Nov. 28, 1939. C. W. BRENN 2,181,117

METHOD OF MAKING CONTINUOUS MANIFOLDING STATIONERY

Filed April 9, 1938 2 Sheets-Sheet 1

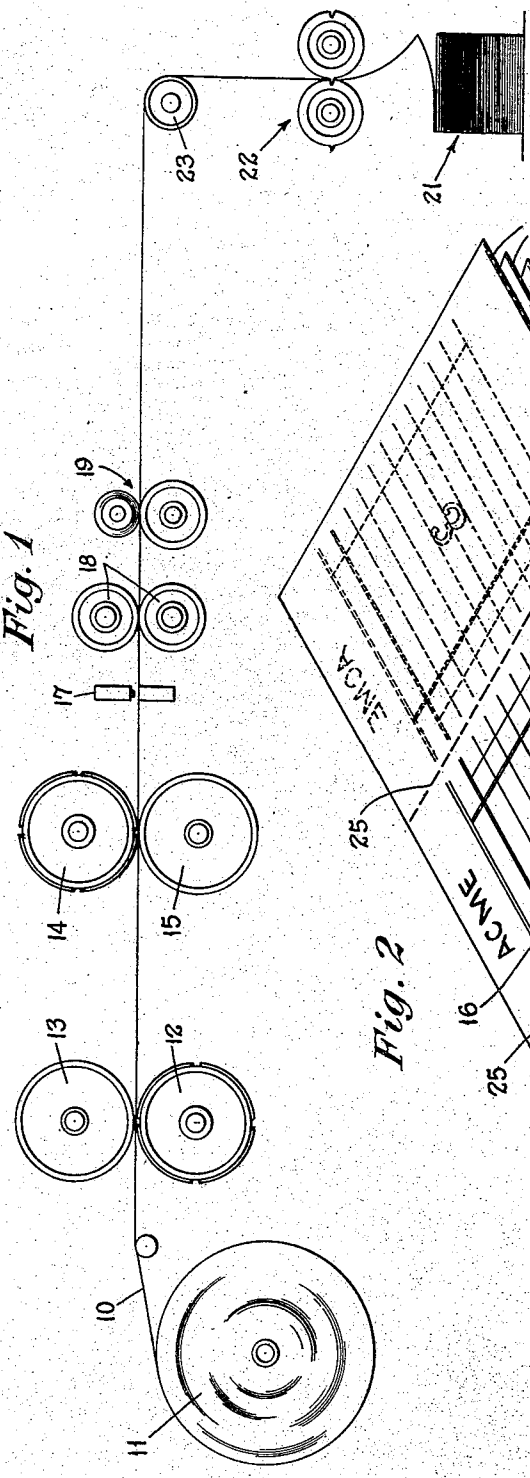


Fig. 1

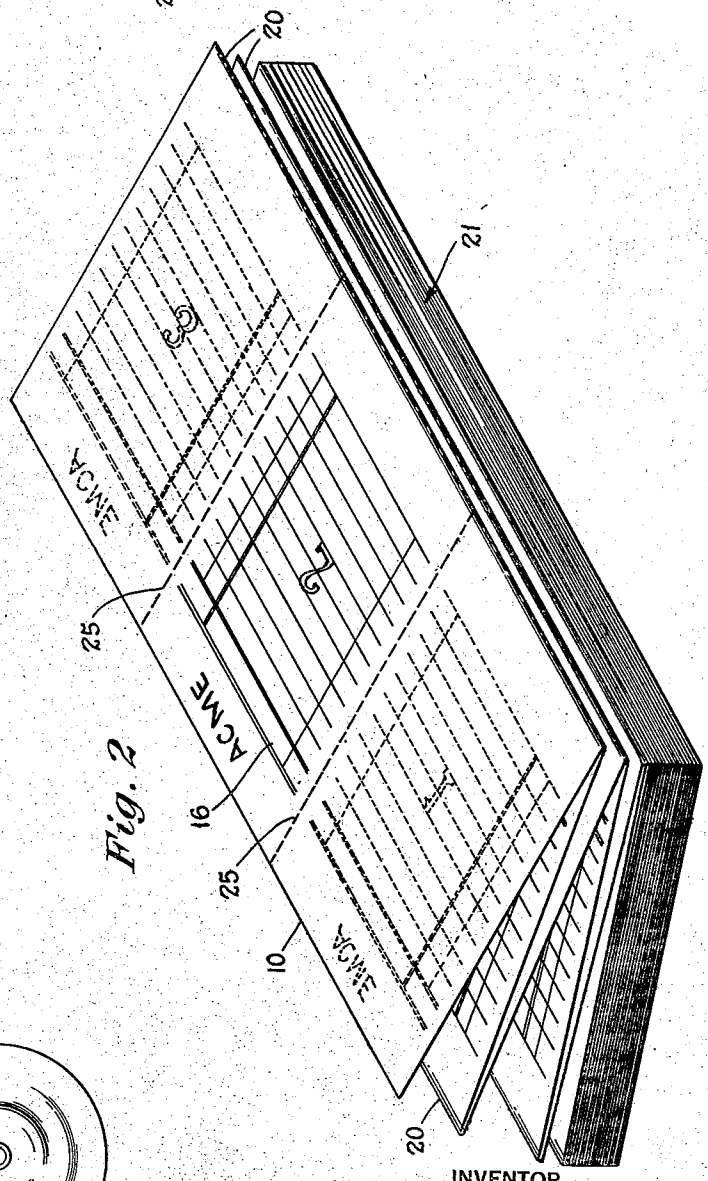


Fig. 2

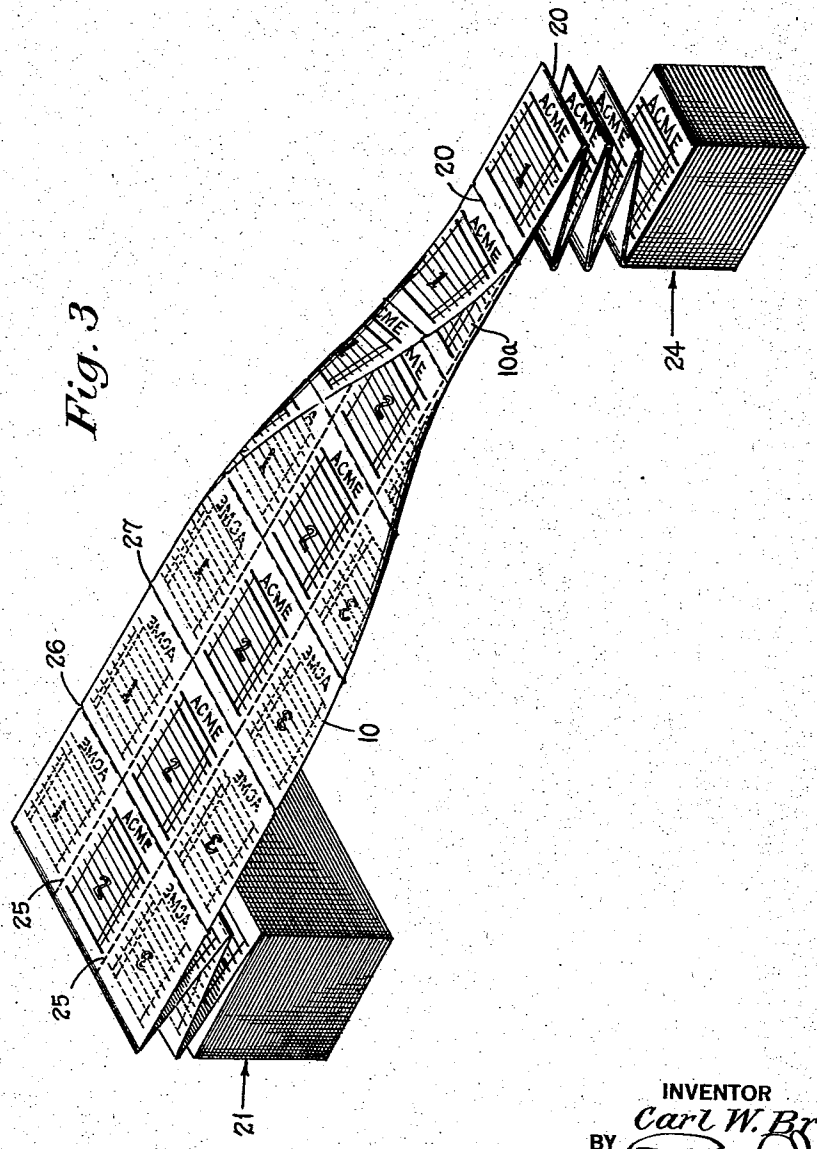
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Filed April 9, 1938 2 Sheets-Sheet 2

Fig. 3



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METHOD OF MAKING CONTINUOUS MANIFOLDING STATIONERY

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8 Claims. (Cl. 270—21)

This invention relates to manifolding material, and, more particularly, to means for preparing continuous zigzag folded and fanfolded forms.

