Feb. 23, 1960 G. E. SORNBERGER 2,926,025

SEVERANCE MEANS FOR MANIFOLDING ASSEMBLIES

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FIG. 1.

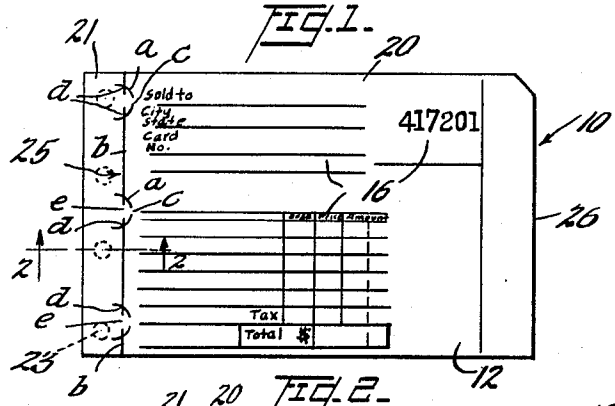


FIG. 2.

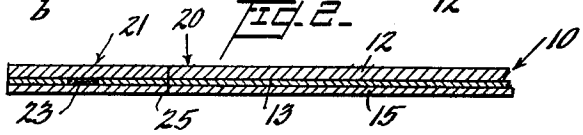


FIG. 3.

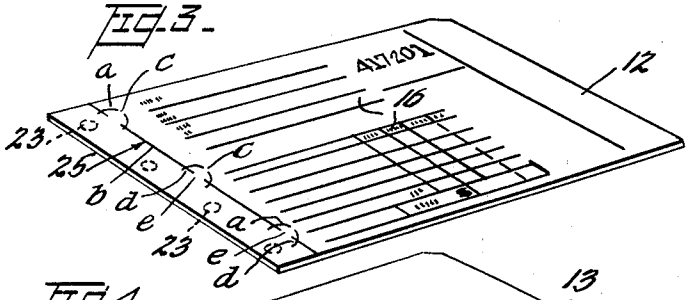


FIG. 4.

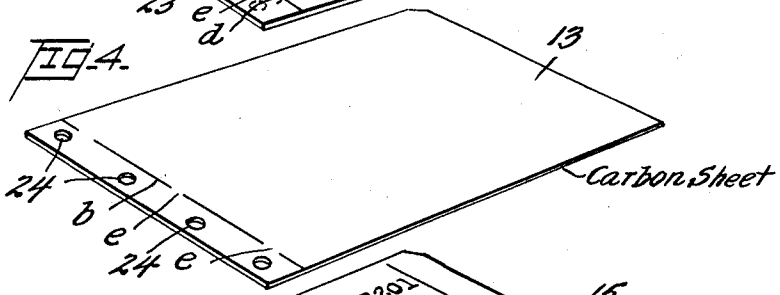
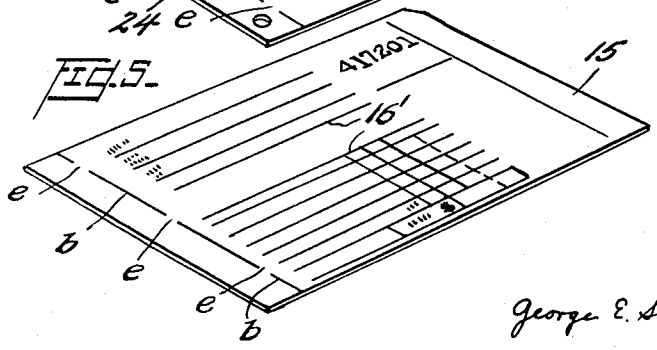


FIG. 5.



