United States Patent

Nissen et al.

[15] **3,679,094**

[45] **July 25, 1972**

[54] INTERFOLDED SHEET MATERIAL ASSEMBLY

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[73] Assignee: **Kimberly-Clark Corporation,** Neenah, Wis.

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[21] Appl. No.: **42,314**

[52] **U.S. Cl.** **221/50,** 206/57, 270/40

[51] **Int. Cl.** **A47k 10/20**

[58] **Field of Search** 206/57; 221/47-60; 270/39, 40

[56] **References Cited**

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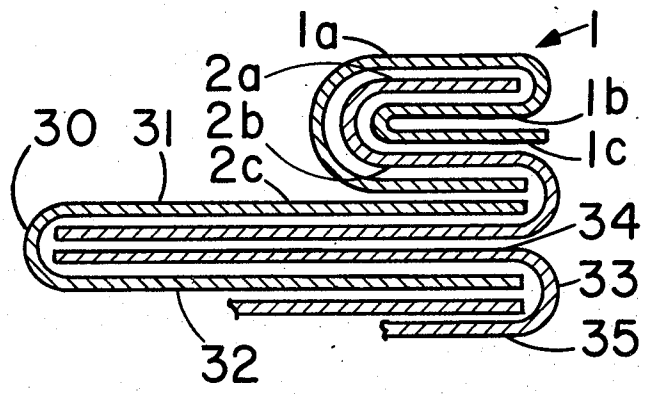
Primary Examiner—Robert B. Reeves
Assistant Examiner—Thomas E. Kocovsky
Attorney—Daniel J. Hanlon, Jr. and Raymond J. Miller

[57] **ABSTRACT**

Interfolded webs such as those of tissue paper are provided in a stack. The upper two webs of the stack are so folded and interfolded as to provide four plies or folds of an upper web to the hand of a user to permit grasping of the full folded thickness for withdrawal. A method and apparatus to effect the particular folding of the upper starter web and next lower web of the stack are illustrated.

