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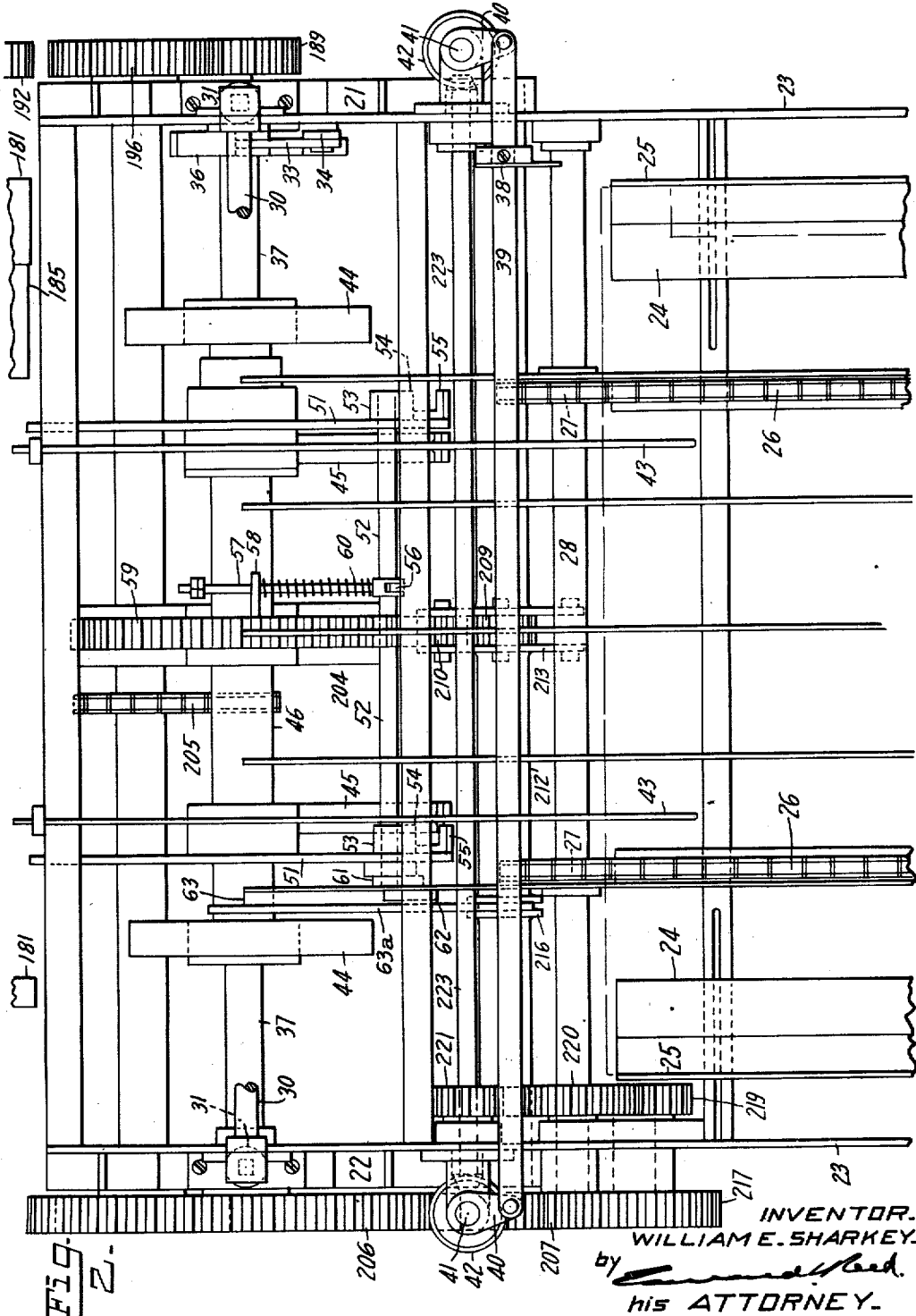
W. E. SHARKEY

2,205,633

BAG VALVE TUCKING MACHINE

Filed Feb. 18, 1938

7 Sheets-Sheet 2



June 25, 1940.

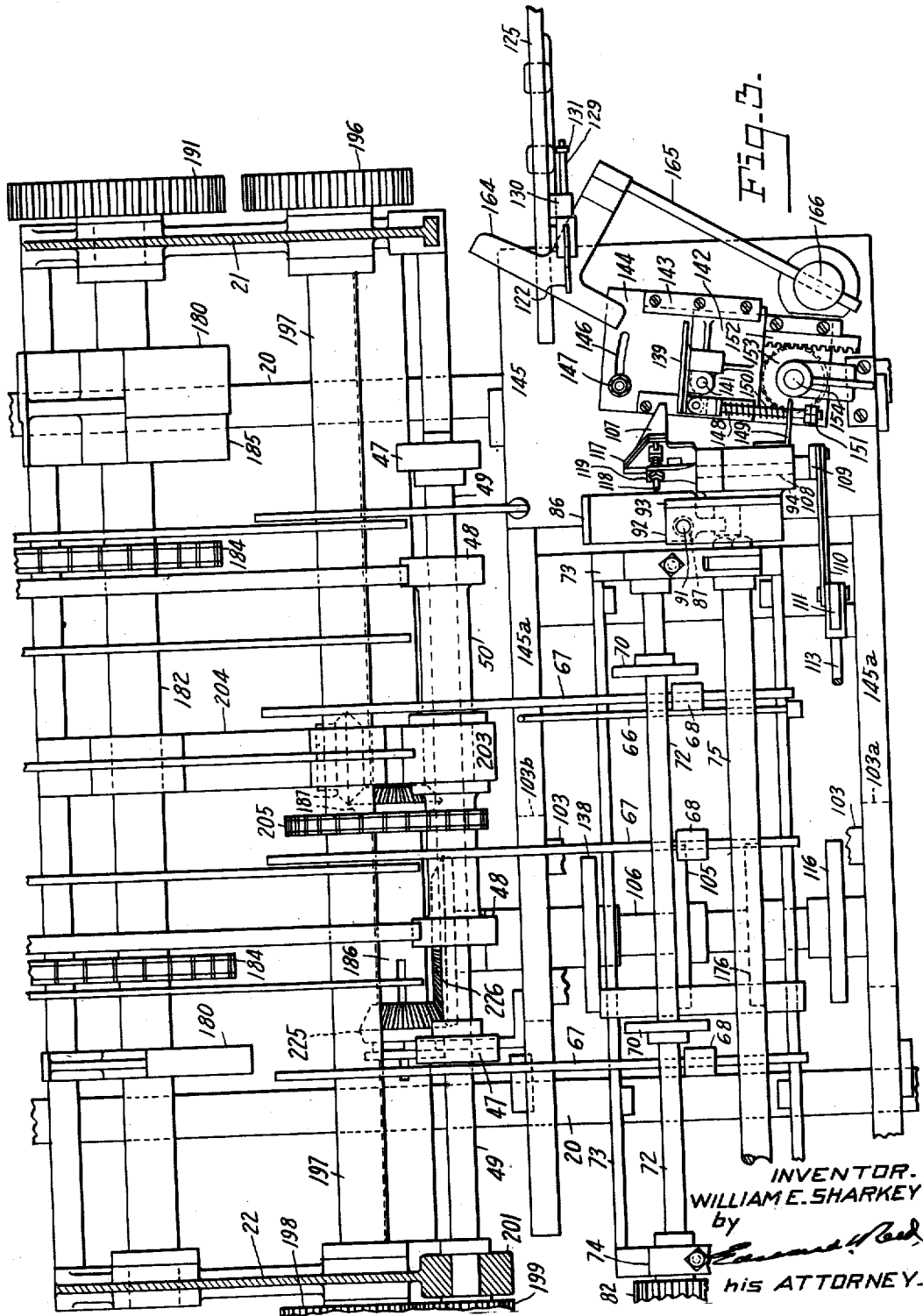
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BAG VALVE TUCKING MACHINE

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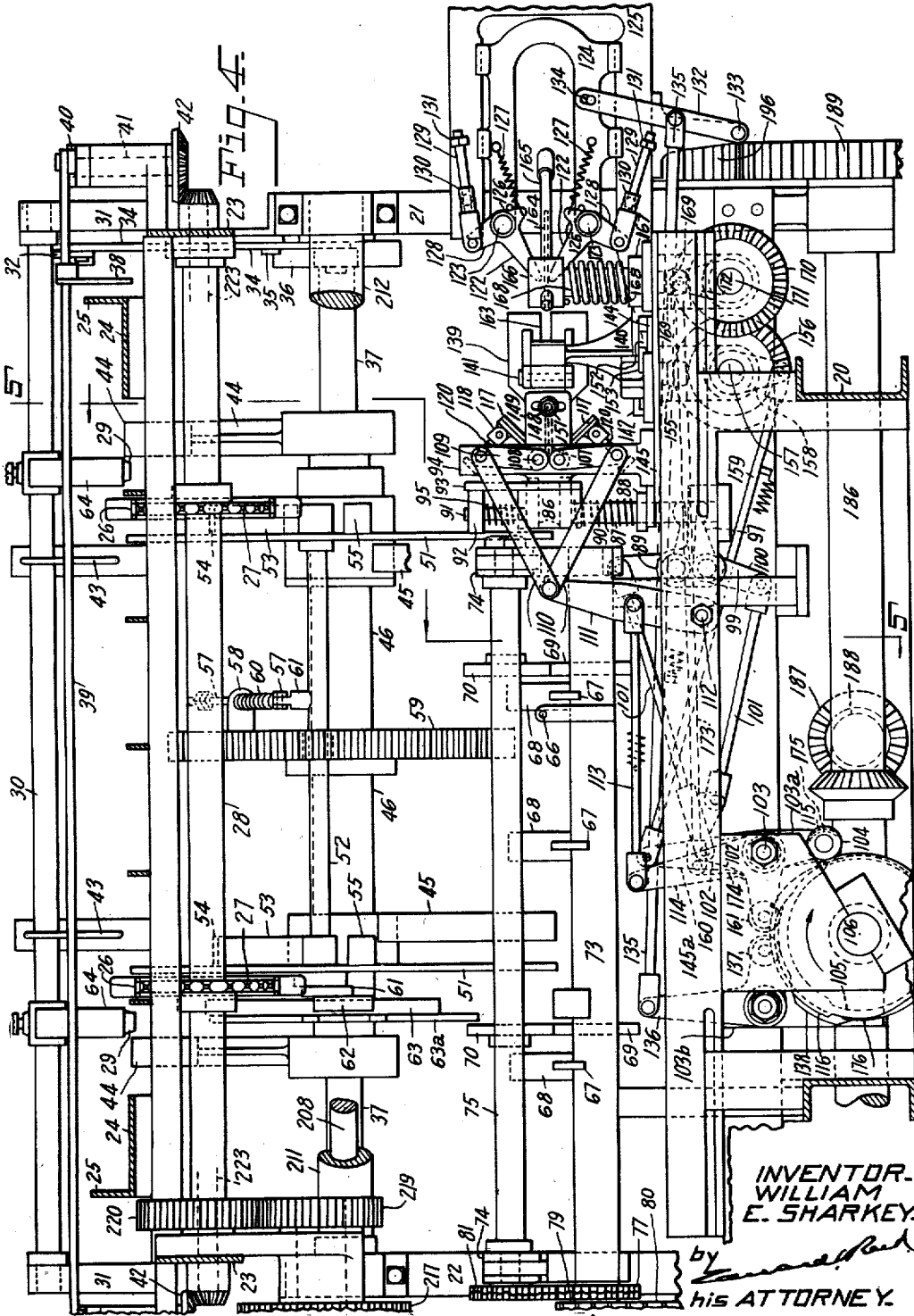
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BAG VALVE TUCKING MACHINE

