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⑤④ **Reinforced file folder panel edges and method.**

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WO-A-82/01165
CH-A- 529 610
DE-B-1 198 663
FR-A-1 083 320
FR-A-1 252 460
FR-A-2 300 685
FR-A-2 477 504
GB-A-1 123 130
US-A-2 052 623
US-A-2 712 342
US-A-4 175 476
US-A-4 204 639
US-A-4 240 848

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Description

This invention relates to file folders and more particularly to such folders having at least one reinforced edge for use in such systems and to a method of manufacture thereof.

With the ever increasing use and popularity of colour coded filing systems in offices there is a decided trend to the use of side tab folders. Side tab folders should be distinguished from top tab folders. Top tab folders are indexed on the upper edge parallel to the spine or fold between the front and back surfaces of the folder. Side tab folders are indexed on the side at right angles to the spine or fold. The file folders are placed upright on shelves with their side edges projecting outwardly from the shelf. Side tab filing systems have become most advantageous, especially in larger filing systems, because the filing and finding of folders is faster and easier. Also, side tab filing systems save floor space as compared with drawer filing. The colour coding of the files is not a necessity but can usually be an enhancement. The reinforced edge can advantageously be used in either top or lateral systems.

An example of the side tab file systems is disclosed in United States Patent 4,204,639. Usually file folders remain in a filing system for many years and during the life of the folder are subjected to considerable wear and tear and often to severe handling and abuse. Also, as they are moved between the file room to the user departments they are often roughly handled as they are temporarily placed in holding baskets or carts with the side tab projecting. This projecting tab is exposed and thus vulnerable to creasing, tearing and fatigue.

The folder stock commonly used for file folders, is a folder stock approximately .011 inches or .014 inches (0.28 mm or 0.36 mm) thick. The folders are manufactured from web stock on high speed automatic folder machines.

In the past, many attempts have been made to reinforce file folder edges, especially the top tab type which have been commonly used for many years and are stored in file drawers. Usually the upper edge of the file folder is reinforced in one way or another to withstand abuse. An example of such file folder reinforcement is disclosed in United States Patent 1,743,191. In that instance, the upper edge of the rear panel of the folder has an additional layer of file folder stock glued to the upper edge and wrapped around the upper edge of the folder to provide a three ply thickness to substantially reinforce the upper edge. Other examples of similar manners for reinforcing file folder edges, are disclosed in United States Patents 1,081,727; 2,052,623 and 2,138,788. In each instance, either the file folder stock integral with the folder is folded over and glued to reinforce the edge or additional material is added of the same file folder stock to reinforce the edge.

The approach to date has, therefore, been to

add additional layers of the folder stock to the folder edge in an attempt to reinforce and add stiffness to the folder edge to resist tearing.

Various forms of high tensile strength films have been used to repair rips in paper and protect surfaces of paper products. An example of such film is Mylar (R.T.M.) which consists of polyethylene terephthalate and is sold by Du Pont. In the file folder field, such film is used to protect add-on file folder tabs as disclosed in copending United States Patent S.N. 276,939 which corresponds to Canadian Patent application S.N. 380,208 filed June 19th, 1981 and granted as Canadian Patent No. 1 138 488.

It has been discovered as discussed below that this type of high tensile strength film may be bonded to the edge of a file folder to unexpectedly greatly increase the strength of the folder and its resistance to tear. Because of the thinness of the film, little bulk is added to the folder thickness and the film may be conveniently applied during the manufacture of the file folder. By using coloured adhesives, which may be applied to a clear film just prior to bonding the film to the folder edge, the edge of the folder front and back panels may be provided with a distinct colour to which colour coded labels may be subsequently applied. An alternative to a coloured adhesive is to use a coloured paper on the folder edge which is covered by a clear film. Another alternative is to use coloured film which is secured to the folder edge to provide the desired colour band. This is a significant advantage in that groups of files of a file system may now be recognized by the complete band of colour down its front and back panel edges. This avoids the prior more costly approach of using many different coloured folder stocks for distinguishing each desired group of files in the system. Such coloured paper stock would fade and lose its distinctive colour. In addition, the colour of the folder stock would change from batch to batch of the stock, so that there would not be a consistent colouring for a group of files.

The folders can be manufactured from web stock on high speed automatic folder machines where the high tensile strength film when bonded to the edge of a file folder unexpectedly greatly increases the strength of the folder and its resistance to tear. This advantage can be accomplished during the folder manufacturing process in a way that only marginally increases the manufacturing cost. This marginal cost factor in relation to a much superior file folder is a worthwhile and important advantage. Such high tensile strength film complements and increases additionally the strength of a folder edge which consists of ploughed over web stock to provide a double thickness of paper stock at the edge. Also, the high tensile strength film provides a superior bonding surface for the attachment of the self adhesive indexing and colour coded labels used to identify the folders.

Summary of the invention

According to the present invention there is provided a file folder of paper stock having generally rectangular front and back panels separated by a fold which extends to an edge of the folder which is formed with an integral identification extension, in which the said edge of the folder and the extension are reinforced by an adhesively secured film of plastics material which extends about the outer edge of the extension and covers both faces thereof and which is adhesively secured to the front and back panels on either side thereof along the length of the edge to reinforce the extension, the outer edge of the extension, the said edge of the folder and the intersecting fold.

The invention extends to a method for producing a file folder of paper stock having generally rectangular front and back panels separated by a fold which extends to an edge of the folder which is formed with an integral identification extension which comprises the steps of advancing a web of paper stock from a supply roll, the web having parallel side edges and upper and lower surfaces when advanced horizontally, applying to the web stock adjacent one side edge thereof a width of a film of plastics material, wrapping the film about the one side edge and adhering it to upper and lower surface portions along said one side edge while said paper stock is moving, cutting the paper stock within the width of the adhered film along the one side edge to leave the extension and define the remaining portion of said edge of the folder, cutting the paper stock to a predetermined length to provide the front and back panels and folding the cut paper stock along a fold separating the front and back panels and extending to said folder edge.

According to another aspect of the invention there is provided a method for producing a file folder of paper stock having generally rectangular front and back panels separated by a fold which extends to and is at right angles to an edge of the folder which is formed with an integral identification extension which comprises the steps of withdrawing the paper stock from a supply roll and advancing the paper stock, applying and adhering a width of reinforcing film of plastics material, drawn from a roll of such material, to one surface of the advancing paper stock adjacent one side edge thereof, folding the paper stock and the adhered film in the length of the film to produce two opposed paper stock portions with the film adhered to the exterior thereof, adhesively uniting the opposed paper stock portions and cutting the opposed paper stock portions within the width of the film to leave the extension and form the remaining portion of said edge of the folder, cutting the paper stock from the supply to provide said front and back panels and folding the cut paper stock to produce the fold separating the front and back panels and extending to said edge of the folder.

The edge of the folder can then be die cut to provide the desired shape for the side of the

folder and at the same time or at another station the web stock is die cut to produce a folder blank which is then folded about its mid-section to provide a file folder.

The method for reinforcing side edge portions of the front and back panels of the folder comprises securing a width of reinforcing tear resistant plastic film along an edge of the paper stock for the folder. The film is secured to the paper stock by an adhesive with the film wrapped about the edge and along portions of both surfaces of the material adjacent the edge. The paper material can be cut along the edge within the width of the film to provide the desired shape for the folder edge with a tab projecting from the side edge of the back panel. The film as it extends along both edge surface portions of the front and back panels reinforces the projecting tab and a portion of the panels adjacent the tab. This serves to reinforce both the tab and the junction of the tab and the panel. Various coloured adhesives may be used with clear film, or a coloured film may be used to provide desired colour bands along the folder side to designate groups in a file system. The band width colour on the exterior of the front folder flap may be wider than on the exterior of the folder so that the colour designation is more noticeable when the folder lies upright on a desk.

