Oct. 23, 1962 H. L. SEIDEN 3,059,549

SHEET FORMING MEANS

Filed March 18, 1959

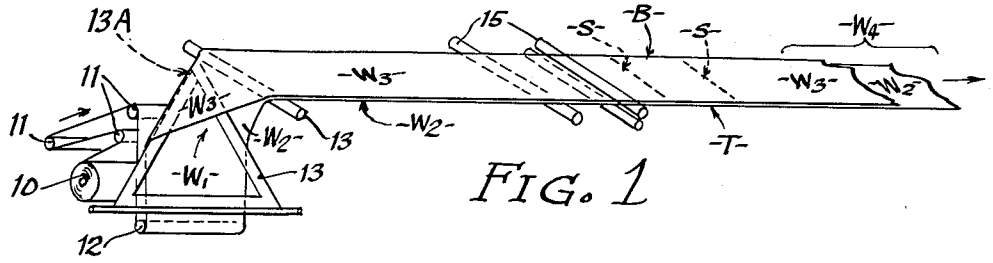


FIG. 1

FIG. 3

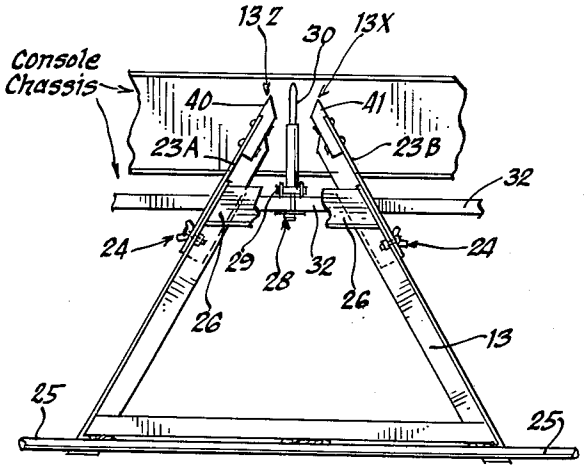
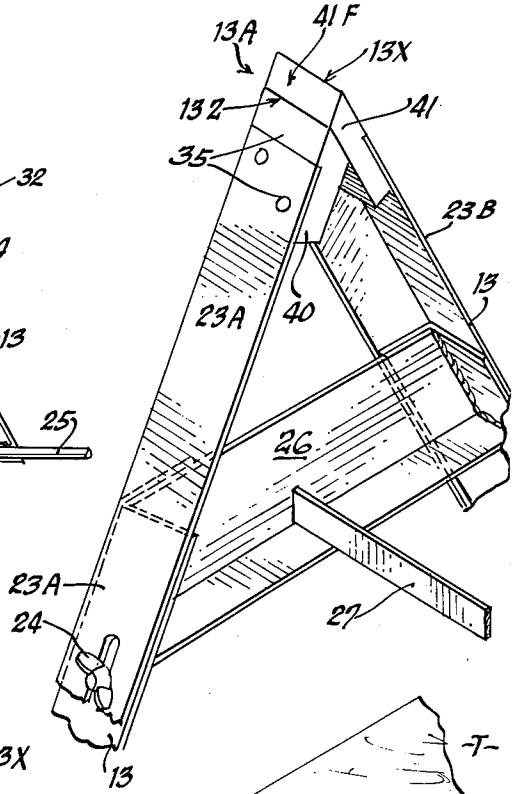


FIG. 2



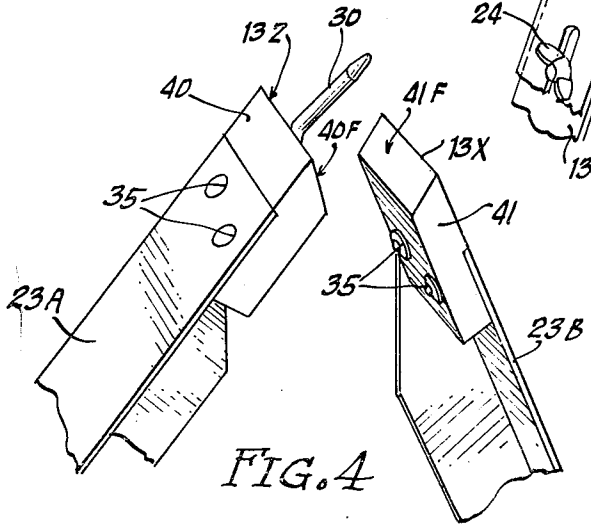


FIG. 4

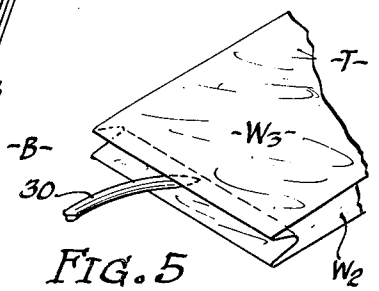


FIG. 5

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SHEET FORMING MEANS

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This invention pertains to sheet-feeding, folding, and forming mechanism for use particularly, but not by limitation, in bag-making machines and the like, especially those employing heat-sealable synthetic (e.g. polyethylene) sheeting or films fed from rolls and folded or lapped and cut to form bags, examples of such machines being described in my copending applications Serial Nos. 745,165 and 782,036.