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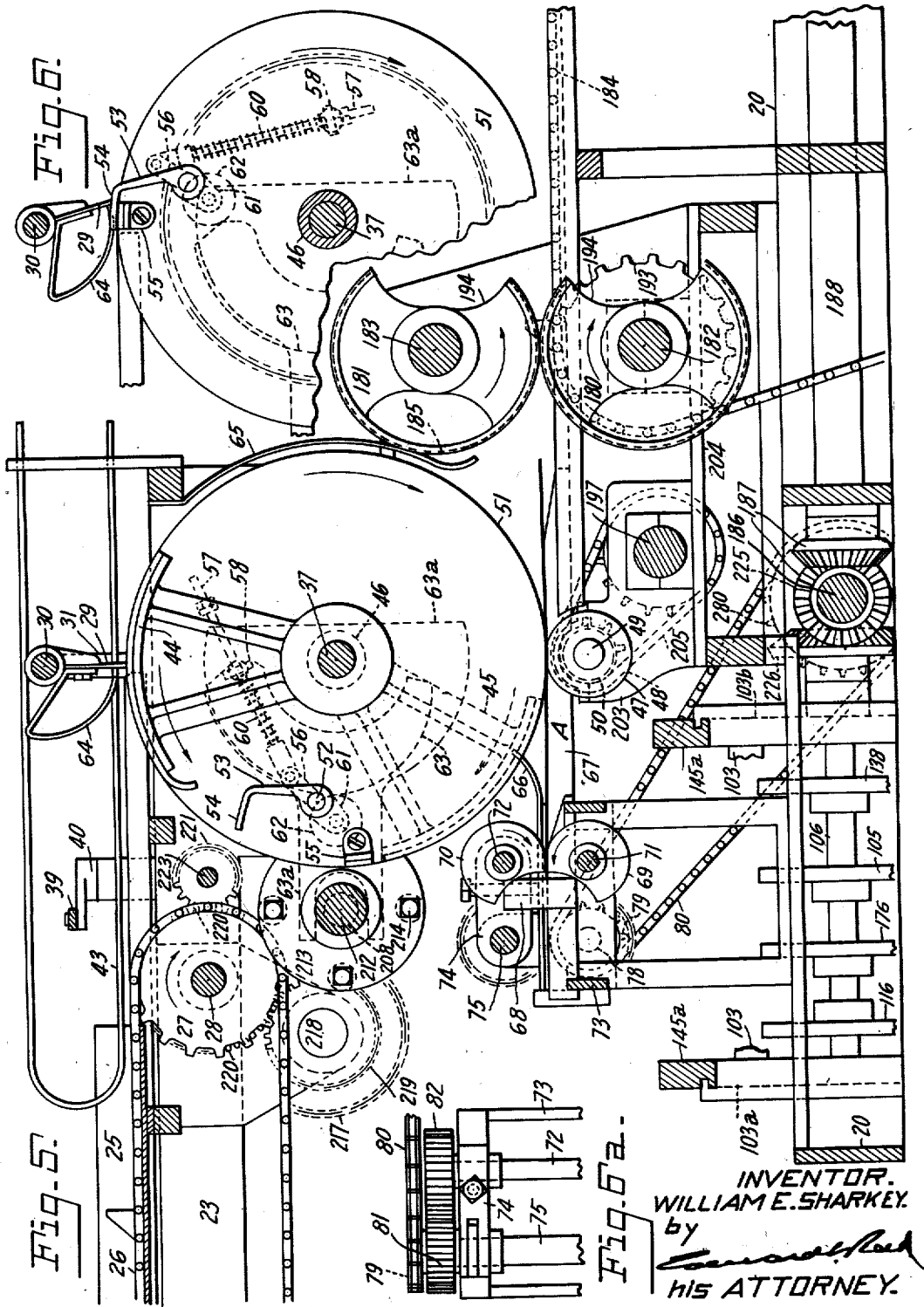
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BAG VALVE TUCKING MACHINE

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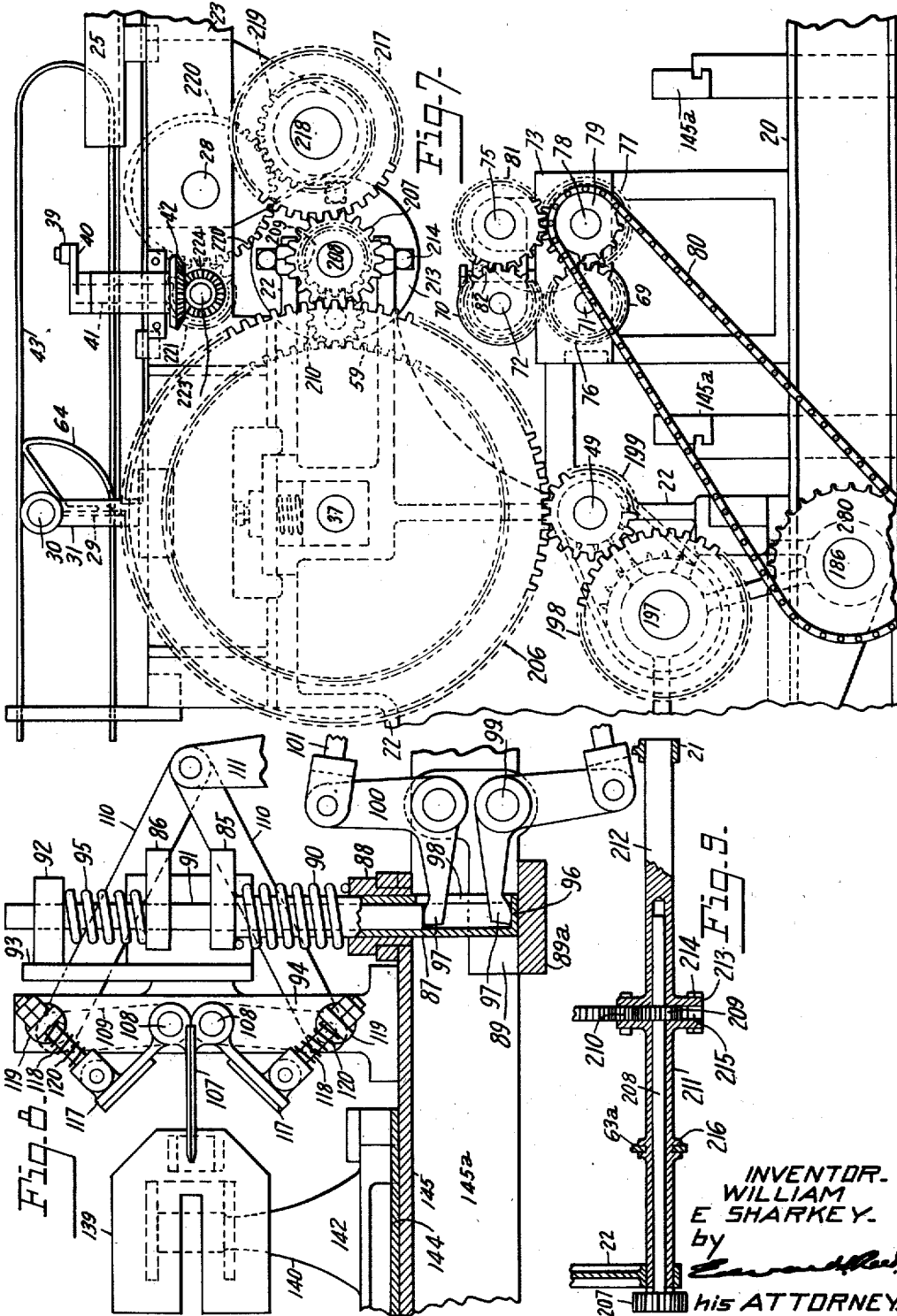
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BAG VALVE TUCKING MACHINE

