Dec. 31, 1957 W. R. PETERSON 2,817,936

BAG CLOSING APPARATUS

Filed Nov. 30, 1954 7 Sheets-Sheet 1

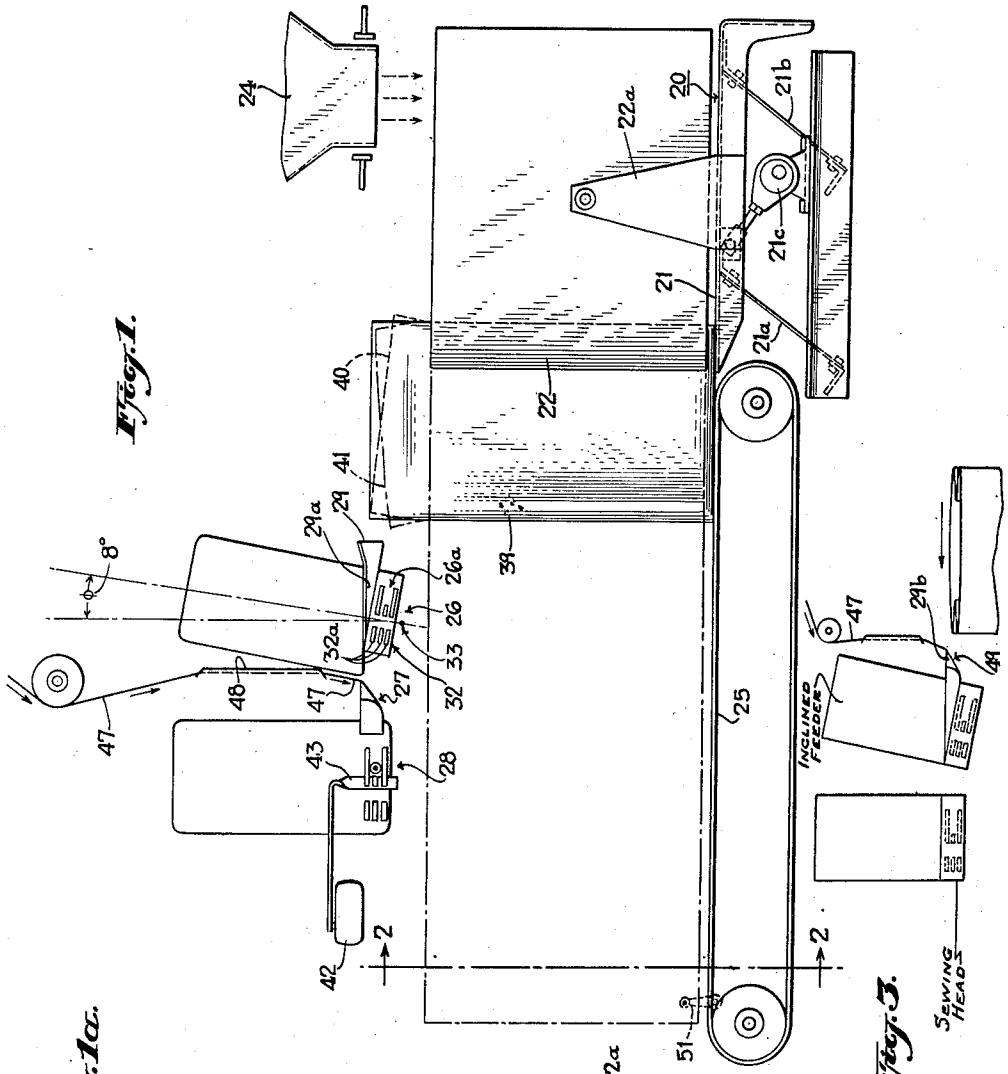


Fig. 1.

Fig. 3.

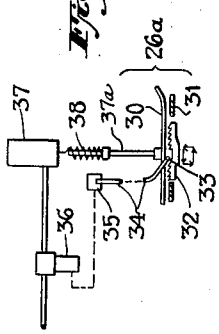


Fig. 1a.

Fig. 2.

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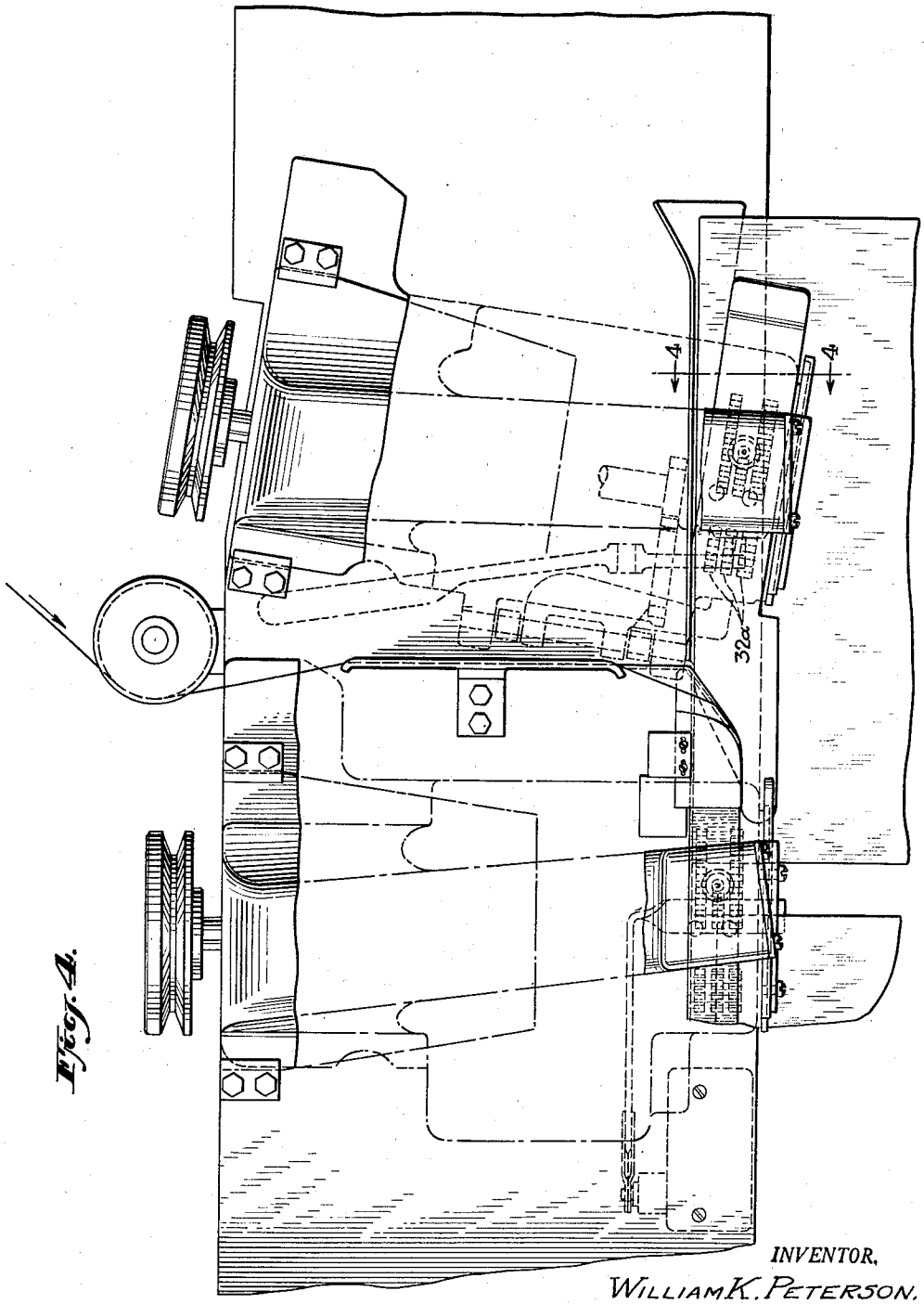


Fig. 4.

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BAG CLOSING APPARATUS

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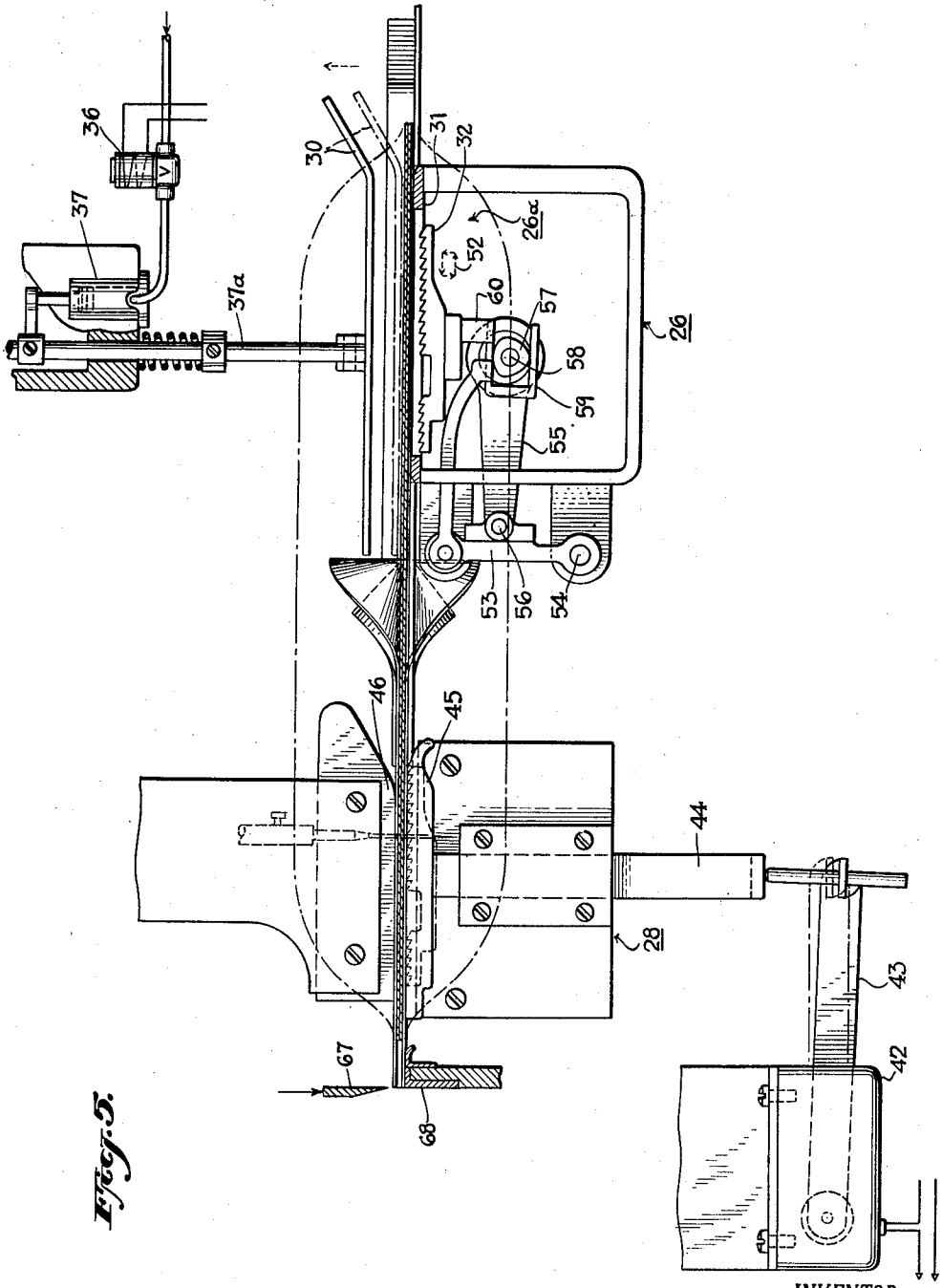