Brief description of the drawings

Preferred embodiments of the invention are shown in the drawings wherein:

Figure 1 is a perspective view of a file folder having a side portion reinforced in accordance with this invention;

Figure 2 is a plan view of web stock which has an edge thereof reinforced with film and from which folder blanks are die cut;

Figure 3 is an enlarged view of the undercut portion of the side tab as it projects from the rear panel of the file folder;

Figure 4 is a perspective view of the enlarged portion of the undercut as shown in Figure 3;

Figures 5 and 6 show other arrangements for file folder side tab portions as reinforced in accordance with this invention;

Figure 7 is an enlarged view of the undercut portion of the file folder side tab arrangement of Figure 5;

Figure 8 is a perspective view of apparatus for applying reinforcing film to the side edge of a moving web from which the folder blanks are die cut;

Figure 9 is a perspective view showing the application of a film having fresh adhesive applied thereto;

Figures 10a, 10b and 10c are a series of partial sectional views through the edge of a file folder diagrammatically illustrating several manufacturing steps;

Figure 11 is a partial perspective view showing an alternate method of applying the film to the paper web stock;

Figure 12 is a partial perspective view of the

web stock and film being folded upon itself after application of an adhesive to the opposite face of the web stock relative to the surface carrying the high tensile strength film;

Figure 13 is a perspective view of a folder blank with the plastic film secured about the reinforced edge;

Figure 14 is a partial perspective view of a folder blank similar to Figure 13 having a portion of the reinforced edge removed to define a label securing portion on the remaining reinforced edge.

Detailed description of the preferred embodiments

File folders according to this invention optionally having colour banding applied thereto are particularly useful in lateral filing systems. Such filing systems differ from the standard drawer type in that the file folders are placed on shelves and stand upright as they rest on the spine portion of each file. Only the side edges of the file folder project from the shelf where each folder side edge carries labels or a label defining the code for the file. It is possible to use colour coded labels with this system to provide an orderly colour array in which misfiles are easily spotted. Details of this system are discussed in previously mentioned United States Patent 4,204,639.

Referring to Figure 1, a file folder 10 for use in a lateral file system is shown. File folder 10 comprises a back panel 12 and a front panel 14. The back panel 12 has a top edge 16 and side edges 18 and 20. Similarly, the front panel has top edge 22 and side edges 24 and 26. The bottom edges of front and back panels are interconnected at the fold or spine portion 28. A reinforcing film 30 is applied to both the top and bottom surfaces of panel edges 20 and 26 in the manner shown, to reinforce the folder edge generally designated 32 along the length of edges 20 and 26. Reinforcement of edge 32 includes reinforcing the projecting tab 32a to decrease damage by creasing or folding causing weakening and separation of the layers making up the web stock as well as reinforcing of the area securing the tab to the panel. This second type of reinforcing is accomplished by having a portion of the film overlie the paper web panels to distribute the local forces exerted on the tab to a larger area of the file folder. In addition, labels 34 are applied over the film 30 to designate at least in part a code for the file folder. In accordance with the aforementioned United States Patent 4,204,639, these labels may be colour coded.

The file folder 10 is formed from a file folder blank which in turn is cut from a web of file folder paper stock. As shown in Figure 2, the file folder stock is a web having side edges 38 and 40. The paper stock 36 has a reinforcing film 30 applied along edge 40. The film 30 is wrapped around edge 40 and secured to adjacent top and bottom surfaces, of the paper stock.

Various configurations may be used in provid-

ing a folder edge for use in a lateral file system. As per the arrangement shown in Figure 1, folder edge 32 is formed by cutting web edge 40 within the width of film 30 along edge 26 to provide a cut-out portion 42. Depending upon the type of cutting mechanism used, the folder blank is cut from the web along lines 44 and 46 either simultaneously with cutting the edge 40 or cut subsequently at another station. Such cut-out blank is subsequently folded along line 28 to form the folder of Figure 1. With portion 42 cut from the web of paper stock to define the side tab 32a of the folder, an undercut portion 48 is provided at the fold line 28. It is this edge portion of the folder side carrying the tab 32a and where the fold line meets the side edge which is most susceptible to wear and tear and can be ripped as the folder is used in lateral file systems, carrying baskets, carts and the like.

Turning to Figure 3, the undercut portion 48 is curved at 50 to reduce sharp edges which are more likely to tear. That in conjunction with the reinforcing film 30 considerably strengthens the folder in the area of the undercut portion 48 to minimize tearing of the folder in this area. In addition the corner edge of the tab 32a adjacent to the undercut area is cut at an angle as at 49 to avoid fraying and splitting of this portion of the side tab. From the standpoint of cutting the outer edge, the angled portion 49 is more accurately cut than a radius because the die cutting edge may extend well beyond the folder edge. This ensures a clean cut to the outer edge of the folder side even if the web should shift slightly laterally before being cut.

In the enlarged view shown in Figure 4 the web of paper stock material may have a side edge folded over to provide double thickness of material along the edge. The edge of the web of paper stock material therefore has an underlying layer 52 which has adhesively secured thereto a folded over upper layer 54 which has an inner edge 56. The reinforcing film 30 is secured to the surfaces along the edge 40 of the web. The reinforcing film 30 is wrapped around the edge where the film is of a sufficient width to extend beyond the inner edge 56 of the folded over web stock material. Thus, the side tab portion 32a of the folder to be made has the reinforcing web wrapped therearound. In the area of the undercut 48 and angled edge 49, the film has been cut so as to be flush with corresponding cut edges of the layers 52 and 54. It has been found that by adhesively securing the film to these portions of the folder paper stock and cutting it flush with the undercut edges, the likelihood of ripping the folder in this undercut area and along the remainder of the cut side 26 is minimized due to the significant increase in strength due to the reinforcing film.

Referring to Figures 5, 6 and 7, alternative arrangements for file folders for use in lateral file systems are shown. In Figure 5, the folder 58 comprises back panel 60 and front panel 62. Projecting outwardly from rear panel 60 is side

tab 64. A reinforcing film 66 is applied to both surfaces of the side tab 64 and also along both surfaces of the edge 68 of the front panel 62. The reinforcing film 66 reinforces this entire side of the folder 58, particularly the neighbourhood of undercut at 70 where the shorter front panel 62 intersects the longer rear panel 60. As shown in Figure 6, file folder 72 has corresponding back panel 74 and front panel 76 with side tab 78. Film 80 is secured to both surfaces of the front and back panels to reinforce the panel edges and particularly the undercut portion 80a. In the embodiment of Figure 6 the undercut portion 80a is located upwardly from the fold line or spine 82 of the folder.

Referring to Figure 7 an enlarged portion of area adjacent the undercut 70 of the folder 58 of Figure 5 is shown where the film 66 is secured by an appropriate adhesive to both surfaces of the front and back panels 60 and 62. In the area of the undercut 70, the notch 84 is protected by the film 66 secured to both surfaces surrounding the notch 84 to prevent or minimize tearing of the material of the folder in this area.

Various techniques may be employed for securing and applying the reinforcing film to the edge portion of a file folder. The film itself may be provided in the form of a roll already having an adhesive on one face thereof, or the film may have applied thereto the adhesive with the film subsequently directly applied to folder web stock material. The desirable forms of adhesives are the pressure sensitive type where, if the adhesive is applied to the film and re-rolled the adhesive has less affinity for the film to which it is applied than for the paper stock material to which it is subsequently applied. Referring to Figure 8, a machine is shown which withdraws film having already applied thereto a pressure sensitive adhesive for securing the reinforcing film to the paper stock material. The film is of a high tensile strength tear resistant type. An example of such film is polyethylene terephthalate which is sold by Dupont under the Registered Trade Mark "Mylar".

The web of paper stock 86 is withdrawn from a supply roll, (not shown), and fed in the direction of arrow 88. The web stock has edge portions 90 and 92. Adjacent edge portion 92, an adhesive 94 is applied by adhesive application wheel 96. The edge 92 is folded over in the direction of arrow 98 and adhered to the adjacent marginal edge of the paper stock by a device (not shown) to provide a double edged portion along the stock 86. This will in turn form the side edge of a folder of the type shown in the enlarged view of Figure 4.

A supply roll 100 of reinforcing tear resistant plastic film having a pressure sensitive adhesive already thereon is mounted on a spindle 102 of the film application apparatus 104. Nip rollers 106 and 108 withdraw the film 110 from the supply roll 100. The rollers 106 and 108 are driven by a motor 112 the speed of which is coordinated with the rate of feed of the web stock 86 in the direction of arrow 88 to withdraw and feed the film 110 at a

linear speed equal to the speed at which the web stock 86 is travelling in the direction of arrow 88. The film 110 is passed over a spring loaded arm having a roller 114 to compensate for slack in the film due to variations in the speed of the web stock 86 should the motor 112 not be capable of quickly compensating for variations in speed of the web stock 86.

