Aug. 19, 1958 W. R. PETERSON 2,847,955

BAG CLOSING APPARATUS

Filed Nov. 21, 1955

3 Sheets-Sheet 1

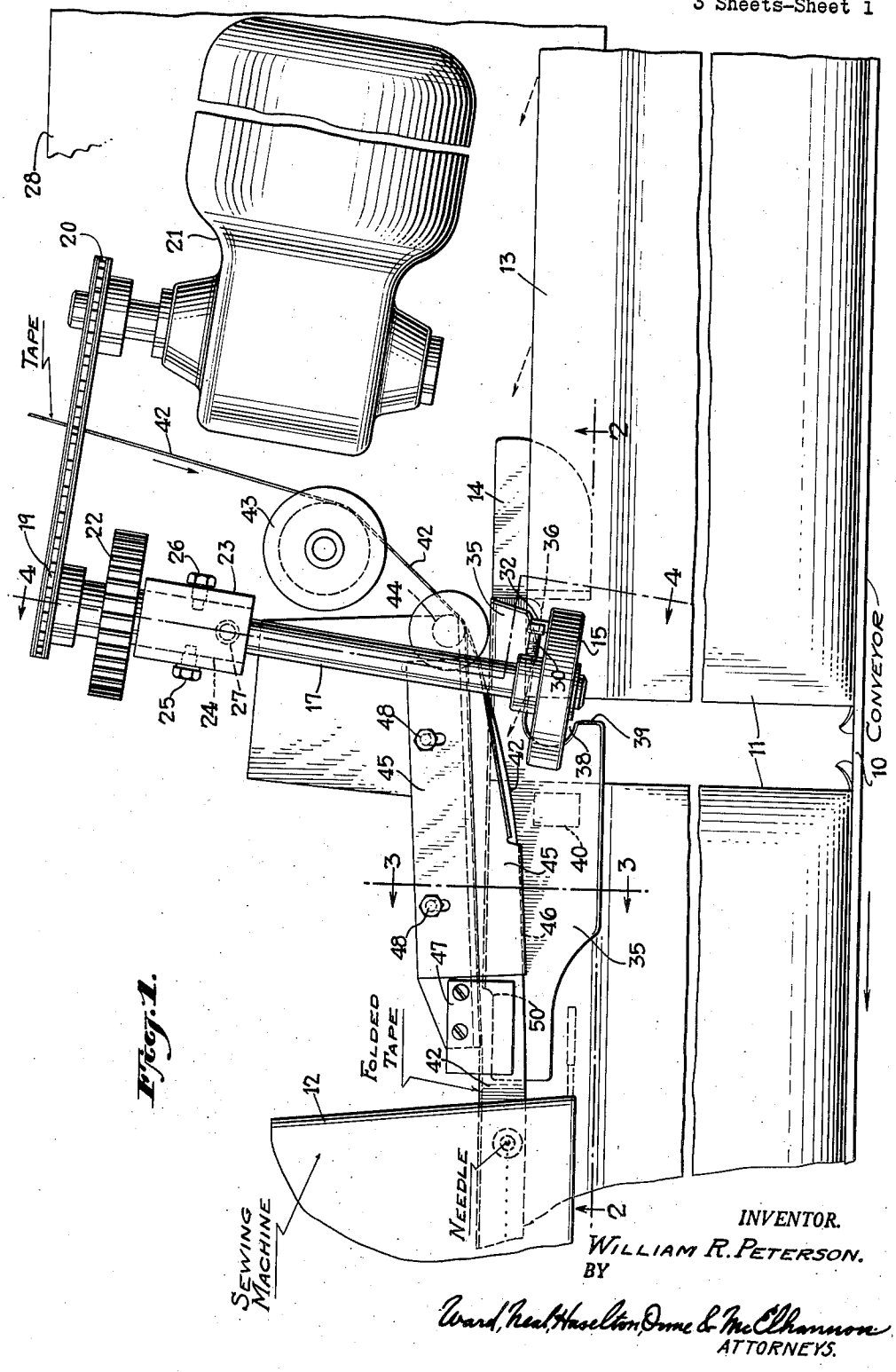


Fig. 1.

