Nov. 24, 1959 J. A. McGARVEY ET AL 2,914,318

MAKING SIGNATURES, BOOKLETS, PAMPHLETS, AND THE LIKE

Filed May 12, 1958 6 Sheets-Sheet 1

FIG. 2.

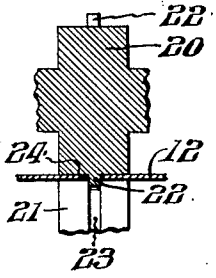
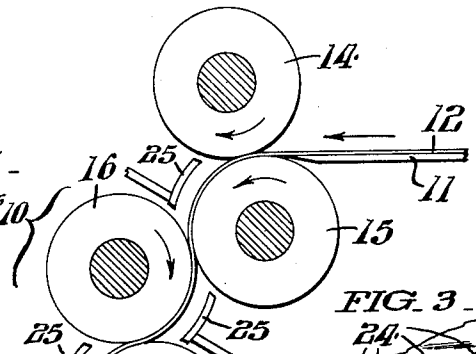


FIG. 1.
PERFORATING



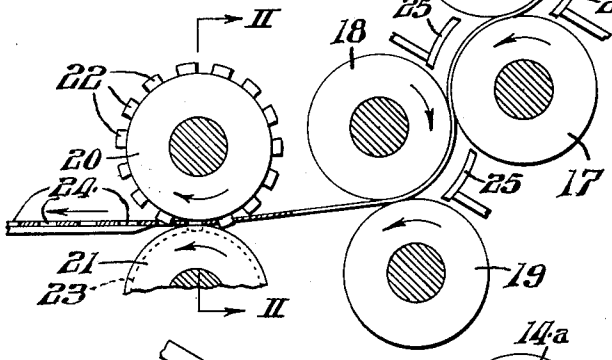


FIG. 3.

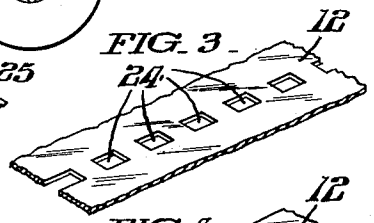
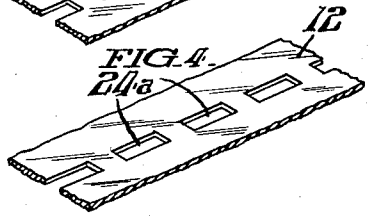


FIG. 4.



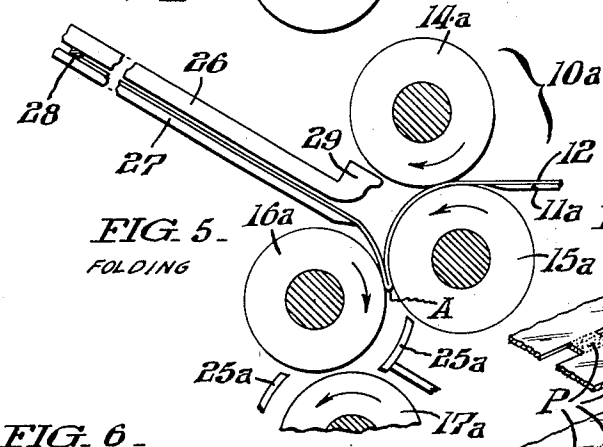


FIG. 5.
FOLDING

FIG. 12.

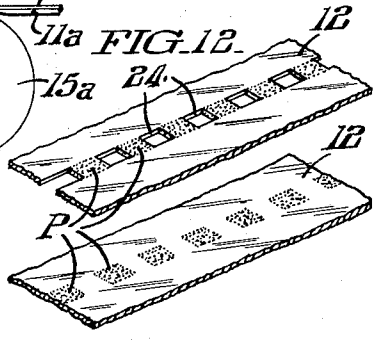
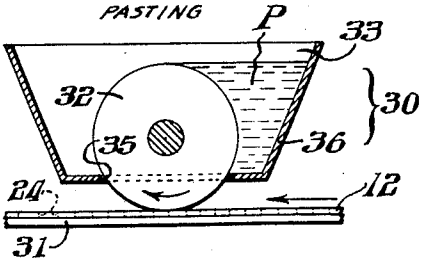


