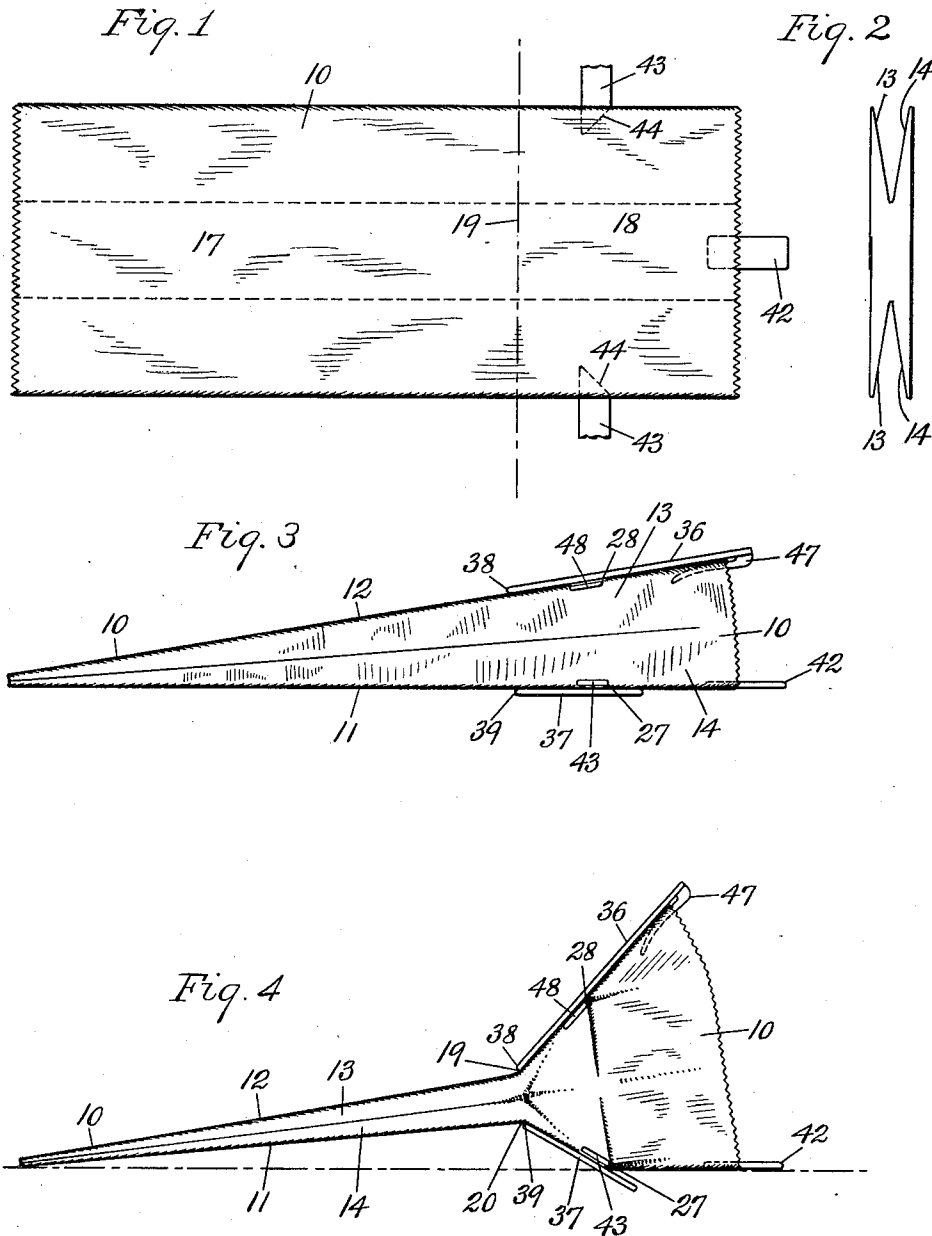


J. MERRITT.
ART OF MAKING PAPER BAGS.
APPLICATION FILED JULY 10, 1907.

1,029,706.

Patented June 18, 1912.