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Filed Nov. 21, 1955 3 Sheets-Sheet 2

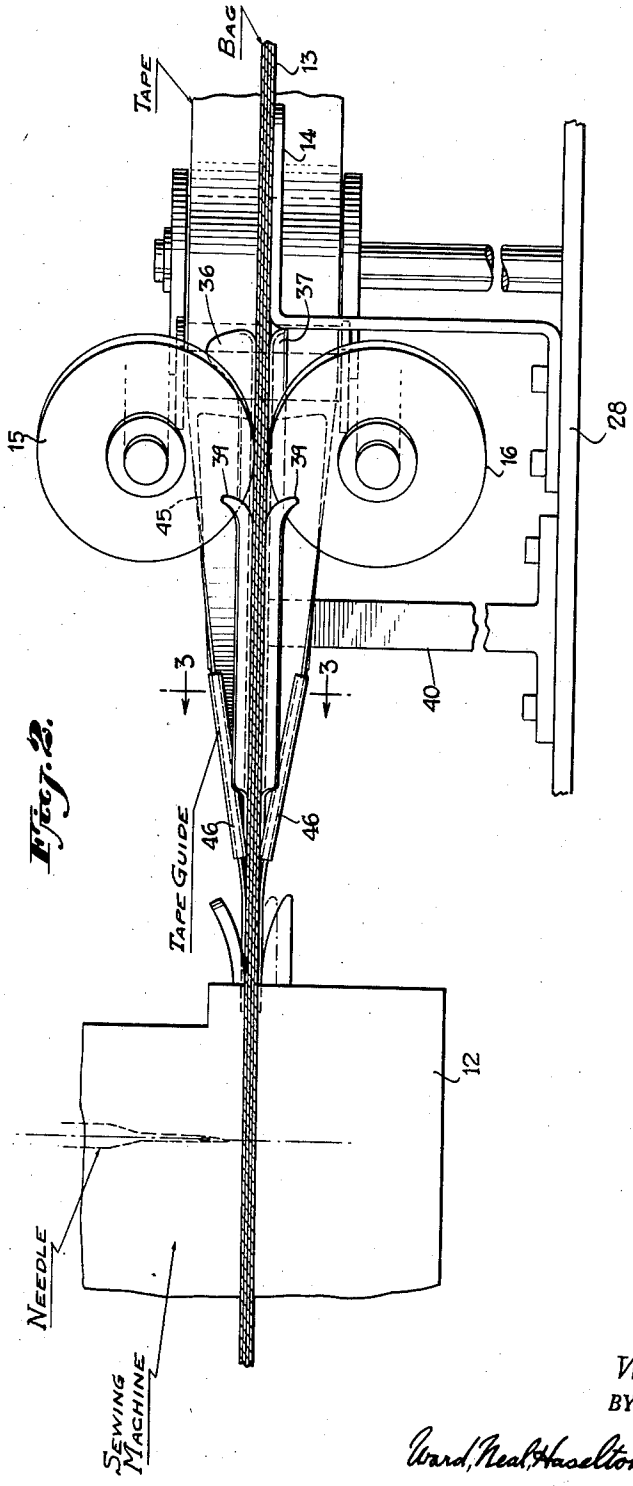


Fig. 2.

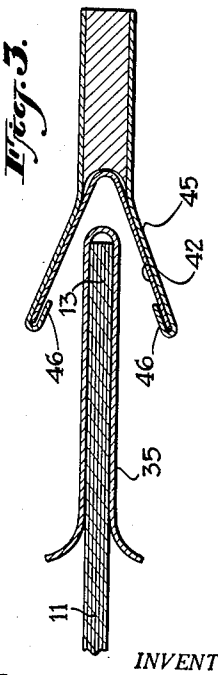


Fig. 3.