Fig. 3.

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Dec. 31, 1957 W. R. PETERSON 2,817,936

BAG CLOSING APPARATUS

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Fig. 8.

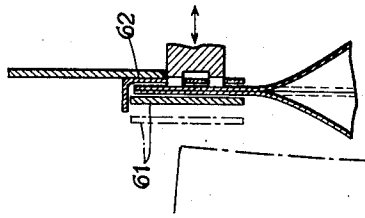
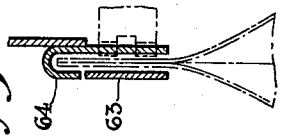


Fig. 7.



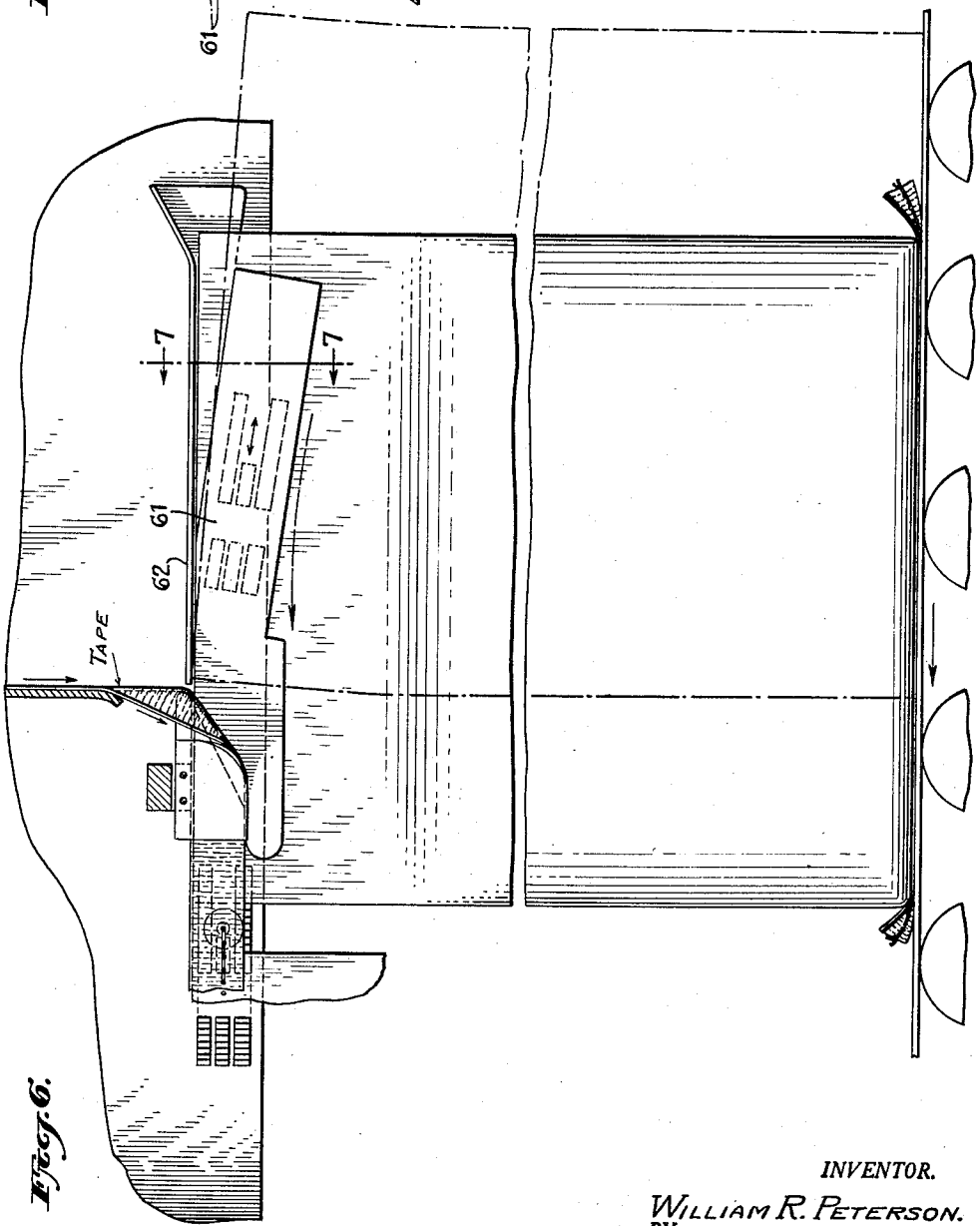


Fig. 6.

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BAG CLOSING APPARATUS

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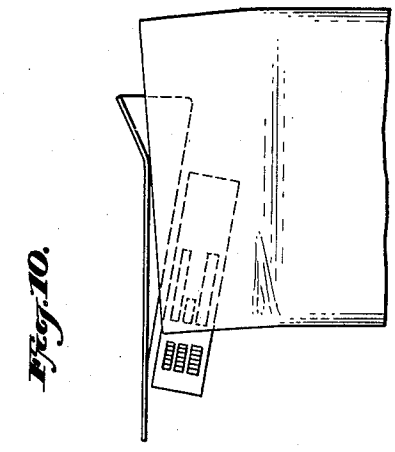


Fig. 10.

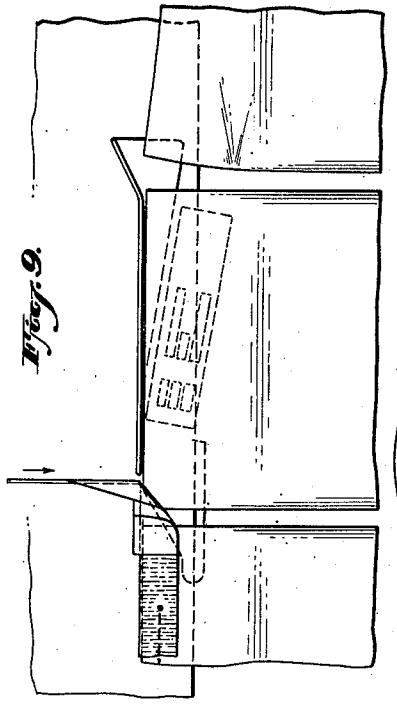


Fig. 9.

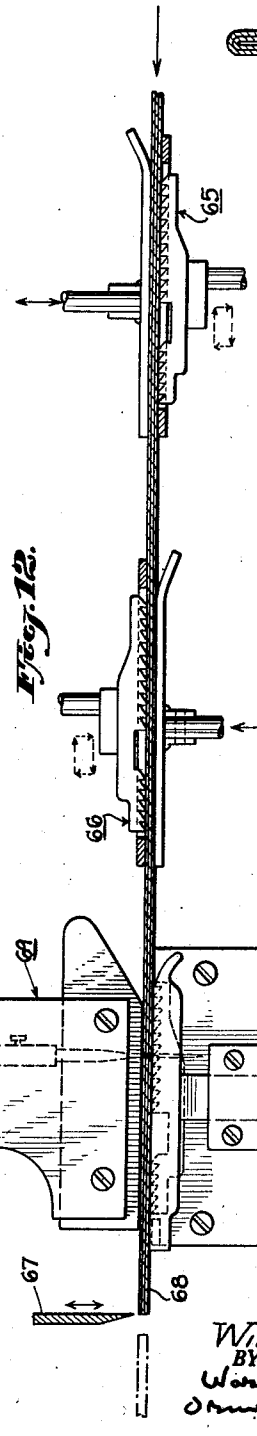


Fig. 12.

Fig. 13.

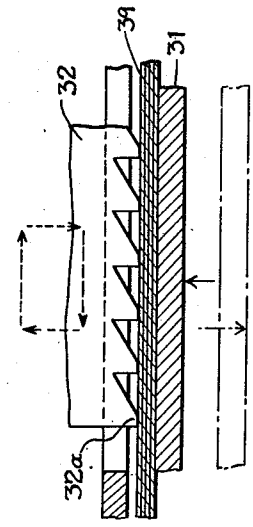


Fig. 11.