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7 Sheets-Sheet 6



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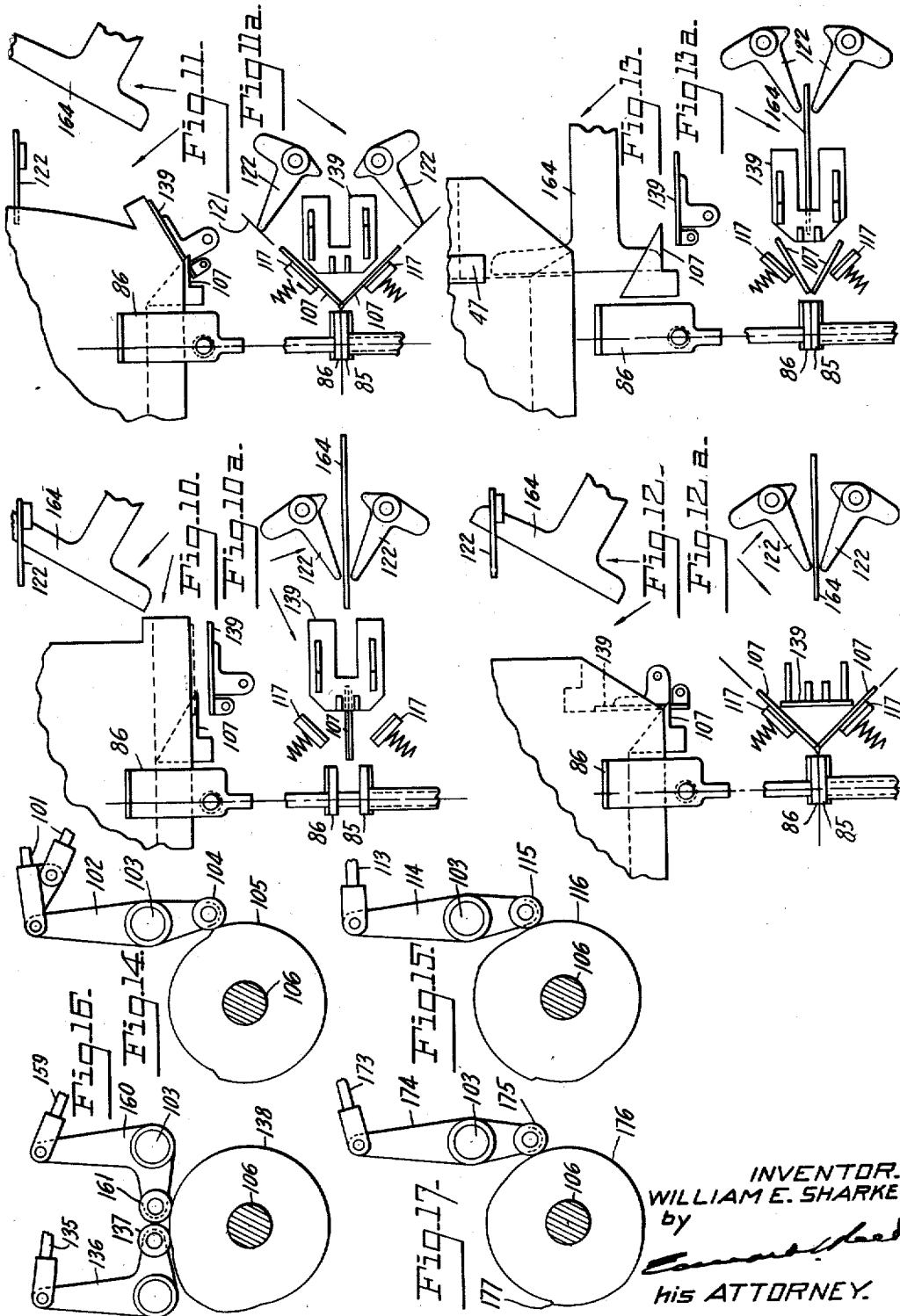
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BAG VALVE TUCKING MACHINE

Filed Feb. 18, 1938

7 Sheets-Sheet 7



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UNITED STATES PATENT OFFICE

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BAG VALVE TUCKING MACHINE

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52 Claims. (Cl. 93—8)

This invention relates to a method and apparatus for forming a valve in a bag. Certain types of bag, particularly heavy duty multi-wall paper bags such as are used for shipping cement and the like, are usually provided with a valved opening through which the bag is filled and which closes after the bag has been removed from the filling spout. Such bags usually comprise sections of tubing cut from a continuous tube and each section is provided at one corner with a longitudinal extension to form a part of the valve. These bags are usually of the gusseted type, that is, the relatively narrow edge walls of the bag are folded inwardly to permit the side walls to be collapsed for storing and shipping. After the section has been cut from the continuous tube the valve corner thereof is folded inwardly between the side walls and the bag is closed at both ends, with the exception of the valved opening, this usually being accomplished by stitching the bag across the both ends.

Machines have been provided heretofore for tucking in the valve by separating the edge portions of the side walls of the bag, at a point spaced from the valve end of the latter, to extend or straighten the end portion of the gusset, and then folding the extended portion of the gusset between the side walls by means of a tucking finger. These machines have not been entirely satisfactory as they would not always accurately tuck the valve, this being particularly true when they were used on multi-wall bags, and in many cases the valves are still tucked by hand.

One object of the invention is to provide a machine which will overcome the objectionable features of the earlier machines and will accurately tuck the valve in either a multi-wall or a single wall bag.

To this end it is a further object of the invention to provide the machine with an improved tucking mechanism including means for so positioning the extended end portion of the gusset that it will be accurately engaged and folded by the tucking element.

A further object of the invention is to provide a simple and efficient means for feeding the bags to and removing the same from the tucking mechanism.

A further object of the invention is to provide means for delivering bags one at a time to the feeding mechanism and for accurately positioning the bag with relation thereto.

Other objects of the invention may appear as the mechanism is described in detail.

In the accompanying drawings Fig. 1 is a side

elevation, partly broken away, of a machine embodying the invention; Fig. 2 is a top plan view of the portion of the machine shown in Fig. 1; Fig. 3 is a section taken on the line 3—3 of Fig. 1, showing the lower portion of the mechanism in plan, partly broken away; Fig. 4 is a rear elevation of the machine, partly broken away; Fig. 5 is a longitudinal section taken on the line 5—5 of Fig. 4; Fig. 6 is a detail view of the gripper forming part of the feeding mechanism; Fig. 6A is a detail of a part of the supplemental feeding device; Fig. 7 is an elevation showing the gear trains on that side of the machine opposite the side shown in Fig. 1; Fig. 8 is a detail view, partly in section, of a portion of the tucking mechanism; Fig. 9 is a sectional detail view of one of the power shafts and its supporting member; Figs. 10 and 10a are, respectively, a plan view and an elevation showing diagrammatically the several parts of the tucking mechanism in positions to receive the bag which is to be tucked; Figs. 11 and 11a are similar views showing the positions of the parts after the bag has been clamped and the side walls spread; Figs. 12 and 12a are similar views showing the parts in the positions which they occupy when the expanded end portion of the gusset has been folded to a transverse position; Figs. 13 and 13a are similar views showing the positions of the parts at the completion of the tucking operation but before the tucking element has been withdrawn; Fig. 14 is a detail view of the clamp operating cam; Fig. 15 is a detail view of the cam which actuates the spreading members for the lateral edges of the bag; Fig. 16 is a detail view of the cam which actuates the spreading device for the end of the bag and the folding member; Fig. 17 is a detail view of the cam which actuates the tucking member; Fig. 18 is an end elevation of one end of the gusseted side of the bag before the valve has been folded; Fig. 19 is a plan view, partly broken away, of a part of the valve end of the bag before the valve has been tucked; Fig. 20 is an end elevation of the valve end of the bag after the valve has been tucked; Fig. 21 is a plan view, partly broken away, of a part of the valve end of the bag after the valve has been tucked; and Fig. 22 is a perspective view of the valve corner of the bag with the gusset extended. In the particular embodiment of the invention here shown, which has been chosen for the purpose of illustration, the machine comprises a main frame 20 on the rear portion of which is supported the tucking mechanism per se, as shown at A. The frame is provided in front of

the tucking mechanism with upwardly extending side members 21 and 22 which support the feeding mechanism and on which is mounted a bag supporting and delivering device which, in the present instance, overhangs the tucking mechanism and is indicated as a whole at B. The term "bag" is herein used, as a matter of convenience, to designate the bag section as it is delivered to the machine, although that section is not a completed bag until the valve has been formed and the ends of the bag closed, as by stitching.

The bag supporting device includes a supplemental frame 23 supported on the side members 21 and 22 of the main frame and carrying bag supporting and guiding members 24 which are provided with upwardly extending flanges 25, these supporting members having their flanges spaced apart a distance slightly greater than the overall length of the bag. Arranged between the bag supporting members 24 and extending lengthwise of the supporting structure is a suitable conveyor here shown as comprising conveyor chains 26 which extend about suitable sprocket wheels, the front sprocket wheels being shown at 27 as mounted on a shaft 28, see Fig. 5. Mounted at the forward end of the bag supporting structure and spaced some distance beyond the conveyor and the supporting members is a suitable stop device to limit the forward movement of the bags, this stop device preferably comprising a plurality of stop fingers 29 spaced one from the other and secured to a shaft 30 which is mounted at its ends in suitable bearings carried by brackets 31 on the supplemental frame 23. Means are provided for actuating the shaft to move the stops to inoperative positions and, as herein shown, it is provided with a crank arm 32 connected by a link 33 with a cam lever 34 which is pivotally mounted at 35 on the frame member 21 and is actuated by a cam 36 mounted on a feed shaft 37 which is rotatably supported at its ends in the frame members 21 and 22. The cam 36 is so shaped and timed that the stop fingers 29 will be held normally in their operative positions to interrupt the forward movement of the bags but will be moved to their inoperative position to release the bag for withdrawal from the supporting structure when the bag has been engaged by the feeding mechanism, as will be hereinafter described. In order to accurately position the bag with relation to the feeding mechanism means are provided for moving the same transversely to the conveyor to a predetermined position. As here shown, this means comprises a pusher plate 38 arranged adjacent the path of the bag at one edge thereof and carried by a bar 39 which extends across the supporting structure above the path of the bags and is pivotally supported at its ends by crank arms 40 secured to vertical shafts 41, provided at their lower ends with beveled gears 42 by means of which the shafts may be rotated from the driving mechanism, as will be hereinafter described. Shafts 41 and the crank arms 40 rotate continuously so that the bar 39 and pusher plate 38 move in circular paths and the plate is caused to intermittently engage the edge of the bag as the latter moves toward the stops and thus move the same to a position determined by the movement of the pusher plate. The position to which the bag is moved may be varied by adjusting the pusher plate on the bar 39. Guide rods 43 extend from points above the conveyor beyond the discharge ends to the supporting struc-

ture to hold the bags in firm engagement with the supporting structure as they move toward the stops 29, as shown in Fig. 1.

