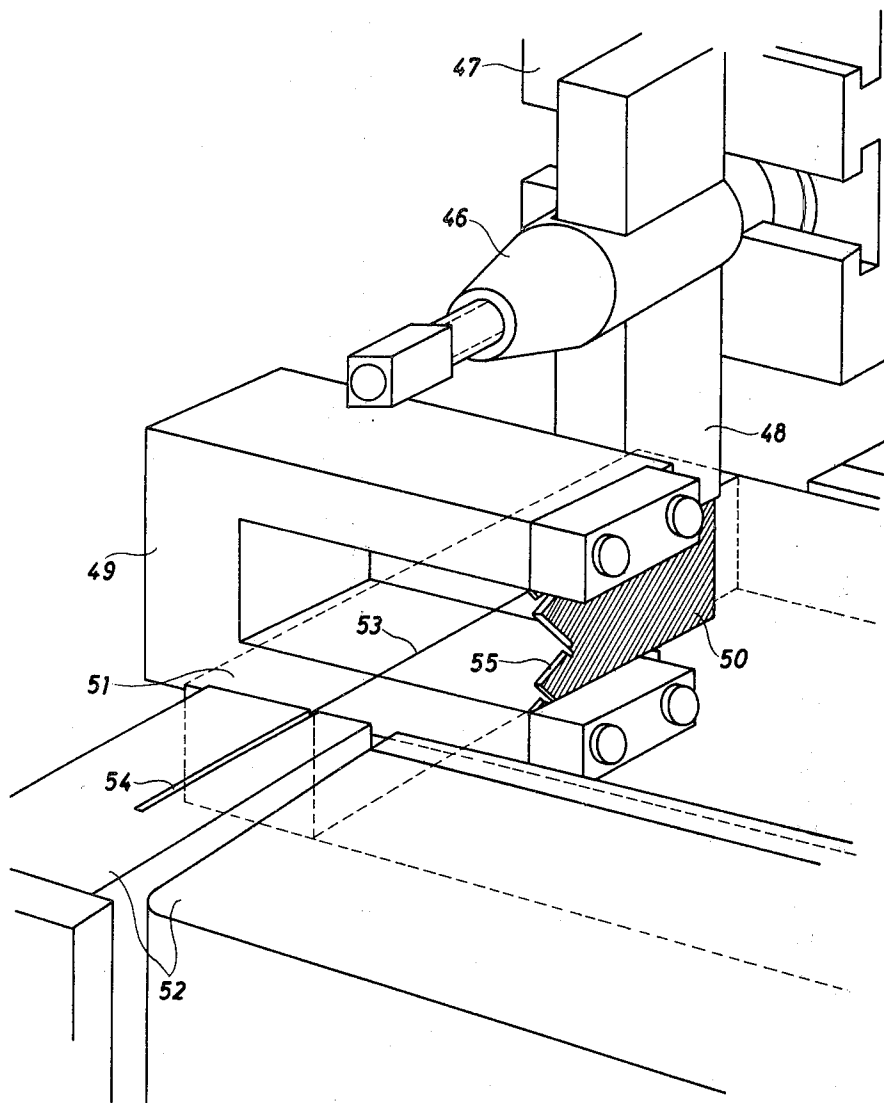
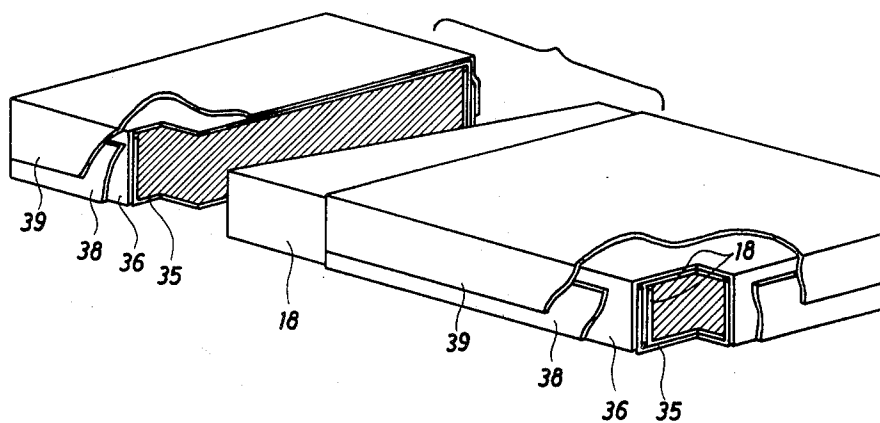