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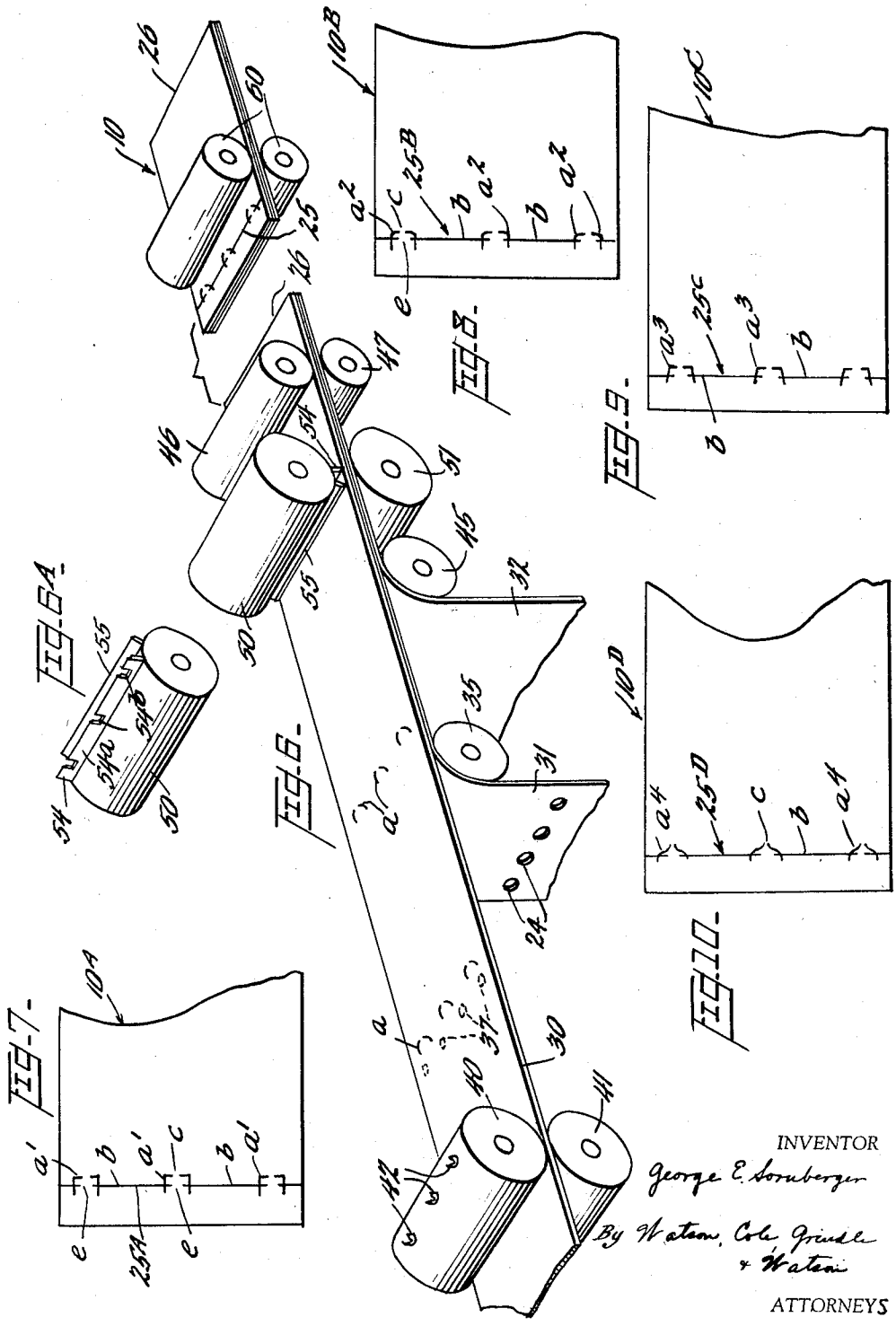
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Feb. 23, 1960 G. E. SORNBERGER 2,926,025

SEVERANCE MEANS FOR MANIFOLDING ASSEMBLIES

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SEVERANCE MEANS FOR MANIFOLDING ASSEMBLIES

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9 Claims. (Cl. 282—22)

This invention relates to manifolding assemblies and similar laminated articles and materials, and more particularly to severance means whereby contiguous units of such assemblies may be readily separated from each other or from a stub wherein portions of each component are relatively permanently secured together.

The general object of the invention is to provide novel and improved severance means for such sheets or assemblies, and methods of preparaing such assemblies with the novel severance means incorporated therein.

Although not strictly limited thereto, the principles of the present invention are peculiarly applicable to the provision of manifolding assemblies consisting of laminations of paper sheets of ordinary weight, or of copy-tissue consistency, together with at least one lamination of relatively heavy card stock, say of the weight and character of a tabulating card such as widely used in automatic tabulating and sorting machines.