Theoretically, it would be most desirable to print a wide web of paper with the desired forms in proper position on the back and front of the web, longitudinally and transversely weaken the web, and, as the web leaves the feed rollers of a printing press, to cause it to fold longitudinally to form a continuous fanfold web and then to fold transversely to form a pile of zigzag folded fanfold web. To do this, however, would require a great deal of space, and it would be difficult to fold the multilayer web in zigzag fashion automatically.

The present invention involves a new and improved method for making zigzag folded, fanfold web, and, instead of attempting to longitudinally fold the web to first produce a fanfold web, the present invention folds the continuous printed web transversely at form-length intervals to provide a zigzag folded pile of single-layer web at the delivery end of the press and while the web is being printed. The leading edge of this zigzag folded pile is then, either by machine or by hand, paid off from the pile and caused to fold longitudinally along lines between adjacent forms, and, after it is thus fanfolded, the multiple layer strip is caused to zigzag fold into a new pile.

In initially zigzag folding the wide web, it is creased at form-length intervals, preferably on weakened fold lines. When this zigzag folded wide web is longitudinally folded and again zigzag folded, I have discovered, the transverse creases existing in the web while it is being longitudinally folded, do not interfere with the proper transverse refolding of the strip into the final product.

When the fanfolded web approaches refolding position, at least some of the plies are creased in the direction of the fold which will take place at the zigzag folded pile. If there are three strips or layers to the fanfold web, the layer which is on the bottom and the layer which is on the top always have their creases extending in the same direction, and these, when they reach the zigzag folded pile, will refold on their original fold lines causing the intermediate strip to reverse its direction of fold. If there are four layers in the fanfold pile, two of the layers will always be in the direction of fold at the final zigzag folded pile, while the other two will be in the opposite direction, but these which are in the opposite direction will easily reverse their direction of fold and lie the same as the other two.

The transverse folding of the fanfold strip preferably should be done so that the fold occurs in the final zigzag folded pile in the same direction as the majority of strips are creased in the single layer zigzag folded pile.

The longitudinal folding of the previously transversely creased web occupies very little space, and, as stated above, may be performed entirely by hand or with the aid of suitable turning bars, etc., but no mechanism is required for zigzag folding the fanfolded web to produce the final pile.

Other features and advantages will hereinafter appear.

In the accompanying drawings—

Figure 1 is a diagrammatic view showing the apparatus for carrying out the first steps in the method of the present invention.

Fig. 2 is a perspective view of the single-ply layer, wide-zigzag folded web.

Fig. 3 shows how the wide web illustrated in Fig. 2 is longitudinally folded and then zigzag folded into a pack.

As shown in Fig. 1, the web of paper 10 is taken from a supply roll 11 and is printed on one side by a printing roller 12 cooperating with a pressure roller 13, and on the other side by a printing roller 14 cooperating with a pressure roller 15. The printing rollers are so disposed as to print forms 16 on the web, some forms being on one side and the other forms being on the other side, so that, when the web is folded longitudinally, the printed forms 16 will register. Thus the web 10 has a plurality of continuous successions of forms arranged side by side although the printing of transversely adjacent forms are on opposite faces of the web.

The web 10 may be transversely weakened at form-length intervals by perforating mechanism 17 and fed by feed rollers 18, and may be longitudinally weakened by mechanism 19. The perforating mechanism 17 produces in the web 10, transverse lines of weakness 20 dividing the web at form-length intervals, and it is along these weakened lines 20 that the web 10 is transversely folded to form a single-ply zigzag folded pile 21 shown in Fig. 2.