The principal object of the present disclosure is the provision of a sheet-folding device of simplified and adjustable construction for turning a travelling, single-thickness sheet or web into a double-thickness sheet which can then be cut and welded to form a bag, with or without a gusset.

Another object is the provision of a simple means cooperable with the folding device for forming a gusset concurrently with the folding of the stock sheeting into a dual-thickness blanking sheet.

A further object is the provision of adjustably separable nose block means for the folding frame which minimizes wear at this point, and which reduces friction and tearing of the sheeting, and permits formation of narrow gussets by providing selectively exposable folding edges on said blocks.

Additional objects and aspects of novelty and utility relate to details of the construction and operation of the illustrative embodiment described hereinafter in view of the annexed drawing, in which:

FIG. 1 is a schematic illustration of the sheet-feeding and folding operation;

FIG. 2 is an enlarged fragmentary detail of a folding machine showing the novel folding means in front elevation with nose open;

FIG. 3 is an enlarged fragmentary perspective detail of the novel nose structure on the folding frame, in closed condition;

FIG. 4 is an enlarged perspective detail of the nose structure in open condition for gusset forming;

FIG. 5 is a perpective schematic detail illustrating the gusset-forming fold.

A method of making bags from single-thickness sheet stock is illustrated in FIG. 1 wherein the heat-sealable synthetic sheeting is fed from a stock roll 10 and trained over various tensioning and guiding rollers 11 to be payed upwardly from a final guide roller 12 and led over a triangular folding frame 13 having an uppermost apex 13A situated substantially at the level of a first outfeed roller means 14 lying in a plane at right angles to that of the frame.

The folding frame 13 is disposed in a plane at an angle to the vertical, and the main infeeding web of sheet W_1 departs from the final guide roller 12 in a plane about parallel to that of the triangular folding frame and then rides over the upper apex portions 13A of the latter to make the right-angled turn onto the first outfeed roller 14, as a result of which the single outfeeding webs W_2 and W_3 travel as one in their new superposed relation over other outfeed roller means 15 into the bag making mechanism (not shown).

The feeding and folding operation described in view of FIG. 1 produces the resultant double-thickness web W_4 from which a plain or non-gusset bag will be made by heat-sealing the lapped side edges as at S (dotted lines) of successively cut-off sections of web W_4, the upper sheet layer W_3 forming one side of the bag and the lower sheet

W_2 forming the opposite side thereof; the lapped edges at T forming the open top of the bag and the far (folded) edge B forming the bottom thereof.

For such a plain bag, the apex portion 13A of the triangular folding frame is adjusted into the closed condition of FIG. 3, so that only one, rather sharp, folding edge 13X is presented by this nose, as it is called, to be engaged by the sheet.

The formation of the nose structure is an important aspect of the improvement in that it involves the formation of the triangular frame with two adjustably shiftable legs 23A, 23B (FIG. 2), which are respectively slidably fitted onto corresponding opposite sides of the frame 13 adjacent the upper apex portion thereof, these legs being respectively clamped in position of adjustment by means such as the wing bolts 24. In this connection, the frame 13 is preferably made from angle iron so that there is a slidable nesting of legs 23A, 23B on the fixed side members of the triangular form.

The folding form 13, as utilized in a machine such as shown in said application Serial No. 782,036 is mounted in fixed position therein by welding the base portions of the triangle onto a cross member 25 forming part of the machine chassis (FIG. 2), and by welding a gusset plate 26 to each side piece of the frame (FIG. 3), to which is welded a strut bar 27 attached to said chassis (not shown). By loosening the wing bolts 24, the legs may be slid downwardly from the closed condition of FIG. 3 to an "open" or gusseting condition such as depicted in FIGS. 2 and 4 wherein the apex portion of the frame no longer presents the sharp folding edge 13X, but a wide, open apex which permits the folding edge of the sheeting to feed loosely toward the first outfeed roller 14 and against the pointed end of an elongated gusset finger 30 carried on a pivot 29 at its foot, with the pivot seated in a clamp 28 secured to a chassis cross bar 32.

