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APPARATUS FOR CLOSING PAPER BAGS

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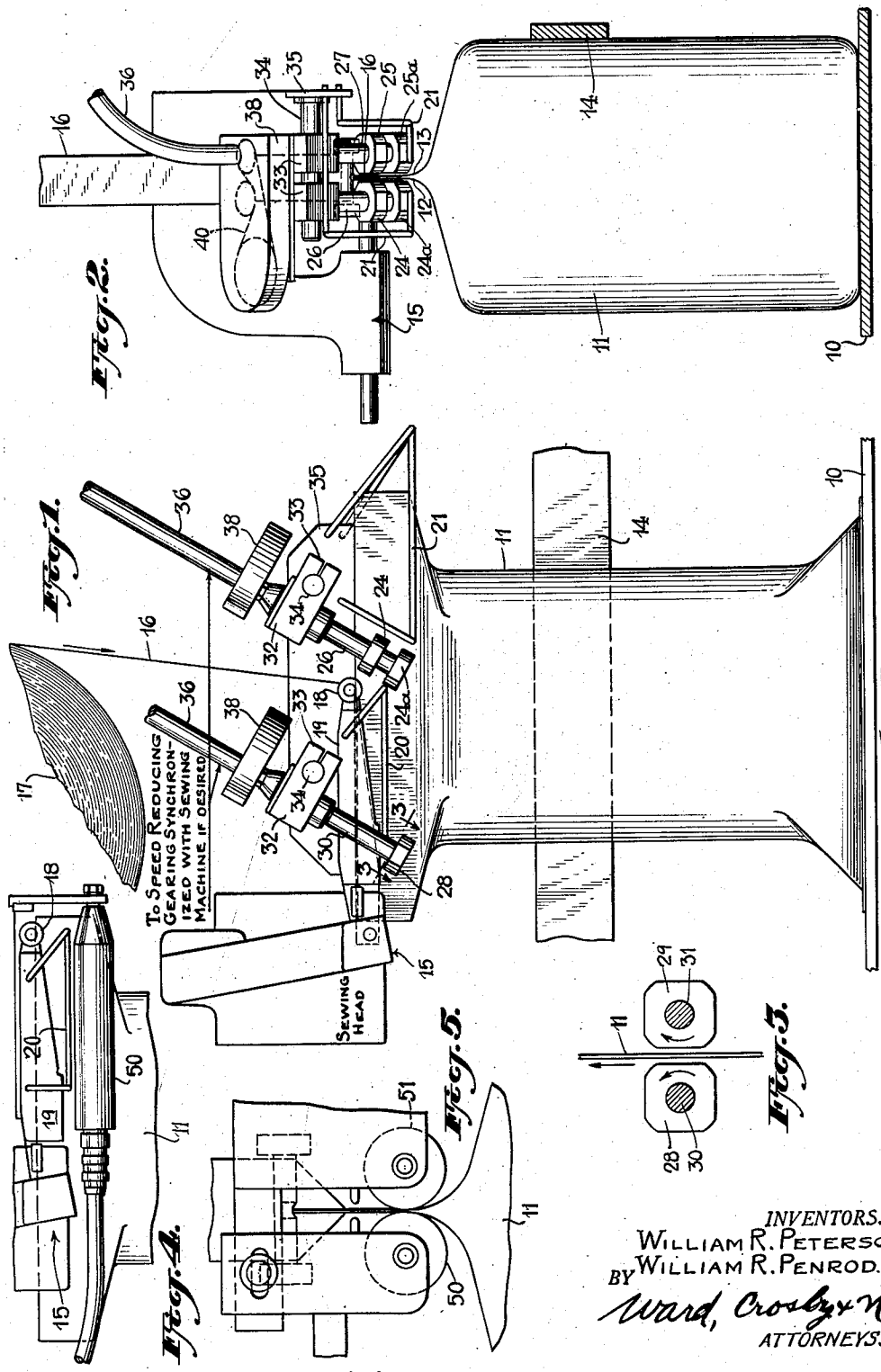


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

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APPARATUS FOR CLOSING PAPER BAGS

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10 Claims. (Cl. 112—11)

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This invention relates to apparatus and methods for closing open-mouthed filled bags.