FIG. 6.
PASTING



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MAKING SIGNATURES, BOOKLETS, PAMPHLETS, AND THE LIKE

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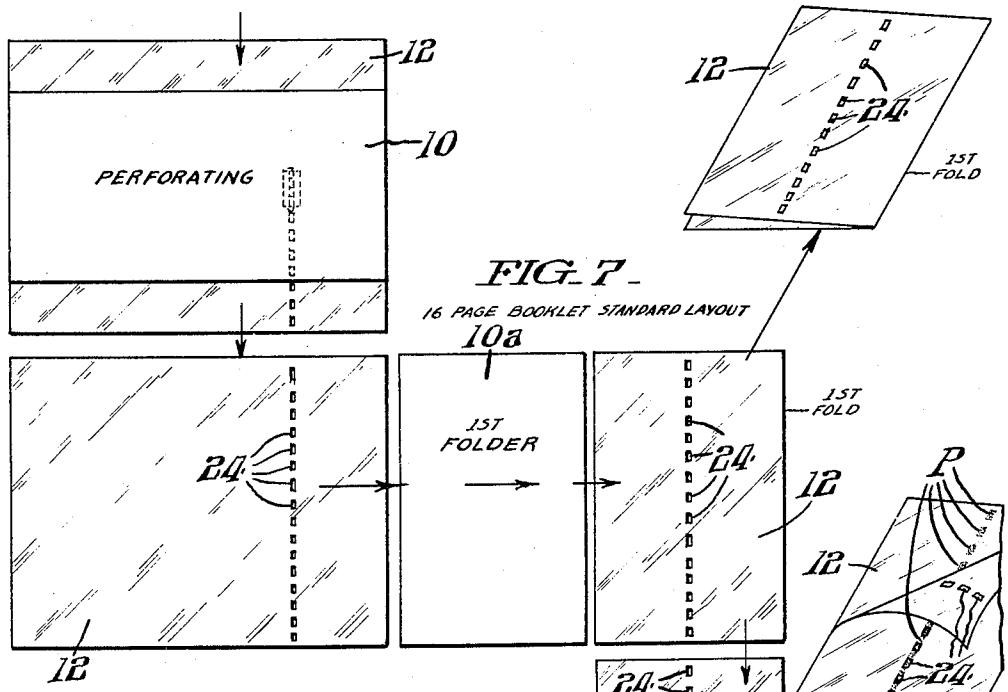
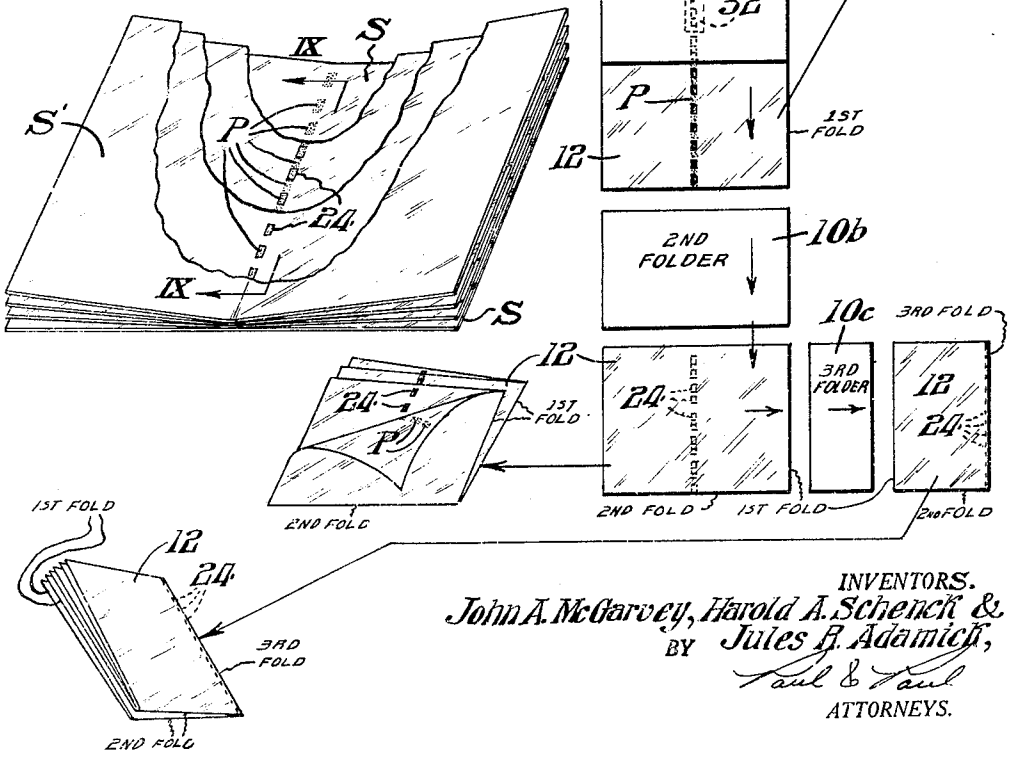


FIG. 7.

16 PAGE BOOKLET STANDARD LAYOUT

FIG. 8.



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MAKING SIGNATURES, BOOKLETS, PAMPHLETS, AND THE LIKE

Filed May 12, 1958 6 Sheets-Sheet 3

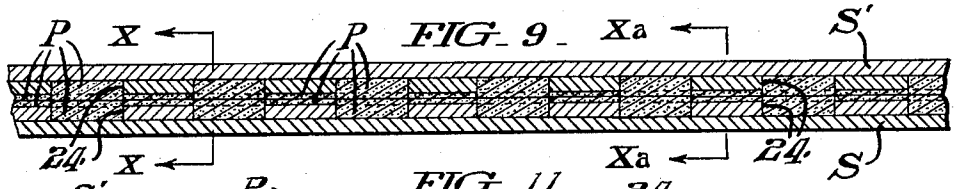


FIG. 9.