Arranged adjacent to the discharge end of the bag support is a feeding device adapted to take the bag from the support and deliver the same to the tucking mechanism. Associated with this feeding device is another feeding device adapted to engage the bag and withdraw the same from the tucking mechanism after the valve has been tucked. These feeding devices may take various forms but in the arrangement here shown each of these devices comprises one or more segments, and the two feeding devices are mounted for rotation in opposite directions. As shown in Figs. 2, 5 and 6, each feeding device comprises two segments, the outer segments 44 being secured to the shaft 37 for rotation therewith and the inner segments 45 being secured to a sleeve 46 rotatably mounted on the shaft 37, the sleeve and the shaft being rotated in opposite directions by means which will be hereinafter described. Arranged beneath the segments and cooperating therewith are a plurality of feeding rollers 47 and 48 (see Fig. 3), the rollers 47 being arranged to cooperate with the segments 44 and the rollers 48 being arranged to cooperate with the segments 45. These rollers, of course, are so mounted that their peripheral surfaces will move in the same direction as the respective segments move and, in the present construction, they are positively driven in opposite directions. To this end the rollers 47 are rigidly secured to a shaft 49 and the rollers 48 are secured to a sleeve 50, in which the shaft is rotatably mounted, the shaft and the sleeve being rotated in opposite directions as will hereinafter appear. The segments 45 and their associated rollers 48 rotate in a direction to move the bags toward tucking position and in order to withdraw the bags from the bag support and move them into feeding position between the segments and the rollers there is associated with each segment 45 a gripper which is adapted to engage the edge of a bag on the bag support and cause the same to move with the segment into feeding relation to the segment and its roller. It is preferable that the gripping device be arranged slightly in advance of the segment with which it cooperates and in the construction illustrated there is secured to the sleeve 46, adjacent each segment 45, a supporting member or disk 51 which, of course, rotates in unison with the segments 45. A shaft 52 extending parallel with the sleeve is rotatably mounted in the disks 51 and has secured thereto gripping fingers 53, the outer end portions 54 of which are shaped and arranged for movement into overlapping engagement with lugs 55 on the respective disks. As shown in Fig. 5 the segments 45 and disks 51 rotate in a clockwise direction and means are provided for holding the grippers 53 in their retracted or inoperative positions during the upward movement of the segments and for causing the gripper to move to its operative position just as the segment approaches the discharge end of the bag support. In the arrangement here shown the shaft 52 has secured thereto a crank arm 56 with which is pivotally connected one end of a rod 57 which is slidably mounted in a guide bracket 58 carried by a part connected with the sleeve 46, such as the gear 59. A spring 60 coiled about the rod 57 tends to actuate the shaft to move the gripper to its operative position. The shaft 52 is also provided at one end 75

with a second crank arm 61 which carries a roller 62 which in turn is adapted to engage a stationary cam 63. The cam 63 may be supported in any suitable manner and in the present instance it is carried by a plate 63a which is supported at its inner end by the shaft 37 and at its outer end by a fixed part of the mechanism. (See Fig. 9.) This cam is so shaped and arranged that when the roller 62 engages the cam the gripper will be moved to its inoperative position and held in that position during the upward movement of the segments 45. Just before the forward ends of the segments 45 pass the discharge end of the bag support the roller 62 will ride off the forward end of the cam 63, thereby permitting the spring 60 to move the grippers 53 to their operative positions. At this time the lugs 55 on the disk 51 will lie just beneath the forward edge of the bag, as shown in Fig. 6, and as the grippers move to their operative positions the end portions 54 thereof will engage the upper surface of the bag and clamp the same tightly to the lugs 55. Simultaneously with or just prior to the gripping action of the grippers the cam 36 (see Fig. 1) will act on the lever 34 to move the stop fingers 29 out of the path of the bag so that the continued movement of the disks and grippers will withdraw the bag from the support. The shaft 30, which carries the stop fingers 29, has secured thereto a segmental element 64 which moves with the stop fingers and acts on the gusseted edge of the bag to fully collapse the same and thus make certain that the fingers 54 of the gripper will engage the upper side wall of the bag and will not enter the gusset. The continued rotation of the disks and grippers will carry the bag downwardly and introduce the forward edge thereof between the segments 45 and their rollers 48, the bag being held close to the disks and segments during its downward movement by the curved guides 65. Just after the forward ends of the segments 45 have passed over and gripped the bag against the rollers 48 the gripper controlling roller 62 will engage the lower portion of the stationary cam 63 and move the gripper to its inoperative position, thereby releasing the bag and permitting the same to be moved toward tucking position by the segments and rollers, a fiared guide 66 being provided to prevent any possibility of the edge of the bag adhering to the lugs 55 and moving upwardly therewith.

As the bag is fed toward tucking position by the feeding devices it moves over a suitable supporting structure here shown as a series of spaced bars 67 and this structure is provided with stops, such as abutments 68 on the respective rods, to limit the rearward movement of the bag and properly position the same with relation to the tucking mechanism. To insure that the gusseted edge of the bag will be in proper contact with each of the stops 68 I prefer to provide a supplemental feeding device which will act on the bag after the feeding segments 45 have passed beyond their rollers 48. This supplemental feeding device comprises two or more pairs of rollers 69 and 70 to which the bag is delivered by the main feeding mechanism, these rollers being rotated at a relatively high speed so as to quickly move the bag into engagement with the abutments. Preferably the upper rollers 70 are of comparatively light weight and engage the bags with a gravity contact only. The rollers 69 are mounted on a shaft 71 and the rollers 70 are mounted on a shaft 72, both of

these shafts being journaled in suitable bearings carried by the supplemental frame 73, which carries the supporting bars 67. Preferably the bearings for the shaft 72 are formed in arms or links 74 which are pivotally mounted on a shaft 75 arranged in the rear of the shaft 72. A gear 76 on the shaft 71 meshes with a gear 77 mounted on a short shaft 78 and rigidly connected with a sprocket 79 which is connected with a suitable source of power by a sprocket chain 80. The gear 77 also meshes with a gear 81 on the shaft 75 and the gear 81 meshes with a gear 82 on the shaft 77, thus causing the shafts 71 and 72, and the rollers carried thereby, to rotate in opposite directions and permitting the roller 70 to have a limited vertical movement with relation to the roller 69.

When the bag has been properly positioned on its support the edge portion of the bag is clamped firmly in position and the side walls between the clamped portion of the bag and the valve end thereof are spread apart to extend and substantially straighten the end portion of the gusset. The end portions of the side walls are also spread apart a distance at least equal to the width of the extended gusset. The extended end portion of the gusset is then folded inwardly to a position transverse to the bag, and is folded upon itself along a longitudinal line, preferably arranged centrally thereof, and the side walls of the bag are then collapsed to complete the forming of the valve. The mechanism for performing these several operations may be of any suitable character and may be mounted in any suitable manner. In the construction illustrated the tucking mechanism as a whole is mounted on a supporting structure comprising a plate 145 carried by rails 145a which are slidably mounted on the main frame for adjustment transversely thereto, to permit the mechanism to be adjusted for operation on bags of different lengths.

The clamping means may be of any suitable character and, as here shown, it comprises a pair of clamping members 85 and 86 (Fig. 8) which are normally spaced apart and are so arranged that as the bag is moved into engagement with the stops 68 the edge portion thereof will enter the space between the two clamping members. In the arrangement shown, the lower clamping member 85 is rigidly secured to a tubular member or sleeve 87 which is slidably mounted in a bearing 88 mounted on the supporting plate 145. A spring 90 confined between the clamping member 85 and the bearing 88 tends to move the clamping member upwardly toward its clamping position. The upper clamping member 86 is rigidly secured to a rod 91, the lower portion of which is slidably mounted in the sleeve 87 and the upper portion of which is guided in an aperture lug 92 carried by a bracket 93 secured to a standard 94 mounted on the plate 145. A spring 95 confined between the lug 92 and the clamping member 86 tends to move that clamping member downwardly toward its clamping position. The sleeve is provided near its lower end with a stop 96, here shown as the bottom wall of this sleeve, and a pair of fingers 97 extend into the sleeve through a slot 98 in the side thereof and engage respectively the stop 96 and lower end of the rod 91, and serve to control the positions of the two clamping members. The fingers 97 are secured to shafts or studs 99, mounted in a bracket 99 supported by a frame member 99a, and rigidly secured to these shafts are oppositely extending crank arms 100, which are connected

by links 101 with the upper end of a cam lever 102 pivotally mounted on a shaft 103 which is supported by spaced brackets or plates 103a and 103b depending from the main frame. The lever 102 has at its lower end a roller 104 which rides on the periphery of a cam 105 (Fig. 14) secured to a cam shaft 106 which is also supported by the brackets 103a and 103b and is rotated in timed relation to the feeding mechanism in a manner to be hereinafter described. The cam 105 is so shaped that during the feeding operation the fingers 97 will be spread apart to retain the clamping members 85 and 86 in their separated positions, and after the bag has been properly positioned the controlling fingers 97 will be released to permit the springs 90 and 95 to move the clamping members into clamping engagement with the edge portions of the side walls of the bag, thus firmly clamping the same together and holding the gusset fully collapsed at that point. The clamping members are retained in this position until the tucking operation has been substantially completed, at which time the cam again separates the controlling fingers 97 to separate the clamping members and release the bag for withdrawal.

Arranged adjacent to the clamping device and between the same and the valve end of the bag is a spreading device adapted to spread apart the side walls of the bag and thus extend and substantially straighten the end portion of the gusset. As here shown (Fig. 8) this spreading device comprises two spreading members or wings 107 which are preferably approximately triangular in shape with their wider ends adjacent the clamping device. These spreading members are secured at their wider ends to shafts 108 which are journaled in suitable bearings on the standard 94 and have secured to their outer ends oppositely extending crank arms 109 which are connected by links 110 with the upper end of the lever 111 pivotally mounted at its lower end on the frame, as shown at 112. This lever is connected between its ends, by means of a link 113, with the upper end of a cam lever 114 pivotally mounted on the shaft 103 and having at its lower end a roller 115 which engages a cam 116 on the cam shaft 106. (Fig. 15.) The shape of the cam is such that during the feeding and clamping operations the spreading members will be held in their closed or substantially parallel positions so that as the bag is moved into engagement with the stops these closed spreading members will enter the gusset, the resiliency of the paper of which the bag is formed holding the gusset sufficiently open for this purpose, the parts then occupying the positions shown in 10 and 10a. Immediately following the operation of the clamping device the cam acts on the spreading members to separate the same and spread apart the side walls of the bag, the latter bending about their points of engagement with the clamping members, as shown in Figs. 11 and 11a. It will be noted (Fig. 8) that the spreading members 107 are mounted on separate shafts spaced one from the other and arranged respectively above and below the normal planes of the spreading members, the hub portions of the spreading members being offset from the planes thereof to receive the spaced shafts. Heretofore it has been customary to mount the two spreading members for movement about a common axis, so that the inclined or operating edges of the members move through different portions of the same arc. This common axis is usually located