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3 Sheets-Sheet 3

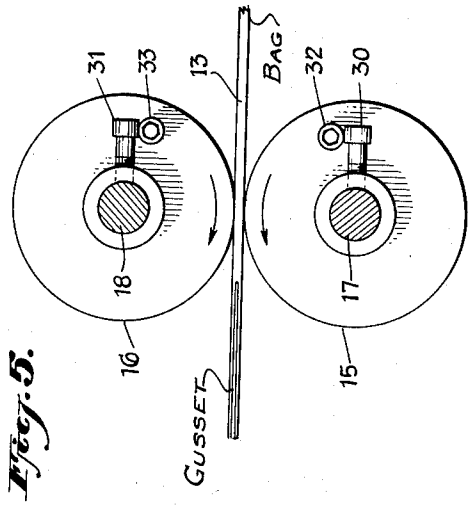


Fig. 5.

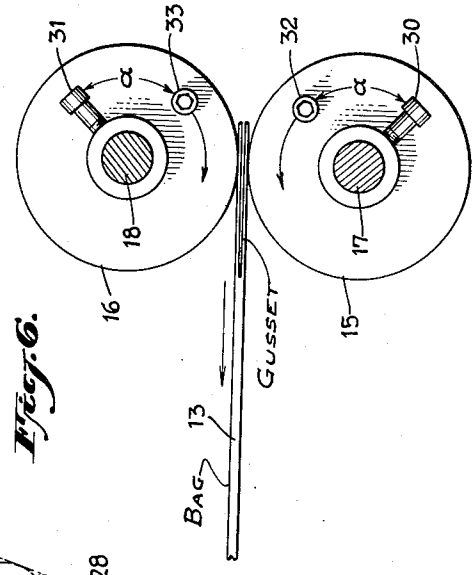


Fig. 6.

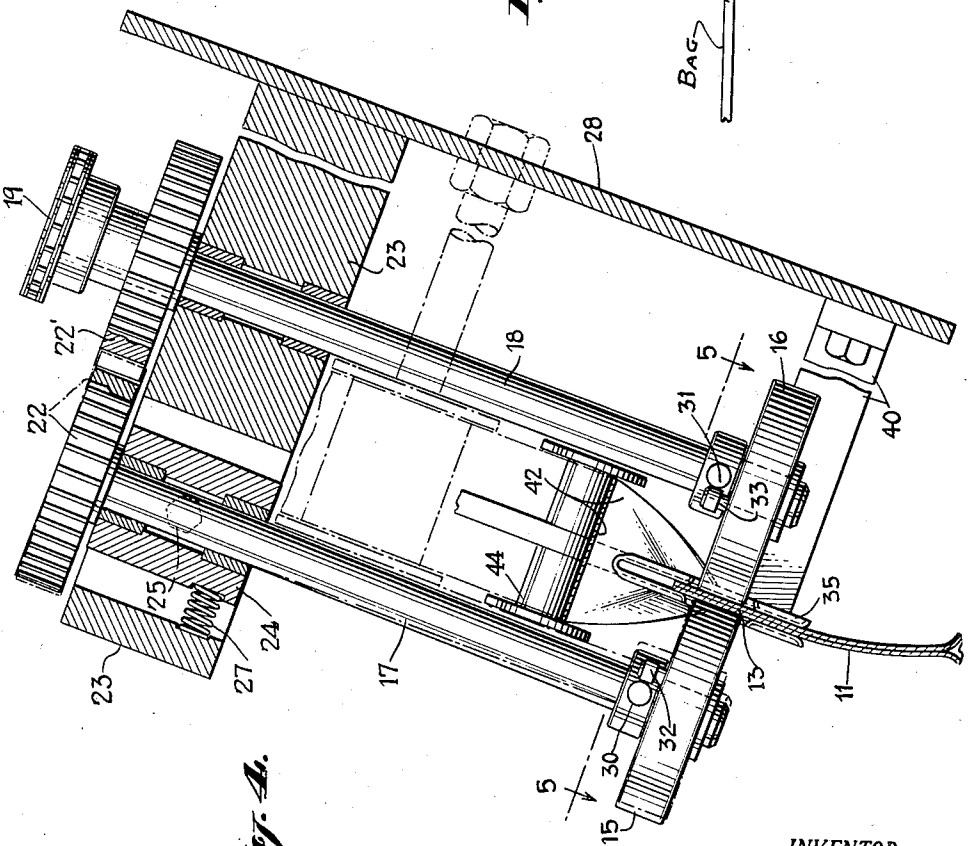


Fig. 4.

