

April 8, 1930.

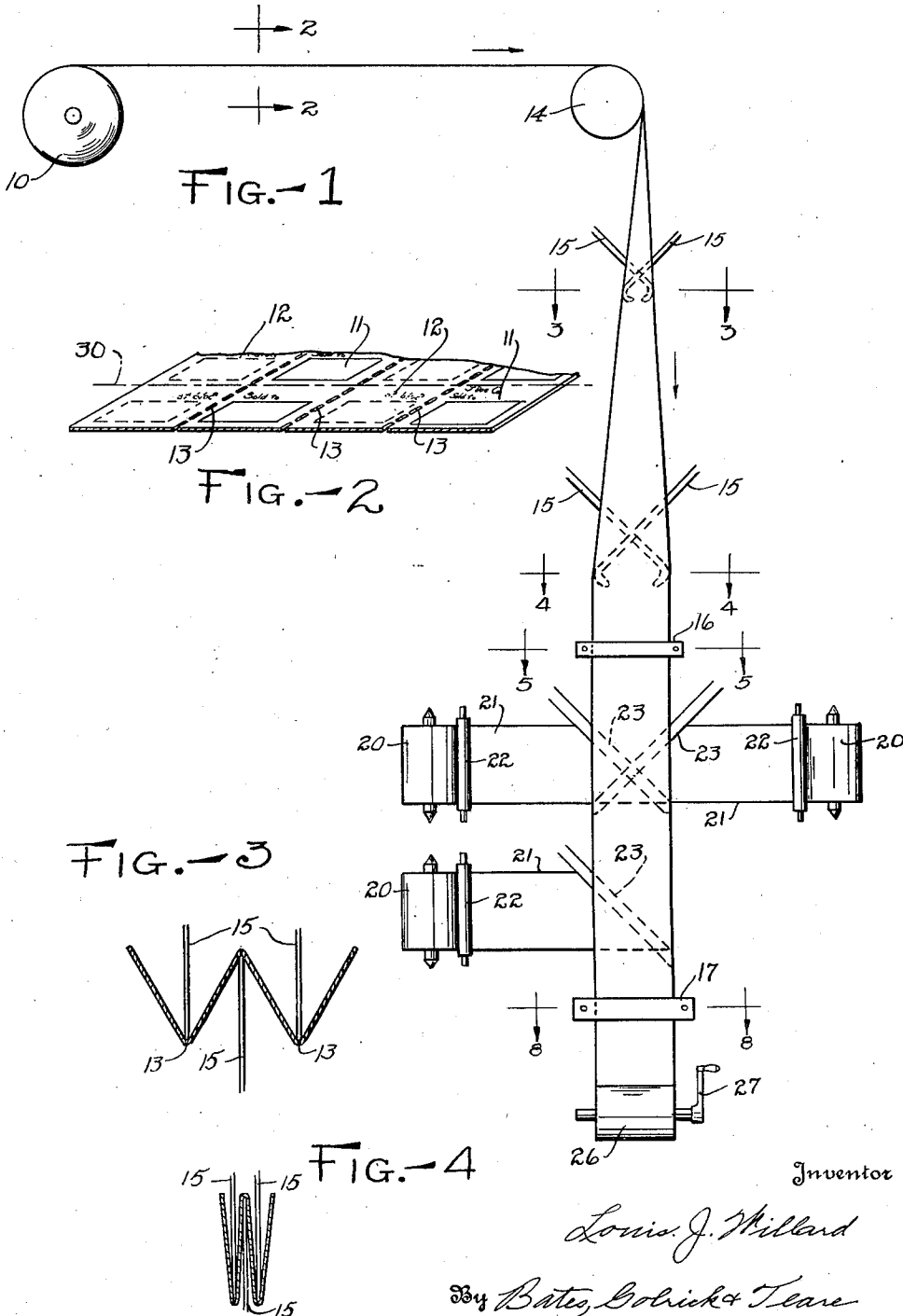
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1,753,764