in or close to a plane extending between the upper and lower edges of the gusset and is spaced some distance from the point at which the gusset is clamped and about which the edges of the gusset move during the spreading operation. The spreading of the gusset causes the spread portions of the edges thereof to move inwardly, that is, laterally toward the longitudinal center line of the bag, a short distance with relation to the clamped portions of the edges. Due to these two movements of the edges of the gusset each edge thereof must slip along the inclined edge of the spreading member toward the axis of the latter, during the final portion of the movement of the spreading member. It is difficult if not impossible, to control the extent of this slippage and it is apt to vary in different bags. Inasmuch as the points at which the spread edges of the gusset are supported by the spreading members are the points about which the valve is folded, it follows that if the points of support are improperly spaced with relation to the valve end of the gusset or with relation one to the other the valve will not be accurately folded. When the spreading members are mounted on separate axes spaced from the plane of the gusset, as here shown, the two spreading members will move in separate arcs and each spreading member will have a slight forward movement with relation to its edge of the gusset, that is, a movement toward the valve end of the gusset, and due to the inclination of the edge of the spreading member this movement relative to the edge of the gusset will compensate for the inward or lateral movement of the edge of the gusset. Consequently there will be no material slippage of the edge of the gusset on the spreading member and at the end of its spreading movement the spreading member will have supporting contact with the edge of the gusset at a point determined wholly by the movement of the spreading member, which movement is positively controlled. This results in the edges of the gussets of all bags being supported in exact predetermined positions and all valves will be accurately folded. The spreading members are retained in their separated positions until the tucking member begins to operate and are then moved toward their closed position as the valve is tucked. Preferably means are provided for holding the side walls and the outer edges of the gusset in their extended positions and for this purpose clamping members 117 are supported in diverging positions above and below the spreading members and in the paths of the latter, so that the side walls of the bag will be moved by the spreading members into engagement with the respective clamping members. In the present instance, the clamping members 117 are pivotally mounted on the shafts 108 and are supported in their diverging positions by rods 118 slidably mounted in bearing lugs 119 on the standard 94. Springs 120 act on the respective clamping members to yieldably support the same and to cause the same to clamp the side walls of the bag firmly against the spreading members. See Fig. 11a, where the side walls of the bag are shown at 121.

During the operation of the spreading members 107, or immediately thereafter, the end portions of the side walls are also spread apart, this being accomplished by a second pair of spreading members. As shown in Fig. 4, this second pair of spreading members comprises fingers 122 pivotally mounted at 123 on the respective arms of a U-shaped member 124 which is

slidably mounted upon a supporting structure 125 for movement toward and from the end of the bag. Each finger is provided with an inwardly extending crank arm 126 which is connected with the adjacent arm of the slidable member by a spring 127. Each spreading finger 122 is also provided with an outwardly extending crank arm 128 with which is pivotally connected a rod 129 slidably mounted in a pivoted bearing 130 mounted on the supporting structure 125. Each rod has near its outer end a stop 131 which is preferably adjustable and is here shown as a nut threaded onto the end of a rod. When the spreading fingers 122 are in their closed or inoperative positions the stops 131 will be spaced some distance from the bearings 130. Movement may be imparted to the slide 124 in any suitable manner. In the present instance, a lever 132 is pivotally mounted on the main frame at 133 and has a pin and slot connection with the slide 124, as shown at 134. This lever is connected by a link 135 with a cam lever 136 pivotally mounted on the plate 103b and having on its lower arm a roller 137 which rides on the periphery of a cam 138 secured to the cam shaft 106. (Fig. 16.) This cam is so shaped that during the feeding and clamping operations the slide 124 will be retained in its retracted position with the spreading arms 122 in their closed positions. During or immediately following the action of the spreading members 107 the cam moves the slide 124 toward the end of the bag, causing the closed fingers 122 to enter the end of the bag between the side walls thereof. During this movement the spreading fingers move with the slide but have no movement with relation thereto. After the fingers have entered the end of the bag the stops 131 on the rods 129 engage the bearings 130 so that further inward movement of the slide will rock the fingers 122 about their axes to separate the same and spread apart the end portions of the side walls. (Figs. 11 and 11a.) The fingers remain in these positions until the gusset has been folded inwardly, as will now be described, after which the slide is retracted and the spreading fingers 122 restored to their closed or inoperative positions.

The means for folding the extended end portion of the gusset to a transverse position may take various forms and, in the present construction, it is shown as a vertical plate 139 pivotally mounted between its ends on a standard 140, as shown at 141 in Figs. 3 and 4. The standard 140 is carried by a slide 142 mounted for movement in guides 143 on a base plate 144. If desired, this base plate may be adjustable and it is here shown as pivotally mounted on the main supporting plate 145 and is provided with an arcuate slot 146 through which extends a bolt 147 by means of which the plate may be secured in its adjusted position to retain the folding member 139 in proper relation to the bag. A rod 148 is pivotally connected with that edge of the folding member 139 adjacent the spreading fingers 107 and is slidably mounted in a bracket 149 carried by a fixed part of the structure. A spring 150 acts on the rod to hold the folding member normally in its retracted position substantially parallel with the edge of the bag. The rod 148 is provided with a stop, such as a nut 150, to cooperate with the bracket 149 as will hereinafter appear. The slide 142 has a rearwardly extending toothed rack 152 which meshes with a pinion 153 secured to a shaft 154 which extends through the base 144 and the main supporting

plate 145. This shaft has at its lower end a beveled pinion 155 which meshes with a beveled gear 156 on a transverse shaft 157 to which is secured a crank arm 158. This crank arm is connected by a link 159 with a cam lever 160, mounted on the shaft 103 and having at its lower end a roller 161 which rides over the periphery of a cam on the cam shaft 106. In the present arrangement this lever 160 is actuated by the cam 138 which actuates the spreading fingers 122. (Fig. 16.) The shape of this cam is such that during the feeding and clamping operations the slide 142 will be retained in its retracted position with the folding plate 139 substantially parallel with the edge of the bag and spaced a slight distance therefrom to avoid interference with the separation of the side walls of the bag. When the side walls of the bag have been separated the slide 142 moves the folding member toward the edge of the bag and when it is close to or in contact with the extended gusset the stop 151 on the rod 148 will engage the bracket 149 and interrupt the movement of the rod so that the further inward movement of the slide will cause the folding member to move about its axis 141 and thus fold the extended gusset to a position transverse to the bag, as shown in Figs. 12 and 12a. While the folding member holds the gusset in this transverse position a tucking finger engages the gusset to fold the same inwardly upon itself, the folding member 139 being provided with a slot 163 to permit the passage of the tucking member, as shown in Figs. 13 and 13a. The action of the folding member 139 provides the extended gusset with a transverse fold or crease extending between the points of contact of the spreading members 107 with the respective edges of the gusset, and this initial transverse fold controls the location of the diagonal folds which form the edges of the valve opening, so that the tucking member will accurately form the valve. Ordinarily the spreading members 107 acting alone will provide sufficient support for the edges of the gusset to enable the transverse fold to be accurately formed but with some bags it is desirable that the edges of the gusset be positively held against movement, as by the clamping members 117.

The tucking member is here shown as horizontal blade 164 carried by a rod 165 which is supported at that end opposite the blade on a vertical shaft 166 which is journaled in a bearing 167 on the supporting plate 145. A spring 168 acts on the shaft 166 to normally retain the tucking blade in its retracted position. The shaft 166 extends below the supporting plate 145 and has secured thereto a beveled pinion 169 which meshes with a beveled gear 170 on a shaft 171. A crank arm 172 on the shaft 171 is connected by a link 173 with a cam lever 174 mounted on the shaft 103 and having a roller 175 which engages the periphery of a cam 176 on the shaft 106. (Fig. 17.) This cam is so shaped that the tucking member will be held in its retracted position until the extended portion of the gusset has been folded to its transverse position and it will then move inwardly to fold that portion of the gusset along a longitudinal center line and after the fold has been completed it will be withdrawn. The cam has a shoulder 177 to impart a quick forward movement to the tucking member to crease the valve, and the folding member 139 is preferably retracted after the initial tucking movement of the tucking member and prior to the final creasing movement thereof. The cam 75

116 for the spreading members 107 and the cam 176 for the tucking member are so shaped that the spreading members have a slight closing movement at or about the time the tucking member engages the transversely folded portion of the gusset. This movement will be sufficient to release the edges of the gusset from the holding members 117 but the spreading members will preferably be retained in widely separated positions until near the end of the tucking operation and will not be completely closed until the tucking member has been partially withdrawn.

When the bag is in tucking position the forward portion thereof, that is the edge portion opposite the edge on which the tucking mechanism operates, rests upon the feed rollers 47 and 48, as shown at A in Fig. 5, and during the tucking operation the outer feeding segments 44 have been rotating in a counterclockwise direction, as shown in Fig. 5, and will engage the bag on the rollers 47 near the completion of the tucking operation and withdraw the same. The segment 44 and roller 47 adjacent the valve end of the bag are so arranged that the folded portion of the gusset, that is the valve, will pass between the same, causing the folds to be creased as the bag is withdrawn. In the arrangement illustrated the segments 44 are timed to engage the bag at about the time the final creasing movement is imparted to the tucking member and the tucking member is retained in its creasing position until the bag has been withdrawn far enough for the segment and roller to grip the forward end of the valve and prevent the folds from springing apart after which the tucking member is retracted.

The segments 44 move the forward edge of the bag between feeding-out rollers 180 and 181 mounted respectively on shafts 182 and 183 journaled in the main frame and these rollers deliver the bag to a conveyor 184 of a sewing machine which carries the bag to the sewing heads where the side walls are stitched together at both ends of the bag and through the outer edge of the valve. These rollers also serve to further crease the folds in the valved corner of the bag. When the valve is completely folded a portion of the valve proper overlaps the adjacent portion of the gusset (Fig. 13) thus providing a greater thickness for the bag at that point. For this reason one or both of the feeding-out rollers may be provided with a circumferential depression, as shown at 185 in Fig. 3, to permit the passage of this thicker portion of the bag without exerting undue pressure thereon. To prevent the bag from being buckled by contact with the bite of the feeding-out rollers the latter are provided with peripheral recesses, as shown at 184 in Fig. 5, which permit the edge of the bag to enter the space between the rollers, so that the initial contact of the rollers with the bag will be at a point spaced from the forward edge thereof.