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BAG CLOSING APPARATUS

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Application November 21, 1955, Serial No. 548,126

2 Claims. (Cl. 112—11)

This invention relates to apparatus for closing bags and the like, the apparatus being more particularly adapted, among other possible uses, to the closing of filled multi-wall paper shipping sacks which are to be closed by a sewn seam or series of stitches extending along adjacent the upper end of the bag, the stitches being usually accompanied by a tape folded over astride the end edges of the bag.

After bags of the above described type have been filled, sometimes by the use of automatic filling machinery, it is the practice to move them in upstanding position side by side in succession on a suitable conveyor toward and past a sewing machine for forming the sewn end closure, the apparatus if desired also including means for applying a folded-over tape supplementing the sewn seam in providing an appropriate closure.

Heretofore an excessive amount of manual attention has been necessary with such equipment to insure that the bag tops approach the tape applying means and the sewing machine in proper position with the opposite side walls of the bag top flattened together and with the end edges parallel to the direction of movement of the conveyor, so that the sewn seam will be straight and uniformly spaced from the end edges, and further so that the end edges will fit snugly up in under the closure tape placed astride same. The problem becomes particularly difficult if, as is usually the case, the bags are formed with gussets along their sides so that the upper portions of the gussets have to be flattened and properly positioned.

Various types of mechanical equipment have heretofore been proposed for solving this problem, such as means for intermittently engaging the tops of the bags for flattening and advancing same toward the sewing machine without interfering with the proper action of the sewing equipment, but so far as is known, all these attempts have heretofore involved certain shortcomings such as the tendency for the bag top areas to become abraded or marred by engagement with the mechanical parts and failures of the equipment reliably to position the top edges of the bags horizontally in cases where the edges initially are tilted either forwardly or rearwardly.

The present invention provides an arrangement which has operated quite successfully in overcoming these problems by providing a means for urging the top edges of the bags up to a predetermined horizontal position, whether or not such edges approach the equipment tilted downwardly or upwardly, and without in any way interfering with the smooth operation of the sewing machine or marring the bag surfaces. At the same time, provision is made for placing in position a closure tape fitting snugly down astride the top end edges of the bags.

In accordance with the invention, a series of the filled bags are carried in upstanding position along on the conveyor, while the open mouth portions at the upper ends of the bags are pressed flat together in the nip of a pair of rollers mounted on axes such that their peripheries where same engage the bags move forwardly and at an angle somewhat upwardly. The rollers cause the end edges of the bag to be moved up snugly against and within a horizontally extending member of inverted channel-shaped cross-section. Means are provided to conduct a continuous strip of tape and to fold same over astride such channel-shaped member, and thereafter directly astride the straightened bag top edges and thence to the stitching machine. The rollers are so connected to drive means therefor that they will be free to turn faster than the drive means to allow the bag tops to be pulled forward by the sewing machine without resisting the latter.

Other 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 the presently preferred embodiment of the invention.

In the drawings:

Fig. 1 is a side elevational view of the assembly of apparatus comprising the principal parts of the invention;

Fig. 2 is a horizontal sectional view looking upwardly substantially along line 2—2 of Fig. 1;

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

Fig. 4 is a sectional view taken substantially along line 4—4 of Fig. 1; and

Figs. 5 and 6 respectively show the bag engaging rollers in two different conditions of operation.