Fig. 8

*Fig. 9*

METHOD OF MANUFACTURING A SET-UP BOX

The present invention relates to a method of manufacturing a set-up box of the type having a base and a separate lid formed as short tubes closed at one end of the same cross-sectional dimensions, and a sleeve fixed into and projecting from the base to receive the lid. The lid is a snug sliding fit about the sleeve, and may be slid along the sleeve to abut against a shoulder formed by the open end of the base and the sleeve. Such boxes are usually made from cardboard or paperboard.

In the packaging of graphic and radiographic film sheets, it is known to enclose a stack of such sheets, wrapped in an air-tight and light-tight flexible wrapper, in a box of the type referred to. The box comprises a base and a lid, and a rectangular sleeve in the base which co-operates with the lid to constitute a light-tight package for the sheets when the light-tight wrapper of the stack of sheets has been opened. The technique for the manufacture of such boxes has not changed for the many years and comprises the steps of separately manufacturing a base, a lid and a sleeve made from paperboard, of completely covering the outer faces and the edges of the opening of the base and lid with a cover paper in order to improve the appearance of the box, and of fixing the sleeve into the base. Said manufacturing technique involves considerable labour and is, therefore, very expensive. It is however suitable for rapidly changing from one size of box to another in the production process.

The present invention aims at providing a method for the manufacture of boxes of the type referred to, which enables a considerable reduction of the cost price of the boxes while still keeping the general appearance of the boxes which is familiar to the user, unaltered.

According to the present invention, a method of manufacturing a set-up box of the type having a base and a separate lid, and a sleeve fixed into the base, comprises the steps of forming two tray-like constructions, assembling them in face to face relationship, one within the other to form a closed box, covering the box thus formed with cover sheet material, cutting the box thus covered from one side to an opposite side and fixing a sleeve into one box portion so that it projects therefrom.

According to preferred embodiments of the invention, the steps of forming two tray-like constructions and assembling them comprise cutting two flat sheets of paperboard to the required size, and bending the sides to right angles so that the bent sides of one tray may overlap the bent sides of the other tray, and fastening the bent sides of one tray to the bent sides of the other tray, and the cutting of the closed box thus covered occurs in a plane which is normal to the portions of the sheets of paperboard which have not been bent.

A box in accordance with the method of the present invention has a sheet of covering material adhered to its outer faces but not to the rim portion of the base and the lid.

The invention will be described hereinafter with reference to the accompanying drawings, wherein:

FIG. 1: is an exploded view of the lid,

FIG. 2: is the rectangular sleeve in unfolded form, and

FIG. 3: is an exploded view of the base of a conventional set-up box,

FIG. 4: is a perspective illustration of an opened film package,

FIG. 5: is an exploded view of a box made in accordance with the first steps of the method according to the present invention, and

FIG. 6: shows the closed box and the plane of cutting,

FIG. 7: illustrates the cutting of the closed box by means of a belt-saw

FIG. 8: illustrates the cutting of the closed box by means of a bench shaping machine,

FIG. 9: is a perspective illustration of a box, partly broken away, made according to the method of the present invention.

The usual manufacture of a conventional box proceeds as shown in FIGS. 1 to 3. Flat sheets of paperboard are first cut and scored to the size required for the type of box aimed at. The large sheet of board is then separated into individual blanks and corners are cut out. The shaping step is accomplished by bending the sides to right angles. Thus the paperboard parts 14 and 15, and 23 and 24 according to FIGS. 1 and 3 are formed. The size of one part is slightly greater than the size of the matching part so that the parts may be fitted together, one inside the other with the bent sides overlapping. The overlapping sides are then fastened to each other, and according to a usual practice this fastening may occur by using a molten thermoplastic adhesive which is applied to either side or both sides of said parts prior to the bending thereof.

The corners at the formed bottom walls, that is the walls opposite to the opening in the lid and the base, are stayed by means of stays 13, 17, 22 and 26. The stays are usually cut from a strong paper or plastic tape and may be fastened by means of a molten thermoplastic adhesive. Optionally, strips 12 and 21 may be glued to the lid and the base to further reinforce and fasten the outer bent side at the mentioned bottom walls.