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Dec. 31, 1957 W. R. PETERSON 2,817,936

BAG CLOSING APPARATUS

Filed Nov. 30, 1954 7 Sheets-Sheet 6

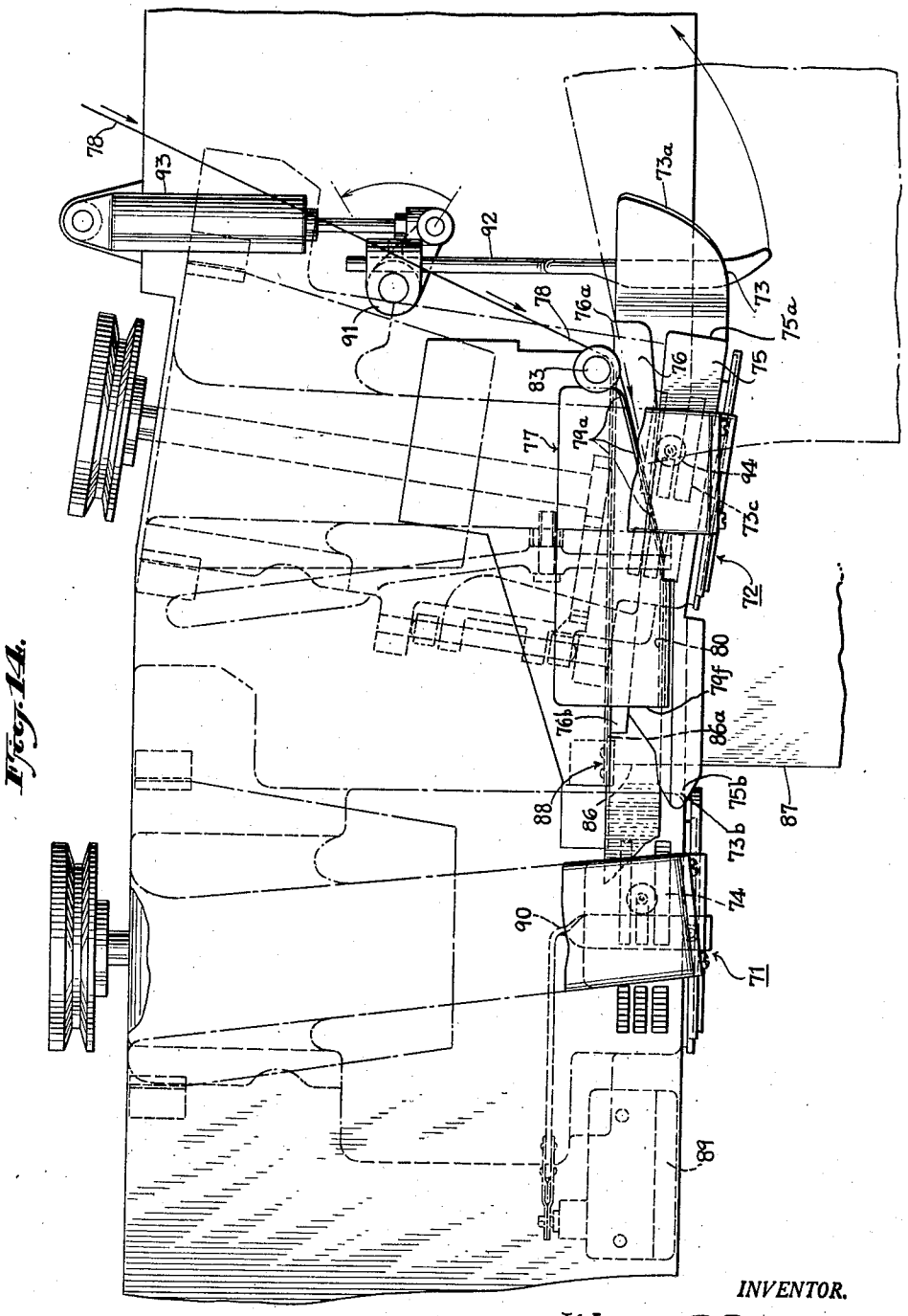


Fig. 14.

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Dec. 31, 1957 W. R. PETERSON 2,817,936

BAG CLOSING APPARATUS

Filed Nov. 30, 1954 7 Sheets-Sheet 7

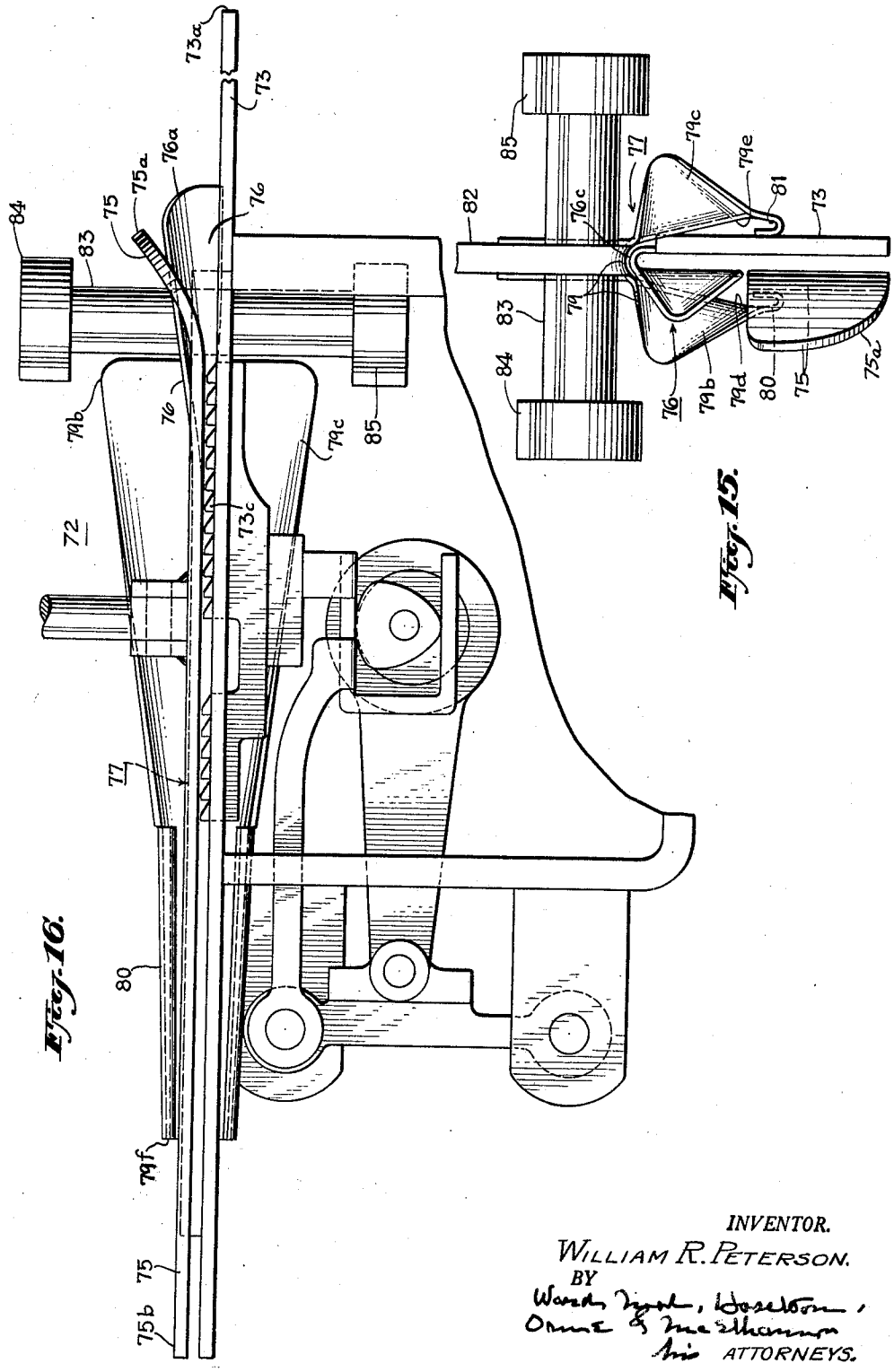


Fig. 16.

Fig. 15.

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United States Patent Office 2,817,936 Patented Dec. 31, 1957

2,817,936

BAG CLOSING APPARATUS

William R. Peterson, South Attleboro, Mass., assignor to St. Regis Paper Company, New York, N. Y., a corporation of New York

Application November 30, 1954, Serial No. 471,988

19 Claims. (Cl. 53—126)

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

The invention more particularly relates to means for leveling the upper edges of the mouths or upper wall closure portions of a succession of open-mouthed filled bags and at the same time holding such upper wall closure portions in a closed condition, for example, in order that such leveled bag mouths then can be sewn closed, each with a seam, which by virtue of such leveling, is straight, parallel to and adequately spaced from such upper edges of the bag.

The invention is well adapted, among other purposes, 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 the upper wall portions of such bags 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 and astride the mouth of the bag, which tape becomes fixed in place by the aforementioned sewn seam.

In apparatus of this type heretofore proposed, so far as known, where both bag filling and bag closing are effected by substantially adjacent devices, it has not been possible for a single operator both to apply empty bags to the bag filling device at a satisfactory speed, and also to attend the bag closing machine, the latter attendance for the purpose of insuring a straight seam of stitching at an adequate distance from the top edge of the bag. This is true because prior bag closing devices alone have required the constant attendance of one operator if such a straight stitch line is desired so spaced at such adequate distance. That is, such constant attendance has been necessary by a single operator for the purpose, from time to time, of manually lifting the slack in the mouth portions of the filled bags in order to straighten them out and stretch the same thereby to insure that the top edges of each bag will nest snugly in and under the bound-over closure tape which may be employed therewith and thus be properly positioned with respect to the stitch line. In those instances where no closure tape is employed, such operator has also been required for the same purpose to insure that the top edges of the bag have had the slack removed and that they are urged upwardly to insure a substantially straight line of stitching along the top thereof. Despite the fact that such manual attention has been heretofore given in such apparatus, there has been no assurance that the top edges of the bag would remain parallel to the stitch line of the sewing machine or even at a safe distance above such stitch line, thereby to insure that the stitching would hold in place securely.

