June 16, 1936. J. KOENIG 2,044,476

APPARATUS FOR MAKING BAGS

Filed April 27, 1934

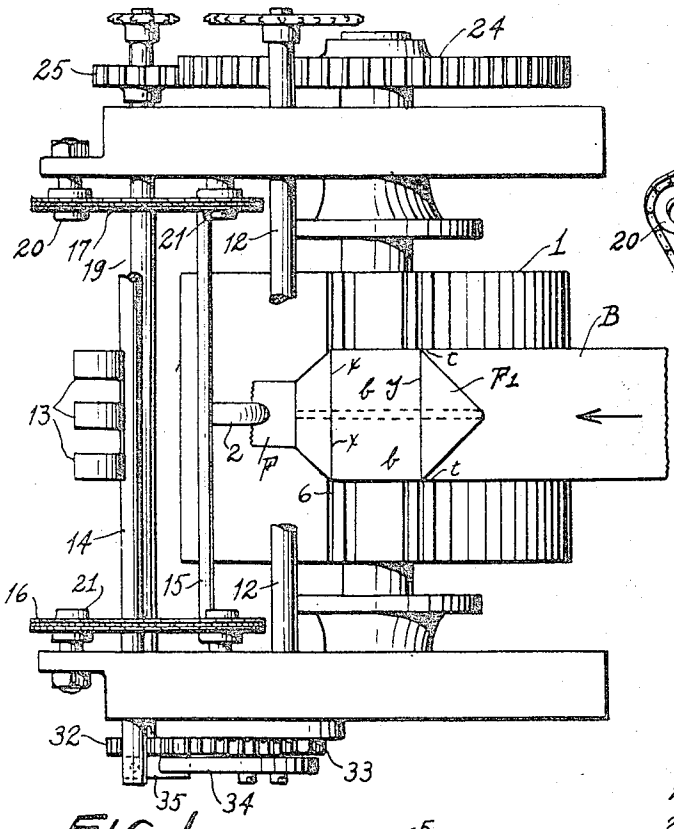


FIG. 1.

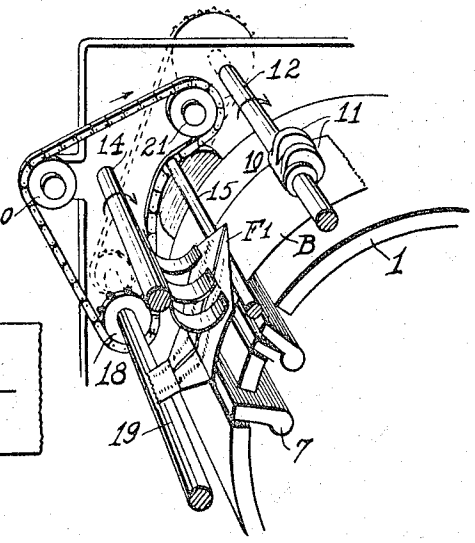


FIG. 3.

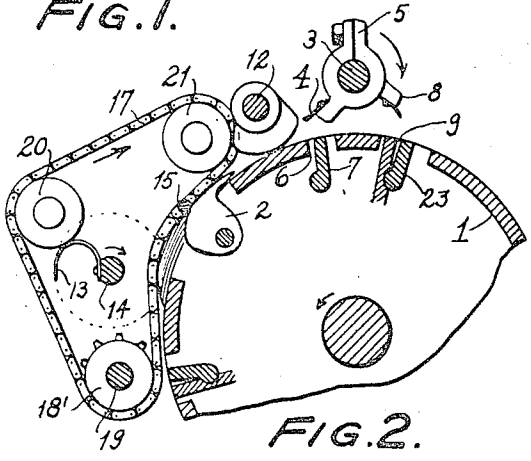


FIG. 2.

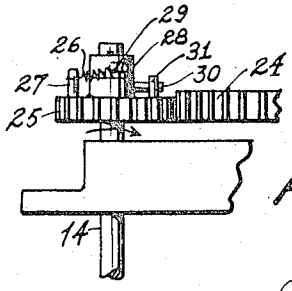


FIG. 5.