The film is then passed over a series of standard rollers generally designated 116 which are usually used to fold the film over edge 118 of the paper stock and apply it to both surfaces along the edge. The rollers 116 comprise a first vertical planar roller 120 which presses the film against the edge 118 of the moving web stock 86. Although not shown, a spring loaded device or a movable guide is placed on the other side of the web to constantly urge the web against the rollers 116. The film 110 is gradually creased at the edge 118 of the web stock 86 by grooved roller 122. Planar vertical roller 124 maintains the slightly creased film against the edge of the web stock where roller 126 having an accentuated grooved portion creases the film further to essentially overlie both surfaces of the web stock along the edge 118. Vertical roller 128 maintains the film in this position as opposing compression rollers 130 and 132 press the film with pressure sensitive adhesive against the web stock material. With the film now adhered to both surfaces along the side edge of the web stock it is ready for cutting to form the desired side tab shape. As the web stock continues to move, a standard device (not shown) is used to cut out from the web stock, edge portion 134 which resembles the shape of cut out portion 42 as shown in Figure 2 in forming the side tab arrangement for the file folder of Figure 1. The file folder blank is cut from the web stock along lines 136 and 138 and folded about its mid section along fold 140 to form the folder of Figure 4.

In situations where it is desired as aforementioned to provide a colour band along the side tab of the file folder, this may be accomplished by selecting a coloured adhesive which is applied to a clear reinforcing film and which is in turn applied to the file folder. As already mentioned, however, one may instead of using various coloured adhesives to determine the colour of the band along the folder side, use a reinforcing film which is itself of the desired colour. Such coloured film may then have clear adhesive applied thereto or have adhesive previously applied and re-rolled. In the latter instance with the coloured film having the adhesive already thereon, such film may be applied to folders by using an apparatus such as that shown in Figure 8.

The width of the film applied to the edge of the web stock or the folder side may vary depending upon whether it is a clear film or a coloured arrangement to provide the band of colour. As shown in Figure 1, a significant portion of the exterior of the front panel 14 includes the Mylar (RTM) film as with the exterior of the back panel.

Thus when the folder having the band of colour applied thereto is lying on a desk either right side up or upside down, the large band of colour designates clearly the group of files to which it belongs. To ensure a sufficient width of colour band, for example with a 10.2 cm (four inch) width of film, 6.35 cm (two and a half inches) may be applied to one surface of the web stock, which constitutes the exterior of the front and back panels, and 3.8 cm (one and a half inches) to the remaining surface which constitutes the interior of the front and back panels. Such 3.8 cm (one and a half inch) overlap is sufficient as already explained with reference to Figure 4, to cover the doubled over portion 54 of the folder edge. Such difference in widths of the film as applied to each side of the folder stock is shown in Figure 2 by the dotted line which signifies the width of the film applied to the other side of the stock. This extra width of film also serves to distribute forces exerted on the tab to a larger area of the panel and reduce the possibility of tearing of the tab from the folder.

The device shown in Figure 9 is similar to that shown in Figure 8. The web stock 142 is conveyed over framework 144 and over a support 146. A glue applicator roll 148 applies glue to an edge 150 of the web 142. A device (not shown) is used to plough over the edge 150 in the direction of arrow 152 and rollers are used to lay down and secure the folded over edge portion 154 of the web stock 142. The adhesive used is such that the folded over edge portion 154 remains flat after passing between spring loaded pressure rollers 156 and 158. The film is of sufficient width and secured to the web 142 in a manner so as to extend beyond edge 160 of the folded over portion 154 such that when the film 162 with pressure sensitive adhesive on its underside passes between the web edge 154 supported by roller 158 and the spring loaded roller 156, it is secured to the web edge and overlaps the edge 160 of the folded over portion of the web stock.

The film is then wrapped around and onto the undersurface of the web stock in a four-stage process. Having secured a portion of the width of the film 162 to the upper surface of the web stock, the accurate location of the film relative to the web stock is now determined. According to the example of a four inch (10.2 cm) width of film, one and a half inches (3.8 cm) of the film width is laid onto and secured to the presented surface of the folder stock. The next stage is to fold over the remaining two and a half inches (6.35 cm) of film which is commenced by roller 164 having bevelled face portion 166. Bevelled face 166 bends the film downwardly at an angle relative to the plane of the web stock. The next stage in bending the film is provided by vertical roller 168 which bends the film to a 90 degree angle relative to the plane of the web stock. The next stage of the fold over is provided by roller 170 having bevelled face 172 which begins to fold the film underneath the web stock at an acute angle relative to the underside of the plane of the web stock. The film, as bent under

the web stock, can now be passed through spring loaded pressure rollers 174 and 176 to complete the securement of the folded over film to the web stock. The overall length of the roller arrangement 178 is sufficient to ensure a smooth wrap around the film without creases therein. The web stock is now ready for the next stage in manufacture, namely the die cutting thereof to provide the desired shape to the side of the folder and cut the folder blank from the web stock in a manner which is commonly used in the art. In instances where a clear film is applied to the web stock a narrower film width may be used because of the nonrequirement of a large colour band. A 7.6 cm (three inch) clear film may be used where the film is folded over equally on both surfaces of the web stock to reinforce the edge.

A coloured band can be provided by having coloured paper on the web stock edge and covered by the Mylar (RTM) film. The colour of the paper shows through the clear film to provide a desired colour band. The coloured paper may be secured to the Mylar (RTM) film and the paper, in turn, be secured to the folder edge or conversely, the coloured paper may be secured to the folder edge and the Mylar (RTM) film applied over the coloured paper.

The plastic reinforcing film must, when applied to the paper web stock, reduce the tendency of the tab or edge to be torn from the paper web stock and distribute forces such that creasing and folding of the tab or panel adjacent the tab are reduced. Films which are suitable include, polyethylene terephthalate films such as sold by Dupont under Mylar (RTM), "Celanar" (RTM) from Celanese, and "Scotchpar" (RTM) from 3M. The film is preferably of a thickness in the approximate range of 0.006 to 0.025 mm (0.25 to about 1 thousandth of an inch) and with advantage from about 0.012 to 0.025 mm (0.5 to 1 thousandth of an inch) and it may usefully be about 0.025 mm (1 thousandth of an inch). The thickness of the folder stock is normally in the approximate range of 0.254 to 0.381 mm (0.010 to 0.015 inches).

Figures 10 through 14 illustrate a variation of the method of manufacturing the product. For this reason, a new numbering scheme will be used. Referring to Figures 10, 11 and 12 the web 300 of paper web stock is advanced from a roll (not shown) and undergoes a number of operations to produce the file folder blank 302 shown in Figure 13 or the modified folder blank 302a shown in Figure 14. The difference between the folder blank of Figure 13 and that of Figure 14 is that a portion of the reinforced edge has been removed from the front panel 308 to thereby define an outward extension portion 305 on the back panel 310. As in the earlier figures the reinforced edge 303 has a high tensile strength reinforcing film 312 secured about the straight reinforced edge 303 with a portion of the film extending beyond the reinforced edge to be in direct contact with the portion of the web stock 300 adjacent the reinforced edge. In this way, reinforcement of the

file folder adjacent the junction of the reinforced edge 303 and the abutting paper stock is achieved. This serves to distribute localized forces exerted on the outward extension 305 to the file folder and thereby avoid localized deterioration of the extension.

In Figure 10a the high tensile strength film 312 has been adhesively secured in this case to the lower surface of the paper web stock as generally shown in Figure 11 and an adhesive 314 has been applied to the opposite surface of the paper web stock for adhesively securing the paper web stock which will be folded upon itself. Therefore the paper web stock with the film on the lower surface thereof is folded upon itself to produce a reinforced edge portion with the high tensile film secured along the length either side of the reinforced edge and about the edge thereof. This defines two opposed surfaces of paper web stock indicated as 316 and 318 which are secured by adhesive 314 to provide a double thickness of paper web stock adjacent the edge of the file folder. It should be noted that the paper web stock and film are not folded in the center line of the film as it is preferable to have the film extend across the junction of the reinforced edge and the paper web stock to reinforce this and reduce the tendency of this reinforced area to be torn from the remaining body of the web stock.