Furthermore, in the filling and closing of such bags as those of the gusset type, each of the two gussets of the bag has heretofore been manually tucked in prior to the feeding of the bag top to the bag closing machine and in so tucking in the gussets there has been a tendency to tilt or incline the upper edges of the filled bag. This has

tended to aggravate the problem of achieving a straight line of stitching across the top of the bag.

According to the present invention, in one aspect thereof, as the filled bags are conveyed in succession upon a suitable conveyor, such as an endless belt, portions of the upper walls of each bag extend above the level of the material therein and comprise the mouth which is to be closed. The upper marginal portions at the mouth of each bag are directed into and urged upwardly against the ceiling of a horizontal guide member in the form of an inverted channel-like device and thus the upper edges of the bag mouth are leveled preparatory to final closing. Such channel-like device has a ceiling which, in cross-section, preferably is rounded or arcuate, the longitudinal axis of which is horizontal. Such ceiling also may be flat and horizontal. The channel-like device is provided with side walls, portions of which are relatively movable and thus may be spread apart or widened in order to insure easy entrance of each oncoming bag into the channel mouth. Thus such movable side wall portions are in spread apart or relatively widely spaced condition when the leading surfaces of a bag enter therebetween. Shortly after such entering, automatic means are provided for resiliently urging such relatively movable side wall portions toward one another thereby to grasp the upper margin of the bag mouth therebetween. Such movable side wall portions are resiliently urged toward one another and have smooth inner surfaces. Consequently each bag is frictionally engaged and pressed therebetween in a yielding or resilient manner in such a way that while so pressed the upper wall portions can be intermittently frictionally engaged by other means (such as a feed dog) capable of overcoming the first-mentioned frictional engagement and urging such upper wall portions upwardly toward said ceiling and also forwardly. Such movable portions of the side walls are herein sometimes referred to as "primary means" for frictionally engaging each bag mouth, and such other means (which intermittently engage each bag) as "secondary means" for frictionally engaging each bag mouth. Thus, after the leading portions of each oncoming bag mouth have penetrated by a selected distance in between the retracted or separated portions of the side walls, automatic means are actuated to urge such portions towards one another thereby to press the bag mouth therebetween. The extent of such penetration is characterized by the fact that it should be sufficient to insure that a substantial engagement by such secondary means (such as the face of the feed dog) can be effected upon the upper marginal portions of the bag top thereby to urge same upwardly against the horizontal ceiling of the channel-like guiding device. The direction of the working or bag moving stroke of said secondary means, such as the feed dog, is inclined or angularly offset upwardly somewhat with respect to the horizontal, the feed dog performing its usual pulling function but, by virtue of such inclination, urging the top regions of the bag not only forwardly but upwardly as aforementioned. If such feed dog is employed, it can be provided with serrations which because of such inclination are similarly angularly offset but from the vertical, such serrations being preferably dulled in order to avoid chafing the bag. Alternatively the face of the feed dog can be smooth as will appear below, such smooth-faced feed dog cooperating with a somewhat similar reciprocative gripping element on the other side of the bag top. One of the aforementioned movable portions of the channel side wall is referred to as a presser foot and is normally mounted for movement toward and away from the opposite side wall and parallel thereto. That portion of the channel side wall which is opposite

to the presser foot and against which the bag mouth is urged, is normally referred to as a throat plate. The reciprocatively mounted feed dog intermittently protrudes through a suitable opening in the throat plate, to engage the bag (by urging it against the presser foot), overcome the friction of said primary means holding same, pull the bag forward, and simultaneously to urge same slightly upward as aforementioned. Thereafter the feed dog retracts or withdraws out of engagement with the bag top preparatory to making the next successive or return stroke. The bag top is then held frictionally between the presser foot and throat plate (primary means), for example, by spring means, awaiting the next stroke of the feed dog. A modified form of the intermittently acting means for frictionally engaging the bags (secondary means) can be employed comprising a feed dog having a smooth working face (in lieu of a serrated one) which preferably is tilted in a manner similar to the first-mentioned feed dog. The smooth-faced feed dog cooperates with another movable smooth-faced bag gripper element on the other side of the bag which moves in timed relation with the first-mentioned smooth-faced feed dog and whereby the bag top is intermittently gripped and urged upwardly and also forwardly. For example, a smooth cam gripper can be employed which is positioned for engaging the opposite side of the bag at the same time as the smooth-faced feed dog. Such smooth cam gripper, for example, can comprise a rotatable disc-like cam adapted to engage the bag with the periphery thereof, such cam being mounted for rotation slightly eccentrically. The coacting smooth-faced feed dog and smooth cam gripper, as aforementioned, cause the upper marginal portions of the bag top (as in the prior modification) to move upwards intermittently in step-like motions until the upper edges of the bag mouth are aligned against the ceiling of the channel-like device whereupon such upper edges move in horizontal and straight-line attitude toward the sewing head. The aforementioned presser foot and throat plate hold the bag top in each new advanced or raised position during the time the feed dog and cam gripper are disengaged therefrom. In the first-mentioned form, the reciprocative feed dog is capable of engaging and moving the bag top portion by coaction with the opposed presser foot without the aid of another intermittently acting movable bag gripper element on the opposite side of the bag.

Regardless whether the leading edges of the bag mouth are depressed or raised relative to the trailing edges, the apparatus will cause such edges to assume a level attitude up under such channel guide member. Thereafter, if desired, by means of a tape applicator, there may be applied to the now leveled and closed but unsewn upper marginal portions of each bag mouth a closure tape which is folded astride and along the mouth prior to the feeding of such upper marginal portions to a sewing machine for sewing same closed, together with the sewing on of the closure tape contemporaneously therewith.

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.

In the drawings:

Fig. 1 is a side elevational view, partly in section and with parts broken away, and illustrating schematically a bag closing system embodying the present invention;

Fig. 1*a* is a plan view illustrating schematically a portion of the bag top leveling and feeding device shown in Fig. 1;

Fig. 2 is a sectional view taken substantially on line 2—2 of Fig. 1;

Fig. 3 is a schematic illustration of a modification of the invention which is substantially similar to that shown in Fig. 1 with the exception of the position of tape applicator means;

Fig. 4 illustrates in greater detail a portion of the apparatus shown in Fig. 1 and in particular the tilted feeder unit and sewing head thereof;

Fig. 5 is an inverted plan view, viz., a view from below of portions of the principal elements of the apparatus shown in Fig. 4;

Fig. 6 is a side view of certain of the elements embodying the present invention and showing the construction of a horizontal guide member for the upper margins of the bag top, such guide member being in the form of an inverted channel-like device;

Fig. 7 is a sectional view taken substantially along line 7—7 of Fig. 6;

Fig. 8 is a vertical sectional view of an inverted channel-like member but of slightly different form than that shown in Fig. 7;

Figs. 9 and 10 illustrate one form of the present invention acting upon bag tops of differing attitudes;

Fig. 11 comprises a fragmentary longitudinal sectional view of a portion of a feed dog device for frictionally engaging the tops of the bags and urging same upwardly and forwardly;

Fig. 12 is a top plan view of a portion of an apparaus embodying a further modification of the present invention;

Fig. 13 is a vertical sectional view through the top marginal portions of a filled open-mouthed bag illustrating the folding over of such marginal portions prior to the sewing thereof, such folding over being effected by one form of the present invention;

Fig. 14 is a side elevation, partly in section and with parts broken away, illustrating a further embodiment of the present invention;

Fig. 15 is an end view of certain of the principal parts of the device shown in Fig. 14; and

Fig. 16 is an inverted plan view, viz., a view from below of certain principal portions of the apparatus shown in Fig. 14.

Referring to the drawings in further detail, a bag conveyor and settler unit 20 may be employed which is similar to that shown in the copending patent application of W. R. Peterson and Herman Rhodes, Serial No. 441,814, which unit is provided with a vibratable settler plate 21 to which are secured a pair of side settler walls or side boards 22 and 23. Such unit 20 is situated beneath an open-mouthed bag filling funnel 24 to which the open mouths of the empty bags are secured for the filling of a full charge whereupon each bag is dropped a short distance onto the aforementioned vibrating settler plate means whereby it is moved onto a continuously moving endless conveyor belt 25. The latter moves the bag beneath the novel bag top leveling and feeding element 26 and thence to a closure tape applicator 27 from whence each bag top is urged through a sewing head 28 which is operated only when a bag top is introduced therein for sewing. Thus the sewing head 28 is actuated intermittently in this embodiment. The aforementioned novel bag top leveler and feeder unit 26 includes a guide member 29 in the form of the aforementioned inverted channel having a smooth ceiling portion 29*a* having a horizontal longitudinal axis. Such guide member 29, for example, can be in the form of a closure tape binding device to which there is fed no tape.

Beneath the ceiling portion 29*a* and situated substantially downstream from the mouth thereof there is provided the aforementioned primary means for frictionally engaging the upper marginal portions of the bags, and also the secondary means for intermittently frictionally engaging such upper marginal portions and urging same upwardly toward said ceiling and simultaneously forward in the direction of motion of the conveyor 25. Such

means comprise, for example, tilted feed dog means 26*a* of the type which may be employed in a sewing head.

Referring to Fig. 1*a*, such feed dog means are constituted by a presser foot 30, a throat plate 31 and a reciprocatively movable feed dog 32 having a serrated face praferably with the teeth thereof purposely slightly dulled or ground away in order to avoid damage to the bags. The presser foot 30 and the throat plate 31 comprise in effect portions of the side walls of the inverted channel-like guide member 29. The aforementioned feed dog 32 protrudes through suitable openings formed in the throat plate 31 in such a manner that the serrations of the feed dog can easily engage the upper marginal portions of the bag top interposed between said presser foot and throat plate.

The feed dog 32, in the form shown, is provided with six separate serrated sub-elements, such as 32*a* (Figs. 1 and 4), each of which passes through its individual opening formed in the throat plate 31. Each of the serrated sub-elements 32*a* is of elongated conformation, for example, of rectangular shape, all of the rectangles having parallel longitudinal axes.