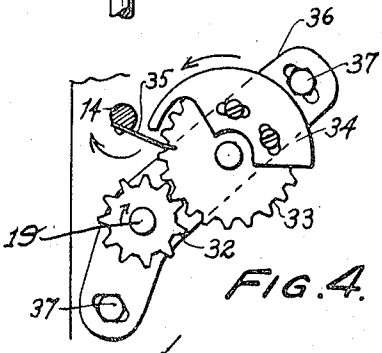


FIG. 4.

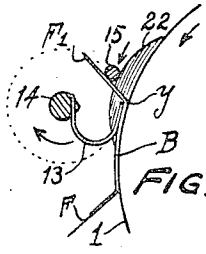


FIG. 6.

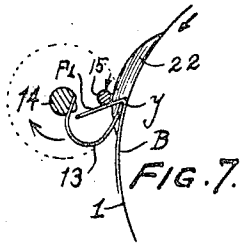


FIG. 7.

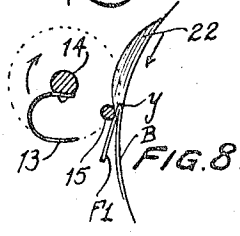


FIG. 8.

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APPARATUS FOR MAKING BAGS

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Application April 27, 1934, Serial No. 722,630

12 Claims. (Cl. 93—27)

My invention relates to apparatus for making bags of paper or like material, and particularly to forming and sealing the bottom of the bag.

In accordance with my invention, a flap of the end of the bag is folded by the cooperation of a member which engages the surface of the bag, to which the flap is to be secured, adjacent the line of fold, and a second member which folds the flap, the first member being withdrawn during, and prior to completion of, the folding operation, thus avoiding need to pinch or nip the bag at the line of fold, as heretofore.

My invention also resides in the features of construction and arrangement hereinafter described and claimed.

For an understanding of my invention and for illustration of mechanism embodying it, reference is to be had to the accompanying drawing in which:

Figure 1 is a plan view, with parts omitted and parts broken away, of apparatus for folding and pasting components of the bag to form the bottom;

Fig. 2 is a side elevational view, with parts in sections and parts omitted, of mechanism shown in Fig. 1;

Fig. 3 is a detail view in perspective of parts appearing in Figs. 1 and 2;

Fig. 4 is a detail view in side elevation of parts appearing in Fig. 1;

Fig. 5 is a detail view, in plan, of a driving connection between parts shown in Fig. 1;

Figs. 6, 7 and 8 diagrammatically illustrate successive positions of parts shown in Fig. 1 to effect folding.

Referring to Fig. 1, the bag B, collapsed and completed except for folding and pasting of the integral flaps F, F1, is delivered to the rotating drum 1 by any suitable mechanism, not shown. The gripper 2 engages the leading flap F of the bag B and by operation of known mechanism, not shown, clamps the leading flap F of the bag B against the drum for movement therewith. The shaft 3 is driven in timed relation to the drum so that the blade 4, mounted upon the support 5, secured to shaft 3, engages the bag to crease it at x which defines the line of folding of flap F. The creasing knife 4 presses the bag into the gap 6 extending transversely of the periphery of the drum. The pivoted jaw 7 whose upper end projects into the gap is operated, by known mechanism, to clamp or pinch the bag along the fold x sufficiently to hold the bag securely to the drum, permitting subsequent unclamping of gripper 2.

As the drum and shaft 3 continue to revolve the second blade 8 meets the bag and creases it along the line y which defines the line of fold of the trailing flap F1. To allow this creasing, the periphery of the roll is provided with a suitable depression or gap 9. In accordance with the present invention, however, the bag is not pinched or gripped along line y.

As the bag moves beyond the creasing knives a pasting device 10, comprising two cylindrical segments 11, mounted upon shaft 12 and driven in synchronism with the drum, applies strips of paste, or other suitable adhesive, for securing the flaps F and F1 to the bottom components b, b of the bag.

The curved structure 13, which is preferably formed of three fingers spaced to span the strips of adhesive on the bag, is mounted upon shaft 14, which is so timed that the outer or free ends of the fingers meet the surface of the bag to which the flaps are to be applied adjacent the line of fold y, as most clearly shown in Figs. 3 and 6.