Many and varied have been the prior provisions for severing manifolding assemblies, and some have been quite adequate and efficient for assemblies consisting of record, carbon, and copy sheets of ordinary weights of paper, and other have been specially designed for severing card stock alone; but none of these means have proved useful in providing efficient severance for combined card and paper stock. If the severance line pattern is made sufficiently weak for card stock, it is too weak for ordinary paper, and the paper components will be apt to be prematurely severed during ordinary handling. On the other hand, if the severance pattern is strong enough for the paper components, it is too adherent for the card element, and either too much resistance to severance is offered or the card is torn or ruptured outside of the severance line and the assembly unit is spoiled.

Another objection to the use of many prior arrangements is the impracticality of the cutting blade configuration for the severance patterns, which in many cases contain abrupt angles, curvatures, and other intricate departures from a straight rectilinear line of severance. Precision cutting of the major transverse severance line requires an unusually heavy, strongly constructed cutting blade, of the sort which is only practical to make if the blade edge is a comparatively straight or at least a gently curved one.

Another feature of novelty in the present conception is the preservation in such a card-and-paper manifold set of accurately cut edges of the card portion after severance, which edges are to be perfectly straight and perfectly smooth, and with all of the inevitable tufts at tie points offset inwardly of the card portion from the general line of severance. This is especially desirable when the card elements of the assemblies are to be run through tabulating machines.

Other objects and features of novelty will be apparent from the following specification when read in connection with the accompanying drawings in which certain embodiments of the invention are illustrated by way of example.

In the drawings:

Figure 1 is a plan view of a card-and-paper manifolding assembly embodying the principles of the invention;

Figure 2 is a longitudinal sectional view of the assembly taken on line 2—2 of Figure 1;

Figures 3, 4 and 5 are perspective views respectively of the record card, the transfer sheet, and a paper copy sheet of an assembly unit;

Figure 6 is a diagrammatic perspective view of a simplified schematic representation suggestive of one way in which the novel assembly might be formed;

Figure 6A is a detail view in perspective of a cutter roll rotated a half turn from its position in Figure 6; and

Figures 7, 8, 9 and 10 are fragmentary plan views of card elements of the novel assemblies illustrating other forms of combined severance patterns which come within the purview of the invention.

One form of manifolding assembly unit produced in accordance with the present inventive concept is indicated generally in Figures 1 and 2 of the drawings by the numeral **10**. The assembly in this illustrative embodiment consists of the uppermost card portion **12**, the intervening transfer sheet **13** which may be of ordinary single-use carbon paper, and the copy sheet **15** which if desired may be ruled and printed at **16'** in the same or similar manner as suggested at **16** in respect to the card element **12**.

In the illustrated example, the assembly unit, which is ultimately severed from a combined web as a final step in its manufacture, consists of an intelligence conveying major portion **20** containing the data to be transmitted, filed, or preserved, and a stub portion **21** which of course may be discarded, but which serves the function of preserving the assembly intact during the inscribing of the data upon the record sheet and the transfer of such data to the copy sheet **15** by way of the carbon sheet **13**. The stub **21** serves to hold the three elements **12**, **13** and **15** together by means of the spot of adhesive **23** which is applied to either the underside of the top lamination **12** or the upper face of the bottom lamination **15** to coincide with any type of punched opening **24** made in the carbon layer **13**. This adhesive effectively locks the three elements together transversely of the stub **21**, and as a practical matter it might better be applied to the underside of the card layer **12** than to the more flimsy web of copy sheet material of which the element **15** is a portion.

The principal portion **20** and the stub portion **21** of an assembly unit are seperated by means of the novel severance means designated generally by the reference numeral **25**, but differing in respect to the card portion **12** and the paper portions **13** and **15** as will be clearly described.

Now bearing in mind the differing strength of the severance means needed for the card portion of the assembly and for the paper portions thereof, and referring particularly to Figures 3, 4 and 5 of the drawings, it will be seen that the severance structure for the card portion **12**, as depicted in Figure 3, includes an interrupted rectilinear severance cut *b*. The several cuts comprising the general severance line *b* are separated by the rather wide gap indicated at *e*. Straddling the adjacent ends of the sections of the severance line *b* and embracing the ties *e* are the pairs of arcuate cuts *a*, each of the cuts *a* being, for example, of the circular extent of approximately 90° of arc or somewhat less, and the total arcuate extent of the pair comprising approximately 180° or slightly less. The arcuate cuts *a* are separated by the ties *c* which ties are located very definitely at points offset to the right of the rectilinear cut *b* or within the confines of the record card element **12** as defined by the severance line *b* and the remote edge **26** of the element.