The inclination of the longitudinal axis of the feed dog 32 is well shown in Figs. 1 and 4. The serrations of the feed dog are all parallel and because of such inclination are slightly angularly offset with respect to the vertical. The feed dog 32 is reciprocatively moved in a conventional sewing machine-like feed dog manner by a mechanism to be described in greater detail below in connection with Fig. 5.

As is well shown in Fig. 1, the angle of tilt of the feed dog, with respect to the horizontal guide member 29, is illustrated by the character ϕ and may comprise, for example, 8–10°.

By virtue of slight tilting or inclination of the feed dog means 26*a*, the latter imparts not only a forward component of movement to the upper marginal regions of the bag but also an upward component, thereby urging same against the horizontal ceiling of the inverted channel member 29.

It will be noted that the feed dog 32 is situated at about the mid-point of the length of guide member 29 and thus well advanced downstream from the opening or mouth of such guide member.

In order to avoid metal-to-metal contact of the reciprocating feed dog 32 and the presser foot 30, the latter is retracted or withdrawn (as by a pneumatic cylinder device) from such feed dog so long as there is no bag top interposed therebetween. I have found it desirable to maintain the presser foot in such withdrawn position until the leading edge of an oncoming bag has penetrated approximately to the point 33 (Fig. 1*a*) thereby insuring an adequate insertion of the upper marginal regions of the bag into the feeder element 26 prior to its coming into operation to level the top edges of the bag mouth. Some suitable sensing means can be positioned at the point 33 for the purpose of causing the normally retracted presser foot 30 to be urged toward the throat plate 31 and the feed dog 32. For example, an arm 34 of a microswitch 35 may extend to the point 33 to be actuated by an oncoming bag when it reaches such location. The microswitch 35 can be operatively connected to a solenoid valve 36 which, for example, controls a suitable pneumatic power cylinder device 37 which in turn is operatively connected by shaft means 37*a* to the presser foot 30. I have found it desirable resiliently to urge the presser foot 30 toward the throat plate 31 by means of a helical spring 38 (coiled about shaft 37*a*) which can be overcome by such pneumatic power cylinder device 37. Thus, the actuation of switch 35 by the arrival of an oncoming bag renders inoperative the cylinder 37 permitting spring 38 resiliently to actuate the aforedescribed primary means for frictionally engaging a bag. Conversely, switch 35 is actuated by the departure of a bag from point 33, thereby to retract presser foot 30.

After a bag, such as that shown at 39, has been filled upon the filling spout 24 and as it progresses toward the feeder unit 26, the operator, if it is a gusseted bag, will tuck in the gussets preparatory to the introduction of the upper marginal portions of the bag mouth into the channel 29 and in so doing may tilt the upper portions of the bag so that the leading corner thereof is higher than the trailing corner, for example, such upper edge of the bag may assume the position shown in the broken line 40. Or alternatively, manipulation of the top portions of the bag may cause the leading corner thereof to be lower than the trailing corner and thereby to assume the attitude shown by the broken line 41. In either one of these instances, the novel bag leveling and feeder unit 26 is capable of leveling the top edges of the bag and feeding same in a desired horizontal attitude into the tape applicator 27 and thence into the sewing head 28.

In operation of the system shown in Fig. 1, the succession of bags may be at an interval of about one-half foot, it being understood, of course, that the presser foot 30 should be retracted from the throat plate 31 and the feed dog 32 when there is no bag interposed therebetween.

Suitable means are provided for starting and stopping the sewing action of the sewing head 28, comprising a microswitch 42 which, by means of an arm 43 and a rod 44 (Fig. 5) is operatively associated with a shoe element 45 of the sewing head 28. Thus when the leading edge of an oncoming bag causes the shoe 45 to move away from a stationary opposed shoe 46, such spreading action is communicated to the microswitch 42 which in turn initiates such sewing action. Conversely, the departure of a bag from between elements 45 and 46 can stop such sewing action.

Referring again to Fig. 1, a continuous web 47 of bag closure tape is fed to the tape binder or tape applicator 27 via a tape guide 48. The tape applicator 27, in the form shown in Fig. 1, is interposed between the feeder-leveler unit 26 and the sewing head 28, whereby the tape is folded over the levelled top edges of the bag mouth just prior to feeding same to the sewing head 28.

However, in a modification of the invention, the tape 47 is applied as shown in Fig. 3, that is, it is introduced initially to an inverted channel-like mmeber 29*b* (analogous to 29) whereby the tape is initially directed into the apparatus contemporaneously with the entrance of the upper marginal portions of each of the bags. One of the reasons why this is desirable is that tape applicator 29*b* (Fig. 3) serves the dual purpose of binding the tape over the oncoming bag top and also providing a horizontal surface towards which the upper edges of the bag are directed for the purpose of leveling same in the manner above mentioned. The remainder of the apparatus of Fig. 3 is identical to that shown in Fig. 1.

In the embodiment of Fig. 3, the tape must be continuously fed to the machine in order to provide a suitable surface against which the bag tops can be leveled.

I have found it desirable to employ the aforementioned vibrating conveyor unit 20 (Fig. 1) wherein the side boards 22 and 23 are vertically disposed and parallel to one another, the length thereof, as measured in a horizontal direction, being as shown in solid lines in Fig. 1. However, if desired, such side boards can be elongated, as shown in broken lines in Fig. 1, to extend substantially throughout the entire length of the apparatus and in lieu of being parallel and upstanding they can be slightly canted toward one another, as shown in Fig. 2, thereby providing a substantially wedge-shaped path for the passage of the bags on the conveyors 21 and 25. Such relative positioning of the side boards 22 and 23, as shown in Fig. 2, has the result of producing a somewhat pear-shaped bag but nevertheless tends to minimize the bulging outwardly of the mouth of the filled bag following its discharge from funnel or filling spout 24. Normally

when a bag has been filled by the filling spout 24 and has been dropped therefrom onto the conveying means, the upper edges thereof form an ellipse or roughly a circle. It is desirable to flatten or narrow such ellipse or circle as much as practicable. This is facilitated by the disposition of the side boards 22 and 23, as shown in Fig. 2.

If the side boards 22 and 23 are elongated to the extent shown in broken lines in Fig. 1, suitable means must be provided for supporting the left-hand extremities thereof and such means may comprise a suitable cord or sling or, if desired, suitable resilient bearing means, such as 50 and 51, can be provided comprising resilient columns of rubber, the bases of which are mounted upon a suitable fixed support, the upper or top portion thereof being connected to the left-hand portion of the side boards (Fig. 1).

The settler plate 21 is mounted upon inclined leaf springs 21*a* and 21*b* and is vibrated by means of a motor-driven eccentric 21*c* in a manner described in the above-identified copending application Serial No. 441,814. The side boards 22 and 23 are each supported upon the vibrating settler plate 21 by means of respective side brackets 22*a*, 22*b* (Figs. 1 and 2). Vibratory motion which is imparted to the relatively shorter plates 22 and 23 is, of course, also imparted to such plates when they are elongated in the form shown in broken lines in Fig. 1 and such vibratory motion assists in settling and shaping the bags and also has the added important effect of aiding in urging each bag forwardly along its path in the same direction as the motion of the conveyor 25.

Referring now to Fig. 5, the feed dog 32 is operatively connected to means which are constructed and arranged for imparting a motion thereto which is illustrated by means of the arrows or vectors 52, it being understood that Fig. 5 is a bottom or inverted plan view. From such arrows it will be seen that the feed dog 32 is urged from right to left substantially in a straight line by means of its mounting device and thereafter is retracted from its pulling position and urged towards its starting position. Thence it is urged towards its primary operating position wherein it protrudes suitably through the openings in the throat plate 31.

Such means for mounting the feed dog 32 comprises a feed dog rocker lever 53 which is pivotally mounted at 54 and to which is pivotally secured a feed dog rocker eccentric and connecting rod 55, the latter being pivoted at 56 to the lever 53. A rotatable feed dog lift or retracting cam 57 mounted upon a driving shaft 58 is movable within a U-shaped element 59, the latter being rigidly secured to the feed dog 32 by means of a connecting rod 60.

Rotation of the feed dog cam 57 effects the motion, as shown by the aforementioned arrows 52. It is, of course, understood that suitable means are provided for supporting the interconnecting rod 60 to facilitate the performance of such movement of the feed dog.

Referring now to Figs. 6, 7 and 8, there will be described two separate types of guide members in the form of inverted channels. In the form shown in Fig. 8, the inverted channel guide member consists of a presser foot 61, the upper edge of which, as viewed in this figure, is positioned for movement very close to the ceiling of the inverted channel member. The remaining portion of the channel member comprises an inverted L-shaped element 62.

In Fig. 7 a presser foot 63 is constructed and arranged in such a way that its upper edge is positioned somewhat below the ceiling of the inverted channel member. The other portion of this element which comprises the inverted channel member is shown at 64 in the form of an inverted J which is so constructed and arranged that the upper edges of the bag mouth can be urged up into the upper portions thereof but, in view of the lower position of the presser foot, without direct pressure thereon by such foot.

In Figs. 9 and 10 there are shown two separate attitudes of the tops of filled open-mouthed bags, one in which the leading and upper corner of the bag is raised somewhat relative to the trailing corner (Fig. 9) and in the other (Fig. 10) the leading corner is relatively depressed as compared to the trailing upper corner. The novel apparatus is capable of righting each of the tops of the bags in these separate attitudes and of urging the upper edges of the upstanding opposed wall portions into a horizontal or level attitude up against the smooth undersurface or ceiling of the channel-like guide member.

In Fig. 11 there is shown on an enlarged scale a portion of the feed dog 32 illustrating the purposely dulled or ground-off outer edges 32*a* of the teeth which are thus so constructed and arranged that adequate frictional engagement with the bag can be attained but the feed dog is prevented from tearing or damaging the bag by virtue of the aforementioned dulling of the teeth which produces a desired slip of such teeth on the bag.