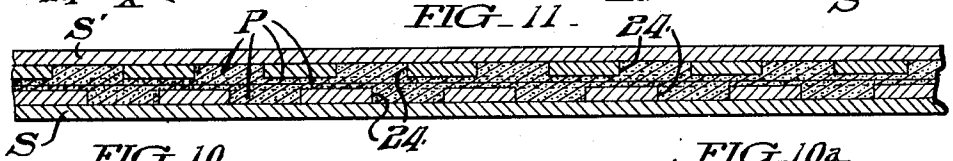


FIG. 11.

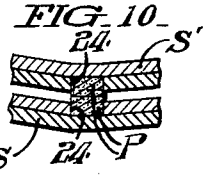


FIG. 10.

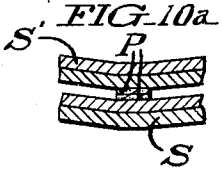


FIG. 10a.

FIG. 13.

16 PAGE PASTED BOOKLET SPECIAL LAYOUT

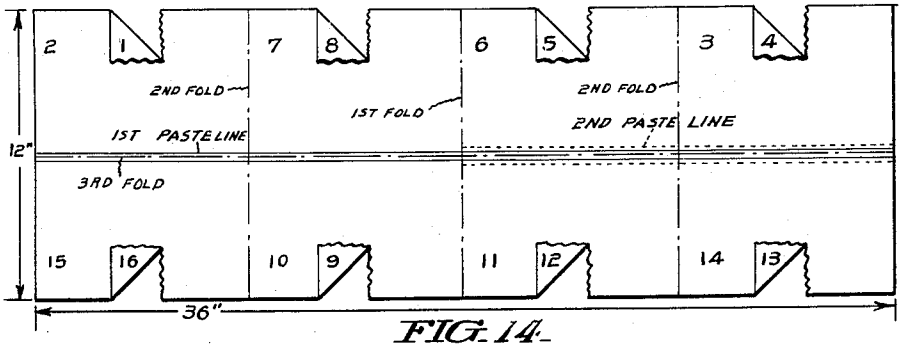
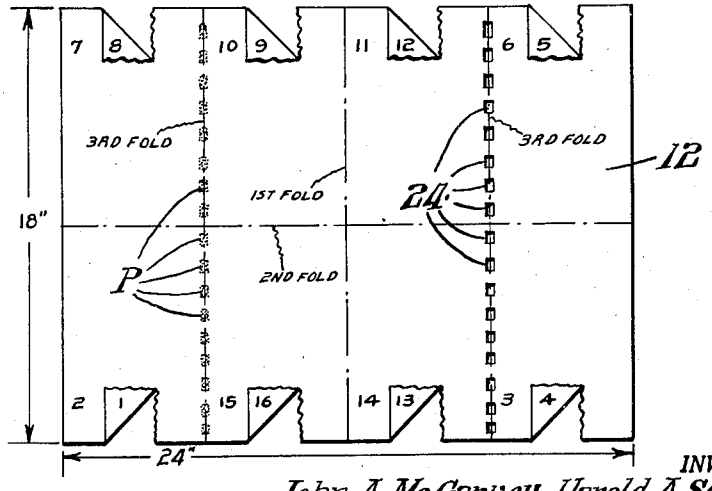


FIG. 14.

16 PAGE BOOKLET STANDARD LAYOUT



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Nov. 24, 1959 J. A. McGARVEY ET AL 2,914,318