METHOD AND APPARATUS FOR MAKING MANIFOLD FORMS

Filed April 24, 1929

2 Sheets-Sheet 1



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METHOD AND APPARATUS FOR MAKING MANIFOLD FORMS

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2 Sheets-Sheet 2

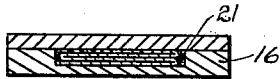


FIG.-5

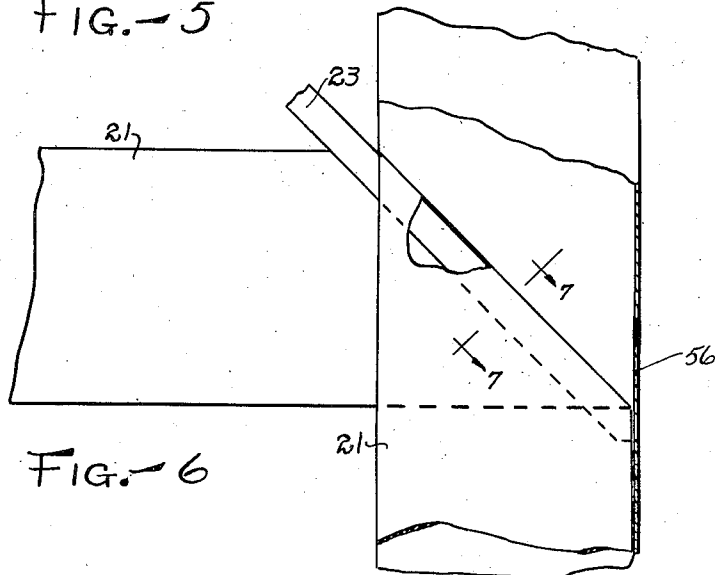


FIG.-6



FIG.-7

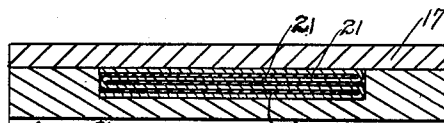


FIG.-8

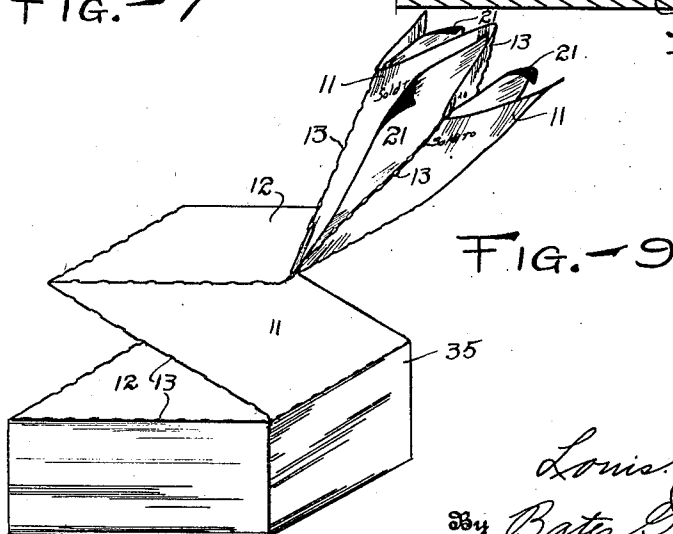


FIG.-9

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UNITED STATES PATENT OFFICE

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METHOD AND APPARATUS FOR MAKING MANIFOLD FORMS

Application filed April 24, 1929. Serial No. 357,744.

This invention relates to a method of making manifold forms, particularly those which are used in continuous billing machines. A form suitable for this character comprises a single web, which is fanfolded along longitudinally extending weakening lines, and which has interleaved transfer carbon strips. Thereafter, the web and transfer strips are folded transversely in a zigzag manner to form a pack. A manifold form of this character is described in a copending application of Glenn R. Eckels, which application bears Serial No. 335,885, and was filed January 29, 1929.