Application of the high tensile film to the lower surface of the paper web stock and the subsequent folding of the film and paper web stock is shown in Figures 11 and 12. The high tensile strength film 312 is secured by an adhesive 311 to one surface of the paper web stock 300 adjacent the edge thereof, in this case to the lower surface of the paper web stock, as the web stock is advanced. This advancement is generally indicated by arrow 320 showing movement of the paper web stock and arrow 321 showing movement of the high tensile strength film with adhesive applied thereto. A paper web stock aligning device 322 accurately maintains alignment of the paper web stock as it is being withdrawn from the supply roll. One such aligning device is manufactured by G. W. D. Controls Limited and is referred to as a paper stock guide. This apparatus accurately maintains the edge of the paper web stock and therefore a manual aligning roller generally shown as 330 in Figure 11 can be used to align the high tensile strength film with the edge of the paper web stock to assure placement of the film adjacent the edge of the web stock.

The high tensile strength film 312 is applied to the lower surface of the web stock 300 and is retained on the web stock as it is passed between pressure rollers 340 and 341. This assures the pressure sensitive adhesive 311 firmly bonds the high tensile strength film to the lower surface of the paper web stock. In applying the high tensile strength film, it is important to control the tension thereof to assure the film is not highly prestressed as it is applied to the paper web stock. It is preferred to merely apply sufficient tension to

maintain the film flat as further stressing of the film will occur when the folder blank is folded to form front and back panels. Prestressing of the film can cause buckling of the paper stock. In contrast to the earlier apparatus, the high tensile strength film is not driven but merely advanced by the web stock.

A further adhesive 314 is then applied adjacent the edge of the paper web stock and is used to secure the paper web stock portions 316 and 318 as shown in Figure 13. After the adhesive 314 has been applied, the web stock is passed through a number of folding rollers generally designated as 350 to fold the paper web stock upon itself and subsequently pass the folded web stock through pressure rollers 352 and 354 in order to strongly adhere the paper web stock portions 316 and 318.

After completing the folding of the paper web stock with the film on the exterior surface thereof, the paper web stock is passed through a number of cutting or blanking operations to form folder blanks generally as shown in Figure 13 and Figure 14. In the embodiment shown, a fold line 370 has been produced on the folder blank 302 and 302a to thereby define front and back panels of the file folder. By removing a portion of the reinforced edge 303 as shown in Figure 14, a file folder having a laterally extending portion 305 is produced suitable for use in lateral filing.

It has been found that the product method and apparatus as described with respect to Figures 10 to 14 is preferred. Because the high tensile strength film is very thin, it is much easier to handle when secured on the paper web stock and problems such as creasing or folding of the film during application to the paper web stock are reduced.

Paper web stock is very susceptible to wear and separation of the individual layers thereof which substantially weakens the overall strength of the web stock. This problem is particularly acute at areas of high stress which are subject to damage such as the portion of the file folder which extends beyond the panels of the folder to present a surface to which labels can be applied for identifying of the file folder. As such, the label identifying portion is prone to wear and often will tear from the body of the folder. By applying a high tensile strength film either side of the paper substrate, and in a manner to bridge the transition between the reinforced edge and the body of the file folder, the tendency of the paper stock to separate is reduced as the high tensile strength film reinforces the area and limits the separation of the individual layers. By providing a film of substantially greater width than the label extending portion and securing the film in a manner such that the film is secured to the web stock interior to the label extending portion a distance approximately at least equal to the label extending portion, it has been found that the tendency of the edge of the panel to tear from the folder is reduced as the high tensile strength film provides a means for distributing the force, which is locally applied to the label extending portion, to a larger

area of the file folder. Therefore edges of file folders prone to damage can be reinforced in the manner described to significantly increase the effective life of the file folder or substrate.

Claims

1. A file folder of paper stock having generally rectangular front and back panels (14, 12; 62, 60) separated by a fold (28; 82) which extends to an edge (26; 68) of the folder (10; 58) which is formed with an integral identification extension (32a; 64), in which the said edge (26; 68) of the folder (10; 58) and the extension (32a; 64) are reinforced by an adhesively secured film (30; 66) of plastics material which extends about the outer edge (20) of the extension (32a; 64) and covers both faces thereof and which is adhesively secured to the front and back panels (14, 12; 62, 60) on either side thereof along the length of the edge (20; 26) to reinforce the extension (32a; 64), the outer edge (20) of the extension, the said edge (26; 68) of the folder (10; 58) and the intersecting fold (28; 82).

2. A file folder according to claim 1 in which an undercut region (48; 80a) is provided where the extension meets the said edge.

3. A file folder according to claim 2 in which the undercut region (48) is provided immediately adjacent the fold (28).

4. A file folder according to claim 2 in which the undercut region (80a) is provided on one of said panels spaced from the intersection of the fold (82) with the said edge (68).

5. A file folder according to claim 2, 3 or 4 in which the undercut region (48) provides a curved edge (50) between the extension (32a) and the said edge (26).

6. A file folder according to any one of the preceding claims in which the said edge (26; 68) and extension (32a; 64) are of a double thickness (52, 54) of the paper stock.

7. A file folder according to any one of the preceding claims in which the said edge (26; 68) is produced by cutting the paper stock after the film (30; 66) is adhesively secured thereto so that the film (30; 66) and the paper stock terminate at a common cut edge (26; 68).

8. A file folder according to any one of the preceding claims in which the film (30; 66) is of a colour different than the paper stock to provide a colour band along the edge of the folder.

9. A file folder according to any one of the preceding claims in which the film (30; 66) has a width of 7.62 to 10.14 cm (3 to 4 inches) with at least 3.8 cm (one and a half inches) applied to opposed sides of the extension (32a; 64).

10. A file folder according to any one of the preceding claims including at least one pressure sensitive adhesive label (34) carried directly on the surface of said film (30) and located on said extension (32a).

11. A method for producing a file folder of paper stock having generally rectangular front and back panels (14, 12; 62, 60) separated by a

fold (28; 82) which extends to an edge (26; 68) of the folder (10; 58) which is formed with an integral identification extension (32a; 64) which comprises the steps of advancing a web (86) of paper stock from a supply roll, the web (86) having parallel side edges (90, 92) and upper and lower surfaces when advanced horizontally, applying to the web stock adjacent one side edge (118) thereof a width of a film (110) of plastics material, wrapping the film (110) about the one side edge (118) and adhering it to upper and lower surface portions along said one side edge while said paper stock is moving, cutting the paper stock within the width of the adhered film (110) along the one side edge (118) to leave the extension (32a; 64) and define the remaining portion of said edge (26; 68) of the folder, cutting the paper stock (86) to a predetermined length to provide the front and back panels (14, 12; 62, 60) and folding the cut paper stock along a fold (140) separating the front and back panels and extending to said folder edge.

12. A method according to claim 9 in which the one side edge (118) is formed by folding a marginal edge (92) of the web of paper stock (86) upon itself and adhesively securing the marginal edge (92) to the web to provide a double thickness of paper stock at the one side edge (118).

13. A method for producing a file folder of paper stock having generally rectangular front and back panels (308, 310) separated by a fold (370) which extends to and is at right angles to an edge (303) of the folder which is formed with an integral identification extension (305) which comprises the steps of withdrawing the paper stock (300) from a supply roll and advancing the paper stock (300), applying and adhering a width of reinforcing film (312) of plastics material, drawn from a roll of such material, to one surface of the advancing paper stock (300) adjacent one side edge thereof, folding the paper stock (300) and the adhered film (312) in the length of the film to produce two opposed paper stock portions (316, 318) with the film (312) adhered to the exterior thereof, adhesively uniting the opposed paper stock portions and cutting the opposed paper stock portions (316, 318) within the width of the film (312) to leave the extension (305) and form the remaining portion of said edge (303) of the folder, cutting the paper stock from the supply to provide said front and back panels (308, 310) and folding the cut paper stock to produce the fold (370) separating the front and back panels and extending to said edge (303) of the folder.

14. A method according to claim 13 in which an adhesive (314) is applied to the opposite surface of the paper stock (300) adjacent said one side edge to unite the two opposed paper stock portions (316, 318) as the paper stock and the adhered film (312) are folded.

15. A method according to any one of claims 11 to 14 in which the cutting of the paper stock to produce the extension and the folder edge produces an undercut portion (48; 80a) between the extension and the folder edge.