1 Claim, 19 Drawing Figures



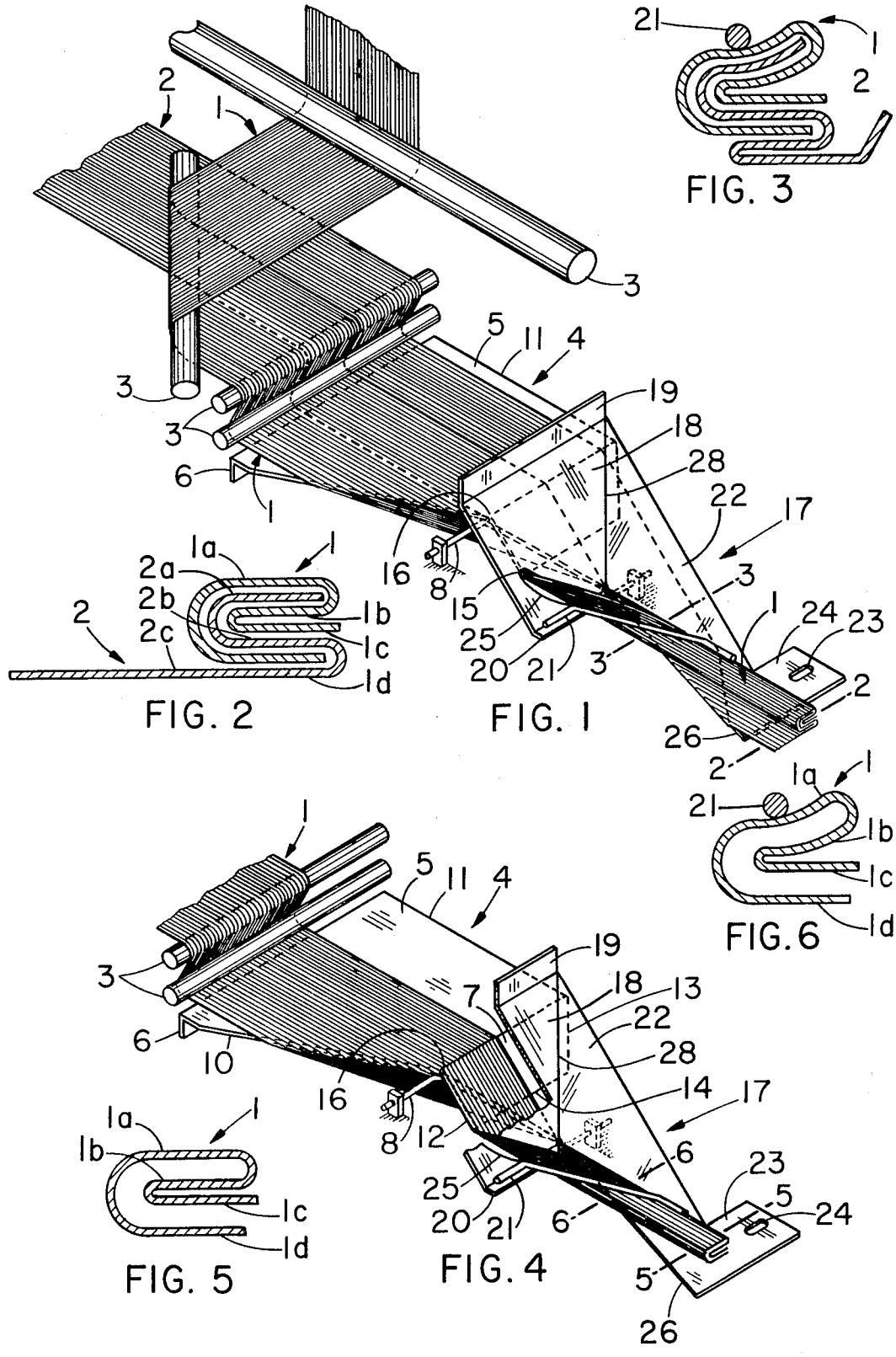

21
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FIG. 3
2
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2a
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FIG. 2
FIG. 1
FIG. 6
FIG. 5
FIG. 4
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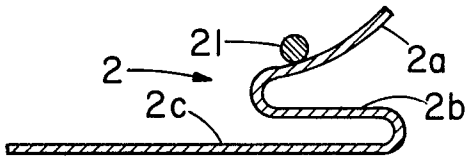