A modification of the invention is shown in Fig. 12 which is identical to that, for example, shown in Fig. 1 with the exception that instead of employing a single tilted feed dog means 26*a*, two are employed, one wherein the feed dog faces away from the operator and the other wherein such feed dog faces toward him. The two feed dog units insure a positive movement of both of the edges of the top of the bag up against the ceiling of the channel 29. The primary of such feed dog units is shown at 65, and downstream therefrom is situated a secondary feed dog unit 66.

There is also illustrated schematically in Figs. 5 and 12 a reciprocating tape cutting knife 67 which cooperates with a stationary blade 68 adjacent either sewing head 28 (Fig. 5) or sewing head 69 (Fig. 12). The tape cutter 67, 68 severs the tape and thread between the bags at a desired location.

Referring again to Fig. 1, there must be some measure of synchronization between the conveyor 25, the feed dog 32 and the feed dogs of the sewing head 28 in order that the bag tops shall not be conveyed too fast or too slow by the conveyor 25 and further in order that suitable stitching may take place by the sewing head 28.

It has been found that some measure of synchronization of both the feeding unit 26 and the sewing head 28 should be attained in order to avoid a slight buckle in the top of the bag. If desired, the feed dogs of the sewing head 28 may be increased in speed to provide a greater horizontal component of motion as compared to that of the feed dog 32.

Furthermore, inasmuch as the top edges of the bag mouth are leveled or straightened by means of the element 26, it is possible automatically to retract the presser foot as soon as the leading edge of each bag reaches the reciprocating needle of the sewing head. Thus, during such retraction there will be eliminated any need for synchronizing the feed dog of the element 26 with that of the sewing head 28. That is, with the presser foot 30 of the feeder and leveler element 26 retracted, there can be no tendency of feed dog 32 to overfeed and thereby to cause a buckle. Thus when the presser foot 30 is retracted, the sewing head feed dog is the only one capable of exerting a pulling force upon the top of the bag. If such presser foot 30 is so retracted, it will be desirable to employ suitable resilient means for resiliently holding the top marginal portions of the bag in their raised and leveled attitude. For example, a spring clip (not shown) may be employed which will continue to hold the top margins of the bag up against the so-called straight edge or ceiling of the inverted channel member. The top of the bag thus can be held with sufficient force to prevent same from dropping downwardly but nevertheless with such a force as to permit a slipping of the bag through

the spring clip caused by the pull of the feed dog in the sewing machine.

In another form of the invention, the means for urging upwardly the top portions of the bag mouth may comprise suitable pickup fingers or pickup means (not shown) which have a motion acting principally in a vertical direction rather than a horizontal direction, such pickup fingers being suitably mounted to permit an arcing thereof toward the sewing machine as caused by the feed dog of the latter. The vertical stroke of the modified pickup means may be timed to act upon the bag only when the feed dog of the sewing machine is not pulling forwardly.

In Fig. 13 there is shown an upper fragmentary view in vertical cross-section of a portion of a bag top which has been folded over by means of the present invention preparatory to sewing same closed. Although normally the bag top is not so folded over, this may be done if desired, for example, by so constructing and arranging the feed dog means and also by so constructing and arranging the inverted U-shaped horizontal channel guide member that the upper edges of the mouth of the bag are so folded over to aid in forming a tight closure. Such folding-over of the top margin of the bag, as shown in Fig. 13, can be effected prior to the application of a closure tape, if it is desired to use such tape. Inverted channel-like means somewhat similar to that shown in Fig. 7 may be employed for folding-over the top portions of the bag, as in Fig. 13, it being desirable to increase the width of the upper portion of the channel slightly in excess of that shown in Fig. 7 in order to be able to accommodate the folded-over portion. The channel-like member for causing such fold-over preferably should have rounded upper longitudinal corners and be substantially in the shape of an inverted U, as shown in such Fig. 7, in order to effect such fold-over. The folded-over portion is designated by the numeral **70**.

Referring now to Figs. 14, 15 and 16, there will be described a further modification of the invention which also is somewhat similar to the form shown in Fig. 1 with the following exceptions:

(*a*) In order further to facilitate the nesting of the top edges of each bag well up and inside the folded-over closure tape, the folding over of such tape is commenced earlier as compared to Fig. 1 (viz., at a point upstream in comparison to the analogous location of Fig. 1). Thus the tape is gradually folded-over an inverted U-shaped channel while passing along and above same, the latter channel serving also as the horizontal straight-edge means under which the top edges of the bags are thrust and leveled by means of the tilted feed dog means. Consequently, such tape, while being held separated from the oncoming bag tops and while moving above such inverted U-shaped channel, is folded-over the latter by means to appear below. As the closed top edges of each bag progressively emerge from such inverted U-shaped channel, the prefolded tape continuously is applied directly thereto and thereover. Consequently, the top edges of each bag and the uppermost inner surfaces of the folded-over tape are placed in direct engagement or substantially so immediately prior to sewing same closed, and without the need further to push the bag top up into the folded tape or vice versa. Thus the direct application of the tape over the bag top occurs, as in Fig. 1, between the tilted feeder means and the sewing head.

(*b*) The throat plate and presser foot are elongated and modified to facilitate the guiding of the bag tops into and out of the tilted feeder means, as will appear below.

In sewing closed the now taped bag tops emanating from such modified feeder, a sewing head **71** is employed similar to sewing head **28** of Fig. 1. The aforementioned modified form of feeder is designated generally by the numeral **72**.

Such modified form of feeder **72** includes the following principal elements, some of which have been discussed above in paragraphs (*a*) and (*b*):

(1) A stationary throat plate **73** having an extended upstream portion **73***a* for aiding in guiding the tops of the bags into the feeder, said throat plate having a downstream extremity **73***b* which extends almost to, but slightly short of, a feed dog **74** of the sewing head **71**.

(2) A presser foot **75** which is similarly formed and substantially similarly mounted as compared with the presser foot **30** above-described in connection with Fig. 1, that is, the presser foot **75**, in the absence of a bag, is normally in a retracted position withdrawn away from and parallel to the stationary throat plate **73** thereby preventing contact with the feed dog which, in Fig. 14, is designated by the numeral **73***c*. The presser foot **75** is consequently mounted in a manner similar to that shown in Fig. 1*a* with respect to presser foot **30** and is resiliently urged by suitable means, such as a spring (not shown), toward the throat plate **73**. Such spring can be overcome by suitable power means, such as an air cylinder (not shown) which can effect the retraction of foot **75**. I have found it desirable for the movably mounted presser foot **75** to be substantially elongated in the modification of Fig. 14 and to extend from a point well in advance of the feed dog **73***c*, that is, from an outwardly flared mouth **75***a* down to the extremity **75***b*. The latter extremity terminates just short of the aforementioned sewing head feed dog **74**.

(3) An inverted channel-like member **76**, the upper surfaces or ceiling of which are arcuate in cross-section and have a horizontal longitudinal axis. Member **76** serves a purpose analogous to the upper surfaces **29***a* of the guide element **29** of Fig. 1. This member is also referred to as a primary inverted channel-like member, in distinction to a secondary inverted channel-like member to be explained below. Such primary and secondary channel-like members are in superposed spaced relation and serve jointly to pre-fold the tape preparatory to applying same to the bag tops.

The aforementioned inverted channel-like element **76** is substantially elongated and is provided with a flared mouth **76***a* which extends upstream substantially beyond the feed dog **73***c* to a position about even with the mouth of the presser foot **75**. Said channel-like element **76** protrudes rearwardly to a termination point **76***b* which may be somewhat upstream relative to the extremity **73***b* of the throat plate **73**. The mouth **76***a* of element **76** is flared outwardly, as is well illustrated in Fig. 16, for the purpose of facilitating the entrance of the upper edges of the oncoming bags. The flared portion narrows down to its normal dimension (which latter persists throughout the balance of the length thereof) at a point substantially the same as the starting point of the reciprocating feed dog **73***c*. The function of the latter feed dog is as before, to urge the upper marginal portions of the bag top upwardly and against the ceiling or top surface of the inverted channel element **76** thereby to compel the upper edges to assume a level position. The operation of the guide member **76** and the guide member **29** are identical in this respect. The cross-section of the uppermost portion of the guide member **76** and the guide member **29** may be identical. Preferably the uppermost inner portion of the guide member **76** is provided with rounded corners, rather than square corners. The rounded corners assist in urging the edges of the bag toward one another, thereby preventing their mushrooming outwardly which increases friction thereupon substantially. Such upper portion of the inverted channel member is designated by the numeral **76***c* (Fig. 15).

The novel closure tape fold-over or binder means **77** of the modification of Figs. 14–16 will now be described which consists generally of means for folding a strip of closure tape, as at **78**, over the top surface of the aforementioned inverted channel member **76** in such a way that when each of the bags emerges from the novel feeder unit **72**, the upper edges thereof are perfectly level as aforementioned and immediately are enveloped by the tape which is fully folded thereover, that is folded over a little

less than but substantially through 180°, and the top edges of the bag are urged well up into the folded-over tape whereby the peak of the bag edges are engaged by the undersurface of the fold of the closure tape or only very slightly removed therefrom. The novel tape fold-over or binder means **77** of this modification commences the tape fold-over operation at a point only slightly downstream with respect to the mouth of the inverted channel-like guide member **76** and thus, as aforementioned, well in advance of an analogous location of the embodiment of Fig. 1. Thus a more gradual tape fold-over takes place and by the time the top edges of the bag engage the undersurfaces of the fold-over tape, the latter is substantially fully folded and is easily continuously laid upon such continuously moving top edges of the oncoming bags.

Accordingly the tape binder of the embodiment of Figs. 14–16 comprises a secondary inverted U-shaped channel member **79** superposed along member **76**, having an inclined mouth **79***a*, and also having downwardly inclined tape guide wings **79***b* and **79***c* respectively, as is well shown in Fig. 15 for guiding the tape into such inclined mouth. The undersurfaces of such wings **79***b* and **79***c* provide a surface upon which the oncoming closure tape **78** can slide while being folded by the action of the side walls **79***d* and **79***e* respectively of the tape binder **79**. The guiding effect of such inner surfaces of the side walls **79***d* and **79***e* effects gradually a folding of the closure tape of somewhat less than but almost 180°.