Referring to Figs. 1 and 2 in further detail, a conveyor which may be of any suitable known type is indicated at **10** upon which a succession of filled bags as at **11** are being advanced in spaced relation in the direction indicated by the arrow at the conveyor and toward a sewing machine as schematically indicated at **12**. The filled bags may be coming from a suitable source, such as an automatic filling machine and as they approach the apparatus of the present invention, the opposed top wall portions as at **13** are in a more or less flattened condition and advance along in contact with a guide plate **14** and then into the nip between a pair of rollers **15**, **16** which may be substantially disc-shaped and having smooth peripheral surfaces for engaging the paper of the bag tops. The rollers as best shown in Figs. 1 and 4 are mounted on shafts **17** and **18** respectively which shafts as shown in Fig. 1 extend along axes directly downwardly and at an angle somewhat forwardly.

It may be here noted that while the assembly of apparatus as shown in Fig. 1 may give the appearance of standing vertically from up above the bag tops, yet preferably the whole assembly including the shafts **17** and **18** and the sewing machine are tipped rearwardly (i. e. away from the operator's side of the machine) at the upper portions thereof as will be apparent from the cross-sectional view of Fig. 4. The positioning of the apparatus in this way, tipped rearwardly for example by an angle of 20° to 30° to the vertical at its upper portions, not only enables an operator standing in front of the equipment to more readily watch its operation, but enables the bag tops **13** to be urged and crowded up uniformly so that their edges will be on the level of the desired horizontal line without necessitating any means which will vertically lift any portion of the bag and its contents, such lifting being avoided by the bending of the bag top portions at an angle rearwardly (i. e. away from the operator) as indicated in Fig. 4. Thus the shafts **17** and **18** appear in Fig. 4 tipped rearwardly in the plane of that figure but only to the same extent that the whole assembly of apparatus is tipped rearwardly.

Shaft **18** may be driven by suitable sprocket and chain means **19**, **20** from a motor and reduction gear assembly, the outline of which is indicated at **21**. Shafts

17 and 18 at their upper ends have loosely meshing pinion drive gears thereon at 22 and 22' whereby shaft 17 is driven from shaft 18 and at substantially the same speed. Shaft 18 is journalled in bearing means formed in a bracket 23 which bracket also forms a support for a bearing means 24 for shaft 17. Bearing means 24 as indicated in Fig. 1 is pivotally supported by pivotal points on screws 25, 26 carried by the bracket 23. Just beneath the level of these pivots a spring 27 is positioned to engage between a portion of bracket 23 and the lower portion of bearing 24 so as to yieldably urge the lower portions of shaft 17 and roller 15 toward roller 16 whereby the bag tops will be firmly pressed within the nip between the rollers.

The entire assembly of equipment may be mounted on a suitable support such as a metal plate 28, the various supporting brackets being suitably secured to such plate.

The rollers 15 and 16 are mounted on their shafts 17, 18 so as to be free to turn with respect thereto at least for nearly one revolution. However, stop means are provided in the form of screws or the like 30, 31 mounted in collars fixed to the shafts respectively and these screws, which may be referred to as "dogs" are adapted to come into engagement with screws as at 32, 33 mounted on the rollers respectively, whenever the rollers are actually being driven by their shafts. Referring now to Fig. 5, the rollers will normally be driven by their shafts when same are rotated in directions indicated by the arrows in this figure and when the parts are in the positions here shown. That is, screws 30, 31 will then come into contact with screws 32, 33 so that the rollers will be positively driven. This occurs when there is no bag top within the nip between the rollers and also this occurs at times before a bag top 13 has progressed far enough through the nip to have reached the sewing machine. However, when, as indicated in Fig. 6, the bag top 13 has progressed further and is being pulled forwardly by the sewing machine, then the rollers by reason of their pressure contact with the rear portions of the bag top will tend to be rotating in advance of their drive means or in what might be termed a "free-wheeling" condition at which time the screws 32, 33 will be spaced from the screws 30, 31 respectively through angles as indicated at *a* in Fig. 6, the degree of such spacing depending upon the degree to which the average speed of the bag top through the sewing machine is exceeding the corresponding speed of the drive means for the rollers.