The invention, among other possibilities, is particularly adapted for use in combination with bag closing apparatus of the type wherein a conveyor is provided for conveying the filled bags in succession to a sewing machine with their upper wall portions in opposed upstanding positions generally parallel to the conveyor path, and ready to be closed by a sewn seam. Usually such apparatus also includes means for applying a closure tape along astride the mouth of the bag, which tape becomes fixed in place also by the sewn seam.

Heretofore with apparatus of this type, so far as known, it has been necessary to attend the machine constantly and from time to time manually lift the slack in the mouth portions of the bags in order to straighten and stretch the same and insure that the top edges will nest snugly in under the bound over tape and be properly positioned with respect to the stitch line. And even with such manual attention, there was no assurance that the top edges of the bag would remain parallel to the stitch line or at a safe distance above the stitch line to insure that the stitching would securely hold in place.

According to the present invention, as the bags are conveyed along, the opposed upstanding wall portions at the mouths thereof are intermittently frictionally engaged by preferably a plurality of pairs of opposed oppositely rotating elements having their surfaces which contact with the bag walls so positioned and moved as to frictionally draw the bag mouth portions upwardly and preferably also somewhat forwardly. It has been found that only fairly light frictional contact is necessary at fairly rapid intervals. Such intermittent contacts permit such slippage as is necessary, so that there is neither any interference with the proper movement of the bags along on the conveyor, nor with the intermittent feed dog means which pulls the bag closure portions into the sewing machine head. Yet these light contacts are sufficient to insure that the upper edges at the bag mouth will be snugly and uniformly seated up in under the closure tape, without the necessity of manual attendance, and with avoidance of the above-noted difficulties heretofore occurring with equipment of this type.

Further and more specific objects, features and advantages of the invention will appear from the detailed description given below, taken in connection with the accompanying drawings which form a part of this specification and illustrate by way of example preferred embodiments of the invention.

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In the drawings:

Fig. 1 is a side elevational view of bag closing apparatus of a preferred type embodying the invention;

Fig. 2 is an end elevational view of the equipment of Fig. 1;

Fig. 3 is a detailed sectional view taken substantially along line 3—3 of Fig. 1; and

Figs. 4 and 5 respectively are side and end views somewhat schematically showing an alternative embodiment of the invention.

Referring to the drawings in further detail, a constantly moving conveyor is indicated at 10, along which filled bags such as indicated at 11 are fed successively in upright position, the upstanding opposed upper wall portions of the bags being indicated at 12 and 13 respectively in Fig. 2. The usual guide rail means as at 14 may be provided along the path of the bags. The outline of the sewing head of a sewing machine of conventional type for sewing the closures of paper bags is indicated at 15. Closure tape as at 16 is drawn from a roll thereof at 17 in the conventional way, down around under a guide roller 18, thence into a conventional form of tape former 19 or inverted channel, which folds the tape longitudinally along a median line to proper position astride the mouth of the bag as it enters the sewing head. Guides as indicated at 20, 21 serve to guide the opposed upper wall portions of the bag into proper position.

As best shown in Fig. 2, a pair of cam-shaped rotatable elements as at 24 and 25 are mounted in opposed positions so that upon rotation thereof, the higher or off-center points of the cam surfaces will come into frictional engagement with the outer surfaces of the opposed upstanding wall portions near the mouth of the bag. Preferably a plurality of such pairs of rotatable cam-like elements are provided, and for example as shown in the machine in Figs. 1 and 2, two additional elements of this form may be provided as at 24a and 25a, mounted on the same shafts 26 and 27 which carry the elements 24 and 25. In the machine as shown, the elements 24, 24a and 25, 25a are located a distance from the sewing head, preferably somewhat greater than one-half of the width of the bag in the direction of the path of the conveyor. Also in the machine as shown, an additional pair 28, 29 of the cam-shaped elements is provided just in advance of the sewing head and beneath the outlet of the tape former 19. The latter cam-shaped elements are rotatably mounted on shafts 30, 31.