FIG. 9

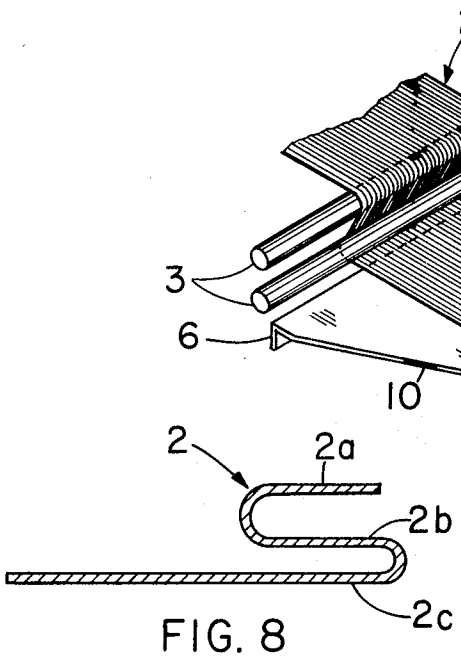

FIG. 8

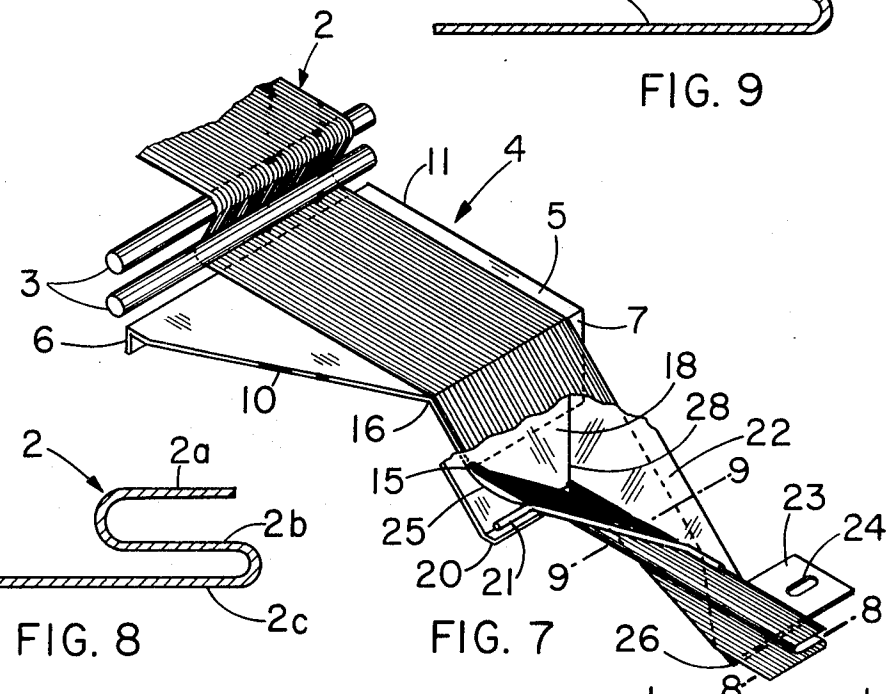

FIG. 7

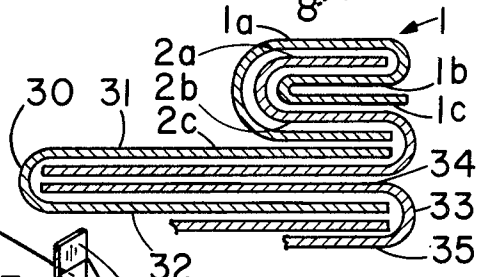

FIG. 11

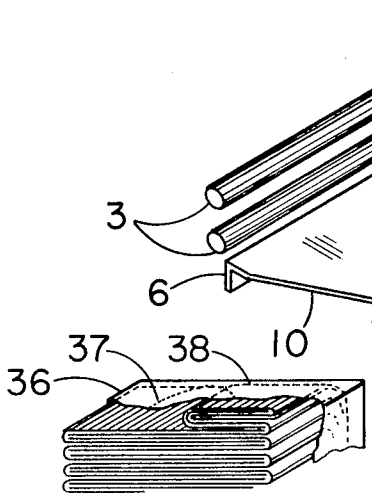

FIG. 19

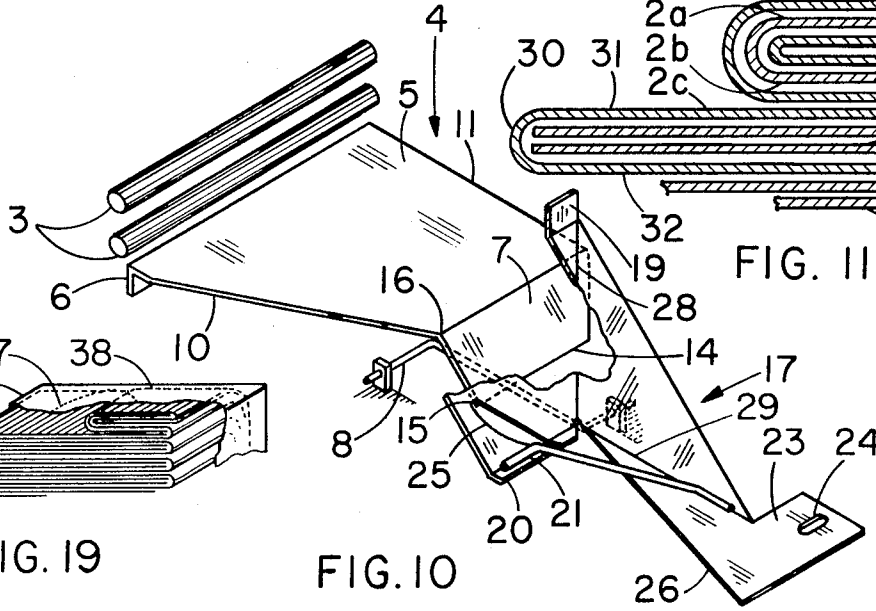

FIG. 10

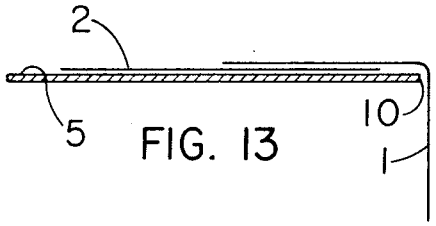

FIG. 13

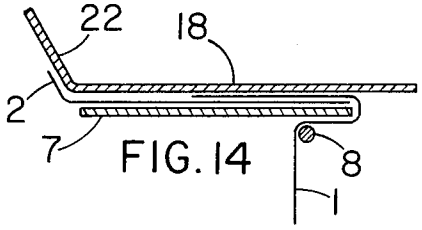

FIG. 14

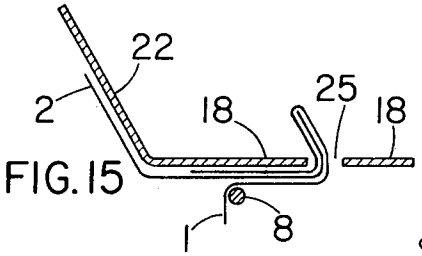

FIG. 15

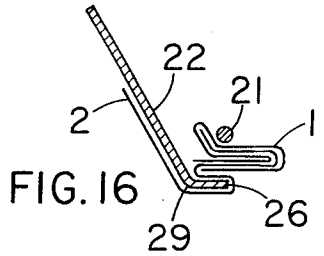

FIG. 16

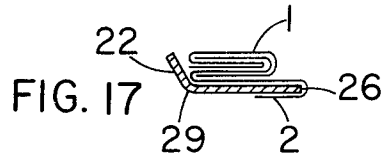

FIG. 17

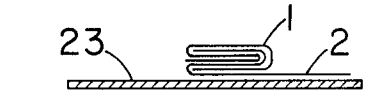

FIG. 18

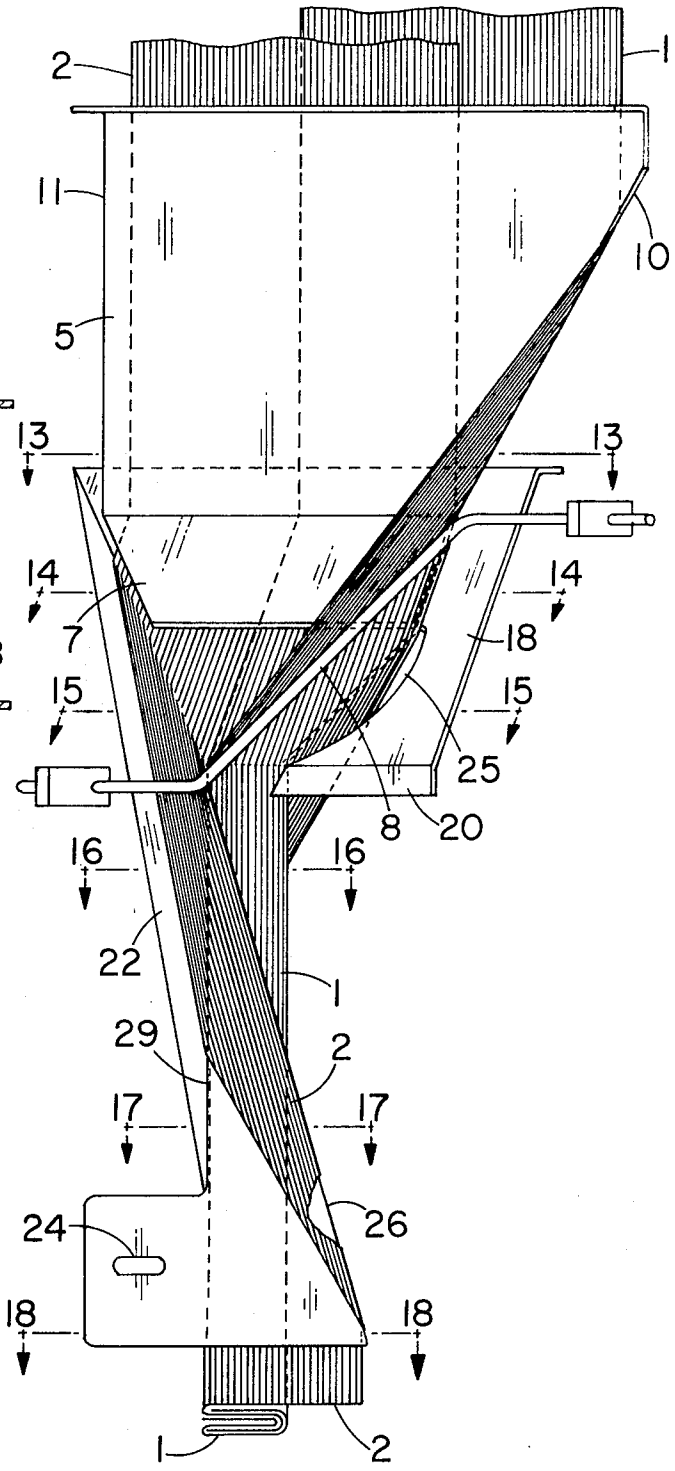

FIG. 12

INTERFOLDED SHEET MATERIAL ASSEMBLY

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to interfolded webs and particularly to a specific arrangement of a starter web for a stack of interfolded webs. The invention also relates to a method for folding the starter web and a procedure for combining it with other webs of the stack.

2. The Invention With Relation to the Prior Art

It is known to interfold webs in a stack in such manner that the withdrawal of an uppermost web of a stack will raise a portion of a next lower web so that the next lower web may be readily grasped and withdrawn from the stack also. Conventionally, cartons suitable for containing a convenient size stack of webs are provided with an opening through which the interfolded tissues may be sequentially withdrawn.