16. A method according to any one of claims 11 to 15 in which the film is coloured.

17. A method according to any one of claims 11 to 15 in which the film is transparent and a coloured adhesive is used to adhere the film to the paper stock.

Patentansprüche

1. Aktendeckel aus Papiermaterial, der je einen vorderen und einen rückwärtigen, im wesentlichen rechteckigen Deckel (14, 12; 62, 60) aufweist, die durch einen Falz (28; 82) getrennt sind, der sich zu einem Rand des Aktendeckels (10; 58) hin erstreckt, der mit einer einstückigen Identifikationsverlängerung (32a; 64) ausgebildet ist, wobei der Rand (26; 68) des Aktendeckels (10; 58) und die Verlängerung (32a; 64) verstärkt sind mittels eines durch Klebung befestigten Films (30; 66) aus Kunststoffmaterial, der sich über den äußeren Rand (20) der Verlängerung (32a; 64) hinaus erstreckt und deren beide Flächen bedeckt und der mittels Klebung an dem vorderen und dem rückwärtigen Deckel (14, 12; 62, 60) an deren beiden Seiten entlang der Länge des Randes (20; 26) befestigt ist, um die Verlängerung (32a; 64), den äußeren Rand (20) der Verlängerung, den Rand (26; 68) des Aktendeckels (10; 58) und den hindurch verlaufenden Falz (28; 82) zu verstärken.

2. Aktendeckel nach Anspruch 1, bei dem ein durch Wegschneiden entstandener Bereich (48; 80a) vorgesehen ist, in welchem die Verlängerung mit dem Rand zusammentrifft.

3. Aktendeckel nach Anspruch 2, bei dem der durch Wegschneiden entstandene Bereich (48) unmittelbar an den Falz (28) angrenzend vorgesehen ist.

4. Aktendeckel nach Anspruch 2, bei dem der durch Wegschneiden entstandene Bereich (80a) an einem der (vorderen bzw. rückwärtigen) Deckel vorgesehen ist im Abstand zu der Schnittstelle des Falzes (82) mit dem Rand (68).

5. Aktendeckel nach Anspruch 2, 3 oder 4, bei dem der durch Wegschneiden entstandene Bereich (48) einen gekrümmten Rand (50) zwischen der Verlängerung (32a) und dem Rand (26) aufweist.

6. Aktendeckel nach einem der vorangehenden Ansprüche, bei dem der Rand (26; 68) und die Verlängerung (32a; 64) eine doppelte Dicke (52, 54) des Papiermaterials aufweisen.

7. Aktendeckel nach einem der vorangehenden Ansprüche, bei dem der Rand (26; 68) durch Beschneiden des Papiermaterials erzeugt ist, nachdem der Film (30; 66) daran mittels Klebung befestigt ist, so daß der Film (30; 66) und das Papiermaterial an einem gemeinsamen Schnitttrand (26, 68) enden.

8. Aktendeckel nach einem der vorangehenden Ansprüche, bei dem der Film (30; 66) eine andere Farbe aufweist als das Papiermaterial, um ein Farbband längs des Aktendeckel-Randes vorzusehen.

9. Aktendeckel nach einem der vorangehenden Ansprüche, bei dem der Film (30; 66) eine Breite

von 7,62 bis 10,14 cm (3—4 inch) aufweist, wobei wenigstens 3,8 cm (1½ inch) entgegengesetzte Seiten der Verlängerung (32a; 64) betreffen.

10. Aktendeckel nach einem der vorangehenden Ansprüche, der zumindest ein druckempfindliches Klebeetikett (34) aufweist, das unmittelbar an der Oberfläche des Films (30) getragen und an der Verlängerung (32a) angeordnet ist.

11. Verfahren zum Herstellen eines Aktendeckels aus Papiermaterial, der je einen vorderen und einen rückwärtigen, im wesentlichen rechteckigen Deckel (14, 12; 62, 60) aufweist, die durch einen Falz (28; 82) getrennt sind, der sich zu einem Rand (26; 68) des Aktendeckels (10; 58) hin erstreckt, der mit einer einstückigen Identifikationsverlängerung (32a; 64) ausgebildet ist, wobei das Verfahren folgende Schritte umfaßt: Verschieben einer Bahn (86) aus Papiermaterial von einer Vorratsrolle weg, wobei die Bahn (86) parallele seitliche Ränder (90, 92) und bei horizontalem Verschieben obere und untere Flächen aufweist, Anbringen eines Breitenbereiches eines Films (110) aus Kunststoffmaterial an das Bahnmaterial angrenzend an seinen einen seitlichen Rand (118), Umschlagen des Films (110) um den einen seitlichen Rand (118) und Ankleben desselben an obere und untere Bereiche der Oberfläche entlang des einen seitlichen Randes, während sich das Papiermaterial bewegt, Abschneiden des Papiermaterials innerhalb der Breite des angeklebten Films (110) entlang des einen seitlichen Randes (118), um die Verlängerung (32a; 64) zu belassen und den verbleibenden Bereich des Aktendeckelrandes (26; 68) zu definieren, Abschneiden des Papiermaterials (86) auf eine vorbestimmte Länge, um den vorderen und den rückwärtigen Deckel (14, 12; 62, 60) vorzusehen, und Umschlagen des abgeschnittenen Papiermaterials längs eines Falzes (140), der den vorderen von dem rückwärtigen Deckel trennt und der sich zu dem Aktendeckelrand hin erstreckt.

12. Verfahren nach Anspruch 11, bei dem der eine seitliche Rand (118) ausgebildet wird durch Umschlagen eines Randbereiches (92) der Bahn aus Papiermaterial (86) auf sich selbst und Befestigen des Randbereiches (92) mittels Klebstoffs an der Bahn, um an dem einen seitlichen Rand (118) eine doppelte Dicke des Papiermaterials vorzusehen.

13. Verfahren zum Herstellen eines Aktendeckels aus Papiermaterial, der je einen vorderen und einen rückwärtigen, im wesentlichen rechteckigen Deckel (308, 310) aufweist, die durch einen Falz (370) getrennt sind, der sich im rechten Winkel zu einem Rand (303) des Aktendeckels hin erstreckt, der mit einer einstückigen Identifikationsverlängerung (305) ausgebildet ist, wobei das Verfahren folgende Schritte umfaßt: Abziehen des Papiermaterials (300) von einer Vorratsrolle und Verschieben des Papiermaterials (300), Anbringen und Ankleben eines Breitenbereiches eines Verstärkungsfilms (312) aus Kunststoffmaterial, der von einer Rolle eines solchen Materials abgezogen wird, auf eine Fläche des sich vorschiebenden Papiermaterials (300), die an seinen

einen seitlichen Rand angrenzt, Umschlagen des Papiermaterials (300) und des angeklebten Films (312) in Längsrichtung des Films, um zwei einander gegenüberliegende Bereiche (316, 318) des Papiermaterials mit dem an dessen Außenseite angeklebten Film (312) herzustellen, Vereinigen der einander gegenüberliegenden Bereiche des Papiermaterials mittels Klebstoffs und Beschneiden der einander gegenüberliegenden Bereiche (316, 318) des Papiermaterials innerhalb der Breite des Films (312), um die Verlängerung (305) zu belassen und den verbleibenden Bereich des Aktendeckelrandes (303) auszubilden, Abschneiden des Papiermaterials von dem Vorrat, um den vorderen und den rückwärtigen Deckel (308, 310) vorzusehen, und Umschlagen des abgeschnittenen Papiermaterials, um den Falz (370) herzustellen, der den vorderen und den rückwärtigen Deckel voneinander trennt und sich zu dem Aktendeckelrand (303) hin erstreckt.

14. Verfahren nach Anspruch 13, bei dem ein Klebstoff (314) an die entgegengesetzte Oberfläche des Papiermaterials (300) angrenzend an den einen seitlichen Rand angebracht wird, um die beiden einander gegenüber liegenden Bereiche (316, 318) des Papiermaterials zu vereinigen, wenn das Papiermaterial und der angeklebte Film (312) umgeschlagen werden.

15. Verfahren nach einem der Ansprüche 11—14, bei dem das Beschneiden des Papiermaterials zum Herstellen der Verlängerung und des Aktendeckelrandes einen durch Wegschneiden entstandenen Bereich (48; 80a) zwischen der Verlängerung und dem Aktendeckelrand erzeugt.