MAKING SIGNATURES, BOOKLETS, PAMPHLETS, AND THE LIKE

Filed May 12, 1958 6 Sheets-Sheet 4

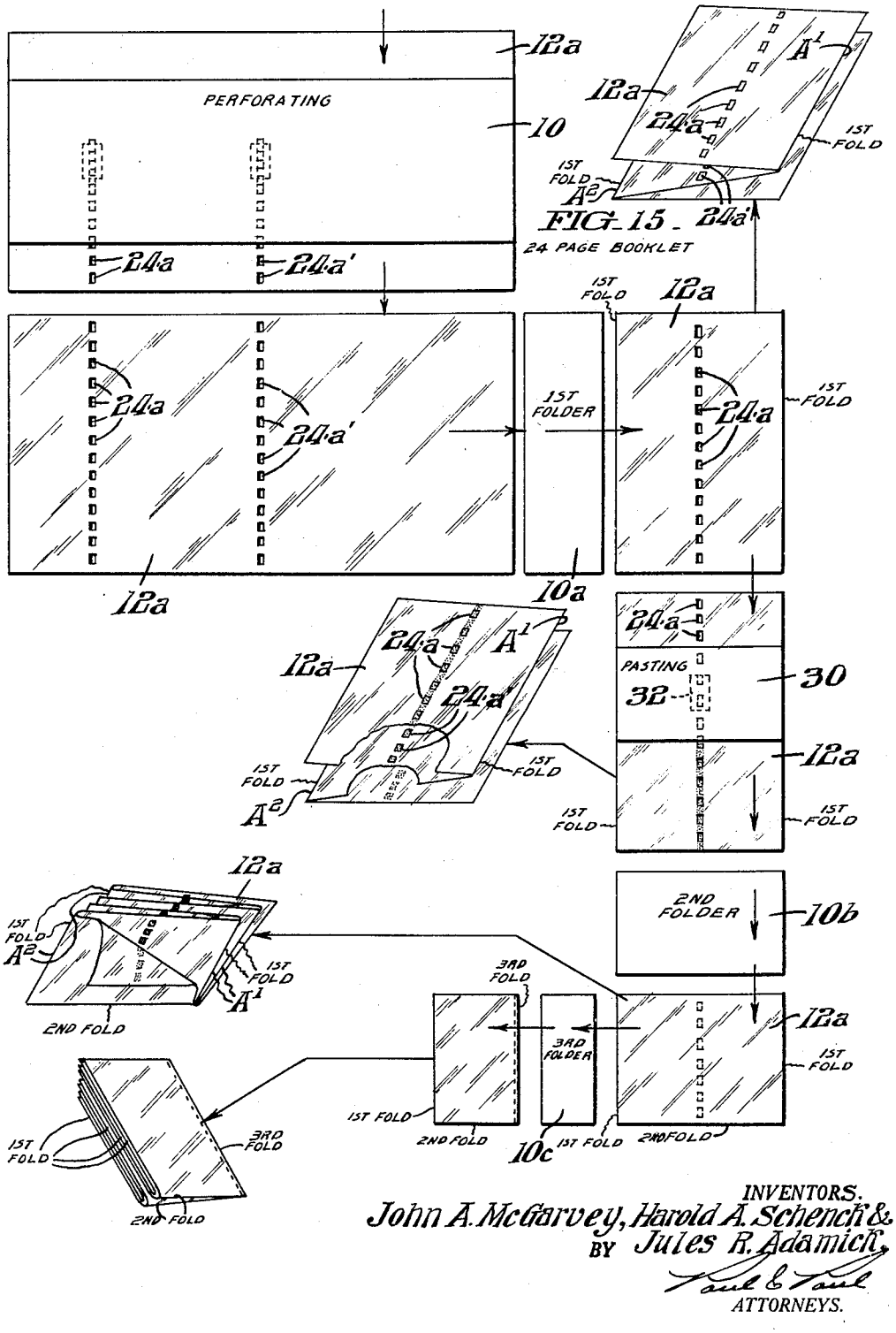


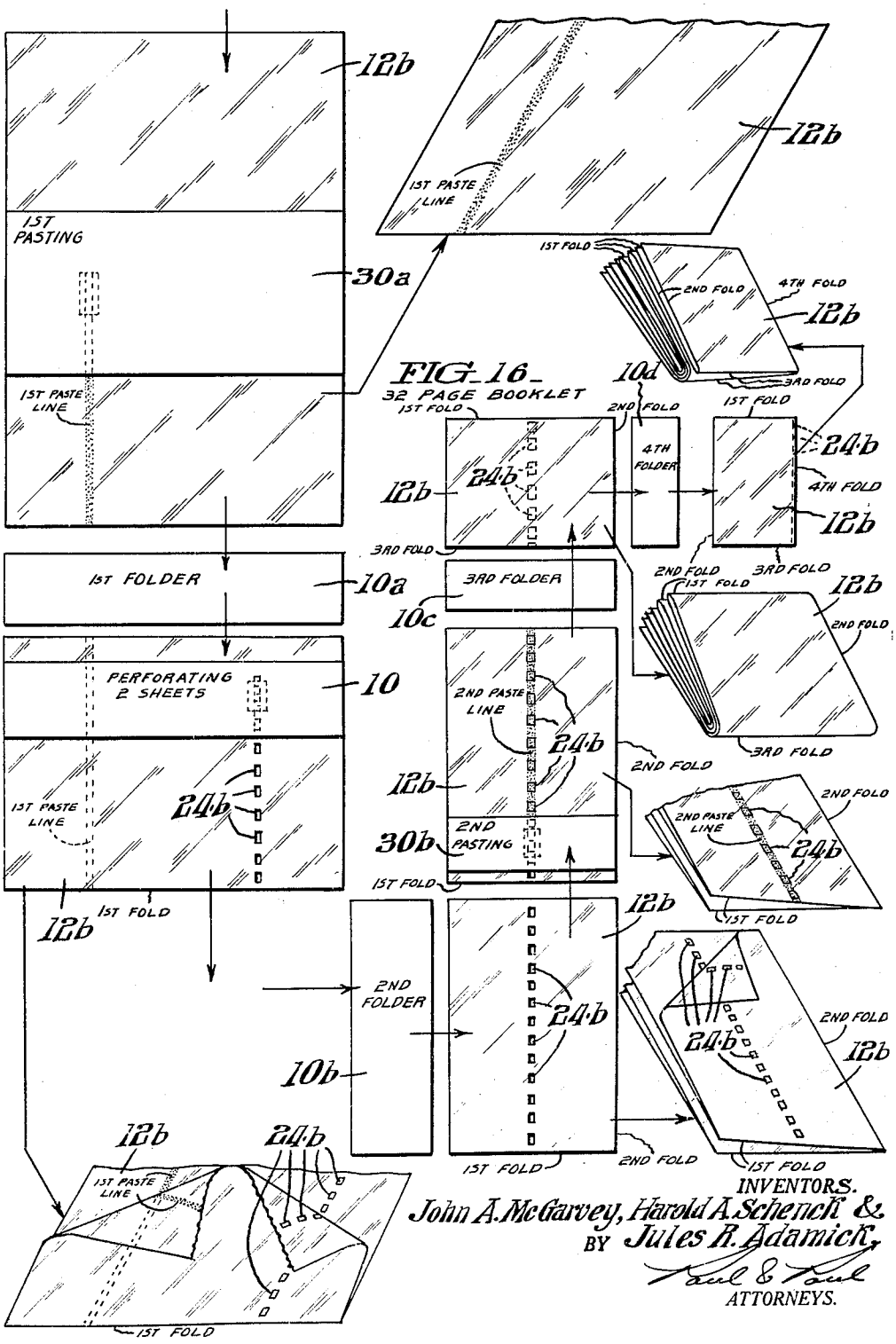
FIG. 15.