The arcuate cuts *a* and the rectilinear cuts *b* intersect

at the points *d*, but of course with no tie means at that point to provide any protruding tufts. In other words, the line of complete severance provided by the means **25** in respect to the card element **12** follows along the fragments of the rectilinear cut *b* to the intersection point *d*, and thence around the arcuate cuts *a* to the tie points *c* and these tie points *c* are the only ties for the card element **12**, which renders it quite easy to sever and provides a sharp accurate marginal line along the cut *b*, between the major portion **20** and the stub **21**.

Because the ties *c* are small and disposed at points relatively displaced from the straight line cuts *b*, the protruding tufts which result from the severance of the ties *c* cannot form projections in the final severed edge at **25**. Furthermore, the width and relative strength of the ties *e* insure that the card portion **12** is not broken across these ties but at the much shorter and weaker ties *c*.

Now it will be understood that the combined severance means including the arcuate cuts *a* and the rectilinear cuts *b*, are applied only to the uppermost or card portion **12** of the assembly **10**, and only the discontinuous cuts *b* are applied to the paper portions which include the carbon transfer sheet **13** and the copy sheet **15**. By reference to Figures 4 and 5 of the drawings it will be seen that the only ties to be ruptured in separating the paper portions from its stub portion are the relatively long ties *e*. These ties are quite long and therefore of sufficient strength to prevent accidental severance of the paper record sheet.

Thus, it will be seen that in effecting the detachment of the record portion **20** of the assembly **10** from the stub portion **21**, a quick hard snapping action will burst the assembly generally along the severance means **25**, but with the protrusions between the intersection points *d* and tie *c* (in other words, between the inoperative tie *e* on the card portion and the effective tie *c*) adhering to the stub portion **21**, and any inevitable tuft at the tie point *c* will be enclosed within the arcuate gap in that edge of the card and will not furnish an obstruction or projection at any point along the line *b* which forms the edge of the card.

With the same tearing motion, the carbon sheet **13** and the copy sheet **15** will be severed generally along the line *b* through the bursting of the ties *e*, and since the preservation of an accurate sharp edge along these paper sheets is of no consequence, any tufts protruding after the breaking of the ties *e* will not matter.

In Figure 6 of the drawings certain generically disclosed mechanism is suggested for effecting the process by which the novel manifolding assemblies may be made. The actual mechanical means by which the process may be effected is of no moment so far as this aspect of the invention is concerned and in fact it is obvious that the process in its broadest sense could be effected by manual means. With these comments in mind, the generic arrangement of Figure 6 will be described. From suitable supply sources, or from a printing press whereby the indicia **16** and **16'** may be applied respectively to the card web **30** and the copy sheet web **32**, these webs are led into the assembling and cutting areas shown in Figure 6. A web **31** of transfer material is led toward the idler roller **35** to be interposed between the card web **30** and the copy sheet web **32**, and by any suitable or appropriate means the transfer web **31** may be provided with the perforations **24** and the underside of the card web may be spotted with adhesive as suggested at **37**, these spots coming into registry with the openings **24** and serving effectively to provide the adhesive ties **23** as shown in Figure 2 of the drawings. The pair of rollers **40** and **41** represent a punch roller and an anvil roller for effecting the arcuate cuts *a* in the card web **30**, suitable cleft or notched cutters or punches **42** being carried by the roller **40** for this purpose. Obviously the diameters of the rollers **40** and **41** are selected in accordance with the spacing of the series of severance cuts applied to the web **30**.

From the idler roller **45** onward the three webs **30**, **31**, and **32** are in superposed position and are fed through the device by means of the pair of pull rollers **46**, **47**. In advance of the pull rolls **46** and **47** is disposed the pair of severance cutting rollers **50** and **51**, the roller **50** carrying the two blades **54** and **55** and the roller **51** acting as an anvil for the blades.

By suitable registry means, the blade **54** which is constituted by interrupted sections **54***a* between which are the gaps or notches **54***b*, is arranged to make the transverse cut intersecting the arc *a* at the points *d* as already described in connection with the description of the article to be formed. At substantially the same time the blade **55** effects the terminal cut for separating the assembly unit **10** from the combined web and thus forming the terminal margin **26** of the following unit. Take-away rolls **60** deliver the pack **10**.