As the lid and the base have thus been formed, they are overwrapped with cover paper sheets 11, 16, 20 and 25 for decorative purposes. The marginal portions of the wrapping sheets, as indicated by the broken lines and by numerals 27, 28, 29 and 30, are folded inwardly over the opening of the lid and the base and they cover in that way the paperboard edges at said openings.

The manufacturing of the box is completed by folding the sleeve 18 shown in FIG. 2 in a rectangular form along the vertical lines, the left and right hand vertical sides overlapping each other, and by attaching the sleeve thus formed to the base.

A complete film package is shown in FIG. 4, and it will be apparent that the length of the portion of the sleeve 18 protruding from the base 32 corresponds almost with the depth of the lid 31, so that the closed box may form a light-tight container for a stack of film sheets 33 after the air-tight and light-tight wrapper 34 of the stack has partly been broken away for the removal of the sheets, one by one, from the box.

The manufacture of the described box is expensive because of the great many distinct operations which are involved therein, a great deal of said operations requiring considerable manual intervention.

The method according to the present invention is based on the insight that the number of manufacturing operations can be considerably reduced by making the box in one piece and by cutting it thereafter into a base and a lid portion.

This method is illustrated in FIGS. 5 and 6. Two tray-like parts 35 and 36 are made from paperboard which has been previously cut and scored to the required size. Tray 35 is slightly smaller than tray 36 so that it may fit therein, the openings of both trays facing each other. The bent sides of one or of both trays, as the case may be, are provided with an adhesive and they are glued to each other in full overlapping relation to form a completely closed box. The corners of the box thus formed are provided with stays such as the stays 37 and the sides of the box may be reinforced by means of strips such as the strip 38, shown in FIG. 6. The box is then covered with cover sheets 39 and 59. The form of the sheets has been shown somewhat simplified as compared with the cover sheets shown in FIGS. 1 and 3, but actually the sheets comprise flap portions at the corners which may overlap so that the corners of the box are covered with one, and preferably with two layers of cover paper.

The closed box 40 must now be cut into two parts according to a plane indicated by the broken line 41 (FIG. 6) in order to obtain a base and a lid.

One method of cutting the box comprises the use of a belt saw machine (FIG. 7). Unlike a conventional belt saw machine, the saw machine 43 comprises an un-toothed stainless steel belt of a thickness of 0.4 mm, and a width of 19 mm. The machine was provided with a guide 44 for determining the lateral position of a box 40. The cutting of a box made from paperboard having an approximate thickness of 1.4 mm, could proceed at a speed of 6 m/min with a belt speed of 2300 m/min.

The cut edges of the paperboard showed no significant traces of fraying or burning and they had a perfectly smooth appearance. The only distinguishing indication which enabled one to discover the direction of motion of the belt was a minuscule fringe at one of the longer sides of the opening of both lid and base. This fringe was caused by the mat black cover paper which was provided at the surface of the paperboard which was present at the inner side of the box. Said fringe could be detected by the fingernail, rather than by the eye, and therefore its existence was not considered to be detrimental to the appearance of the box.

The uncovered edge of paperboard of the lid and the base of the opened box showed a somewhat unattractive appearance, mainly as a consequence of a marked distinction in colour between the paperboard material and the finishing layer of the cover paper. It was considered, however, that the mentioned small deficiency could yet be accepted in practice for the following two reasons. First, the cover paper of conventional boxes may rather rapidly be damaged in use, and in particular, at the first opening of the boxes it occurs frequently that part of the cover paper, at or near the edge of the opening of the lid or the base is damaged or torn away in removing or in cutting through the label or in pulling away the tear-strip which seals the box. Second, conventional boxes are recently being replaced to a limited extent by boxes made from corrugated fibreboard. These corrugated boxes are made in situ around the stack of wrapped films, and the opening of the film packaging occurs by means of a tear-strip which separates the box into a lid and a base portion. The edges of the opening of both the lid and the base have, however, an unsightly appearance because the corrugation is directly visible to the eye, and the flat liners of the corrugated member are not torn along a straight line.

As compared with this known economic packaging method, the method according to the present invention produces a much more attractive package at a cost which is somewhat higher than the cost of the low grade corrugated fibreboard packages, but which is considerably lower than the cost of conventional paperboard packages which it almost resembles.