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Nov. 24, 1959 J. A. McGARVEY ET AL 2,914,318

MAKING SIGNATURES, BOOKLETS, PAMPHLETS, AND THE LIKE

Filed May 12, 1958 6 Sheets-Sheet 5



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MAKING SIGNATURES, BOOKLETS, PAMPHLETS, AND THE LIKE

Filed May 12, 1958 6 Sheets-Sheet 6

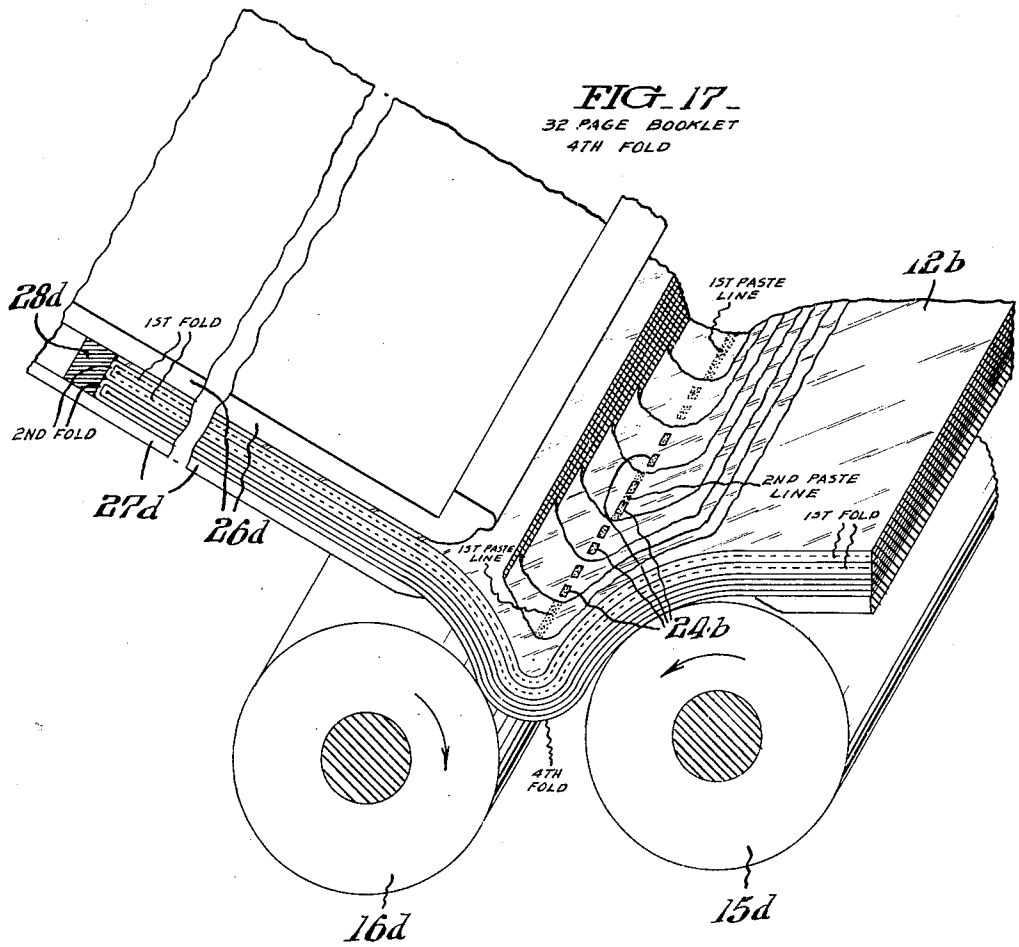


FIG. 17.
32 PAGE BOOKLET
4TH FOLD

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United States Patent Office 2,914,318
Patented Nov. 24, 1959

2,914,318

MAKING SIGNATURES, BOOKLETS, PAMPHLETS AND THE LIKE

John A. McGarvey, Willow Grove, and Harold A. Schenck and Jules R. Adamick, Philadelphia, Pa.; said Schenck assignor to said Adamick

Application May 12, 1958, Serial No. 734,534

11 Claims. (Cl. 270—32)

This invention relates to the art of making signatures, booklets, pamphlets and the like, and more particularly relates to new and useful improvements in the production of signatures, booklets, pamphlets and the like from multi-page sheet stock or layouts of standard dimensions.