The interfolded webs are commonly provided as paper materials suitable for use as facial tissues. However, the interfolded webs may also be of a character to provide them as towels, wipes, napkins and the like. In many instances the webs are tightly packed and are subjected to relatively heavy pulling forces in withdrawal. This is particularly true of the starter webs. A primary purpose of this invention is to provide a novel starter web which is so interfolded with a next lower web that rupture of either web in withdrawal from a stack of webs is unlikely.

In a preferred embodiment of the invention the uppermost and starter web of a stack is folded longitudinally to provide quarter folds of the web in overlying relation and with the web closed toward a longitudinal center zone of the stack. With the web so closed all four plies of the web are conveniently presented to the hand of a user for grasping the full folded web thickness. Also, the folded web is then open towards the stack side and a fold of the next lower web lying in the opening will provide for partial withdrawal and exposure of the next lower web as the uppermost web is removed from the stack.

Very suitably, the uppermost web, when folded along longitudinal fold lines, has widthwise quarter folds in overlying relation; these overlie such that the widthwide quarter folds of the opposed edge portions of the web are adjacent and define an opening for receipt of a fold of the next lower web. The next lower web has at least one widthwise quarter fold which lies in the opening and, preferably, has in addition an adjacent center portion widthwise quarter fold which also lies in the opening. In the preferred embodiment a quarter edge portion fold and a center portion fold are in the stack in overlying relation but spaced apart by a quarter edge portion fold and a center portion fold of the uppermost web.

The four folds of the uppermost web are preferably made simultaneously with the interfolding of the next lower web. The next lower web is itself folded as described in U.S. Pat. No. 3,401,927, R. H. Frick inventor, and assigned to the same assignee as the present invention. Prior, however, to such folding, the next lower web is combined with the uppermost web as the uppermost web itself is folded. For the purpose the two webs are fed forwardly in partially overlying relation over successive folding boards. The completely folded webs are cut to suitable length for packaging.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be more fully understood by reference to the detailed description and accompanying drawings which follow. The drawings, for the sake of clarity, are somewhat exaggerated in the presentation of folds, fold lines thicknesses and the like. It will be understood that the webs are, for example, conventional facial tissues of usual thickness and that the folds would lie very flat and immediately upon one another. More specifically, in the drawings:

FIG. 1 is a fragmentary view in perspective of a folding mechanism in accordance with the invention and illustrating the method of folding and interleaving the upper two webs of a stack;

FIG. 2 is a sectional view taken along line 2—2 of FIG. 1 illustrating the relationship of the two upper webs of a stack;

FIG. 3 is a sectional view taken along line 3—3 of FIG. 1;

FIG. 4 is a fragmentary view illustrating the method of forming the web which is the uppermost web of a stack in accordance with the invention;