Numerous difficulties have arisen in attempting to interleave long continuous carbon strips between the folds of such forms. Efforts have been made to take the carbon strips from rolls and interleave them with the forms during the gathering operation. Due to variations in the paper, and the presence of air between the folds, the carbon strips would not remain in longitudinal alignment, and would not lie perfectly flat within the folds. An effort was made to have the carbon strips enter the folds at right angles to the direction of web travel before the web was completely gathered. To this end, a conical deflector was placed at an angle of about 45-degrees to the direction of web travel, and was used as a guide to change the path of travel of the carbon strip as it entered the fold of the web. This arrangement was objectionable as the strip would bind on the guide notwithstanding the fact that the guide was mounted on anti-friction bearings. A further objection to this expedient was the fact that the strip had a tendency to creep along the guide and thus to move out of longitudinal registration with the forms. Moreover, the point of the deflector would cut the paper web if the paper should happen to be too close to it.

The principal object of the present invention is to provide a method of interleaving long continuous carbon strips between the folds of a continuous longitudinally fanfolded web, and to enable such method to be accomplished without causing the carbon strip to move out of registration with the edges of the web. My invention also con-

templates an apparatus for enabling the strip to be inserted into the extreme edge of the fold without tearing the web.

The apparatus for carrying out the method of my invention is illustrated in the drawings wherein Fig. 1 is a diagrammatic view showing a web which is being interleaved with carbon strips in accordance with my invention; Figs. 2, 3, 4 and 5 are transverse sections taken on correspondingly numbered lines in Fig. 1; Fig. 6 is a side elevation, partly in section, on an enlarged scale showing the position of the carbon strip at the time it is inserted within the folds of the web; Fig. 7 is a transverse section taken on the line 7-7 in Fig. 6; Fig. 8 is a transverse section on an enlarged scale taken on the line 8-8 in Fig. 1, and Fig. 9 is a perspective view of a manifold pack which is made in accordance with my method.

Referring now to Fig. 1, 10 indicates a roll of paper in the form of a web, which is shown in Fig. 2, as a four-part form, having printed forms 11 on one side, and corresponding forms 12 printed on the other side, and spaced alternately in the usual way. Such forms are separated by longitudinal perforations 13, during the printing operation and hence, are present in the web which forms the roll 10. The web is directed over a guide roll 14 and thence into contact with the arms 15 which fanfold the web longitudinally along the perforations 13. This operation is known as the gathering operation and is completed at the guide 16. This guide is shown more in detail in Fig. 5, as comprising a box-like structure, having a passageway, through which the folded web passes. The width of the passageway assures a substantially complete gathering operation, as the paper passes therethrough. Another box like guide 17 is shown beneath the guide 16 and spaced a substantial distance therefrom. I have found that carbon strips can be interleaved in a satisfactory manner between the web folds if they are inserted between the guides 16 and 17. The web shown is a 4-part form and accordingly, 3 strips of carbon must be used therewith. The rolls for such strips are indicated at 20, as being

mounted upon vertical axes at the side edges of the folded web.

The transfer strips indicated at 21 thus extend from the rolls around guide rolls 22 and then transversely to the path of web travel and into the folds. Deflector or guide bars 23 extend into the respective folds and serve to guide the strips in the same direction as the path of web travel.

I have found that the carbon strips will move easily over the guide bars, if such bars comprise relatively thin metallic strips and if the top edges 25 are rounded to conform to the curvature of the paper, as is shown particularly in Fig. 7. A strip about one-half inch in thickness is suitable for this purpose and can easily be inserted between the folds for changing the path of travel of a transfer strip without requiring the folds to be open to an objectional degree.