16. Verfahren nach einem der Ansprüche 11—15, bei dem der Film gefärbt ist.

17. Verfahren nach einem der Ansprüche 11—15, bei dem der Film durchsichtig ist und ein gefärbtes Klebemittel verwendet wird, um den Film an das Papiermaterial anzukleben.

Revendications

1. Couverture de classeur en matériau de papier comportant des panneaux frontal et postérieur de forme généralement rectangulaire (14, 12; 62, 60) séparés par un pli (28; 82) qui s'étend vers une arête (26; 68) du classeur (10; 58) qui est pourvue d'un prolongement d'identification (32a; 64) qui en fait partie intégrante, dans laquelle ladite arête (26; 68) de la couverture (10; 58) et le prolongement (32a; 64) sont renforcés par une pellicule fixée par adhésif (30; 66) d'un matériau plastique qui s'étend autour de l'arête extérieure (20) du prolongement (32a; 64) et qui recouvre les deux faces de ce dernier et qui est fixée par adhésif aux panneaux frontal et postérieur (14, 12; 62, 60) sur l'un des côtés le long de la longueur de l'arête (20; 26) de manière à renforcer le prolongement (32a; 64) l'arête extérieure (20) du prolongement, ladite arête (26; 68) de la couverture et le pli de raccordement (28; 82).

2. Couverture de classeur selon la revendication 1, dans laquelle une région prédécoupée

(48; 80a) est prévue à l'endroit où le prolongement rencontre ladite arête.

3. Couverture de classeur selon la revendication 2, dans laquelle la région prédécoupée (48) est prévue immédiatement adjacente au pli (28).

4. Couverture de classeur selon la revendication 2, dans laquelle la région prédécoupée (80a) est prévue sur l'un desdits panneaux espacés de l'intersection du pli (82) avec ladite arête (68).

5. Couverture de classeur selon l'une des revendications 2, 3 ou 4, dans laquelle la région prédécoupée (48) délimite une arête incurvée (50) entre le prolongement (32a) et ladite arête (26).

6. Couverture de classeur selon l'une quelconque des revendications précédentes, dans laquelle ladite arête (26; 68) et le prolongement (32a; 64) présentent une double épaisseur (52, 54) du matériau de papier.

7. Couverture de classeur selon l'une quelconque des revendications précédentes, dans laquelle ladite arête (26; 68) est obtenue par découpage du matériau de papier après fixation par adhésif de la pellicule (30; 66) sur ce matériau de manière que la pellicule (30; 66) et le matériau de papier se terminent sur une arête à découpe commune (26; 68).

8. Couverture de classeur selon l'une quelconque des revendications précédentes, dans laquelle la pellicule (36; 66) présente une couleur différente de celle du matériau de papier de manière à obtenir une bande de couleur le long de l'arête de la couverture.

9. Couverture de classeur selon l'une quelconque des revendications précédentes, dans laquelle la pellicule (30; 66) présente une largeur de 7,62 à 10,14 cm (3 à 4 pouces) avec au moins 3,8 cm (1 1/2 pouce) appliqués sur les côtés opposés du prolongement (32a; 64).

10. Couverture de classeur selon l'une quelconque des revendications précédentes, comportant au moins une étiquette à adhésif sensible à la pression (34) supportée directement par la surface de ladite pellicule (30) et située sur ledit prolongement (32a).

11. Procédé pour la production d'une couverture de classeur en matériau de papier comportant des panneaux frontal et postérieur de forme généralement rectangulaire (14, 12; 62, 60) séparés par un pli (28; 82) qui s'étend vers une arête (26; 68) du classeur (10; 58) qui est pourvue d'un prolongement d'identification (32a; 64) qui en fait partie intégrante, qui comprend les étapes consistant à: faire avancer une bande (86) d'un matériau de papier à partir d'un rouleau d'alimentation, la bande (86) comportant des bords latéraux parallèles et des surfaces supérieure et inférieure lorsqu'elle se déplace horizontalement; appliquer sur le matériau en bande, près d'une arête latérale (118) de ce dernier une largeur d'une pellicule (110) de matière plastique; envelopper la pellicule (110) autour de ladite arête latérale (118) et la faire adhérer aux parties de surfaces supérieure et inférieure le long de ladite arête latérale pendant que le maté-

riau de papier se déplace; découper le matériau de papier sur la largeur de la pellicule adhérente (110) le long de ladite arête latérale (118) de manière à laisser le prolongement (32a; 64) et à délimiter la partie restante de ladite arête (26; 68) de la couverture; découper le matériau de papier (86) sur une longueur prédéterminée de manière à obtenir les panneaux frontal et postérieur (14, 12; 62, 60) et plier le matériau de papier découpé le long d'un pli (140) séparant les panneaux frontal et postérieur et s'étendant vers l'arête de ladite couverture.

12. Procédé selon la revendication 9, dans lequel l'arête latérale (118) est formée par repliage sur elle-même d'une arête latérale (92) de la bande du matériau de papier (86) et par collage par adhésif de cette arête latérale (92) sur la bande de manière à obtenir une double épaisseur du matériau de papier sur ladite arête latérale (118).

13. Procédé pour la réalisation d'une couverture de classeur en matériau de papier comportant des panneaux frontal et postérieur de forme généralement rectangulaire (308, 310) séparés par un pli (370) qui s'étend vers une arête (303) de la couverture et qui est à angle droit par rapport à cette arête, celle-ci étant pourvue d'un prolongement d'identification (305) qui en fait partie intégrante, qui comprend les étapes consistant à: extraire le matériau de papier (300) d'un rouleau d'alimentation et faire avancer le matériau de papier (300); appliquer et faire adhérer une largeur de pellicule de renfort (312) de matière plastique, extraite d'un rouleau d'une telle matière, à l'une des surfaces du matériau de papier en déplacement (300), adjacente à l'une des arêtes latérales de ce dernier; replier le

matériau de papier (300) et la pellicule adhérente (312) dans la longueur de la pellicule de manière à produire deux parties de matériau de papier opposées (316, 318), avec la pellicule (312) qui adhère à l'extérieur de ces parties; relier à l'aide d'adhésif les parties opposées de matériau de papier et découper ces parties opposées de matériau de papier (316, 318) sur la largeur de la pellicule (312) en laissant le prolongement (305) et en formant la partie restante de ladite arête (303) de la couverture; découper le matériau de papier du rouleau d'alimentation de manière à obtenir lesdits panneaux frontal et postérieur (308, 310) et replier le matériau de papier découpé de manière à produire le pli (370) séparant les panneaux frontal et postérieur et s'étendant vers ladite arête (303) de la couverture.

14. Procédé selon la revendication 13, dans lequel on applique un adhésif (314) à la surface opposée du matériau de papier (300), près de ladite arête latérale, de manière à unir les deux parties opposées de matériau de papier (316, 318) lorsque le matériau de papier et la pellicule adhérente (312) sont pliés.

15. Procédé selon l'une quelconque des revendications 11 à 14, dans lequel le découpage du matériau de papier pour produire le prolongement et l'arête de la couverture produit une portion prédécoupée (48; 80a) entre le prolongement et l'arête de la couverture.

16. Procédé selon l'une quelconque des revendications 11 à 15, dans lequel la pellicule est colorée.

17. Procédé selon l'une quelconque des revendications 11 à 15, dans lequel la pellicule est transparente et l'on utilise un adhésif coloré pour faire adhérer la pellicule au matériau de papier.