Thus the bag top advances to positions such as shown in Fig. 5 by the rollers turning at a speed determined by their drive means. And since the rollers engage the bag tops along lines extending upwardly and forwardly, the bag tops will tend to be pulled as they are advanced upwardly and forwardly to the desired position, as hereinafter explained. Then, as the bag tops have advanced far enough so that their forward corners are taken into the sewing machine, they will then be pulled forward at a speed determined by the sewing machine rather than the driven speed of the rollers, but as soon as the trailing edge of the bag top leaves the nip of the rollers, they will then be driven only by their drive shafts, that is to say, they will be restored to the angular positions with respect to their shafts, as indicated in Fig. 5, and so remain until the next bag top comes through and is engaged by the sewing machine.

While on superficial consideration it might be assumed that the conveyor, the rollers and the sewing machine might all be positively interconnected and adjusted to operate at exactly corresponding speeds such that they will all engage the bag and tend to advance it at identically the same speed, yet in practice this should not be accomplished for the following reasons. First, the sewing machine will engage and tend to advance the bags intermittently and thus, if the bag top cannot be pulled forward by the machine freely upon each stroke, then the rollers or any other means which engages or grips the bag tops will tend to mar or scratch the paper or interfere with proper sewing action. Furthermore, there will inevitably be some irregular slippage of the bag tops with respect to the rollers depending upon the varying positions at which the bag tops enter the roller nip. There will also be varying inertia factors affecting the relative speeds of the parts due to the intermittent action of the sewing machine as well as the engagement and release of each successive bag by the rollers. Thus, in accordance with the invention, the bag conveyor is preferably driven at a predetermined speed depending upon the size of the bags and the number per minute which are to be closed. For example, with bags of a typical size, the conveyor may be driven to advance the bags at a rate of twenty bags per minute, the conveyor moving at the rate of about 40 ft. per minute. Then, to insure that the sewing machine will at no time be "crowded" by reason of movement of bag tops too rapidly into the machine with consequent deflection and crumpling of the paper, the sewing machine is operated usually at a speed such as to tend to pull the bag tops forward at an average speed slightly faster than the speed of the conveyor, for example, about one percent faster. Meanwhile, the speed of the rollers is adjusted so that the peripheral velocity at the nip thereof will be substantially faster than the speed of the conveyor. This is necessary for two reasons. First, the roller peripheries are positioned at an angle so that they have to move faster than the conveyor by an amount such as to urge the bag tops horizontally forward at a speed at least equal to the conveyor speed. And secondly, since there will be some slippage at the rollers, their driven speed should be adjusted still faster by a small amount. Although the drive speed for the rollers is thus made faster than the corresponding conveyor speed, yet the roller drive should be adjusted so that it will still tend to advance the bag tops at a speed slightly lower than the average speed at which the sewing machine tends to advance the bag tops, and so that the sewing machine through the medium of the bag tops is free to advance the rollers slightly ahead of the speed of their drive connections, the "free-wheeling" drive connections to the rollers allowing their speed to be controlled during the passage of each bag by the pulling of the sewing machine on the bag top. The drive connections for the sewing machine, rollers and conveyor may be of any suitable known type readily adjusted by trial to meet these requirements.

Just as the bag tops pass the guide plate 14, they enter an inverted channel-shaped member 35 mounted horizontally in fixed position with its apex within its ridge at the desired line along which the very top and edges of the bags travel as they enter the sewing machine, that is, this line will be spaced above the level of the sewing machine needle at the same desired distance as that of the sewn closure seam below the top edges of the bag wall. The cross-sectional shape of the member 35 at section line 3—3 is shown in Fig. 3. The entrance of the member 35 is best shown in Fig. 2. One depending side portion of this member as at 36 may be flared outwardly considerably to insure that the leading gusseted edge of the bag tops will properly enter, whereas on the opposite side the depending portion 37 thereof may be positioned flush with guide plate 14 but flared at its lower edge. A portion of member 35 as indicated at 38 in Fig. 1 may be cut away to accommodate the rollers 15, 16. Beneath these cutaway portions the depending portions 39 may be outwardly flared as best shown in Fig. 2 to insure that the approaching bag edges will properly enter. It will be understood that the member 35 may be suitably supported on the plate 38 as by bracket 40 (Fig. 4). The forward end portions of the member 35 may extend

substantially to or into the entrance of the sewing machine.