After the gathering operation is completed, the folded web, with the interleaved strips, is preferably wound upon a drum 26 which is disposed beneath the guide box 17. A crank 27 may be used for winding the drum at the desired speed. It is advantageous to wind the gathered forms upon a drum as the tendency for air pockets to form within the folds is greatly eliminated. The web is then taken from the drum and passed through a perforating machine, which perforates the web and carbons transversely, as along the line indicated, for example at 30 in Fig. 2. Thereafter, the forms are transversely folded in a zigzag manner to form a pack, such as that shown at 35 in Fig. 9.

For enabling the transfer strip to be inserted into the far edge of the fold and at the same time to avoid tearing of the web along the folded edge, I have shown the lower end of each guide bar 23, as having an edge 55 which extends parallel to the edge 56 of the web fold. This permits the end of the guide bar to engage the web at the fold without tearing it along the perforation, and at the same time causes the inner edge of the transfer strip to be inserted as far as possible into the fold.

An advantage of this invention is that long continuous strips of carbon may be interleaved with a single fanfolded web, and that the edges of the carbon strips can easily be maintained in registration during such interleaving operation. A further advantage is the fact that transverse perforations are performed after the interleaving operation is completed, and that by reason of such procedure, the transfer strips are maintained in the desired registration.

I claim:

1. A method of making manifold forms, comprising taking a web, gathering it longitudinally to make a fanfold form, and thereafter interleaving long continuous carbon strips between the folds.

2. A method of making manifold forms, comprising fanfolding a single web longitudinally and progressively, then interleaving transfer strips substantially at the completion of the gathering operation, and thereafter transversely perforating the folded web and inserted strips.

3. A method of making manifold forms, comprising folding a web longitudinally while it is being moved downwardly, passing strips of transfer material into the folds while the web is in motion, and thereafter zigzag folding the web and the carbon strips transversely to form a pack.

4. A method of making a manifold form, comprising folding a single web in a longitudinal direction, passing a carbon strip into the fold in a transverse direction, then changing the path of travel of the strip as it enters the fold to a direction extending longitudinally of the fold, and thereafter zigzag folding the web and strip in a transverse direction to form a pack.

5. A method of making manifold forms, comprising folding a single web longitudinally, pressing the folded portions together during movement of the paper, inserting continuous strips of carbons into the folds, then pressing the folds together again, and thereafter transversely folding the web and strips in a zigzag manner to form a pack.

6. An apparatus of the character described, comprising in combination, means for folding a web longitudinally, means for supporting a roll of transfer material adjacent one edge of the folded web, a guide member extending into the fold of said web, said member being adapted to guide the transfer strip into the fold so as to leave the innermost edge of the strip in close proximity to the innermost part of the fold, and means for moving the web and strip simultaneously, and at the same velocity.

7. An apparatus for interleaving a continuous carbon strip into a continuous manifold form, comprising in combination, means for folding a web longitudinally and progressively until portions comprising the fold are in close proximity to each other, a member extending obliquely into the fold and terminating adjacent the innermost part thereof, there being a continuous strip of transfer material extending over said member and into the fold, and means for moving the web and transfer strip simultaneously and at the same velocity.

8. In a device of the character described, the combination with means for longitudinally folding a single web of paper, a relatively thin flat guide member extending obliquely into the fold, said member having the innermost edge thereof extending parallel to the inner edge of the fold, there being a continuous strip of transfer material extending over said member, and into the fold, and the upper

edge of said member being adapted to contact with the uncoated side of the strip of transfer material and to guide it into the fold.

5 9. An apparatus for making manifold forms, comprising in combination, means for longitudinally folding a single web of paper, devices mounted at spaced intervals for pressing the folded portions together, means
10 for introducing a continuous strip of transfer material into the fold, the last named means being disposed between the pressing devices, and other means for moving the web and strip simultaneously and at the same velocity.

15 10. A transfer strip guide member for use in an apparatus for making manifold forms, comprising a relatively thin flat member, having a curved upper edge and having the web engaging end thereof extending obliquely to the upper edge and parallel to the edge
20 of the web.

In testimony whereof, I hereunto affix my signature.

25 LOUIS J. WILLARD.

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