FIG. 5 is a view taken along line 5—5 of FIG. 4;

FIG. 6 is a view taken along line 6—6 of FIG. 4;

FIG. 7 is a fragmentary view illustrating the method of folding the web which interleaves with the uppermost web of a stack in accordance with the invention;

FIG. 8 is a sectional view taken along line 8—8 of FIG. 7;

FIG. 9 is a sectional view taken along line 9—9 of FIG. 7;

FIG. 10 is a fragmentary view partially in section like that of FIG. 1 but with the webs removed and with parts broken away illustrating the arrangement of successive folding boards and associated equipment;

FIG. 11 is a sectional and fragmentary view of an upper portion of a completed stack;

FIG. 12 is a much enlarged view similar to that of FIG. 1 but taken from the rear of the folding boards;

FIGS. 13–18 inclusive are sectional views based on FIG. 12 illustrating in detail steps in the folding of the two uppermost webs in a stack; and

FIG. 19 is a perspective view of tissue as folded and disposed in a carton for individual removal.

A PREFERRED EMBODIMENT OF THE INVENTION

Referring to the drawings and initially particularly FIGS. 1, 4, 7 and 10, the numeral 1 designates a web which is to be folded as the uppermost web of a stack. The numeral 2 designates a web which is to be interfolded with web 1 and to be the next lower, that is, the second web of the stack.

For convenience, the folding of web 1 to the structure of FIGS. 2 to 6 will first be considered. The folding of web 2 to the structures of FIGS. 7–9 inclusive will then be considered separately, and the formation of the interfolded two webs will then be described particularly in connection with FIGS. 12–18 inclusive.

The web 1 is directed by suitably positioned guide rolls 3 to a first folding board indicated generally at 4. Board 4 has a first surface 5 in the general form of a trapezoid; support 6 integral with the board depends rearwardly and is adapted for providing support of the board. The board further includes (FIGS. 4, 7 and 10) a downwardly forwardly directed surface 7 also in the general shape of a trapezoid. A web guide rod 8 projects forwardly beneath and beyond surface 7 (FIGS. 10 and 12) angularly to the direction of sheet travel as indicated by the arrow (FIG. 1) and terminates adjacent a forward portion of a second folding board 17 (FIG. 1).

The board 5 has a first lateral fold edge 10 which is inwardly directed forwardly on surface 5 toward surface 7; the board also has a second fold edge 11 also directed forwardly toward surface 7; this edge suitably extends in the direction of web travel. The surface 7 includes opposed lateral fold edges 12,13 (FIG. 4) and a forward terminal edge 14 (FIG. 10) which forms a juncture or corner 15 (FIG. 10) with lateral edge 12. The numeral 16 (FIGS. 7,8) designates a common juncture of surfaces 5,7 at a narrow zone of the board 4.

The web 1 is directed under a suitable tension around guide 3 (FIGS. 1 and 4) and across surface 5. The left hand lateral edge portion (FIG. 1) of the web is urged downwardly and inwardly of the edge 10 of surface 5 (FIGS. 4 and 12). The angularly projecting guide rod 8 (FIGS. 8, 14 and 15) urges the one lateral edge of web 1 toward the other edge and into overlying relation as the web proceeds toward folding board 17 (FIG. 4).

Web 2 (FIG. 1) is presented over guides 3 to surface 5 in underlying relation to web 1 and moves substantially rectilineally across surface 5 toward panel 18 of board 17. Panel 18 (FIG. 4) has an upstanding upper extension 19 which may be used to support the board in any convenient mount

(not shown). This board **17** is similar to the board shown and described in Frick, U.S. Pat. No. 3,401,927 mentioned above but with modification noted hereinafter. The board is here described sufficiently to indicate its functions in the embodiments of this application. Reference may be had to the Frick patent for a more detailed description. Opposite extension **19** of panel **18** is a lip **20** of the board **17**. Projecting forwardly from lip **20** in a direction angularly disposed to the direction of web travel indicated by the arrow (FIG. **1**) is a rod **21** providing a folding edge.