The folding bar 15 is supported at its opposite ends by the chains 16, 17, driven, respectively, by sprockets 18, 18′ secured to opposite ends of the shaft 19 which is driven in synchronism with the other elements described. The idlers 20, 21 are disposed to insure that the bar 15 will clear the path of movement of the fingers 13 except as now described.

The drive for the folding bar 15 is so timed that at about the time the fingers 13 engage the bag, the bar, which is traveling at a speed higher than the drum, rides up upon the cams 22 projecting beyond the drum and, in so doing, begins to fold the rear flap F1 toward the bottom panels b, b, as shown in Fig. 6. As the parts continue to move, the bar 15, due to its higher speed, continues to fold the flap F1, the fingers 13 remaining in engagement with the line of fold y to ensure sharp and definite folding. For continued operation, the fingers 13 are withdrawn from their position beneath the flap, Figs. 7 and 8, the bar 15, however, continuing to remain in engagement with the flap F1 for a somewhat longer time to complete folding thereof into adhesive engagement with the bottom of the bag.

The subsequent steps of unclamping and folding the panel F of the bag, releasing of the bag from the drum, etc., may be performed in the manner previously known. Briefly, the gripper 2 releases the flap F so that it may be engaged by a folding bar disposed in its path, continued rotation of the drum causing the flap to be turned back over the previously applied flap F1. Subsequently, the clamping jaw 7 opens and the completed bag is removed from the drum.

Heretofore, in machines generally of this type, the bag was clamped at both of the lines of fold x and y; i. e., the jaw 23 was movable to pinch or clamp the bag at the fold y in a manner similar to the action of jaw 7 upon fold x, and the folding of the flap F1 was effected by a bar similar to bar 15 without, however, the assistance of any mechanism equivalent to the fingers 13, re-

liance being placed upon the gripping action of the jaw 23. However, it was found in practice that this method had several objectionable features. In the first place, it involved clamping or pinching, in a sharp fold, of many thicknesses of bag material, fourteen thicknesses of the bag material for an unlined bag and, of course, greater thickness for a lined bag. To hold the bag securely, it was necessary for the jaws 23 to exert a very high pressure and/or the fold to be pushed deeply into the gap, with the result that the bags were very often torn at the corners *t*. If, on the contrary, the pressure exerted by the jaws 23 was insufficient, the folding bar, as previously used, would pull the bag from between the jaws, with the result that the flap F1 would not be pasted. It was extremely difficult, and in some cases practically impossible, to obtain the optimum adjustment of pressure which would insure that the bag would not release, and yet would not be so great as to cause tearing. To adjust the apparatus so that it would neither tear the corners, and yet would securely clamp the bag along the fold *y*, required great skill and inordinate time. Furthermore, with some grades of paper and types of bags, it was practically impossible to obtain satisfactory operation.

There is little or no difficulty in clamping the paper at the fold *x*, therefore, in accordance with this invention, the bag is nipped only along that line of fold. The second set of blades 8, in accordance with my invention, simply creases the paper at *y* to facilitate the subsequent folding at *y*; this preliminary creasing, in at least some cases, is not essential.

The portion of the bag, therefore, extending to the rear of the fold *x* is entirely free. The fingers 13, as above described, press the bag against the supporting surface afforded by the drum during the folding operation effected by the bar 15. By this mode of folding there is avoided need to pinch the bag along the line of the second fold *y*. By my invention, it is practical to make bags covered with or comprised of synthetic and/or processed sheet materials many of which have a high glaze and are relatively fragile, which was not feasible with the prior method and arrangement described.

As indicated by Fig. 2, the drum may be of diameter sufficiently large to accommodate more than one bag at a time. In the specific case illustrated, the drum is designed with three sets of grippers and jaws. For this specific arrangement, the gearing is such that the shafts 3, 14 and 12 make three revolutions for each revolution of the drum 1, and the sprockets for driving the chains which support the folding bar 15 are driven at nine times the speed of the drum. In general, the angular velocity of the shaft 3 and the shaft 14 for fingers 13 or equivalent is equal to the angular velocity of the drum 1 times the number of bags it may accommodate.