The shafts for each of the cam-shaped elements are preferably mounted in suitable bearings as at 32, and each of these bearings is formed

with a suitable clamp as at 33 for engaging a horizontal shaft as at 34, the bearings being adjustable around and along such shafts upon releasing the camp 33, whereby the spacing between opposed pairs of the cam-shaped members may be adjusted, thereby to adjust the effective pressure with which the intermittent contacts are made against bag mouth portions of various thicknesses. The shafts, such as 34, as well as the guides 20, 21, may be mounted upon suitable stationary supporting means as at 35.

The shaft 27 may be directly driven by a flexible shaft 36 connected through suitable adjustable speed reduction gearing to a motor or other suitable source of power, for example the source of power which drives the sewing head. The shaft 31 may be similarly driven. The shafts 29 and 30, on the other hand, are driven through the medium of any suitable connecting means located within a guard or housing as at 38, such connections being so constructed and arranged as to afford opportunity for the adjustment of the spacing of shafts 26 and 30 with respect to shafts 27 and 31. For example, as indicated by dotted lines in Fig. 2, such connecting means may comprise a simple form of sprocket and chain drive 40, including means whereby the shafts 26 and 30 will be rotated in a direction opposite from the rotation of shafts 27 and 31. And the direction of rotation is such that, as indicated by the arrows in Fig. 3, the cam-shaped surfaces which contact the bag will both move in a forward and upward direction. As best shown in Fig. 1, the shafts for the cam-like rotatable elements are preferably adjusted about the bearing supporting shafts, such as at 34, at an angle to the vertical, and preferably so that their axes extend at about 60° upwardly and rearwardly with respect to the conveyor 10. Thus the direction of movement of the cam surfaces which contact the bag walls will be upwardly and forwardly at an angle of about 30° to the horizontal, although such angle may be adjusted and varied considerably depending upon the relative dimensions of the machine and the bag and other factors as may readily be determined by trial.

The rotatable cam-like elements may take various shapes, the form as shown in Fig. 3, which has been found satisfactory in practice, comprising a circular shape having four flat or cut-off areas spaced 90° apart. The cam-like elements may be formed of steel, but if more friction is desired, they may be formed of rubber or rubber-like material, either with smooth or somewhat roughened surfaces.

The speed of rotation of the cam-like elements may be varied within rather wide limits. With the embodiments shown in Figs. 1 and 2, the speed may vary from about 30 to 75 R. M. P., a speed of 45 R. P. M. being preferred. Also, in the form as shown in Figs. 1 and 2, satisfactory results were obtained for three-ply heavy duty kraft paper bags, with a center-to-center spacing of the cam-like elements of about 2⅜ inches, and with such spacing, the higher cam surface portions were such as to allow the several thicknesses of the multiwall bags to pass therebetween with light pressure.

The sewing head will ordinarily be provided with the conventional form of feed dog pull means (not shown) acting to pull the bag mouth portions with closure tape thereon into place for sewing. If desired, the intermittent action of such feed dog means may be so synchronized with the cam-shaped rollers that when the high spots on the cams are not feeding the bag forward, the feed dog means is pulling forward. However, in view of the slippage possible with the light intermittent contact of the cam means with the bag, an actual mechanically synchronized drive of the cam means and sewing machine dog means is often not essential or required.