The several parts of the apparatus may be operated by mechanism of any suitable character and, in the particular construction here illustrated, the apparatus is provided with a main shaft 186 extending across the full width of the machine and journaled in the respective side members of the main frame (Figs. 3 and 5) and this main shaft is connected by beveled gearing 187 with a longitudinal drive shaft 188 which may be driven by any suitable source of power. Secured to one end of the main shaft 186 is a gear 189 which is connected through an idle

gear 190 with a gear 191 on the shaft 182 and this gear 191 meshes with a gear 192 on the shaft 183, thus rotating the feeding-out rollers 180 and 181 in opposite directions. The shaft 182 preferably carries the sprocket wheels 193 for the conveyor 184, these sprocket wheels being loosely mounted on the shafts and the conveyor being otherwise driven at a speed less than that of the feeding-out rollers, so that the lugs on the conveyor will not engage the bag until it has passed beyond the rollers.

The gear 189 on the main shaft also meshes with a gear 196 on a transverse shaft 197. The shaft 197 extends across the full width of the machine and has secured to its other end a gear 198 (Figs. 3 and 7) and this gear 198 meshes with a pinion 199 on the shaft 49. This shaft 49 is supported at one end in a bearing 201 in the frame member 22 and is supported at its intermediate portion in the sleeve 50 which is journaled in an intermediate bearing 203 carried by a bracket 204 on the main frame. The sleeve 50 is connected with the shaft 197 by means of a sprocket chain 205 which rotates the sleeve in a direction opposite the direction in which the shaft 49 is rotated. The sleeve 50 carries the rollers 48 which cooperate with the inner feeding segments 45 and the shaft 49 carries the rollers 47 which cooperate with the segments 44, thus causing these rollers to rotate in opposite directions, as hereinbefore described. The gear 199 on the shaft 49 also meshes with and drives a large gear 206 on the shaft 37 which carries the feeding segments. (Fig. 7). Meshing with the gear 206, at one side thereof, is a gear 207 carried by a shaft 208 to which is secured a gear 209 which is connected through an idle pinion 210 with the gear 59 which is secured to and rotates the sleeve 46, (Figs. 2, 7 and 9), thus causing the sleeve 46 and the shaft 37 to rotate in opposite directions. In the construction illustrated (Fig. 9) the shaft 208 is mounted in a tubular support comprising two members 211 and 212 rigidly mounted at their outer ends in frame members 21 and 22 and provided at their inner ends with opposed flanges 213 rigidly connected one to the other by bolts 214 and maintained in spaced relation by spacing members 215. The gear 209 is arranged between the flanges 213 and the pinion 210 is arranged between those flanges on a stud carried by the flanges. The part 211 of this tubular structure is provided with spaced lugs 216 which form a support for the plate which carries the stationary cam 63.

The gear 207 meshes with a gear 217 on a short shaft 218 (Figs. 2 and 7). Secured to the shaft 218 is a gear 219 which meshes with a gear 220 on the shaft 28, which carries the sprocket wheels 27 for the conveyor 26. The gear 220 meshes with a pinion 221 on the shaft 223, which shaft extends across the machine and is provided at each end with a beveled pinion 224, which pinions mesh with the beveled gears 42 on the shafts 41 which actuate the pusher plate 38. Secured to the main shaft 186 (Figs. 3 and 5) is a beveled pinion 225 which meshes with a beveled gear 226 on the cam shaft 186, thereby causing the cam shaft to rotate in accurately timed relation to the feeding mechanism. The pinion is preferably adjustable lengthwise of the shaft to conform to the adjustment of the tucking mechanism for operation on bags of different lengths. The main shaft 186 also carries the sprocket wheel 280 (Fig. 7) for the sprocket

chain 88 which drives the supplemental feeding mechanism.

While I have shown and described one embodiment of my invention I wish it to be understood that I do not desire to be limited to the details thereof as various modifications may occur to a person skilled in the art.

I claim:

1. The method of forming a valve in a gusseted bag which comprises spreading apart the adjacent lateral edges of the side walls of the bag near one end thereof to substantially straighten the end portion of the gusset, bending said end portion of said gusset while in a straightened condition about a line transverse to the gusset to a position between the side walls of the bag and in a plane intersecting the lateral edge of the bag, and then folding said bent portion of the gusset inwardly upon itself about an intermediate longitudinal line and collapsing the side walls of the bag.

2. The method of forming a valve in a gusseted bag which comprises spreading apart the adjacent lateral edges of the side walls of the bag near one end thereof to substantially straighten the end portion of the gusset, bending the straightened portion of the gusset inwardly about a line transverse to the gusset to a position between the side walls of the bag and at substantially right angles to the gusseted edge of the bag, maintaining said portion of said gusset straightened until said bending is completed, and thereafter folding said straightened portion about its median longitudinal line and collapsing the side walls of the bag upon said folded portion.

3. The method of forming a valve in a gusseted bag which comprises holding the gusset in collapsed position at a point spaced from one end of the bag, spreading apart the side walls of the bag between held point and said end of the bag to substantially straighten the end portion of the gusset, spreading apart the side walls of the bag at the end of the bag a distance greater than the width of the gusset, and tucking the straightened portion of the gusset and the corners of the side walls between the spread side walls.

4. The method of forming a valve in a gusseted bag which comprises spreading apart the side walls of the bag near one end thereof to substantially straighten the end portion of the gusset, holding the spread edges of the bag against movement at points spaced from the end of the bag, bending the straightened portion of the gusset about a line connecting said holding points to a transverse position between the side walls of the bag, folding said portion of said gusset inwardly about a line extending lengthwise thereof to fold said portion of said gusset upon itself, and collapsing the side walls of the bag.

5. The method of forming a valve in a gusseted bag which comprises spreading apart the adjacent lateral edges of the side walls of the bag near one end thereof to substantially straighten the end portion of the gusset, spreading apart the end portions of the side walls of said bag, bending the straightened portion of said gusset between said side walls to control the final folding of the valve, and folding said portion of said gusset inwardly and collapsing said side walls.

6. The method of forming a valve in a gusseted bag which comprises holding the gusset in its collapsed condition at a point spaced from

one end of the bag, spreading apart the side walls of the bag adjacent said end thereof to substantially straighten the end portion of said gusset, holding the spread edges of said bag against movement at points spaced from said end of the bag, spreading apart the end portions of the side walls of the bag, bending the straightened portion of said gusset to a transverse position between said side walls to control the final folding of the valve and then folding said portion of said gusset inwardly along an intermediate longitudinal line and collapsing the side walls of the bag.

7. In an apparatus for forming a valve in a gusseted bag, a spreading device adapted to enter the gusset at a point spaced from one end of the bag, means for actuating said device to spread apart the side walls of the bag and substantially straighten the end portion of the gusset, means for moving the straightened portion of said gusset to a transverse position between said side walls, and means for folding said transverse portion of said gusset inwardly along an intermediate longitudinal line.

8. In apparatus for forming a valve in a gusseted bag, a spreading device adapted to enter the gusset at a point spaced from one end of the bag, means for actuating said device to spread apart the side walls of the bag and substantially straighten the end portion of the gusset, means for contacting the straightened portion of the gusset along its edges, means for swinging said contacting means to move the straightened portion of said gusset to a transverse position between said side walls, and means for folding said transverse portion of said gusset inwardly along an intermediate longitudinal line.

9. In apparatus for forming a valve in a gusseted bag, a spreading device adapted to enter the gusset at a point spaced from one end of the bag, means for actuating said device to spread apart the side walls of the bag and substantially straighten the end portion of the gusset, a plate approximately the width of the straightened gusset, means to move the plate into contact with the straightened portion of the gusset and thereafter to move the plate with the contacted portion of the gusset to a position transverse of its original position between the side walls of the bag, and means for thereafter folding said transverse portion of said gusset inwardly along an intermediate longitudinal line.

10. In an apparatus for forming a valve in a gusseted bag, means for spreading apart the adjacent lateral edges of the side walls of said bag to extend the end portion of said gusset and for holding said spread edges against movement at points spaced from the end of said bag, means for moving the extended end portion of said gusset to a transverse position between said side walls, and means acting on said transverse portion of said gusset to fold the same inwardly upon itself on an intermediate longitudinal line.

11. In an apparatus for forming a valve in a gusseted bag, a spreading device adapted to enter the gusset at a point spaced from one end of the bag, means for actuating said device to spread apart the adjacent lateral edges of the side walls of the bag and substantially straighten the end portion of the gusset, a holding device arranged to be engaged by the spread side walls and cooperating with said spreading device to hold the spread edges of said walls against movement, means for bending the straightened portion of said gusset inwardly about a line adjacent said

holding device, and a tucking element to engage said inwardly bent portion of said gusset and fold the same inwardly upon itself along an intermediate longitudinal line.

12. In an apparatus for forming a valve in a gusseted bag, clamping means to retain the gusseted edge of said bag collapsed at a point spaced from the end thereof, a spreading and holding device comprising a pair of normally parallel spreading members adapted to enter the gusset of said bag and pivotally mounted for movement to diverging positions, holding members spaced from and arranged in the paths of the respective spreading members, and means for actuating said spreading members to spread apart the side walls of said bag and clamp the same between said spreading members and the respective holding members.

13. In an apparatus for forming a valve in a gusseted bag, means acting on the side walls of the bag at a point spaced from one end of the bag to separate the adjacent lateral edges of said side walls and substantially straighten the end portion of the gusset, means acting on the end portions of said side walls at points spaced from said separated edges to separate said end portions, means for moving the straightened end portion of said gusset to a transverse position between said side walls, and means for folding the transverse portion of said gusset inwardly along an intermediate longitudinal line.

14. In an apparatus for forming a valve in a gusseted bag, means acting on the side walls of the bag at a point spaced from one end of the bag to separate the adjacent lateral edges of said side walls and substantially straighten the end portion of the gusset, spreading members, means for inserting said spreading members between the end portions of said side walls at a point spaced from said separated edges thereof and for actuating the same to spread apart said side walls, means for moving the straightened end portion of said gusset to a transverse position between said side walls, and means for folding the transverse portion of said gusset inwardly along an intermediate longitudinal line.

15. In an apparatus for forming a valve in a gusseted bag, a device for spreading apart the end portions of the side walls of the bag and comprising a movable carrier, spreading members mounted on said carrier for movement therewith and with relation thereto, and means for actuating said carrier to insert said spreading members in the end of the bag and to move said members with relation to said carrier to spread apart said side walls.

16. In an apparatus for forming a valve in a gusseted bag, a device for spreading apart the end portions of the side walls of the bag, comprising a supporting structure, a carrier slidably mounted on said structure, spreading fingers pivotally mounted on said carrier, yieldable means for retaining said fingers normally in their retracted positions, means for actuating said carrier to insert said fingers in the end of the bag, and means controlled by the further movement of said carrier after said fingers have entered the end of the bag to separate said fingers and spread apart said side walls.