In the art of book making, signatures, booklets, pamphlets and the like are generally made on standard equipment from standard size sheets or layouts comprising a plurality of pages, which normally are 8, 12, 16, 24 or 32 in number. In forming signatures from standard layouts, it has not been practical to bind the pages thereof by an adhesive along their overlapping folds when the pages exceed twelve in number. Attempts to so bind signatures when the number of pages exceeds twelve has proven to be cumbersome and impractical because of the resulting thickness of the fold. In addition, when an adhesive is used as a binder along the fold line, increasing the number of pages above twelve increases the inaccuracy in the finished signature, and also tends to weaken the bond.

For these reasons, it has been the practice in the past to bind signatures made from standard layouts by means of staples or sewing where more than twelve pages are involved. The use of staples or sewing for binding signatures is expensive and time consuming in manufacture, and is unsatisfactory in use because such securing means tend to prevent the signatures from laying flat when open.

It is possible to produce signatures in excess of twelve pages having their pages bound by an adhesive, but in order to do so it is necessary to use a specially dimensioned multi-page sheet or layout which is not adapted for standard equipment. The cost of using such special layout has proved to be prohibitive due to the extra expense involved as a result of the necessity of using special equipment in connection therewith.

It is therefore an object of this invention to provide a new and improved method of producing signatures from standard sheets or layouts wherein the individual pages of the signatures are securely bound along the overlapping seam or fold by an adhesive.

It is a further object of this invention to provide a method of producing signatures having in excess of twelve pages from standard sheets or layouts where the use of staples or sewing as a binding means is successfully dispensed with.

It is a further object of this invention to provide new and improved signatures for books, booklets, pamphlets and the like which are produced from standard layouts on standard equipment and which have the pages thereof bound by means of an adhesive.

It is a further object of this invention to provide a method of making signatures or the like comprising perforating a standard multi-page sheet along at least one of the lines along which the sheet is to be folded, folding the sheet so that the perforations overlap a portion of the sheet, applying an adhesive to the sheet along a line of perforations, folding the sheet along a line midway of and at right angles to said line of perforations so that said line

of perforations overlaps itself and folding the sheet along the overlapped line of perforations.

Other objects and advantages of this invention will be apparent from the following description and accompanying drawings illustrating preferred embodiments thereof, wherein:

Fig. 1 represents a fragmentary, sectional, more or less schematic view in side elevation of a portion of a standard buckle type folding machine used in the practice of this invention and showing the perforating operation.

Fig. 2 is a fragmentary view partially in section taken as indicated by the angled arrows II—II in Fig. 1.

Fig. 3 is an enlarged fragmentary view in perspective showing a blank sheet with perforations formed therein.

Fig. 4 is a view similar to Fig. 3 showing a modification of the perforations.

Fig. 5 is a fragmentary view similar to the upper portion of Fig. 1, but with a buckle folding device substituted for the first curved guide.

Fig. 6 is a sectional view in elevation showing the application of adhesive.

Fig. 7 is a schematic showing of a preferred method of forming a 16 page signature or booklet from a standard sheet or layout in accordance with this invention.

Fig. 8 is a fragmentary view in perspective of a signature produced by the method shown in Fig. 7.

Fig. 9 is an enlarged view in section taken as indicated by the angled arrows IX—IX in Fig. 8 and showing the overlapping perforations in substantially aligned relationship.

Fig. 10 is a view taken as indicated by the angled arrows X—X in Fig. 9.

Fig. 10*a* is a view taken as indicated by the angled arrows *Xa*—*Xa* in Fig. 9.

Fig. 11 is a view similar to Fig. 9 showing the overlapping perforations somewhat out of alignment.

Fig. 12 is an exploded fragmentary view of a folded sheet used in this invention showing the application of adhesive to the line of perforations.

Fig. 13 shows a special sixteen page sheet or layout which was utilized in the art prior to this invention.

Fig. 14 is a standard sheet or layout used to produce a sixteen page signature in accordance with this invention.

Fig. 15 is a schematic showing of a preferred method of forming a twenty-four page signature or booklet in accordance with this invention.

Fig. 16 is a schematic showing of a preferred method of forming a thirty-two page signature or booklet in accordance with this invention.

Fig. 17 is a fragmentary view in perspective showing the manner of making the final fold in a thirty-two page signature or booklet made in accordance with this invention.

Referring to Fig. 1, there is shown a standard buckle-type blank folding machine **10** of the type shown and described in United States Patent No. 2,699,331. Machine **10** has a guide plate **11** for feeding paper sheets or layouts **12** into the machine and coacting feed rolls **14**, **15**, **16**, **17**, **18** and **19** which feed the sheet **12** to a pair of coacting perforating rolls **20** and **21**. Roll **20** is formed with a plurality of circumferentially spaced perforating teeth **22** which cooperate with the circumferential groove **23** in roll **21** to produce a line of slot-like perforations **24** in sheet **12** as it advances between the rolls **20** and **21**. The size and configuration of the teeth **22** may be varied to produce perforations of any desired size or configuration. For example, the perforations may be of substantially square configuration, as shown at **24** in Fig. 3, or may be of a somewhat elongated configuration, as shown at **24***a* in Fig. 4. A plurality of curved guide plates **25** serve to direct the advancing sheet

12 between each succeeding pair of contiguous rolls as it advances through the machine 10.