It will thus be seen how, by means of the suggested mechanism of Figure 6 or by any other suitable arrangement, the cuts *a* and *b* may be separately and consecutively applied whereby both cuts are combined in the card web **30** to form the full and complete severance pattern indicated at **25**, whereas the cut *b* only is applied to the paper webs **31** and **32**.

In Figure 7 of the drawings the assembly unit designated **10A** bears the severance patterns shown at **25A** which includes the usual interrupted rectilinear cut *b* with its ties *e*, but instead of the arcuate cuts *a* right angle cuts a_1 are used, the transverse portions of these angular cuts in each pair being spaced apart to form the ties *c*.

In Figure 8 of the drawings the severance pattern **25B** is applied to the assembly unit **10B** utilizing the transverse cut *b* with its ties *e* but providing the cardboard ties by means of curved angular cuts a_2.

In the embodiment illustrated in Figure 9 of the drawings the assembly **10C** utilizes a severance pattern **25C** which consists of the usual rectilinear cuts *b* and the divergent angular intersecting cuts a_3.

In Figure 10 of the drawings a further variation in severance pattern is applied to the assembly **10D** at **25D** where the rectilinear cuts *b* are intersected by the ogee-shaped curved card lamination cuts a_4, which terminate adjacent each other to provide the ties *c*. All of these variations may have their own individual merits for particular purposes, but the general principle still prevails that sharp angles or sudden departures from rectilinear cutting tends to weaken the structure of the cutting blades and the cutting patterns with the gentler curvatures are to be preferred for most purposes.

In summary, it will be understood that the present invention provides a severance structure for card-and-paper manifolding assemblies which assures a perfectly smooth severed edge and which also provides sufficiently weakened severance means to assure satisfactory parting of relatively strong heavy materials such as card stocks, and at the same time a sufficiently strong severance means to prevent inadvertent and accidental severance of the paper stock portions of the assembly. The present inventive concept also provides a two-stage fabricating method for making these novel manifolding assemblies with the sequentially applied severance cuts which go to form the variable sevarance features for accommodating both the card portions and the paper portions of the assemblies.

It is also understood that various changes and alterations may be made in the embodiments illustrated and described herein without departing from the scope of the invention as defined by the following claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A manifolding assembly comprising a plurality of superposed sheets, certain of which sheets have different bursting strength and resistance to tearing than others, at least one weakened severance line extending across said

assembly along which the assembly may be severed into separate units, said sevarance line comprising an arrangement of interrupted slits, the contiguous ends of adjacent sections of said interrupted slits being spaced apart to provide ties adapted to be ruptured when the assembly is severed, the arrangements of patterns of slits being different in the tougher and weaker sheets respectively, one pattern which penetrates all of the sheets comprising a series of aligned elongated slit-sections, the gaps between the contiguous ends of the sections providing relatively wide ties for constituting the severance point of the weaker sheets; and the pattern which penetrates the tougher sheet comprising the same slit arrangement as the first named pattern and in addition pairs of converging slits, each pair embracing one of said wide gaps in the first named pattern, there being one of said pairs embracing each of said wide gaps, one slit of each pair transversing the end portion of one of the adjacent aligned slits of the first pattern and converging toward the other slit of said pair, the mutually directed ends of the convergent slits being spaced apart a shorter distance than the gaps of the first pattern, to provide narrower and weaker severable ties laterally offset from and disposed in parallel with the wider and stronger ties provided by the first pattern for the weaker sheets, said weaker ties represented by the narrower gaps being thus indented into the general confines of the tougher sheet at one side of the principal severance line, leaving a substantially straight edge boundary for said last named sheet.