Small tape edge retainer channels **80** and **81** (Fig. 15) are provided respectively along the lower edges of that portion of the length of the tape binder between the termination of inclined mouth **79***a* and outlet **79***f*. Such channels serve the purpose of aiding in preventing the upper folded edge of the tape from engaging with too great a pressure the top surface **76***c* of the primary channel **76**.

Thus there are provided a pair of spaced but superposed channel members, both of which are substantially coaxial and between which the closure tape is fed and thereby folded over by the joint action of the upper surface of the primary inverted U-shaped channel member **76** and also by virtue of the guiding action of the undersurface of the secondary channel member **79** and its side walls as aforementioned **79***d* and **79***e*.

I have found it desirable to form the tape foldover device **77** in three pieces, as is well shown in Fig. 15, comprising a principal support member **82**, the lowermost surface of which is grooved to form the upper surface of the tape binder, the other two portions of the three comprising the side pieces thereof, each of which preferably is an integral element including, for example on the left, the wing **79***b*, the side wall **79***d* and the tape edge retainer channel **80**.

Any suitable means can be employed for guiding the oncoming closure tape into the novel tape foldover device of this embodiment and, in the form shown, such means comprises a roller **83** having collars **84** and **85** on opposite extremities thereof for preventing the tape from moving off of the roller **83** and also for holding it centered with respect to the tape foldover device. The roller **83** may be mounted, for example, in suitable bearings or journals in the main support element **82** (Fig. 15) and centered with respect thereto.

As shown in Fig. 14, the side walls **79***d* and **79***e* of the novel tape binder terminate at an exit **79***f* which is slightly upstream with respect to the termination point **76***b* of the primary inverted channel guide means **76**.

Also, as shown in Fig. 14, the tape **78** at the terminal region of the channel **76**, namely, at **76***b*, is folded in equal amounts with strips of tape of equal width on either side of the bag mouth.

Leading edge **86** of the upper marginal portion of bag **87** is well shown in Fig. 14 as emerging from the novel feeder with the top edges thereof **86***a* in a completely leveled or horizontal attitude.

The action of the novel feeder **72**, as above described, so levels and makes horizontal the upper edges **86***a* of the bag **87** and aids in urging same downstream from beneath the horizontal ceiling surfaces of the inverted channel **76**. By virtue of the top or roof-like surface of the channel **76** coacting with the undersurfaces of the channel **79** to fold the oncoming tape double with equal laps on opposite sides and well in advance of the exit **76***b*, it will be seen that the bag top edges **86***a* are immediately, upon emergence from the channel **76**, thrust into engagement with the undersurface of the fold of the closure tape. This occurs, for example, at approximately the region designated by the numeral **88**.

Consequently the upper edges of the bag top are easily and continuously urged well up into the bound-over closure tape.

If desired, the feed dog **74** of the sewing head **71** can be continuously operated thereby continuously to pull the closure tape **78** through the machine, such pulling, of course, being synchronized in speed with the speed of the motion of the oncoming bags whereby the leading upper edges of the bag emerging from the novel feeder **72** are moved into engagement with a moving bound-over tape. Alternatively, the feed dog **74** of the sewing head **71** can be intermittently operated, the operation being initiated only in response to a bag moving between the throat plate and presser foot of the sewing head **71** in the manner analogous to that described above in connection with Fig. 5. In the latter event, a microswitch **89** and its control arm **90** are employed for purposes analogous to microswitch **42** and arm **43** of Fig. 1.

Reverting to Figs. 14 and 16, it will be seen that the portion **73***a* of the throat plate **73** extends upstream well beyond the mouth **76***a* of the inverted channel-like member **76**. The reason for this is to provide a surface commencing, as at **73***a*, against which the top of the leading portions of each bag can be pushed manually by the operator, thereby insuring that the leading edge of the bag will enter the mouth of the guide or channel element **76**.

The presser foot **75** and the throat plate **73** are disposed relative to the feed dog **76** in a manner analogous to that of the embodiment of Fig. 1 with the exception of the elongated downstream or rear portion of the presser foot terminating at **75***b*.

As is well shown in Fig. 14, a microswitch **91** is employed for a purpose analogous to microswitch **35** (Fig. 1*a*). To the microswitch **91** a control arm **92** is operatively associated, by means of which an air cylinder **93** (for a purpose to appear below) is controlled through the intermediary of a suitable solenoid valve (not shown).

In operation of the embodiment shown in Figs. 14–16, a bag, such as **87**, is advanced by means of a suitable conveyor, such as an endless belt conveyor analogous to the conveyor means shown in Fig. 1. The upper portions of such bag may be, for example, tilted slightly downwardly, which attitude will be corrected by means of the novel apparatus. The presser foot **75** is in a retracted position spaced away from the reciprocating feed dog **73***c* and so remains until the leading portions of the bag penetrate into the novel feeder a preselected amount, for example, up to a point as at **94** (Fig. 14) at which time, by virtue of the operation of the microswitch **91** and its arm **92**, the air cylinder **93** is actuated thereby to close the presser foot **75** and thus to urge the top regions of the bag between the presser foot **75** and the throat plate **73** whereby the reciprocating feed dog can intermittently frictionally engage such upper bag regions and urge same both forwardly and upwardly. Such forward and upward urging moves the bag up against the horizontal under-surfaces of the primary inverted channel member **76** and thereby forces the upper edges of the bag into a horizontal attitude. The apparatus will perform this function whether the upper edges of the bag are tilted downwardly or upwardly. The closure tape **78** at this time may be stationary (assuming intermittent operation of

the sewing head), such tape being threaded through the machine and passing through the primary and secondary inverted channel members (Fig. 15) and thence up to and past the feed dog **74** of the sewing head **71**, thus being in condition for immediately being pulled forward by the feed dog **74**. The upper edges of the bag **87** are forced into a horizontal attitude by the novel feeder **72** and thence are urged downstream, as shown in Fig. 14, from right to left and towards the sewing head **71**. When the upper leading edge **86** of the bag emerges from the inverted channel **76**, it then moves beneath the stationary closure tape until it reaches the sewing machine, at which time the motion of the bag can actuate the microswitch arm **90** thereby to initiate operation of the sewing head **71** and thus to pull the tape **78** through the sewing head at a rate equal to that of the motion of the bag. Alternatively the sewing head can operate continuously and thus continuously pull the tape **78** therethrough.

It is, of course, understood that the conveyor means shown and described in connection with Fig. 1, and including the particular arrangement of the side boards **22** and **23**, can be employed with any other embodiment including Figs. 14–16.

While the invention has been described with respect to certain preferred examples which have given satisfactory results, it will be understood by those skilled in the art after understanding the invention that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended therefore in the appended claims to cover all such changes and modifications.

What is claimed is:

1. In apparatus of the class described, conveying means for conveying filled bags in succession along a common path with the closure portions at the mouth of each bag in opposed positions, a guide member generally in the form of channel means and having a guide surface extending in the same direction as said path and having a longitudinal axis which is substantially parallel to said path, primary means for resiliently frictionally engaging such closure portions extending along such guide surface, and secondary means for contemporaneously intermittently frictionally engaging such closure portions overcoming the frictional engagement of said primary means thereupon and urging such portions toward said guide surface.

2. Apparatus according to claim 1 wherein means are provided for controlling the operation of said primary means in response to the position of a bag with respect to said guide surface.

3. In apparatus of the class described, conveying means for conveying filled bags in succession along a common path with the wall closure portions at the mouth of each bag in opposed positions, a guide member generally in the form of channel means having sides and a floor portion and for receiving such opposed wall closure portions between the sides thereof, such floor portion being substantially parallel to the aforementioned path and in a selected attitude against which the edges of such bag wall closure portions can be thrust thereby to position such edges also in a selected attitude, mechanical means positioned for urging such bag wall closure portions of each bag into said channel means and against such floor portion thereof while also urging same in the direction of motion of such conveying means, and means for guiding a strip of closure tape over the upper surfaces of such channel means thereby to fold same into substantially U-shape preparatory to applying same to such edges and to the bag wall closure portions.

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 wall closure portions thereof in opposed positions, primary inverted channel-like means situated in advance of said closing machine for preliminarily holding closed said wall closure portions and guiding same toward said closing machine, means for urging said wall closure portions upwardly against the inner surfaces of such channel-like means and also in the direction of motion of said conveyor, secondary channel-like means, the latter being positioned along and adjacent the former but spaced therefrom for coacting with said primary channel-like means for folding bag closure tape preparatory to its being applied to the margins of such wall closure portions.

5. 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 primary inverted channel-like element situated in advance of said closing machine for preliminarily holding closed said upper wall closure portions and guiding same toward said closing machine, means for urging said upper wall closure portions upwardly against the inner upper surfaces of such element and also in the direction of motion of said conveyor, a secondary inverted channel-like element, the latter being positioned above the former and spaced therefrom but closely adjacent thereto for coacting with said primary element for folding bag closure tape preparatory to applying same to the margins of such wall closure portions, said primary and secondary elements being positioned for applying such tape to such margins at a location between said urging means and said bag closing machine.

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, primary horizontal inverted channel-like means situated in advance of said closing machine for preliminarily holding closed said upper wall closure portions and guiding same toward said closing machine, means for urging said upper wall closure portions upwardly against the inner upper surfaces of such channel-like means and contemporaneously in the direction of motion of said conveyor, secondary inverted channel-like means, the latter being positioned above the former and spaced therefrom but closely adjacent thereto and having downwardly inclined wings at the mouth thereof for the purpose of guiding closure tape therein whereby such tape is foldable by the coaction of such primary and secondary means and is thus prepared for application to the margin of such upper wall closure portions.