The means for applying the tape astride the top of the bag will now be explained. Such tape, as indicated at **42**, may be pulled down from a suitable source over rollers or spools **43**, **44**, thence into a tape folding guide member **45**, the cross-section of which at section line **3—3** is shown in Fig. 3. The entrance portions of this tape guide may be similar to such guides as heretofore used for the purpose and as the tape becomes folded somewhat to the extent indicated in Fig. 3, its lower edge will slide into channel portions as at **46** formed on the lower edges of the guide. It will be apparent therefore that the tape will be folded over astride the bag top guide member **35**. The tape guide and folding means may be supported as by suitable bracket means 47 and bolts **48** which in turn are supported through bracket means **49** from the plate **38** (Fig. 2). At a point just preceding the point where the tape is to leave the guide **45**, the member **35** is recessed as indicated at **50** (Fig. 1) so that the tape guide here may discharge the tape in completely folded-over condition firmly against the top end edges of the bag as same enter the sewing machine.

With the rollers positioned and operated as above described, it has been found that whether the bag tops approach the nip either at a downwardly or upwardly tilted angle, the rollers will quickly cause the top edges to be thrust firmly and horizontally up against the apex within the member **35** and they will remain substantially in alignment with this position until they are sewn together by the sewing machine. Thus the rollers and the member **35** act independently of the tape guide 45 to bring the top bag edges into proper position before the tape is applied thereto and then the tape guide acts positively to bring the folded-over tape firmly down astride the thus accurately positioned edges as a final step just before the region of the sewing machine needle is reached. Accordingly, the tape will be accurately positioned without any substantial space between same and the top bag edges which would cause what may be referred to as "soft edges" with which the closure would be less durable. Since the bag top edges are pressed firmly up into the rigid channel shaped member and into horizontal position exactly parallel to the desired line of sewing, the sewing seam will be formed paralle to the bag top edges and at the proper distance therefrom and parallel to the tape, even though before the bag tops reach this equipment they may be in quite irregular positions.

Although a preferred embodiment of the invention is herein disclosed for purposes of explanation, various modifications thereof, after study of this specification, may 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 apparatus for closing open-mouthed filled bags, the combination comprising a conveyor for conveying the bags in succession in upstanding position, a pair of opposed rollers mounted above said conveyor in positions to engage in a nip therebetween the top portions of the bags, means being provided for resiliently urging said rollers toward each other, said rollers being mounted on axes which extend downwardly and forwardly with respect to the path of travel of the bags whereby the peripheries of the rollers engage the bag tops along lines extending forwardly and upwardly, means for driving said rollers, a member of inverted channel-shaped cross-section extending along and parallel to the desired line of closure of the bag tops, said member forming a stop means which the top edges of the bags are caused slidably to engage by reason of the upward and forward thrusting action thereon of the rollers, and means for guiding a continuing strip of tape and folding over same astride said member and then astride the top end edges of the bag as the latter advance beyond said member.

2. In apparatus for closing open-mouthed filled bags, the combination comprising a conveyor for conveying the bags in succession in upstanding position, a pair of opposed rollers mounted above said conveyor in positions to engage in a nip therebetween the top portions of the bags, means being provided for resiliently urging said rollers toward each other, said rollers being mounted on axes which extend downwardly and forwardly with respect to the path of travel of the bags whereby the peripheries of the rollers engage the bag tops along lines extending forwardly and upwardly, rotational means for driving said rollers, the rollers however being free to turn in advance of said rotational means, a fixed member of inverted channel-shaped cross-section extending along parallel to the desired line of closure of the bag tops, said member forming a stop means within which the top edges of the bags are caused slidably to engage by reason of the upward and forward thrusting motion of the rollers, tape guide means for guiding a continuing strip of closure tape and folding same over and astride said fixed member of inverted channel-shaped cross-section and then closely down upon, in engagement with and astride the top edges of the bag as the latter advances beyond said fixed member and a closure forming mechanism into which the bag tops are then drawn.

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