2 SHEETS—SHEET 1.



Witnesses:

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Caroline M. Buckle

Inventor:

Joseph Merritt
By W. H. Honiss. Atty

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2 SHEETS-SHEET 2.

Fig. 5

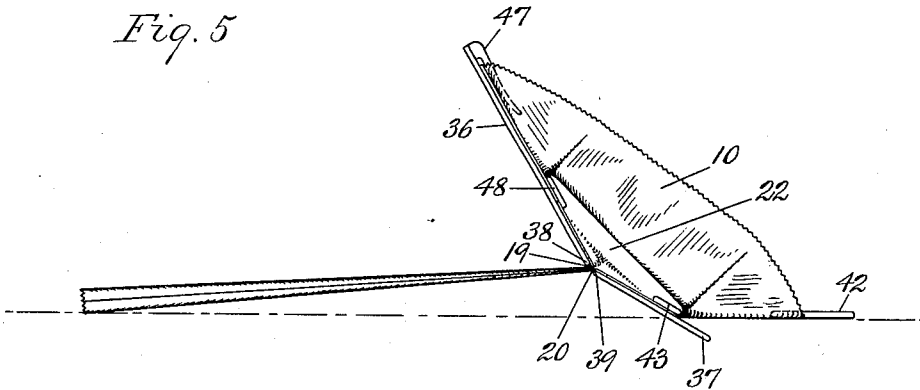


Fig. 6

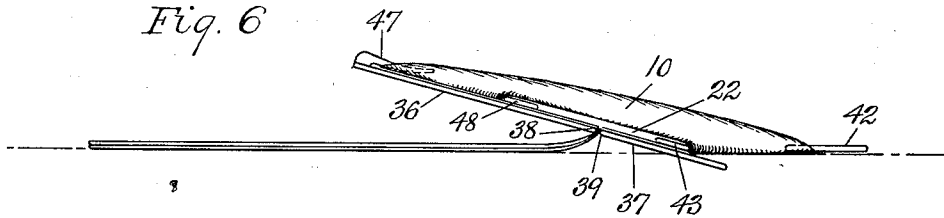
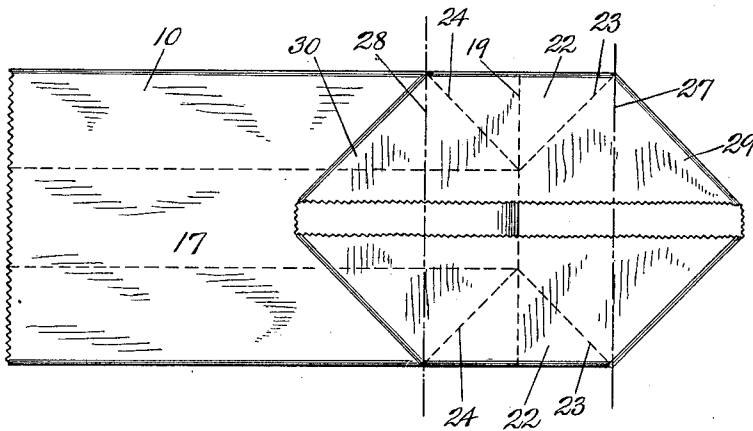


Fig. 7



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UNITED STATES PATENT OFFICE.

JOSEPH MERRITT, OF HARTFORD, CONNECTICUT, ASSIGNOR TO UNION PAPER BAG MACHINE COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

ART OF MAKING PAPER BAGS.

1,029,706.

Specification of Letters Patent.

Patented June 18, 1912.

Application filed July 10, 1907. Serial No. 383,043.

To all whom it may concern:

Be it known that I, JOSEPH MERRITT, a citizen of the United States, and resident of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Art of Making Paper Bags, of which the following is a full, clear, and exact specification.

This invention relates to the art of making paper bags, and consists in an improved process of forming the so-called "diamond" in bellows or tucked-sided tubular blanks.