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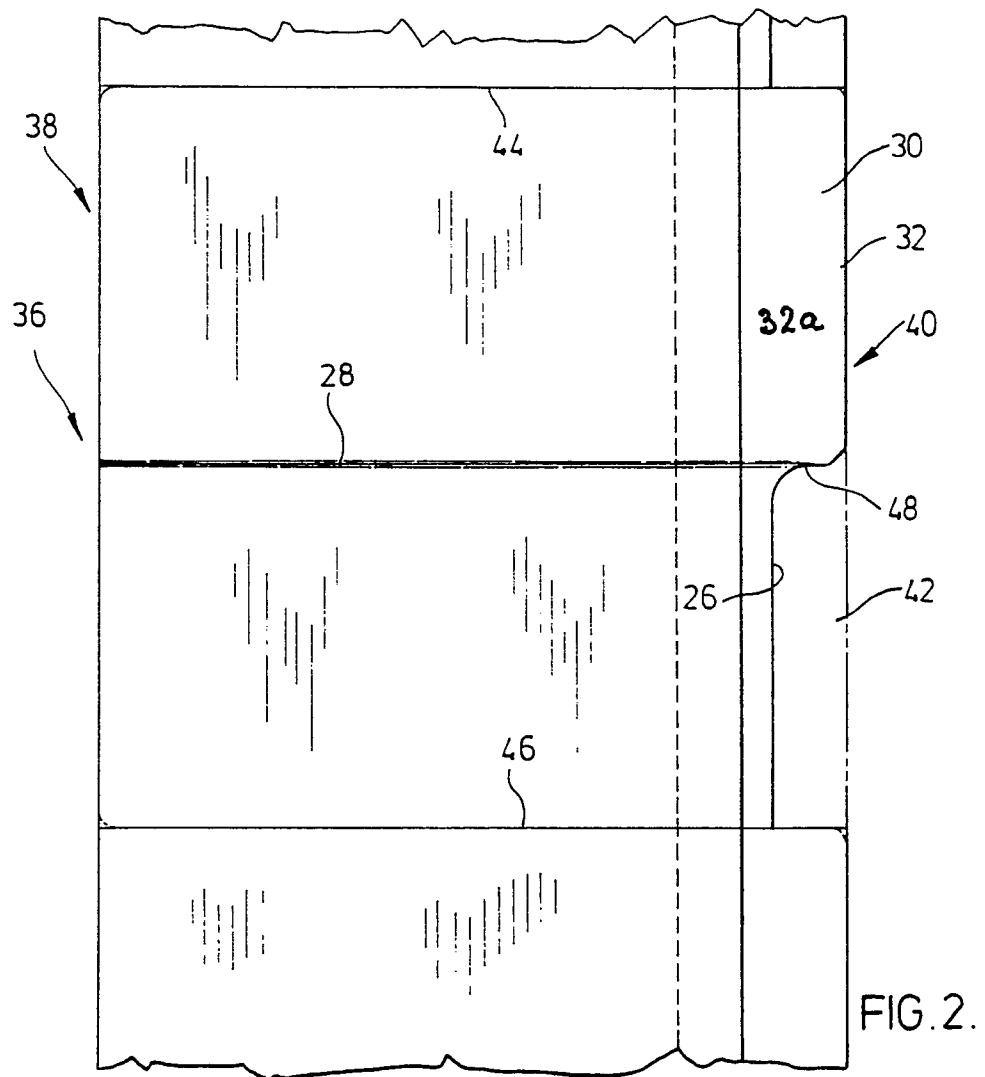
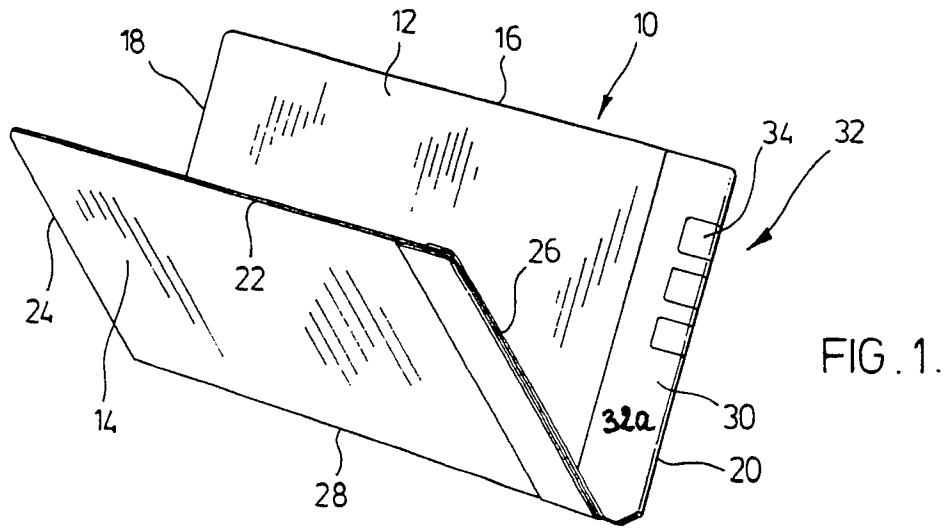
50

55

60

65

11



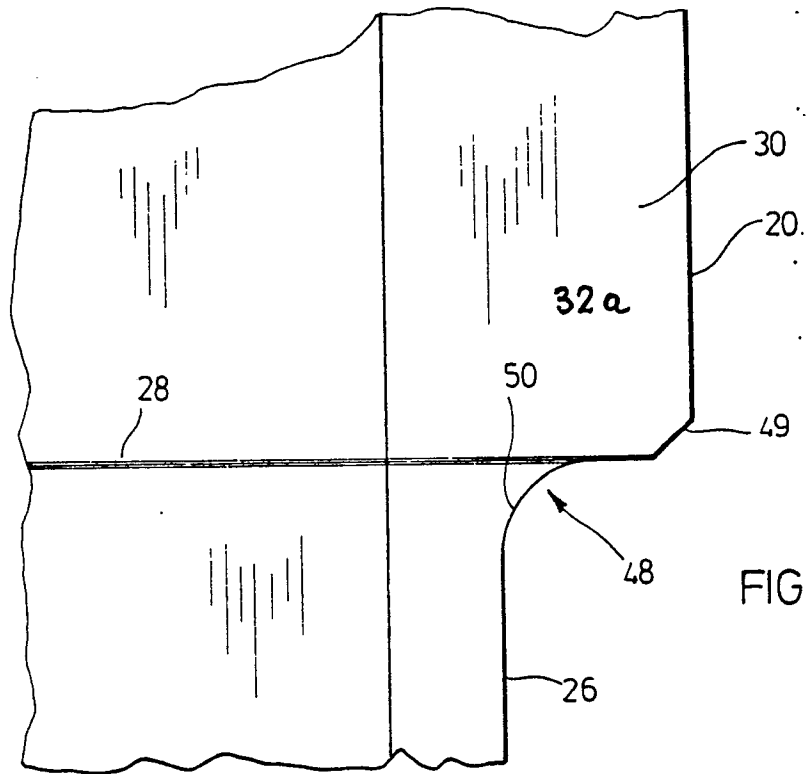


FIG. 3.

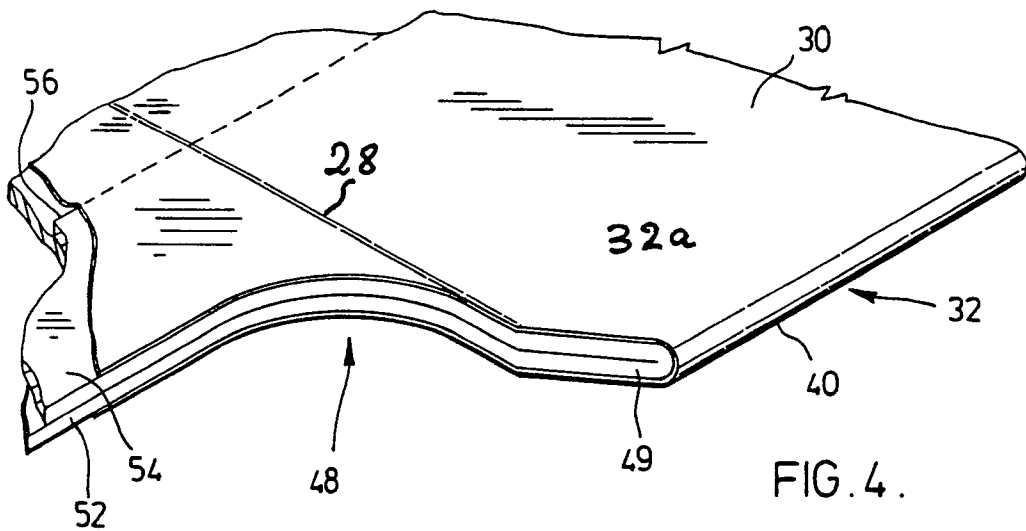


FIG. 4.