7. In apparatus of the class described, the combination comprising: conveying means for conveying filled bags in succession along a common substantially horizontal path with upper wall closure portions of each bag in opposed upstanding positions, a generally horizontal guide member having an undersurface of arcuate transverse configuration, said guide member being positioned generally in the path of such upper wall closure portions but slightly thereabove and extending in the same direction whereby the upper edges of such wall closure portions can be received thereby and urged upwardly against such undersurface, means for intermittently frictionally engaging such upper wall closure portions and urging same in a direction which is tilted upwardly with respect to the horizontal but which is in the same direction as that of such conveyor, whereby such upper edges can be so urged up against said undersurface and also urged in the direction of said conveyor, opposed plate members situated on opposite sides of the path of said upper wall closure portions, and means for resiliently urging at least one of said plate members toward the other member whereby said upper wall closure portions are yieldingly frictionally engaged thereby in order to hold such portions while being acted upon by said intermittently engaging means.

8. In apparatus of the class described, the combination comprising: conveying means for conveying filled bags in succession along a common substantially horizontal path

with upper wall closure portions of each bag in opposed upstanding positions, a generally horizontal guide member having an undersurface which is positioned generally in the path of such upper wall closure portions but slightly thereabove and extending in the same direction whereby the upper edges of such wall closure portions can be urged upwardly against such undersurface and thus leveled, means for intermittently frictionally engaging such upper wall closure portions and urging same up against said undersurface, opposed plate members situated on opposite sides of the path of said upper wall closure portions constructed and arranged for yieldingly and frictionally engaging such wall closure portions, means for holding said plates in retracted condition, and means for rendering ineffective said holding means in response to an upper wall portion of a bag moving a selected distance in between said plates.

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 the upper wall closure portions thereof in opposed generally upstanding positions, a bag top feeder element situated ahead of said bag closing machine for leveling the top edges of such upper wall closure portions and urging same into a selected attitude including a guide member comprising inverted channel-like means having opposed side walls, one of such side walls being stationarily mounted and the other being mounted for movement toward or away therefrom, such stationary side wall having an opening therein, feed dog means having a working face positioned in such opening for intermittent frictional engagement with a bag top in such inverted channel-like means, such face being disposed whereby the motion thereof when in engagement with such bag top has an upward component and a component in the direction of motion of such conveyor.

10. 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 substantially parallel to the conveyor path; a guide member for such upper wall closure portions comprising an inverted channel having a horizontal ceiling, such guide member being situated in advance of such closing apparatus and above the conveying means and into which said opposed upper wall portions pass, a throat plate comprising a portion of a side wall of such channel guide member, such throat plate having an opening therein, a feed dog having a working face positioned for reciprocative movement in such opening; at least a portion of the side wall of such channel guide member opposite to such throat plate being movably mounted and resiliently urged toward said face of said feed dog, said feed dog being constructed and arranged for intermittent frictional engagement with said upper wall closure portions within such guide member thereby to urge same in the direction of such conveyor and also upwardly toward the horizontal ceiling of said guide member.

11. In apparatus of the class described, conveying means for conveying filled bags along a common path in succession with the upper wall closure portions thereof in opposed upstanding positions, substantially parallel to the conveyor path; a guide member for holding closed such upper wall closure portions while the bags are being conveyed, such member comprising an inverted channel having a ceiling parallel to such path and having opposed side walls at least a portion of one of which is mounted for movement towards or away from the other side wall and which is resiliently urged theretowards; and means for intermittently frictionally engaging the bag upper wall closure portions and urging same in the direction of motion of such conveyor, such means being disposed whereby such intermittent urging thereof is accompanied by an upward component for urging such bag closure portions upwardly against such ceiling.

12. In apparatus of the class described, the combination comprising: conveying means for conveying filled bags in succession with upper wall closure portions thereof in opposed upstanding positions; a horizontal guide element; and feeder means mounted beneath such element and including: a serrated feed dog, a throat plate and a presser plate, the serrated feed dog being so constructed and arranged intermittently to pull the upper wall closure portions in the direction of such conveyor and also to urge same upwardly toward such horizontal guide element.

13. In combination with a machine for closing open-mouthed filled bags, conveying means for conveying to said machine such filled bags in succession with the upper wall closure portions thereof in opposed upstanding positions; a bag top feeder element including a bag top guide member comprising an inverted channel-like element for receiving such upper wall closure portions, the ceiling of such inverted channel-like element being parallel with the path of said conveying means, means for mounting at least a portion of one of the side walls of such inverted channel-like element for movement towards or away from the other side wall thereof and for resiliently urging such movably mounted side wall towards such other side wall, means for urging such upper wall closure portions upwardly and into such bag top guide member and thus up against the ceiling thereof comprising a feed dog having a face for frictionally engaging such portions and having a plane of motion disposed slightly angularly inclined from the horizontal, such feed dog extending through an opening formed in said second-mentioned channel side wall whereby said movable portion of the first-mentioned side wall can urge a bag top resiliently against such feed dog face, said feed dog having means associated therewith for reciprocatively moving same with such face to contact with a bag passing between such side walls thereby pulling same generally in the direction of such conveyor and also urging same upwardly by virtue of the aforementioned inclination: means for holding said movable channel side wall in a retracted position with respect to the other side wall; and means for rendering inoperative such holding means in response to a bag top progressing a preselected distance into such bag top feeder element.

14. In apparatus of the class described, the combination comprising: conveying means for conveying filled bags in succession along a common substantially horizontal path with upper wall closure portions of each bag in opposed upstanding positions, a guide member having a substantially horizontal surface portion and positioned generally in the path of such upper wall closure portions but slightly thereabove whereby the upper edges of such wall closure portions can be urged up against said substantially horizontal surface portion, and mechanical means positioned for urging such upper wall closure portions upwardly towards such horizontal portion and horizontally in the direction of such conveyor.

15. In apparatus of the class described, conveying means for conveying filled bags in succession along a common path with the wall closure portions at the mouth of each bag in opposed positions, a guide member generally in the form of channel means having sides and intermediate surface portions therebetween and positioned for receiving such opposed wall closure portions between the sides thereof, such intermediate surface portions having a longitudinal axis which is substantially parallel to the aforementioned path and thus in a selected attitude against which the edges of such bag wall closure portions can be thrust thereby to position such edges also in a selected attitude, and means positioned for urging such bag wall closure portions of each bag into said channel means and against such intermediate surface portion thereof and also in the direction of motion of such conveying means.

16. In apparatus of the class described, conveying

means for conveying filled bags in succession along a common path with the wall closure portions at the mouth of each bag in opposed positions, a guide member generally in the form of channel means having sides and a guide surface intermediate therebetween for receiving such opposed wall closure portions between the sides thereof, such intermediate guide surface being substantially parallel to the aforementioned path and in a selected attitude against which the edges of such bag wall closure portions can be thrust thereby to position such edges also in a selected attitude, mechanical means positioned for urging such bag wall closure portions of each bag into said channel means and against such intermediate guide surface thereof and contemporaneously in the direction of motion of such conveying means, and means for applying a closure tape over such edges following the discharge of the latter from such guide member.

17. In combination with a machine for closing open-mouthed filled bags, conveying means for conveying to said machine such filled bags in succession with the upper wall closure portions thereof in opposed upstanding positions; a bag top feeder element including: a guide member comprising inverted channel means having a mouth portion for receiving such upper wall closure portions, said channel means having portions for guiding said upper wall closure portions into a closed condition, the ceiling surface of such guide member being parallel with the path of said conveying means; means beneath such guide member for urging such upper wall closure portions upwardly and into such guide member and thus against said ceiling surface including a pair of separable substantially vertical guide plates resiliently urged together, and a feed dog which is reciprocatively movable intermittently frictionally to engage the upper portions of any bag between said guide plates, the reciprocative motion of such feed dog having components acting both upwardly and in the direction of motion of said conveyor; and a closure tape applicator positioned for applying tape along and astride the closed upper wall closure portions of the bags at a location between said bag top feeder element and said bag closing machine.

18. In apparatus of the class described, the combination comprising: a device for filling an open-mouthed bag; a sewing machine for sewing closed the mouths of a succession of open-mouthed filled bags; a bag mouth leveling and feeding unit positioned intermediate said bag filling device and sewing machine, said leveling and feeding unit having inverted channel guide means in alignment with the path of movement of the bags for holding the mouth of the bags in closed condition and also having means for urging the top marginal portions of the bag mouths upwardly toward the ceiling surfaces of said inverted channel guide means and also toward said sewing machine; and conveyor means for moving a succession of filled bags along the aforementioned path from beneath said bag filling device beneath said feeder and leveler unit and said sewing machine, said conveyor means including a pair of substantially upright side plates positioned in spaced face-to-face relation along opposite margins of the aforementioned path of the bags and extending from beneath said bag filling device along the bag path beneath said leveler and feeder unit and said sewing machine, bag bottom supporting means extending along such path, means for imparting a reciprocative motion to at least a portion of said bag bottom supporting means, said motion having a vertical component and a component in the direction of motion of said bags, said side plates being connected to the reciprocative portion of said bag bottom supporting means, such reciprocative motion imparting a vibratory movement to said side plates thereby to slap the sides of the bags resting on said supporting means and to advance same along the bag path.

19. In apparatus of the class described, the combination comprising: a bag filling device for open-mouthed bags; a bag mouth feeder and leveler unit; and a sewing machine for sewing closed the mouths of bags which are fed thereto by said bag mouth leveler and feeder unit; and conveyor means for moving a succession of filled bags along a selected path from a position beneath said bag filling device to said bag mouth feeder and leveler unit and thence to said sewing machine, said conveyor means including bag bottom supporting means extending along the same path, a pair of substantially upright side plates positioned in spaced face-to-face relation along opposite margins of said bag path, means for imparting a vibratory motion to said side plates thereby to produce reciprocative angular movement in said plates about a vertical axis thereof causing said plates to slap the sides of the bags therebetween and urge same along said path, at least a portion of said bag bottom supporting means including a conveyor element movable in the direction of said path.

References Cited in the file of this patent

UNITED STATES PATENTS

2,362,462 Belcher et al. ---------- Nov. 14, 1944