This pile may be formed by folding the web 10 by hand, or it may be done by suitable folding mechanism 22 shown in Fig. 1. In either case, creases are formed alternately in opposite directions along the web on the lines 20. To provide space on the drawings for Fig. 2, the guide roller 23 and folding mechanism 22 are spaced a considerable distance from the feed rollers 18 and longi-

tudinal slitting mechanism 19, but it should be understood that in actual practice the folding mechanism may be located very close to the usual parts of the printing press. Likewise, the relative spacing of the various elements shown in Fig. 1 has no significance, for these elements may be placed closer to each other than in the diagrammatic view shown in Fig. 1.

By zigzag folding the web 10, a large quantity of the web may be very neatly and conveniently packed together. At suitable intervals, the long web 10 is torn along one of the transverse lines of weakness 20, and it is then ready to be fanfolded. This may be done at some other place in the plant, and it may be done immediately or at some later time.

To fanfold the printed web coming from the zigzag folded pile 21, the leading edge of the pile is drawn therefrom, and, either by hand or by machine, the web is folded along longitudinal lines at which the several forms 16 of each layer of the web 10 join.

As illustrated in Fig. 3, there are three forms side by side in the creased zigzag folded pile 21, and these are numbered "1", "2", and "3" to indicate that they are the original, duplicate and triplicate copies respectively. The free stretch of the web 10 leading from the pile 21 is folded so as to bring the part of the web containing the forms marked "1" over the part of the web containing the forms marked "2", and the part of the web containing the forms marked "3" under the part of the web containing the forms marked "2", with the result that the forms "1", "2", and "3" are brought with the printing facing up and with the forms and the printing thereon in superposed relation with each other.

The superposed or fanfolded part 10*a* of the strip is then refolded along the transverse lines of weakness 20 to form a zigzag folded pile of fanfolded webs 24.

The longitudinal folding of the strip is greatly facilitated by the provision of longitudinal lines of weakness 25 produced in the web 10 by the mechanism 19, and these lines of weakness 25 also facilitate the separation of the several forms from a set of fanfolded forms severed from the pile 24 along lines of weakness 20. It should be understood, however, that the invention may be practiced without the web 10 being longitudinally weakened along the lines 25.

In the stretch of the web 10 leading from the pile 21 to the pile 24, the web may remain creased on the weakened fold lines 20, depending upon the extent of the weakening. As illustrated in Fig. 3, in this stretch of web from the pile 21 to the pile 24, there are creases 26 which extend downwardly and creases 27 which extend upwardly while the web is yet flat. When the web folds to fanfold shape, the creases 26 and 27 in the outer row of forms on opposite sides of the web will lie in the same direction and will tend to cause the middle row of forms to reverse their direction of crease as they approach the zigzag folded pile 24.

When, as shown, the web has three sets of forms disposed transversely, the refolding of the web into the zigzag folded pile will be so performed as to cause the web to fold in the same direction as the outside stripes were folded in the pile 21. If this is done, the refolding of the web, after it becomes fanfolded, will occur almost automatically and a slight patting of the pile occasionally will cause the central stripe to change its direction of fold.

This same practice is followed where there is an odd number of rows of forms, so that advantage may be taken of the greater number of creases which lie in the same direction. Where an even number of forms extend transversely of the web 10, it is immaterial in which direction the fanfolded web is folded transversely to form the pile 24. Whichever way it is started, it will continue to fold, although the pack 24 will have to be pressed down more often to reverse the direction of crease in those portions of the fanfolded layer which are folded oppositely to the way they were folded in the zigzag folded pile 21.

This operation of fanfolding the web while it is being converted from a single-ply zigzag folded web to a multiply fanfolded web requires very little space, for the webs, especially when they have longitudinal weakening lines 25, very easily and naturally assume their fanfolded relation.

In the broader aspects of the invention, even the transverse weakening lines 20 may be omitted, because the web 10 may be so folded in making the zigzag folded pile that the fold itself weakens the strip and permits it to be easily refolded into opposite direction.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

I claim:

1. The method of making continuous manifolding stationery, which includes the steps of printing a plurality of successions of forms side-by-side on a web of paper and weakening the web along longitudinal and transverse lines between the forms while the web is being printed; zigzag folding the web along said transverse weakening lines to form a zigzag folded pile of single-ply folds; subsequently drawing said web from said zigzag folded pile and fanfolding said web along said longitudinal weakening lines to place said side-by-side forms in superposition; and then transversely refolding the fanfolded pile of strips along the weakened fold lines to form a fanfolded zigzag folded pile of printed stationery.