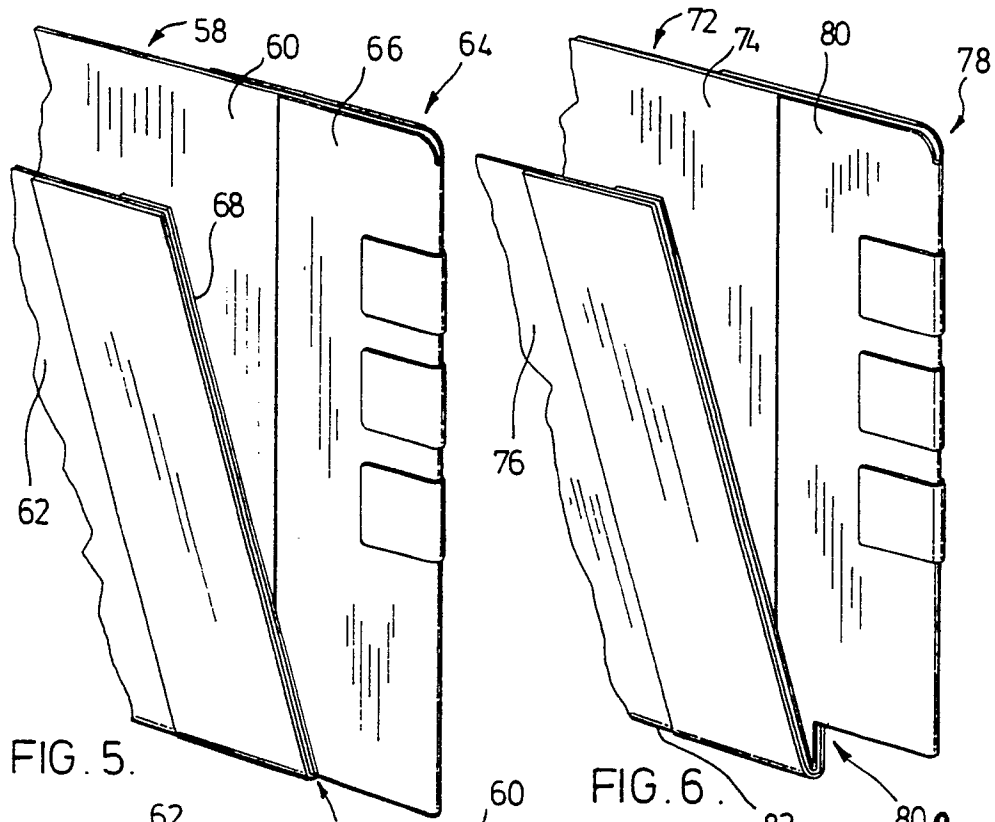


FIG. 5.

FIG. 6.

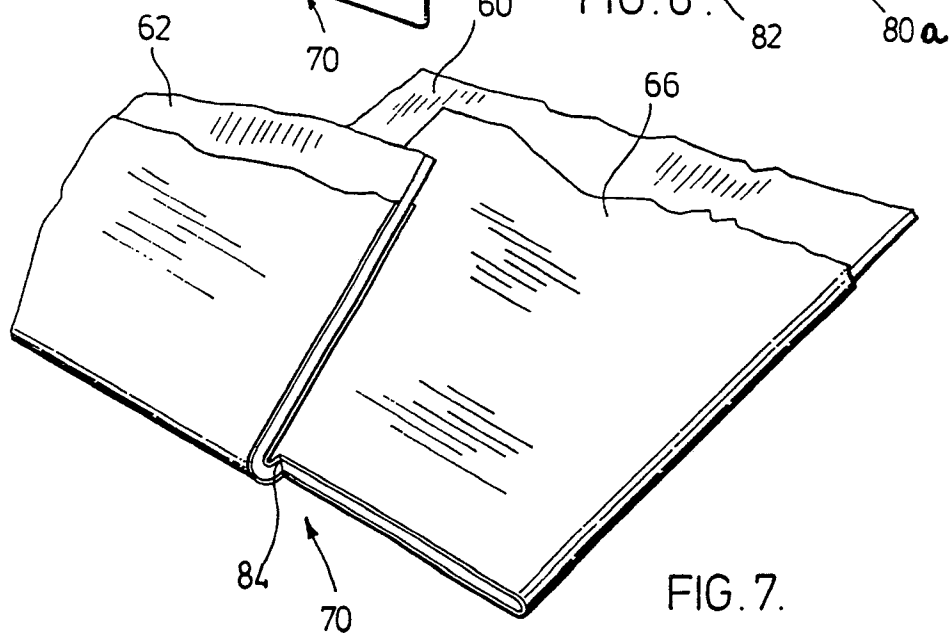


FIG. 7.

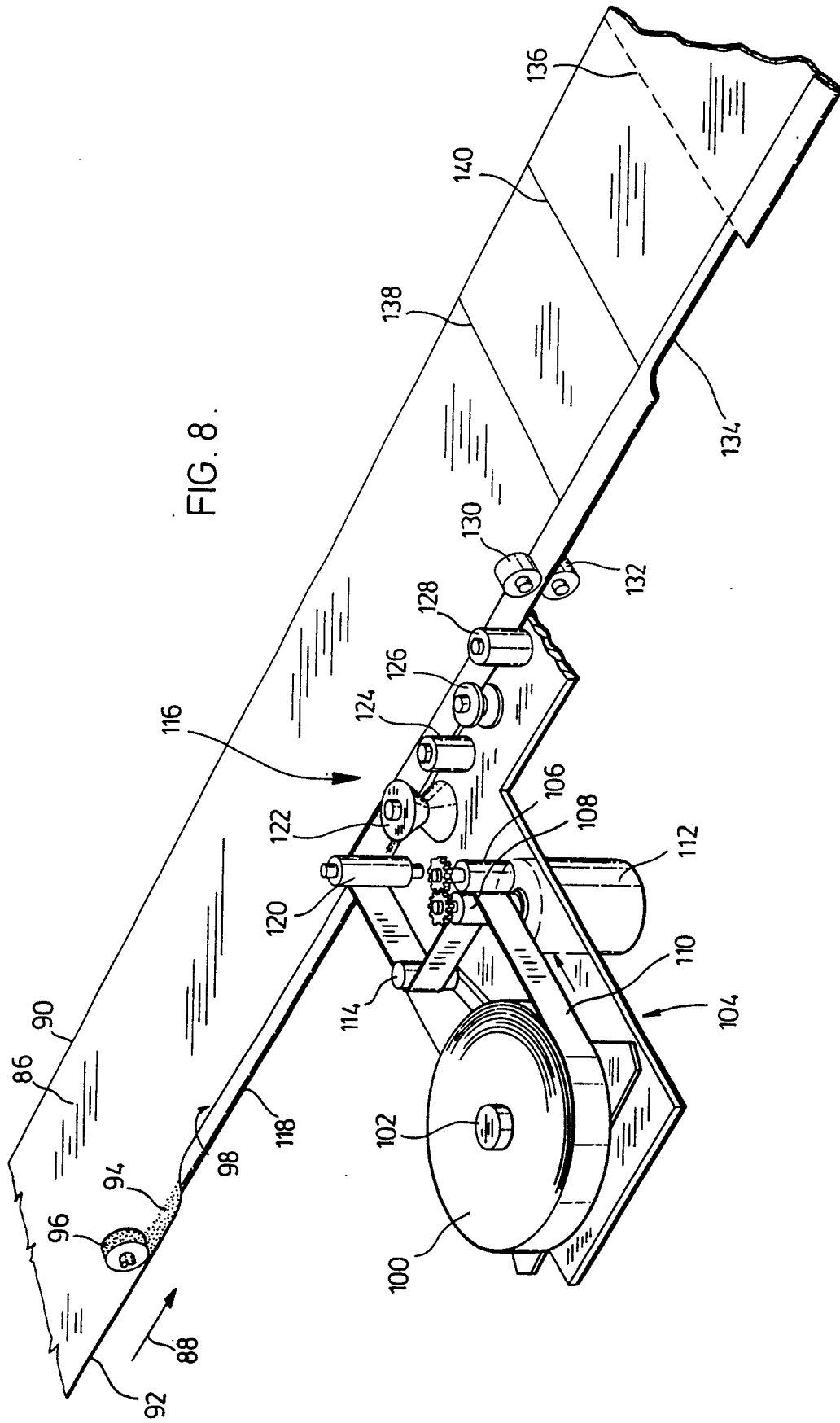


FIG. 9.