With the form of the invention shown in Figs. 4 and 5, the rotatable elements comprise two cylindrical steel members 50 and 51 mounted on parallel horizontal axes at each side of the mouth of the bag, these elements being rotatable in opposite directions as before, and in directions such that in contacting the bag, they frictionally engage same and tend to lift the slack and straighten the upper wall portions by upwarly stretching the same slightly. The elements 50 and 51 as here shown, may be cylindrical, but slightly eccentrically mounted on their shafts to bring about the same general type of intermittent frictional engagement as made possible with the embodiment of Figs. 1 and 2. These rollers 50 and 51 also of course might be formed with eccentric surfaces and in fact it has been found that effective results may be obtained if such elements are circular in outline and mounted normally at their centers, but on "wobbly" or loose bearings, which have the effect of causing the rollers to intermittently engage the bag walls. If desired, the parts for supporting the rotatable elements in the embodiments of Figs. 1 and 2 may be so arranged and positioned that the rotatable elements may be adjusted with horizontal axes, as in the case of the embodiment of Figs. 4 and 5. However, the arrangement as shown in Figs. 1 and 2 is preferred.

With each of the embodiments of the invention above described or referred to, the rotatable elements in effect have cam-like intermittent engagement with the bag walls, preferably with such relatively light pressure that the normal travel of the bags along the conveyor is not interfered with, and neither is the intermittent feed dog pulling action in the sewing head interfered with. And in each case, the upward thrust on the upward edges of the bag walls is such as to crowd such edges firmly up into the folded-over closure tape, and the latter in turn is thrust firmy up into the channel-shaped tape former, which acts to limit the upward thrust. Thus the arrangement insures that the upper edges at the mouth of the bag will be uniformly spaced above the line of stitching at the proper distance to insure against any possibility that the wall edges will pull out of the stitching or out of the closure tape in the normal use of the bag.

Although certain particular embodiments of the invention are herein disclosed for purposes of explanation, various further modifications thereof, after study of this specification, will be apparent to those skilled in the art to which the invention pertains. Reference should accordingly be had to the appended claims in determining the scope of the invention.

What is claimed and desired to be secured by Letters Patent is:

1. In bag closing apparatus, the combination comprising conveying means for conveying filled bags in succession with upper wall closure portions thereof in opposed upstanding positions generally parallel to the conveyor path, a pair of opposed rotatable cam-shaped members adjacent the closing apparatus and above the conveying means between which said opposed upper wall portions pass, while the raised surface portions

of said cam-shaped members respectively in their normal operation intermittently and frictionally engage said wall portions, and means for supporting and rotating said members in opposite directions and about axes positioned at an angle to the vertical such that said raised surface portions move upwardly when engaging the bag walls and whereby the slack in said upper wall portions is lifted by reason of said frictional intermittent engagements.

2. In bag closing apparatus, the combination comprising a sewing machine having feed dog means for intermittently pulling the bag closure portions into sewing position, conveying means for conveying filled bags in succession with upper wall closure portions thereof in opposed upstanding positions generally parallel to the conveyor path, and means for lifting the slack in said wall portions directly in advance of the sewing machine, said means comprising two opposed cam-like elements rotatable in opposite directions and between which said wall portions pass and are normally intermittently engaged by the raised surface portions of said cam-like elements, the axes of rotation of said elements being inclined rearwardly and upwardly and the surfaces of said elements which contact said wall portions being rotatable upwardly and forwardly at the moments of contact.

3. In bag closing apparatus, the combination comprising a sewing machine, conveying means for conveying to said machine filled bags in succession with upper wall closure portions thereof in opposed upstanding positions generally parallel to the conveyor path, a tape former in advance of said machine for folding over and positioning a closure tape astride the top edges of the bag walls as same are advanced, and means operatively associated with said former for urging said top edges up into such folded over tape, said means comprising two opposed rotatable elements between which the top portions of the bags pass, and drive means for said elements being provided to cause same normally to intermittently and frictionally engage the upper wall portions of the bags therebetween with an upward movement, said tape former with the tape therein acting to limit such upward movement.