2. The method of making continuous manifolding stationery, which includes the steps of printing a plurality of successions of forms side-by-side on a web of paper and weakening the web along longitudinal and transverse lines between the forms while the web is being printed; zigzag folding the web along said transverse weakening lines as it comes from the printing press to form a zigzag folded pile of single-ply folds; subsequently drawing said web from said zigzag folded pile and fanfolding said web along said longitudinal weakening lines to place said side-by-side forms in superposition; and then transversely folding the fanfolded pile of strips along the weakened fold lines to form a fanfolded zigzag folded pile of printed stationery.

3. The method of making continuous manifolding stationery, which includes the steps of printing a plurality of successions of forms side-by-side on a web of paper and weakening the web along transverse lines between successive sets of forms while the web is being printed; zigzag folding the web along said transverse weakening lines to form a zigzag folded pile of single-ply folds; subsequently drawing said web from said zigzag folded pile and longitudinally folding the web along longitudinal lines between the forms to place the forms which are side-by-side in said pile in superposition in a fanfolded pile; and then transversely folding the fanfolded pile of strips

along the weakened fold lines to form a fanfolded zigzag folded pile of printed stationery.

4. The method of making continuous manifolding stationery, which includes the steps of printing a plurality of successions of forms side-by-side on a web of paper and weakening the web along transverse lines between successive sets of forms while the web is being printed; zigzag folding the web along said transverse weakening lines as it comes from the printing press to form a zigzag folded pile of single-ply folds; subsequently drawing said web from said zigzag folded pile and longitudinally folding the web along longitudinal lines between the forms to place the forms which are side-by-side in said pile in superposition in a fanfolded pile; and then transversely folding the fanfolded pile of strips along the weakened fold lines to form a fanfolded zigzag folded pile of printed stationery.

5. The method of making continuous manifolding stationery, which includes the steps of preparing a zigzag folded pile of paper web having a plurality of successions of forms thereon side-by-side with the folds occurring on transverse weakened fold lines between successive forms; drawing said web from said pile and longitudinally folding the web along longitudinal lines between the forms to place the forms which are side-by-side in said pile in superposition in a fanfolded pile; and then transversely folding the fanfolded pile of strips along the weakened fold lines to form a fanfolded zigzag folded pile of stationery.

6. The method of making continuous manifolding stationery, which includes the steps of preparing a zigzag folded pile of paper webs having a plurality of successions of forms thereon side-by-side with the folds occurring on transverse weakened fold lines between successive forms and also having longitudinal weakening lines by the sides of the forms; drawing said web from said pile and longitudinally folding the web along said longitudinal weakening lines to place the forms which are side-by-side in said pile in superposition in a fanfolded pile; and then transversely folding the fanfolded pile of strips along the weakened longitudinal lines to form a fanfolded zigzag folded pile of stationery.

7. The method of making continuous manifolding stationery, which includes the steps of preparing a zigzag folded pile of paper webs having a plurality of successions of forms thereon side-by-side with the folds occurring along transverse lines between succeeding forms; drawing the folded web from said pile and folding it longitudinally along longitudinal lines between the adjacent successive forms to place the forms which are side-by-side in the zigzag folded pile in superposition in a fanfolded pile; and then transversely folding the fanfolded pile of strips along the transverse lines of fold existing therein to form a fanfolded zigzag pile of stationery.

8. The method of making continuous manifolding stationery, which includes the steps of preparing a zigzag folded pile of paper webs having a plurality of successions of forms thereon side-by-side with the folds occurring along transverse lines between succeeding forms; drawing the folded web from said pile and folding it longitudinally along longitudinal lines between the adjacent successive forms to place the forms which are side-by-side in the zigzag folded pile in superposition in a fanfolded pile; and then transversely folding the fanfolded pile of strips along the transverse lines of fold existing therein to form a fanfolded zigzag folded pile of stationery, said last-named transverse folding operations being in the same direction as the folds existing in the majority of the strips in the single-ply zigzag folded pile.

CARL W. BRENN.