The preferred arrangement for controlling the operation of the fingers 13 to clear the bar 15 as it moves from the position of Fig. 7 to the position of Fig. 8, is shown in Figs. 4 and 5. The driving gear 24 meshes with the gear 25 which is loose upon shaft 14, and the spring 26 connected between the stud 27 on gear 25, and the pin 28 extending from the collar 29 secured to shaft 14, biases the shaft for movement in counter-clockwise direction normally to keep the pin 30 secured to the shaft in engagement with the stop 31 secured to the gear 25.

To the opposite end of shaft 19 is secured the pinion 32 which drives the gear 33 on which is mounted a cam 34 adapted to engage the arm 35 extending from shaft 14. As the bar 15 approaches the fingers 13, the arm 35 of their shaft is engaged by the cam 34 which is traveling at higher angular velocity, specifically, twice the velocity in the construction shown, so that the fingers are quickly removed from the path of the bar. When the cam 34 is rotated to such an extent that the lever 35 drops off the trailing end of the cam, the spring 26 returns the shaft 14 to its initial position relative to the gear 25. In other words, the angular relation of the folding fingers 13 is not fixed with respect to gear 25 throughout a revolution. As the folding fingers 13 approach the drum 1 for engagement of the bag, they occupy their normal angular relation with respect to their driving gear 25 and maintain this relationship until the folding bar 15 rises over the cam surface 22 and approaches the fingers 13 when they are rapidly but temporarily accelerated or advanced with respect to their driving gear 25 to avoid interference with the folding bar 15. Thereafter, while the arm 35 is riding on the cam 34, or, as it leaves the trailing edge thereof, the fingers 13 remain stationary until their driving gear 25 overtakes them, which may occur while the member 35 is riding on the cam 34 or after it has left the trailing edge thereof. At this point, the fingers 13 and their driving gear 25 again occupy their normal relation, as indicated by the engagement of the stops 30 and 31, and are ready for subsequent engagement of the next successive bag to be folded. Before they are withdrawn, the angle between the flap F1 and the surface to be engaged is quite sharp so that there is little or no tendency for the bag to move outwardly from the drum.

The cam may be adjusted angularly with respect to the gear 33 suitably to time the engagement of fingers 13 with the bag. Also, as indicated, the gear 33 may be carried by a bracket 36 pivoted concentric to the axis of shaft 19 and adapted to be clamped in any desired angular position by the bolts 37 which extend through slots in the bracket. These adjustments permit the mechanism to be used with bags whose widths between the lines of fold *x* and *y* substantially differ. It is, of course, also necessary for use with different sizes of bags either to adjust the relative positions of the creasing knives 4 and 8, if both are used, or to select a different set of blades with proper spacing.

It is to be understood that my invention is not restricted to the arrangement specifically described for purposes of illustration, but is coextensive with the claims appended hereto.

What I claim is:

1. Bag folding mechanism comprising a rotatable drum conveyor structure for a bag to be folded, structure for engaging the surface of a bag to be attached to a flap adjacent the line of fold therebetween and for pressing the bag against the conveyor drum, said engaging structure being mounted external to said drum conveyor structure and movable independently thereof, a member for engaging and folding the flap along said line of fold against said surface and for pressing the fold against the conveyor drum, and means for withdrawing said engaging structure during, and prior to completion of, the folding operation of said member.

2. Bag folding mechanism comprising a rotatable drum conveyor structure for a bag to be

folded, means for creasing a bag to define a line of fold between a flap and a surface of the bag to be engaged thereby, structure operating subsequent to said creasing means to engage said surface of the bag adjacent the line of fold and to press it against the conveyor drum, said engaging structure being mounted external to said drum conveyor structure and movable independently thereof, a member for engaging and folding the flap against said surface, and means for withdrawing said engaging structure during, and prior to completion of, the folding operation of said member.