4. In combination with a machine for closing open-mouthed filled bags, conveying means for conveying to said machine such filled bags in succession with upper wall closure portions thereof in opposed upstanding positions, a pair of opposed rotatable elements operatively associated with said machine and between which said wall portions pass in light frictional slipping engagement insufficient to disturb the conveying movement of the bags toward said machine, means for mounting said elements on axes generally parallel to the top edges of the bags, and means for rotating said elements in opposite directions such that their surfaces which engage the bags move upwardly to lift the slack in said upper wall portions.

5. In combination with a machine for closing open-mouthed filled bags, conveying and guiding means for conveying to said machine such filled bags in succession with upper wall closure portions thereof in opposed upstanding positions and with their upper edges guided continuously substantially horizontally, a pair of opposed rotatable elements between which said wall portions pass in light frictional and normally slipping engagement, means for mounting said elements in advance of and adjacent the closing machine on

axes inclined upwardly and rearwardly, and means for rotating said elements in opposite directions such that their surfaces which engage the bags therebetween move upwardly and forwardly, thereby lifting the slack in said upper wall portions.

6. In combination with a machine for closing open-mouthed filled bags, conveying means for conveying to said machine such filled bags in succession with upper wall closure portions thereof in opposed upstanding positions, a pair of opposed rotatable elements operatively associated with the machine and having off-center peripheral portions between which said wall portions pass normally in intermittent frictional engagement, means for mounting said elements on axes at an angle to the vertical, and means for rotating said elements in opposite directions such that their surfaces which engage the bags therebetween move upwardly, thereby lifting the slack in said upper wall portions.

7. In combination with a machine for closing open-mouthed filled bags, conveying means for conveying to said machine such filled bags in succession with upper wall closure portions thereof in opposed upstanding positions, a pair of opposed rotatable elements having off-center peripheral portions between which said wall portions pass normally in intermittent frictional engagement, means for mounting said elements adjacent the closing mechanism of the machine on axes substantially within planes parallel to the conveyor path but adjustable to various angles within such planes, and means for rotating said elements in opposite directions and with their adjacent surfaces moving upwardly, thereby lifting the slack in said upper wall portions.

8. In combination with a machine for closing open-mouthed filled bags, conveying means for conveying to said machine such filled bags in succession with upper wall closure portions thereof in opposed upstanding positions, a pair of opposed rotatable elements adjacent the closing mechanism of the machine and having off-center peripheral portions between which said wall portions pass normally in intermittent frictional engagement, means for mounting said elements on axes within planes generally parallel to the conveyor path but adjustably spaced apart, and means for rotating said elements in opposite directions and with their adjacent surfaces moving upwardly to engage the wall closure portions of the bag therebetween, thereby lifting the slack in said upper wall portions.

9. In combination with a machine for closing open-mouthed filled bags, conveying means for conveying to said machine such filled bags in succession with upper wall closure portions thereof in opposed upstanding positions, a plurality of pairs of opposed rotatable elements having off-center peripheral portions between which pairs said wall portions pass normally in intermittent frictional engagement, means for mounting said elements adjacent the closing mechanism of said machine on axes at an angle to the vertical, and means for rotating said elements in opposite directions such that their surfaces which engage the bags move upwardly, thereby lifting the slack in said upper wall portions.

10. In bag closing apparatus, the combination comprising a sewing machine having feed dog means for intermittently pulling the bag closure portions into sewing position, a pair of opposed elements shaped and rotatable normally to pro-

vide intermittently a nip therebetween, means for conveying and guiding filled bags in succession with upper wall portions thereof in opposed upstanding positions generally parallel to the conveyor path and with their upper edges guided continuously substantially horizontally to and through such nip, a tape former in advance of said sewing machine for folding over and positioning a closure tape astride said upper edges, and means for mounting and rotating said rotatable elements in opposite directions below said tape former, and such that their surfaces at said nip move upwardly to intermittently urge said upper wall edges up into such folded-over tape.

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