17. In an apparatus for forming a valve in a gusseted bag, a device for spreading apart the end portions of the side walls of the bag, comprising a supporting structure, a carrier slidably mounted on said structure, spreading fingers pivotally mounted on said carrier, yieldable means

for retaining said fingers normally in their retracted positions, means for actuating said carrier to insert said fingers in the end of the bag, guides mounted on said supporting structure, rods connected with said fingers and slidably mounted in the respective guides, stops carried by said rods at points spaced normally to the rear of said guides, said parts being so arranged that the continued movement of said carrier will cause said stops to engage said guides and move said fingers about their respective pivotal axes.

18. In an apparatus for forming a valve in a gusseted bag, means acting on the side walls of the bag at points spaced from one end of the bag to separate the adjacent lateral edges of said side walls and substantially straighten the end portion of the gusset, a folding member pivotally mounted in substantially parallel relation to said gusset, means for actuating said folding member and causing the same to engage the straightened portion of said gusset and fold the latter between the side walls of the bag, and means for thereafter folding said straightened portion of said gusset inwardly upon itself.

19. In an apparatus for forming a valve in a gusseted bag, means acting on the side walls of the bag at points spaced from one end of the bag to separate the adjacent lateral edges of said side walls and substantially straighten the end portion of the gusset, a movable carrier, a plate pivotally mounted on said carrier and supported normally in substantially parallel relation to the straightened portion of said gusset, means for moving said carrier toward said gusset and for moving said plate about its axis to fold said straightened portion of said gusset between the side walls of said bag and means for thereafter folding said gusset inwardly on an intermediate longitudinal line.

20. In an apparatus for forming a valve in a gusseted bag, a device for folding a straightened portion of the gusset of said bag between the side walls of the bag comprising a carrier movable transversely to the gusseted edge of said bag, a plate pivotally mounted on said carrier, means for actuating said carrier to move said plate toward said gusset, and means for retaining said plate in substantially parallel relation to said gusset during the initial movement of said carrier and for moving said plate about its pivotal axis during the further movement of said carrier.

21. In an apparatus for forming a valve in a gusseted bag, a spreading device to enter the gusset of the bag, means for actuating said device to spread apart the side walls of said bag and substantially straighten said gusset, a clamping device to hold the adjacent portion of said gusset collapsed during the spreading operation, said clamping device comprising a longitudinally movable sleeve, a clamping member secured to said sleeve, a rod slidably mounted in said sleeve, a clamping member secured to said rod, springs acting on said sleeve and said rod to move said clamping members toward each other, a cam actuated device acting on said sleeve and said rod to move the same against the action of said springs and hold said clamping members in spaced relation to receive between them the edge portion of a bag and to then release the clamping members for movement by said springs into clamping engagement with said bag.

22. In an apparatus for forming a valve in a gusseted bag, a device for clamping the gusseted edge of the bag at a point spaced from the end of the bag, a device for spreading apart the side

walls of said bag to substantially straighten the end portion of said gusset, a device for spreading apart the end portions of said side walls, a device for moving the straightened portion of said gusset to a transverse position between said side walls, a device for folding said transverse portion of said gusset upon itself on an intermediate longitudinal line, and means for actuating said devices in timed relation one to the other.

23. In an apparatus for forming a valve in a gusseted bag, mechanism for tucking an end portion of the gusset between the side walls of the bag to form the valve, means for feeding the bags to and from said tucking mechanism comprising feeding members rotating in opposite directions, one of said members being arranged to engage a bag and move the same toward tucking position and the other of said members being arranged to engage said bag after the valve has been formed and withdraw the same from tucking position, and means for actuating said feeding members.

24. In an apparatus for forming a valve in a bag, tucking mechanism, means for feeding bags to and from said tucking mechanism comprising a plurality of segments mounted for rotation about a common axis, means for rotating a part of said segments in one direction and for rotating another part of said segments in the opposite direction, and rollers cooperating with the respective segments, one part of said segments being arranged to engage a bag and move the same toward tucking position and the other part of said segments being timed to engage the bag after the valve has been tucked and withdraw the same.

25. In an apparatus for forming a valve in a bag, tucking mechanism, means for feeding bags to and from said tucking mechanism comprising at least two segments, means for rotating said segments in opposite directions, rollers cooperating with the respective segments, means for supporting a bag adjacent to said segments, a gripper associated with one of said segments for rotation therewith, and means for causing said gripper to engage a bag on said supporting means and move said bag between said segment and its cooperating roller and to then release said bag for movement by said segment and said roller toward tucking position, the other segment being arranged to engage said bag after the valve has been tucked and withdraw the same from said tucking mechanism.

26. In an apparatus for forming a valve in a bag, tucking mechanism, a bag support arranged in spaced relation to said tucking mechanism, a segment mounted for rotation in a path extending close to one end of said bag support, means for rotating said segment, a roller arranged close to said path in spaced relation to said end of said bag support, a gripper associated with said segment for rotation therewith, and means for actuating said gripper to cause the same to grip a bag on said support while said segment is adjacent said end of said support, to move said bag with said segment to a position between the latter and said roller and to then release said bag, said segment and said roller then cooperating to move said bag toward said tucking mechanism until said segment has moved beyond said roller.

27. In an apparatus for forming a valve in a bag, tucking mechanism, a device for positioning a bag with relation thereto, means for feeding bags to said mechanism comprising a segment

and a cooperating roller, means for rotating said segment, a gripper associated with said segment for rotation therewith, means for supporting a bag in a position to be engaged by said gripper, means for actuating said gripper to cause it to grip a bag on said supporting means and move said bag between said segment and said roller and to then release said bag for movement by said segment and said roller, and supplemental feeding means to engage said bag and move the same into engagement with said positioning device.

28. In an apparatus for forming a valve in a bag, tucking mechanism, a shaft, a sleeve rotatably mounted on said shaft, means for rotating said shaft and said sleeve in opposite directions, segments secured to said sleeve and said shaft, respectively, for rotation therewith, rollers arranged beneath the respective segments in cooperative relation thereto, means for supporting a bag above said segments, a spring actuated gripper associated with one of said segments for rotation therewith and arranged near the forward end thereof, a stationary cam acting on said gripper to retain the same in an open position during a portion of the rotation of said segment, said cam being arranged to release said gripper when it is adjacent to a bag on said supporting means and permit said gripper to engage said bag and move the latter between said segment and its cooperating roller and to move said gripper to its open position as it passes beyond said roller, thereby causing said bag to be moved toward said tucking mechanism by said segment and said roller, said rollers being so arranged with relation to said tucking mechanism that a portion of the bag will rest on said rollers during the tucking operation, and the rotation of the other of said segments being timed to cause the same to engage said bag upon completion of the tucking operation and move the bag in a reverse direction.

29. In an apparatus for forming a valve in a bag, tucking mechanism, a device for positioning a bag with relation to said mechanism, a bag supporting structure above said mechanism, a conveyor to move a bag over the supporting structure, a movable stop to limit the movement of the bags by said conveyor, means for moving the bag transversely to said conveyor to accurately position the same thereon, a feeding segment beneath the discharge end of said supporting structure, means for rotating said segment, a roller cooperating with said segment, a gripper associated with said segment for rotation therewith, means for moving said stop to an inoperative position and means for causing said gripper to engage the edge of a bag on said supporting structure during the rotation of said segment and to move said bag between said segment and said roller and to then disengage said gripper from said bag and permit the same to be moved toward said tucking mechanism by said segment and said roller.

30. In an apparatus for forming a valve in a bag, tucking mechanism, a bag supporting structure spaced from said tucking mechanism, means for moving a bag lengthwise of and transversely to said supporting structure to accurately position the same thereon, feeding mechanism having means to engage a bag on said supporting structure and move the same toward said tucking mechanism and supplemental feeding mechanism to receive the bag from the first mentioned feed-

ing mechanism and accurately position the same with relation to said tucking mechanism.

31. In an apparatus for forming a valve in a bag, a valve tucking mechanism arranged transversely to said apparatus near the rear end thereof, a structure extending forwardly from said tucking mechanism to support a bag as it moves toward and from said tucking mechanism, a second structure spaced from the first mentioned structure to support a bag for movement lengthwise of said apparatus, and feeding mechanism comprising oppositely moving feeding devices, one of said devices including means to grip a bag on said second structure, move the same transversely to its length onto said first mentioned structure and then rearwardly over said first mentioned structure toward said tucking mechanism, and the other of said devices including means to engage the bag after it has been tucked and move the same forwardly over said first mentioned structure to withdraw the same from said tucking mechanism.

32. In an apparatus for forming a valve in a bag, tucking mechanism arranged near the rear end of said apparatus to act on bags extending transversely to said apparatus, a conveyor having its receiving end near the forward end of said apparatus, a bag supporting structure extending lengthwise of said apparatus between said tucking mechanism and said conveyor, a second bag supporting structure spaced from the first mentioned supporting structure, and continuously operating feeding mechanism having means for withdrawing bags successively and at predetermined intervals from said second supporting structure, delivering said bags onto said first mentioned supporting structure in a position transverse thereto, and moving each bag rearwardly over said first mentioned supporting structure to said tucking mechanism, and also having means for moving the tucked bag forwardly over said first mentioned supporting structure and onto said conveyor prior to the delivery of the next bag to said first mentioned supporting structure.

33. In an apparatus for forming a valve in a bag, tucking mechanism, a bag support above said tucking mechanism, and feeding mechanism arranged in front of said tucking mechanism and having means to engage the forward edge of the bag on said support and move said bag forwardly with relation to said tucking mechanism and to turn said bag so that said forward edge is nearest said tucking mechanism and to then move said bag rearwardly toward said tucking mechanism.

34. In an apparatus for forming a valve in a bag, tucking mechanism, a bag support above said tucking mechanism, and feeding mechanism arranged in front of said tucking mechanism and having means to engage the forward edge of the bag on said support and move said bag forwardly with relation to said tucking mechanism and to turn said bag so that said forward edge is nearest said tucking mechanism and to then move said bag rearwardly toward said tucking mechanism, said feeding mechanism also having means to move said bag forwardly from said tucking position after the latter has acted thereon.

35. In an apparatus for forming a valve in a bag, tucking mechanism, a bag support spaced from said tucking mechanism, a feeding mechanism comprising oppositely rotating members, rollers cooperating with said rotating members,

means associated with one of said members to engage a bag on said support and move the same between said member and its cooperating roller and then release said bag for movement by said member and said roller toward said tucking mechanism, the other of said members being arranged to subsequently engage said bag and move the same from said tucking mechanism.