Secured respectively by rivet means 35 to the upper end of each frame leg 23A, 23B are nose blocks 40 and 41 made of a material of the class of nylon and shaped substantially alike but so positioned on their respective frame legs that the block 41 can lap in closing relation with the companion block 40, as depicted in FIG. 3, to close the apex, shield the gusseting edge 13Z and present the single "sharp" folding (non-gusset) edge 13X to the sheeting. This is the so-called regular or non-gusseting position, which requires that the gusset finger 30 be swung back out of the way on its pivot 29.

When the apex structure is opened to the gusseting position shown in FIGS. 2 and 4, nose block 40 will present the edge 13Z to the sheeting, but owing to the relative bluntness of the apex, there will be sufficient looseness at the folding line to permit the finger 30 to press this fold region of the doubled-sheet inwardly, as in FIG. 5, to form the gusset.

The nylon blocks, arranged and shaped as described, present a very sharp folding edge 13X or 13Z in the sense of making a very narrow crease or fold so that very small gussets (e.g. one-quarter inch deep) can be formed, yet owing to the smooth, slippery character of the material, there is no danger of cutting the thin polyethylene sheeting as can be the case with metal nose pieces or edges of comparable sharpness. Also, there appears to be a tendency of metal to become somewhat gummy at this point which causes a drag on the sheeting. The Nylon nose blocks wear longer than steel and present much less friction.

The non-metallic, slippery nose members are most satisfactorily made in the shape of rectangular blocks 40, 41, each of which has one end truncated to define an angular face 40F or 41F (FIG. 4), such that in the closed apex condition of FIG. 3, the face 40F will be lapped and concealed by the other block, and the face 41F of the lat-

ter will be exposed and flush with outside surface of the leg **23A**, as in FIG. 3, leaving only the folding edge **13X** exposed to the sheeting, whereas in the open-apex condition of FIG. 4, both truncated faces **40F**, **41F** are exposed and there will result the exposure of another folding edge **13Z** in place of the former edge **13X** to make the broader fold necessary for a gusset.

I claim:

1. A sheet folding device comprising a triangular frame structure having an upper apex portion over which sheeting is passed for folding and formed by a pair of legs each movably mounted on one of the adjacent convergent sides of the frame structure for adjustment into close contiguity to define a closed apex making a sharp fold on the sheeting, said legs being adjustable apart to define an open apex to make a looser fold suitable for forming a gusset in said fold, and a nose member block attached to the apex end of each said leg and each member shaped so as to fit into a lapped relation in the closed-apex condition with the other of said blocks thereby presenting a sharp folding edge for engagement by said sheeting, and for the further purpose of presenting at least one like folding edge for engagement by the sheeting in said open-apex condition.

2. The construction of claim 1 further characterized in that said nose members are in the form of substantially rigid block members made from a smooth, slippery, non-metallic material.

3. A sheet folding device comprising a triangular frame structure having an upper apex portion over which sheeting is passed for folding and formed by a pair of legs each movably mounted on one of the adjacent convergent sides of the frame structure for adjustment into close contiguity to define a closed apex making a sharp fold on the sheeting, said legs being adjustable apart to define an open apex to make a looser fold suitable for forming a gusset in said fold, and a gusset-forming finger and means mounting the same on said structure adjacent said apex portion for movement to project into and out of said open apex to engage the sheeting fold and press a gusset in the latter.

4. Sheet folding apparatus comprising a pair of adjustable members and means mounting the same in angular relation to shift relatively to bring corresponding convergeable end portions thereof substantially into convergence to form a turning apex defining the fold line for a sheet trained over said members to fold said sheet upon itself laterally of its direction of travel, said members being selectively movable in a direction oppositely away from convergence to afford a gap between said convergeable end portions for providing a looseness in the sheet fold at that location, and a gusset-forming member and means mounting the same on a part of said structure adjacent said convergible end portions for selective positioning out of said gap or in the gap to engage the loose portions of the sheeting and press the sheeting inwardly to form a gusset substantially at the fold margins thereof.

5. Sheet folding apparatus comprising a pair of adjustable members and means mounting the same in angular relation to shift relatively to bring corresponding convergeable end portions thereof substantially into convergence to form a turning apex defining the fold line for a sheet trained over said members to fold said sheet upon itself laterally of its direction of travel, said members being selectively movable in a direction oppositely away from convergence to afford a gap between said convergeable end portions for providing a looseness in the sheet fold at that location, and a glide member on each of said convergeable end portions, said members having angularly-faced endwise portions fitting together closely in the fully converged condition of said pair of adjustable members whereby to define a substantially sharp turning apex, and to afford a pair of substantially sharp folding apices in the gapped condition of said adjustable members.

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