2. A manifolding pack comprising a sheet of tabulating card stock, a thin paper transfer sheet, and a thin paper copy sheet secured in superposed relation at a common stub area comprising one edge portion of the assembly; a severance line separating said stub area from the major intelligence bearing portion of the pack, said severance line comprising a pattern of slits common to all of the elements of the pack and which consists of a series of aligned slit sections disposed along said severance line and spaced apart at their continguous ends to provide gaps of substantial width which provide severable ties for connecting the principal and stub portions of the relatively thin transfer and copy sheets, and another supplemental pattern of slits which penetrates the card element only and which comprises pairs of convergent slits, each pair embracing one of said wide gaps in the first named pattern, there being one of said pairs embracing each of said wide gaps, each slit of each of said pairs intersecting an end portion of the respective adjacent aligned slits of the first pattern, and directed inwardly toward the other slit of the same pair to one side of the severance line in the direction away from the stub area and the converging ends of said slits spaced apart to provide a gap which is narrower than the first named gap and which provides weaker ties for severance of the principal and stub portions of the card element, each pair of bowed slits viewed together forming a generally U-shaped configuration, the arrangement providing for severance of the tabulating cards having only straight cut edges along the line of severance, all tufts of paper fibers remaining after the card is separated from the stub occurring inside of the boundary area of the card so as not to interfere with mechanical handling and feeding of the tabulating card.

3. The manifolding pack set forth in claim 2 in which each of the pairs of convergent supplemental slits for the card portion comprises two slits each of a circular arc of aproximately 90°.

4. The manifolding pack set forth in claim 2 in which each of the pairs of convergent supplemental slits for the card portion comprises two right angle slits.

5. The manifolding pack set forth in claim 4 in which each of the right angle slits has a rounded corner.

6. The manifolding pack set forth in claim 2 in which each of the pairs of convergent supplemental slits for the card portion comprises converging portions which intersect the slits of the first pattern and angular ends directed toward each other which ends are parallel with the axis of the slits of the first pattern.

7. The manifolding pack set forth in claim 2 in which each of the pairs of convergent supplemental slits for the card portion comprises a gently curved ogee-shaped slit.

8. The process of preparing a manifolding assembly made up of both tough and weak sheets, adjacent units of which assembly are readily and differentially severable along a general transverse severance line, which process comprises cutting fragmentary slits in a tough sheet in relatively widely spaced pairs, the contiguous ends of the slits of each pair being separated by a narrow gap forming a weak tie, and at least the remote end portions of the slits of each pair disposed at an angle to said severance line; applying a sheet of thinner stock to said preliminarily slitted tough sheet in conterminous laminated relationship; cutting slits in the resulting laminated assembly in a discontinuous pattern which comprises a series of elongated slits each extending along one of the relatively wide spaces between said pairs of slits and themselves separated by wider gaps than those between the first named slits thus forming stronger ties, the second named elongated slits intersecting the angled remote ends of the first named slits and the two gaps being offset one from the other transversely of said general line of severance, whereby the operative ties in the tougher sheet are the weak ones provided by the first named narrower gaps, but the second named pattern of slits being the only slits in the thin sheets which are thus provided with stronger ties appropriate to their weak consistency.

9. The process of preparing a manifolding assembly made up of both tough and weak sheets, adjacent units of which assembly are readily and differentially severable along a general transverse severance line, which process comprises feeding a web of tough stock toward an assembling point; cutting fragmentary slits in said web in widely spaced pairs, the contiguous ends of the slits of each pair being separated by a narrow gap forming a weak tie, and the remote end portions of the slits of each pair having at least a component extending at an angle to said severance line; feeding a web of thin transfer stock and a web of thin copy paper stock in convergency toward said slitted tough web; uniting said webs in laminar form; applying a rotary drum slitter to the travelling united web whereby the cutter moves along with the web during its engagement and thus may aid in feeding the web, said slitter acting to cut slits in the united assembly in a pattern which comprises discontinuous elongated slits the contiguous ends of which are spaced apart by a wider gap forming a stronger tie, said subsequently applied pattern of slits combining with the said fragmentary slits to intersect the opposite end portions of each pair of first named slits in the tough web, whereby the only ties remaining therein are the weak ones provided by the first named narrower gaps, but the second named pattern of slits being the only slits in the thin sheets which are thus provided with stronger ties appropriate to their weak consistency, the narrower gaps between the first named slits being located forwardly of the wider gaps considered in the direction of travel of the web; and then severing the united laminated web into manifolding assembly units.

References Cited in the file of this patent

UNITED STATES PATENTS

1,980,560	Thyssen	Nov. 13, 1934
2,719,735	Kerr	Oct. 4, 1955
2,802,678	Bright	Aug. 13, 1957

FOREIGN PATENTS

658,769	Germany	Apr. 12, 1938
677,131	Germany	June 19, 1939