A second method of cutting the closed box comprised the use of a bench shaping machine. The tool post 46 of the clapper block 47 of a conventional bench shaping machine (FIG. 8) is provided with a specially designed tool comprising a vertical leg 48 to which is welded a horizontal U-shaped yoke 49. A cutting blade 50 is fitted to the extremities of the yoke and has a cutting edge 55 in the form of saw teeth. A box 51 to be cut is indicated in broken lines and rests with its lower face on a horizontal table, not shown, and with its vertical front side against retaining bars 52.

The intersection of the cutting plane with the upper surface of the box as located on the machine, is indicated by the line 53, and it will be apparent from the drawing that in the position shown, the blade 50 has cut through the box to about half the width thereof. During the cutting of the blade, the box remains firmly pressed with its vertical front side against the bars 52, until the blade has completely cut through the box and has entered the gap 54 provided in one of the bars 52. At that stage the lid and the base of the box have been separated from each other and they may be removed from the machine. The ram of the machine (not shown) returns to its inoperative position whereafter a new box may be located on the machine for performing the next cutting step. It was noticed that the appearance of the edges of the openings of lid and base was slightly improved over that of the edges cut in using the machine shown in FIG. 7. It was believed that this better appearance was due to the particular form of the cutting edge of the blade 50 causing one smaller edge and the two longer edges of the box openings to be cut from the outer side of the box towards the inner side so that occasional fringes were situated at the inner surface of the box.

A third method of cutting comprises the use of laser tool, and it was shown that a CO₂ laser with a power of 250 Watts could cut through a box made from paperboard with a thickness of 2 mm at a speed of 15 m/min. The line of cut was perfectly smooth and neither the slightest fringe, nor any burning effect was noticed. It will be understood that the focusing of the laser enabled the cutting through one wall only of the box so that the cutting operation needed to be carried out four times for cutting the four walls of the box.

As the lid and the base of the box have been cut as described hereinbefore, a sleeve 18 may be inserted in the base and retained therein either by press fitting or by gluing. A stack of wrapped film sheets may be inserted into the box and the box may be sealed in any known way, for instance by means of a sealing strip covering the entire peripheral length of the abutting edges of both the lid and the base, or by means of a label covering only a limited portion of the peripheral length of such edges.

FIG. 9 illustrates more in detail a box made according to the invention, the numerals of the different parts of the box shown corresponding with those used in the description of FIGS. 2 and 5.

The box made by applying the method according to the present invention is intended in the first place as a package for light-sensitive photographic film sheets. The sheets may be graphic or radiographic films, the latter films bearing a light-sensitive coating on one or both film surfaces. The film sheets may be separated from each other by paper interleaves, and a stack of film sheets may be enclosed in an air-tight and light-tight wrapping under tension so as to reduce the relative mobility of the sheets.

It will be understood, however, that the method according to the present invention extends also to the manufacture of boxes for the packaging of other sheets and other articles which are suited for packaging in shoulder style set-up boxes.

The invention also includes a box or boxes made by a method according to the present invention.

We claim:

1. A method of manufacturing a set-up box of the type having a base and a separate lid, and a sleeve fixed into the base, comprising the steps of forming two separate tray-like constructions by cutting two flat sheets of paperboard to the required size, scoring the sheets along lines spaced internally of and parallel to the side

edges thereof, and bending the marginal portions along said score lines to upstanding position, assembling the resultant tray-like constructions in face to face telescoping relationship, one within the other, fastening the overlapping tray sides together to form a closed box, covering the box thus formed with cover sheet material, cutting the box thus covered from one side to an opposite side along a plane normal to the unbent sections of the starting sheets, and fixing a sleeve into one box portion so that it projects therefrom.

2. Method according to claim 1 wherein the covered closed box is cut entirely through all four sides along said normal plane.

3. Method according to claim 1, wherein the covered closed box is cut by means of a laser tool.

4. Method according to claim 1, comprising the further step of applying reinforcement strips over corner portions of the box before applying the cover sheet.

5. Method according to claim 1, wherein the covered closed box is cut by means of a belt-saw.

6. Method according to claim 1, wherein the covered closed box is cut by means of a bench shaping machine.

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