The incoming sheets 12 are fed into the machine 10 in the direction indicated by the arrow in Fig. 1. The rolls of machine 10 are mechanically driven by conventional driving means (not shown) for advancing the sheets 12 into and through the machine. In practice, only the rolls 14, 16, 18, 20 and 21 need be driven.

In Fig. 5 there is shown a portion of a second buckle-type blank folding machine 10*a* which is used for folding sheet 12. Machine 10*a* has a guide plate 11*a* and, as shown, coacting feed rolls 14*a*, 15*a*, 16*a* and 17*a*, etc., and curved guide plates 25*a*, all similar to the corresponding parts of machine 10. Machine 10*a* differs from machine 10 in that a buckle folding device composed of folding plates 26 and 27 and stop 28 has been substituted for the first of the curved guide plates 25 and the perforating rolls 20 and 21 have been removed. As indicated in Fig. 5, after the leading edge of sheet 12 passes between rolls 14*a* and 15*a* it is directed by means of lip 29 between the fold plates 26 and 27 until its advance is arrested by the stop 28. The continued feeding of sheet 12 due to the rotation of rolls 14*a* and 15*a* causes the sheet to buckle in the area between the fold plates 26 and 27 and the rolls 14*a*, 15*a* and 16*a*. The buckled blank is gripped between the rolls 15*a* and 16*a* to form a fold A in the sheet 12. The blank is then fed through the remaining rolls of the machine in preparation for the next step.

The linear distance from the stop 28 to the open ends of the folding plates 26 and 27 is of such dimension as to produce the fold A along a predetermined line in the sheet 12. Such linear distance may be varied through appropriate adjustment of the stop 28, thus varying the location of the fold line A in sheet 12.

For each folding operation made in the sheet 12 in accordance with this invention, a separate folding machine of the type shown in Fig. 5 is utilized. All such machines are alike in every respect, except for the position of the stop 28 between the fold plates 26 and 27, which is varied to provide for different folds in sheet 12.

In Fig. 6 there is shown an adhesive applicator 30 for use in applying a strip of adhesive to the sheet 12. The applicator 30 comprises a bed 31 along which the sheet 12 is advanced, a disc applicator 32 and a trough 33 in which is retained an adhesive P, which preferably is a paste having characteristics of a viscid fluid. The disc 32 is preferably mounted internally and centrally of the trough 33, and has a small portion protruding through an opening 35 in the bottom of trough 33. The disc 32 is mechanically driven by conventional means (not shown) in the direction of the curved arrow. The adhesive P is disposed in trough 33 in the space between the disc 32 and the trough wall 36 so that upon rotation of the disc 32 a thin strip of adhesive is transferred by the periphery thereof to the advancing sheet 12.

In Fig. 7 there is schematically shown a preferred method of producing a sixteen page signature from a standard sheet or layout (having eight pages on each side thereof) in accordance with this invention. The perforating machine is designated by the numeral 10, the folding machines are designated, respectively, by the numerals 10*a*, 10*b* and 10*c* and the adhesive applicator is designated by the numeral 30. The sheet 12 is advanced through the perforating machine 10 whereby a line of perforations 24 is formed in the sheet along one of the lines along which the sheet is to be folded in making the signature. In the particular embodiment shown, the line of perforations is formed one fourth of the width of the sheet in from the right side edge thereof. The sheet 12 is then delivered by suitable and conventional conveyor means to the first folding machine 10*a* where the sheet is folded in half on a line parallel to the line of perforations to produce the first fold. By reason of such folding, the line of perforations is disposed centrally of the folded sheet and overlaps the unperforated half portion thereof. The folded sheet 12 is then delivered by suitable and conventional conveyor means to the adhesive applicator 30 where a strip of adhesive or paste P is applied thereto along the line of perforations. As shown in Fig. 12, the adhesive P is applied to the upper half of sheet 12 between adjacent perforations and is applied to the lower half of sheet 12 in the manner of a bead by penetration through the perforations.

Following the application of adhesive, the sheet 12 is delivered by suitable and conventional conveyor means to the second folding machine 10*b* where the sheet is folded on a line perpendicular to and midway of the line of perforations to produce the second fold. As shown, by reason of the second folding operation, the line of perforations having the adhesive applied thereto is folded upon itself.

Following the second folding operation, the sheet 12 is delivered by suitable and conventional conveyor means to a third folding machine 10*c* where the sheet is folded along the line of the overlapped perforations to produce the third and final fold. Following the third folding operation, the resulting signature is trimmed by means of a standard guillotine cutter (not shown) to produce the finished signature or booklet shown in Fig. 8.

In Fig. 14 there is shown a standard sixteen page sheet or layout with the page numbers designated thereon used in accordance with this invention to produce a sixteen page signature having its pages bound by an adhesive. By reason of this invention, it is possible, for the first time, to produce economically and with standard sheets and equipment adhesively bound signatures in excess of twelve pages. Because of the line of perforations formed in the sheet, it is possible to reduce the bulk along the fold line of the signature, resulting in greater accuracy and ease of folding. Further, by reason of the line of perforations, it is possible to produce a bead of paste on the underlying half of the sheet, thereby enabling the signature to be securely bound along its fold.

Heretofore, in order to produce practical signatures in excess of twelve pages it was necessary to use special sheets or layouts such as that illustrated in Fig. 13. Such special layouts are extremely expensive to use in view of the fact that they were not adapted for use with standard equipment.