3. Bag folding mechanism comprising means for feeding a bag, a member for engaging the bag adjacent a line of fold for pressing it against said feeding means, said engaging member having a movement independent of but related to said feeding means, structure for engaging a flap extending beyond said line of fold and folding it against the surface of the bag engaged by said member, and mechanism for withdrawing said member during, and prior to completion of, said folding operation.

4. Bag folding mechanism comprising conveying means for feeding a bag, structure adapted to meet the bag during transport by said feeding means to engage it adjacent a line of fold, a member movable substantially parallel to the bag, means for moving said member at a velocity higher than the speed of the bag, and means concurrently operative therewith for moving said member away from said conveying means subsequent to engagement with a bag flap extending rearwardly of said line of fold and for thereafter, during continued engagement with the flap, moving said member toward said conveying means to fold the flap, said structure being withdrawn prior to completion of the folding of the flap.

5. Bag folding mechanism comprising conveying means for feeding a bag, structure adapted to engage the bag adjacent a line of fold and to remain in engagement therewith during transport by said conveying means, a member movable in the direction of feed of said bag and at higher velocity than the feed thereof, means for moving said member after engagement with a flap extending rearwardly of said line of fold away from said conveying means and subsequently during continued engagement with the flap for moving said member toward said conveying means to fold the flap, and means for withdrawing said structure during, and prior to completion of, the folding operation.

6. Bag folding mechanism comprising conveying means for a bag, structure mounted independently of said conveying means and movable toward and away therefrom, means adjustable to vary the timing of said structure to ensure that it presses the bag against said conveying means adjacent a line of fold, a member movable relative to said conveying means for folding a flap extending beyond said line of fold, and completing the folding after withdrawal of said structure.

7. Mechanism of the character described comprising bag conveying means, rotatable structure adapted to engage a bag transported by said conveying means, driving means for said rotatable structure including a lost-motion connection, and means for moving said structure independently of said driving means accurately to time the engagement of said structure with the bag.

8. Bag folding mechanism comprising a rotatable drum bag conveying device, rotatable structure mounted external to said conveying device and movable in a path substantially tangent to the path of said conveying device to press a bag transported thereby against said drum adjacent a line of fold, and a member movable in an endless path substantially tangent to the path of said device and movable at higher velocity to fold a bag flap projecting beyond said line of fold and timed to complete and press the fold shortly after withdrawal of said structure from enagement with the bag.

9. Bag folding mechanism comprising a rotatable cylinder, means for holding a bag against the periphery thereof, structure rotatable about an axis parallel to the axis of rotation of said cylinder and external thereof, mechanism for timing the operation of said cylinder and structure to effect pressing by said structure of the bag against said cylinder adjacent a line of fold, and a member operating to fold a flap extending beyond said line of fold toward the cylinder, said mechanism moving said structure away from said cylinder, prior to completion of the folding action by said member.

10. Bag folding mechanism comprising a conveyor for transporting a bag to be folded, rotatable structure, whose path is tangent to said conveyor, timed to meet the bag during transport thereby at a line of fold and press it against the conveyor, and a member movable substantially parallel to said conveyor through a region including the point of tangency of the path of said structure and the conveyor for engaging a flap extending to the rear of said line of fold and partially folding it during engagement of said structure with the bag, and completing the fold after said structure has passed beyond its said point of tangency.

11. Bag folding mechanism comprising a conveyor for transporting a bag to be folded rotatable resilient structure, whose path is tangent to said conveyor, adapted to press the bag adjacent a line of fold against the conveyor during transport thereby, and a member movable in a path intersecting the path of said structure for engaging a flap extending to the rear of said line of fold and partially folding it while said structure is pressing the bag as aforesaid, and for completing and pressing the fold after said structure has passed beyond its point of tangency with the conveyor.

12. Bag folding mechanism comprising a conveyor drum for transporting a bag to be folded, rotatable structure, whose path is tangent to said drum, adapted to press the bag against a line of fold against said drum adjacent the point of tangency, and a member movable in a path substantially parallel to the periphery of said drum and including said point of tangency for engaging and partially folding a flap extending to the rear of said line of fold during engagement of the bag by said structure and for completing the fold after said structure has passed beyond the point of tangency.

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