The board **17** further includes a panel **22** which projects forwardly of panel **18** and upwardly obliquely from horizontally disposed panel **23** lying in the direction of web travel. Panel **23** has a slot **24** adapted for receiving a mounting bolt (not shown). A slot **25** in panel **18** having an edge **27** (FIG. **7**) and the edge **26** of panel **23** provide means for effecting folding of the traveling web **2** (FIG. **7**). The slot is of somewhat greater dimension than the slot shown in Frick U.S. Pat. No. 3,401,927 to provide for passage of the folded material; additionally, one edge is curvilinear to aid web threading. The board **17** is suitably of sheet metal and has bend lines **28,29** (FIG. **10**) serving respectively to join the panels **18,22**, and **22,23**.

The web **2** itself as it travels on the board **17**, conveniently termed a right hand board, is folded to the configuration of FIG. **8**. Specifically, the web **2**, to achieve this fold (FIG. **8**) is passed over guides **3** downwardly along the rear surface of panel **18** (FIG. **7**) and its longitudinal center line crosses the intersection of fold edges **29**, **28** and **26**. The right hand half (FIG. **7**) of the web **2** passes around the fold edge **28** on the rear side of the board onto the rear face of the panel **22** (FIG. **15**) and makes a turn of 180° on the edge **26** (FIG. **4**) so as to form the fold **2c** (FIG. **8**) on the upper surface of panel **26**.

The left hand half (FIG. **7**) of web **2** forms the folds **2***a* and **2***b* (FIG. **8**). For this purpose the outer left quarter of web **2** is drawn through slot **25** over edge **27** (FIG. **7**) while the inner left quarter passes under fold edge or lip **20** (FIG. **7**). This inner left quarter is drawn directly through the device in the path indicated by the arrow (FIG. **12**) to form the fold **2***b*; the rod **21** urges the outer quarter over the inner quarter fold **2***b* to form the fold **2***a*.

The web **2** is threaded as illustrated in the views of FIGS. **12** and **15** with one edge portion passing through slot **5** as shown. The web **1** as it is presented to slot **25** from the surface **7** of board **4** has been largely folded upon itself and interfolding of the two webs is initiated as the web portions pass in the slot (FIG. **15**). This interfolding is completed as the webs pass under rod **21** (FIG. **16**) in their movement in the direction of the arrow (FIG. **1**). The completion of interfolding is carried out as web **2** is drawn down the rear of panel **22** around fold edge **9** (FIG. **16**) and around edge **6** (FIGS. **17** and **18**).

The interfolded webs **1,2** are intended, as already indicated, as the upper webs of a stack and a portion of such a stack is illustrated in FIG. **11**. Therein uppermost web **1** is indicated to have longitudinal quarter folds in overlying relation and such that the web **1** has an opening toward a side of the stack. This uppermost web is also closed along a longitudinal zone intermediate the opposite side edges of the stack so that the complete web **1** is readily grasped on the longitudinal center line rather than separate folds of the web. The web **2** is interfolded with web **1** as already described and with other webs **30** having conventional folds **31, 32, 33, 34, 35**.

The stacked webs are conventionally cut to length and provided in cartons in generally known manner. In one such method of packaging the stack may be provided in a carton in the rectangular arrangement shown in FIG. **18**. In a preferred arrangement shown in FIG. **19** the numeral **36** designates the upper portion of a consumer size carton having an oval shaped perforation **37**. The tissue stack is indicated at **38** and, in this instance, is in generally U-shaped form. The start of tissue withdrawal is readily accomplished without damage to the individual webs.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that I do not limit myself to the specific embodiments thereof except as defined in the appended claims.

What is claimed is:

1. A sheet material assembly comprising a stack of longitudinally folded sheet material webs including an uppermost starter web and a next lower web, said uppermost web having longitudinal quarter folds all in overlying relation providing a folded web having an opening toward a side edge of the stack, the quarter folds of an edge portion and of a central portion of the uppermost web lying in contact, the quarter fold of the said one edge and of the opposite web edge defining said opening, and the said next lower web having an edge portion fold and an adjacent central portion fold in overlying relation and lying in said opening of the uppermost web interposed between and separated by an edge portion fold and a central portion fold of the uppermost web so that withdrawal of the uppermost web from the stack also partially withdraws the next lower web, said uppermost web being closed along a zone intermediate the side edges of the stack to permit grasping of the folded thickness of the uppermost web.

* * * * *