The intricacy of diamond folds when made in a bellows-sided blank, and the necessity, under commercial conditions, of manufacturing paper bags rapidly from more or less fragile material such as paper, renders the blanks liable to be torn, or the folds malformed, particularly during the formation of the inner triangular folds. This is especially true when the front end of the blank is held down to the surface of the folding bed, or when the succeeding blanks are connected together during the diamond folding operation by means of an unsevered strip of the paper, it being desirable thus to hold or secure the leading end of the blank, in order to insure proper delivery and registration of the blank in passing through the machine from one folding mechanism to another. It has already been recognized in this art that the strains referred to are in a large measure relaxed and this phase of the difficulty correspondingly overcome by releasing the front end of the blank, or at least allowing it to spring upwardly during the formation of the inside triangular folds, at which time the strains are most likely to occur. But this releasing or relaxing of the front end of the blank introduces the further difficulty of recovering and returning that flap to its forwardly extending position, so as to deliver the blank properly to the succeeding mechanism. In the present invention the advantages of securing and retaining the leading end of the blank in its forwardly extending position are preserved while at the same time overcoming the liability to strain and tear the material, or to deform the folds, which was attendant upon former methods in which the front flap was thus held. Hence according to this method the front flap or leading end of the blank may remain secured to the folding bed or traveling carrier, or may remain

connected by an unsevered strip to the preceding blank. In this way the front flap is retained in a position and condition of complete control, while the remainder of the blank is accommodated to that position, thus avoiding the sacrifice of control and position which is liable to result when the front flap is accommodated to the rest of the blank.

The accompanying drawings illustrate the various steps in the formation of the diamond folds, according to this improved process, showing in connection therewith a set of holding and fold-defining instrumentalities, which, however, may be varied greatly in character, according to the type of machine employed.

Figure 1 is a plan view, Fig. 2 an end view, and Fig. 3 a side view of a bellows-sided bag blank in an early stage of the folding operation. Figs. 4, 5 and 6 are side views of the blank, showing later successive steps or stages of the folding operation. Fig. 7 is a plan view of the blank, showing a completed diamond fold.

In the present process the lower leading end of the blank, which generally forms the end flap of the diamond fold, is either connected to the succeeding blank by an unsevered strip or is held to the folding bed by means of a suitable gripping device. The upper and lower plies of the blank are then separated, and, either after or concurrently with this separating movement, that portion of the lower ply which lies rearwardly of the flap fold line is bent upwardly at that line, and is also reversely folded at the primary fold line. The leading end of the upper ply is bent upwardly and backwardly at the primary fold line, thus bringing the primary fold lines in the two plies toward each other and ultimately into substantial coincidence, by closing the body portions of the upper and lower plies together as soon as the safe formation of the inner triangular folds is assured, after which the continued turning movement of the upper ply upon its primary fold line more sharply defines the triangular folds and flattens the bottom end of the blank into the well-known diamond form, after which the blank may be passed on to other suitable mechanism for pasting and cross-folding the end flaps of the diamond to complete the rectangular bottom of the bag.

The blank 10 has tucked or bellows sides 13 and 14, and comprises the body portion 17 and the bottom-forming portion 18, the latter lying below the primary-fold line 19, along which the upper ply 12 is folded back upon itself to form the diamond. The lower ply 11 of the blank is held at its front end to a blank support of any suitable form by the diamond holder 42. A pair of oppositely disposed tuck holders 43 engage the lower tucks 14 of the blank and hold them to the lower folding plate 37, the rear edge 39 of which serves to define the primary fold line 20 (Fig. 4) of the lower ply. The inclined edges 44 of the tuck holders define the position of the front edges 23 (Fig. 7) of the inside triangular folds 22 of the completed diamond. The upper ply 12 of the blank is folded back by means of the upper folding plate 36, the lower edge 38 of which may, as herein shown, serve to define the primary fold line 19. The upper ply 12 is held to the plate 36 by the diamond holder 47 and by a pair of oppositely disposed box-holders 48 which engage the upper tucks 13 of the blank. The box holders 48 are provided with inclined edges which define the rear edges 24 (Fig. 7) of the triangular folds 22. The flap fold lines 27 and 28 are those upon which the flaps 29 and 30 are finally folded over to form the bag bottom.