As shown in Figs. 9, 10, 10*a* and 11, the adhesive or paste P securely binds the signature along its fold regardless of whether or not the superimposed perforations are in perfect alignment. Even if the perforations are not aligned, the adhesive P effectively secures the outermost sheet S of the signature to the innermost sheet S' thereof.

In Figs. 15 and 16, respectively, there are shown schematic diagrams of the adaptation of this invention to the production of twenty-four page and thirty-two page booklets or signatures. As shown in Fig. 15, in producing a twenty-four page signature, two parallel lines of perforations are formed in the sheet 12*a*, the first line of perforations 24*a* being formed one sixth of the width of the sheet in from the left side edge thereof and the second line of perforations 24*a*' being formed midway of the sheet. Thereupon, the sheet 12*a* is transferred by suitable and conventional conveyor means to the first folding machine 10*a* where, through the provision of two conventional buckle folding devices of the type shown in Fig. 5, it is folded into thirds along fold lines A^1 and A^2 parallel to the lines of perforations. The fold lines A^1 and A^2 are disposed in such manner that, when the sheet is folded along these lines, the perforations 24*a* and 24*a*' are each disposed centrally of separate one third portions of the sheet and are superimposed upon each other and upon the unperforated third portion of the sheet. Following the first folding operation, the sheet 12*a* is then subjected to the pasting and second and third folding operations previously described in respect of the sixteen page signa-

ture, following which it is trimmed to produce a finished twenty-four page signature.

In the case of the thirty-two page signature, the sheet **12***b* is first delivered to an adhesive applicator **30***a* where a strip of adhesive is applied thereto one quarter of the width of the sheet in from the left hand edge of the sheet. Thereafter, the sheet **12***b* is transferred by suitable and conventional conveyor means to a folding machine **10***a* where it is folded in half, doubling the adhesive strip upon itself. Thereafter, the folded sheet **12***b* is transferred by suitable and conventional conveyor means to machine **10** where a line of perforations **24***b* is formed in the sheet. Thereafter, the perforated and folded sheet **12***b* is delivered to a second folding machine **10***b* where it is again folded in half, thence to a second adhesive applicator **30***b* where a strip of adhesive is applied over the line of perforations, thence to a third folding machine **10***c* where the sheet is folded along a line perpendicular to and midway of the line of perforations and finally to a fourth folding machine **10***d* where the sheet is folded along the overlapped line of perforations, following which the sheet is trimmed to produce the finished signature.

In Fig. 17 there is shown rolls **15***d* and **16***d* and fold plates **26***d* and **27***d* and stop **28***d*, all of machine **10***d*, used in the formation of the fourth fold in the thirty-two page signature.

While certain selected embodiments of the invention have been illustrated in the drawings and written specification hereof, it is to be understood that equivalent elements or steps may be used and the various steps of the methods described may be reversed without departing from the spirit and scope of the invention as defined in the claims.

Having thus described our invention, we claim:

1. A method of making a signature or the like from a standard multi-page sheet comprising perforating the sheet along at least one of the lines along which it is to be folded, folding the sheet so that the perforations overlap a portion of the sheet, applying an adhesive to the sheet along a line of perforations, folding the sheet along a line at right angles to said line of perforations so that said line of perforations overlaps itself and folding the sheet along the overlapped line of perforations.

2. The method of claim 1 wherein the perforations are aligned centrally of the folded sheet following the first folding step.

3. The method of claim 1 wherein the line along which the sheet is folded following the application of adhesive is midway of the line of perforations.

4. The method of claim 1 further including the step of trimming the folded sheet following the last folding.

5. A method of making a signature or the like from a multi-page sheet comprising perforating the sheet along a plurality of the lines along which it is to be folded, folding the sheet so that the lines of perforations coincide and at the same time overlap a portion of the sheet, applying an adhesive to the sheet along the coincident lines of perforations, folding the sheet along a line at right angles to the lines of perforations so that the perforations overlap and folding the sheet along the overlapped lines of perforations.

6. The method of claim 5 wherein the perforations are aligned centrally of the folded sheet following the first folding step.

7. The method of claim 5 wherein the line along which the sheet is folded following the application of adhesive is midway of the line of perforations.

8. The method of claim 5 further including the step of trimming the folded sheet following the last folding.

9. A method of making a signature or the like from a multi-page sheet comprising applying an adhesive to the sheet along one of the lines along which it is to be folded, folding the sheet in half along a line perpendicular to the line of adhesive, perforating the folded sheet along a second line along which it is to be folded, folding the sheet so that the line of perforations coincides with the folded line of adhesive, applying an adhesive to the line of perforations, folding the sheet along a line at right angles to the line of perforations so that the line of perforations is folded upon itself and folding the sheet along the overlapped line of perforations.

10. The method of claim 9 further including the step of trimming the folded sheet following the last folding.

11. The method of claim 9 wherein the first application of adhesive is along a line spaced inwardly from one side edge of the sheet a distance equal to substantially one quarter of the width of the sheet and wherein the sheet is perforated along a line spaced inwardly from the other side edge of the sheet a distance equal to substantially one quarter the width of the sheet.

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