That portion of the lower ply extending rearward from the flap fold line 27 is moved upward by the plate 37 which swings on an axis substantially coincident with the line 27 until the defining edge 39 reaches about the position shown in Fig. 4. The upper ply is folded back over the defining edge 38 by the upper plate 36 which swings on the upper flap line 28 as an axis, the axis also moving away from the line 27 to bring the upper ply to the position shown in Fig. 4, thus bringing the two primary fold lines 19 and 20 into proximity to each other. By these movements of the two plates 36 and 37, the front end of the blank is opened out as shown in Fig. 4 with the side tucks 13 and 14 and the upper and lower plies beginning to assume at their ends the triangular form of the diamond. The continued movement of the plate 36 on its axis 28 and a rearward and downward movement of that axis carries the blank through the position of Fig. 5, where the primary-fold lines 19 and 20 are brought substantially together, to the position of Fig. 6 where the two plates 36 and 37 have been brought into alinement and the inside triangular folds 22 fully defined by the position of the tuck-holders 43 and the box holders 48. This movement of the folding plates separates the upper and lower plies of the bottom forming portion of the blank, forming the primary fold lines in said separated plies, and closes said fold lines toward each other,

swinging the bottom portion of the blank upon said fold lines as upon hinges to carry the plane of the triangular folds of the bottom toward the plane of the body portion of the bag. This practically completes the diamond so that it needs only some flattening means, such as a plate or a roll, to bring it into its final shape ready for the pasting and folding over of the flaps.

In carrying out the above-described process of forming the diamond, the sequence, direction, and amplitude of the different movements, as well as the extent to which they are performed simultaneously, may be varied considerably without departing from the spirit of this invention. The movement of the lower ply may be less or greater than that indicated in the drawings. The two folding plates may or may not be brought fully into the same plane, and the angles which they make relative to the general position of the remainder of the blank may also be varied from the position shown in Fig. 6. The quality of the paper, its strength, the size of the bag and the character of the mechanism employed are all factors which may vary more or less the details of the process.

I claim as my invention:—

1. The process of diamond folding a bellows sided bag blank, which consists in separating the upper and lower plies and spreading the bellows sides thereof from the bottom end of the blank to a point above the location of the primary fold line of the blank, and continuing the opening movement of the bottom end of the blank while closing both the upper and lower plies of the blank toward each other at the location of the primary fold line, to restore the bellows sides of the blank to their initial closed condition at that line, continuing the opening movement of the bottom ends of the upper and lower plies until the inner triangular folds are fully developed from the bellows sides of the blank.

2. The process of diamond folding bellows sided bag blanks, which consists in separating the upper and lower plies of the blank in diverging planes, extending from the bottom ends of the blank beyond the location of the primary fold line to expand the bellows sides of the blank, then closing those plies toward each other at the primary fold line, while continuing the opening and diverging movement of the bottom end of the plies, thereby returning the bellows sides to their folded flattened condition at the primary fold line to develop and locate the apexes of the inner triangular folds at the primary fold line, while expanding and developing the outer corners of those triangular folds at the sides of the bag blank.

3. The process of diamond folding bellows sided bag blanks, which consists in

holding the front end of the lower ply of the blank in a constant plane and separating the bottom end of the upper ply therefrom in a plane increasingly diverging from that of the lower ply, with the two planes converging near the upper end of the blank, then closing the upper and lower plies together at the primary fold line, while continuing the separating movement of the upper ply below the primary transverse fold line, to develop the inner triangular folds in the bellows sides of the blank, with their apexes coincident with the primary fold line.

4. The process of forming the diamond folds in a bellows sided bag blank, which consists in maintaining the bottom end of the lower ply of the blank in a constant plane while separating the upper ply and the bellows sides of the blank therefrom in planes and lines converging toward the up-

per end of the blank beyond the position of the primary fold line, to develop the outer corners of the inner triangular folds of the diamond, then closing the upper and lower plies toward each other at the primary fold line, to develop the apexes of the said triangular folds at that point, while continuing the backwardly turning movement of the bottom forming portion of the upper ply until the folds of the diamond and its inner triangular folds are developed in a common plane.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses this 8th day of July, 1907.

JOSEPH MERRITT.

Witnesses:

CAROLINE M. BRECKLE,
NELLIE PHOENIX.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."