36. In an apparatus for forming a valve in a gusseted bag, a bag support, a rotatable feeding device having means for engaging a bag on said support and moving same beneath said device toward valve forming position, means for clamping the edge portion of the bag in valve forming position, means for spreading apart the side walls of said bag between said clamping means and the end of the bag to substantially straighten the end portion of the gusset, means for folding said straightened end portion of the gusset to a transverse position between the side walls of the bag, means for folding said transverse portion of the gusset inwardly upon itself about an intermediate longitudinal line, a second rotatable feeding device arranged to engage said bag after said valve has been folded and to move said bag in a reverse direction, and feeding-out rollers arranged to receive the bag from said second feeding device, crease the folds of the valve and discharge said bag.

37. In an apparatus for forming a valve in a gusseted bag, means for separating the side walls of the bag and extending the end portion of the gusset, a tucking member to engage the extended portion of the gusset and fold the same inwardly upon itself to form the valve, means for withdrawing the bag and creasing the valve structure, and actuating means for said tucking member timed to retain said tucking member in engagement with the folded valve until the latter has been engaged by said creasing means.

38. In an apparatus for forming a valve in a gusseted bag, means for separating the side walls of the bag and extending the end portion of the gusset, a tucking member to engage the extended portion of the gusset and fold the same inwardly upon itself to form the valve, means for withdrawing the bag from tucking position comprising rotating members having opposed arcuate surfaces arranged to compress the folded valve structure between them, and means for holding said tucking member in engagement with the folded valve until the latter has been gripped between said withdrawing members.

39. In an apparatus for forming a valve in a gusseted bag, a pair of spreading members arranged normally in adjacent and substantially parallel planes and adapted to enter the gusset at a point spaced from one end of the bag, means for pivotally supporting said spreading members on separate axes spaced one from the other, means for moving said spreading members in opposite directions about their respective axes to spread apart the side walls of the bag and substantially straighten the end portion of the gusset, and means acting on the straightened portion of said gusset to fold the same inwardly between the side walls of the bag.

40. In an apparatus for forming a valve in a gusseted bag, clamping means to hold the gusset in one edge of said bag collapsed at a point spaced from the valve end of the bag, a pair of normally parallel spreading members adapted to enter said gusset between said clamping means and said end of said bag, two substantially parallel shafts spaced one from the other and arranged on oppo-

site sides of the normal planes of said spreading members near those ends of the latter which are adjacent said clamping means, said spreading members having means for mounting said ends thereof on the respective shafts, means for moving said spreading members in opposite directions about the axes of the respective shafts to spread apart the side walls of the bag and substantially straighten the end portion of said gusset, and means acting on the straightened portion of said gusset to fold the same inwardly between the side walls of the bag.

41. In an apparatus for forming a valve in a gusseted bag, a pair of spreading members arranged normally in adjacent and substantially parallel planes and adapted to enter the gusset at a point spaced from one end of the bag, means for pivotally supporting said spreading members on separate axes spaced one from the other, means for moving said spreading members in opposite directions about their respective axes to spread apart the side walls of the bag and substantially straighten the end portion of the gusset, means for folding said straightened portion of said gusset to a transverse position between the side walls of the bag, and means to fold said transverse portion of said gusset upon itself along an intermediate longitudinal line.

42. In an apparatus for forming the valve of a gusseted bag having its valve end formed from the gusset on a fold line established transverse the gusset and diagonal fold lines tapering inwardly therefrom to the center fold line of the gusset and diagonal fold lines tapering outwardly therefrom to the open edges of the bag, comprising means to deliver the bag to the valve forming device with the gusseted edge foremost, spreading plates arranged to enter the gusset and spread the gusset, and having slanting edges arranged to substantially establish the first noted diagonal fold lines and by their outer ends to establish the transverse fold line, means for clamping the gusset closed at a point inwardly from the said spreading plates, means arranged to enter and spread the open end of the bag at points substantially where the outwardly tapering fold lines intersect the end edges of the bag thereby establishing said outwardly tapering fold lines, a folding plate arranged to engage the spread end of the bag gusset and fold it in along the transverse fold line, as defined by the outer ends of the spreading plates, and a finger arranged to engage the spread and folded back gusset end along the center line of the gusset thus tucking in a valve along the said outwardly tapering lines of fold.

43. In an apparatus for forming the valve of a gusseted bag having its valve end formed from the gusset on a fold line established transverse the gusset and diagonal fold lines tapering inwardly therefrom to the center fold line of the gusset and diagonal fold lines tapering outwardly therefrom to the open edges of the bag, comprising means to deliver the bag to the valve forming device with the gusseted edge foremost, spreading means including plates arranged to enter the gusset and spread the gusset, and having slanting edges arranged to substantially establish the first noted diagonal fold lines and by their outer ends to establish the transverse fold line, means for clamping the gusset closed at a point inwardly from the said spreading plates, means arranged to enter and spread the open end of the bag at points substantially where the outwardly tapering fold lines intersect the end edges of the bag

thereby establishing said outwardly tapering fold lines, a folding plate arranged to engage the spread end of the bag gusset and fold it in along the transverse fold line, as defined by the outer ends of the spreading plates, and a finger arranged to engage the spread and folded back gusset end along the center line of the gusset thus tucking in a valve along the said outwardly tapering lines of fold, the first mentioned spreading means including members arranged to engage and clamp the outer faces of the gusset walls to the said spreading plates as they are operated.

44. In an apparatus for forming the valve of a gusseted bag having its valve end formed from the gusset on a fold line established transverse the gusset and diagonal fold lines tapering inwardly therefrom to the center fold line of the gusset and diagonal fold lines tapering outwardly therefrom to the open edges of the bag, comprising means to deliver the bag to the valve forming device with the gusseted edge foremost, spreading means including plates arranged to enter the gusset and spread the gusset, and having slanting edges arranged to substantially establish the first noted diagonal fold lines and by their outer ends to establish the transverse fold line, means for clamping the gusset closed at a point inwardly from the said spreading plates, means arranged to enter and spread the open end of the bag at points substantially where the outwardly tapering fold lines intersect the end edges of the bag thereby establishing said outwardly tapering fold lines, a folding plate arranged to engage the spread end of the bag gusset and fold it in along the transverse fold line, as defined by the outer ends of the spreading plates, and a finger arranged to engage the spread and folded back gusset end along the center line of the gusset thus tucking in a valve along the said outwardly tapering lines of fold, the first mentioned spreading means including members arranged to engage and clamp the outer faces of the gusset walls to the said spreading plates as they are operated, and operating means for the above noted parts being arranged to hold the spreading plates and last mentioned spreading means in operated position while the folding plate initiates its movement and relax the same when the operation of the finger takes place.

45. In an apparatus for forming the valve of a gusseted bag having its valve end formed from the gusset on a fold line established transverse the gusset and diagonal fold lines tapering inwardly therefrom to the center fold line of the gusset and diagonal fold lines tapering outwardly therefrom to the open edges of the bag, comprising means to deliver the bag to the valve forming device with the gusseted edge foremost, means to grip the gusset to hold it closed and to open the gusset between the gripping means and the lateral open edge along the first named diagonal lines so as to establish the fold line transverse the gusset, means thereafter to open the bag so as to extend the same to straighten out the gusset along the second named diagonal lines, means thereafter to lay over the expanded portion of the gusset on the said transverse line, means thereafter to engage the center line of the laid over gusset portion and bend it inwardly to tuck the said laid over gusset portion within the walls of the open side of the bag, the operation of said means being accompanied by relaxation of both spreading means, and means timed thereupon to engage the bag and feed it away in the opposite

direction of the path of delivery, the said clamping means arranged to release the gusseted edge of the bag previous to the feeding away means coming into operation.

46. In an apparatus for forming a valve in one corner of a bag, means for moving a bag to a predetermined position, means operating in timed relation to the first mentioned means to turn said bag edge over edge to a reverse position and feeding the reversed bag to a second predetermined position, means operating in timed relation to said feeding means to form a valve in said bag while it is in said second predetermined position, and means for feeding the valved bag from said second predetermined position in a direction opposite its direction of movement toward that position.

47. In an apparatus for forming a valve in one corner of a bag, means for moving a bag to a predetermined position, means operating in timed relation to the first mentioned means to turn said bag edge over edge to a reverse position and feeding the reversed bag to a second predetermined position, means operating in timed relation to said feeding means to form a valve in said bag while it is in said second predetermined position, sewing mechanisms for stitching the ends of said bags, and means for feeding the valved bag from said second predetermined position in a direction opposite its direction of movement toward that position to said sewing mechanisms, said bag being moved at all times in a direction parallel with the ends thereof, whereby said ends thereof will be presented to the respective sewing mechanisms.

48. In an apparatus for forming a valve in a bag, a tucking mechanism arranged near the rear end of said apparatus to act on a bag extending transversely to said apparatus, discharge mechanism adjacent the front end of said apparatus, a bag supporting structure extending forwardly from said tucking mechanism lengthwise of said apparatus substantially to said discharge mechanism, and feeding mechanism having means for delivering bags successively and at predetermined intervals to said supporting structure in a position transverse thereto and for moving a bag rearwardly transversely to its length from said structure to said tucking mechanism, and also having means for moving the tucked bag forwardly over said supporting structure and delivering the same to said discharge mechanism prior to the delivery of the next succeeding bag to said structure.

49. In an apparatus for forming a valve in a bag, tucking mechanism arranged near the rear end of said apparatus to act on a bag extending transversely to said apparatus, discharge mechanism adjacent the forward end of said apparatus, a bag supporting structure extending forwardly from said tucking mechanism lengthwise of said apparatus substantially to said discharge mechanism, a second bag supporting structure spaced from the first mentioned supporting structure, and feeding mechanism having means for moving bags successively and transversely to their length from said second supporting structure onto the forward portion of said first mentioned supporting structure and for moving each bag rearwardly and transversely to its length over said

first mentioned supporting structure to said tucking mechanism, and also having means for moving the tucked bag forwardly over said first mentioned supporting structure and delivering the same to said discharge mechanism before the next succeeding bag is moved onto said first mentioned supporting structure.

50. In an apparatus for forming a valve in a bag, tucking mechanism arranged near the rear end of said apparatus to act on a bag extending transversely to said apparatus, discharge mechanism adjacent to the forward end of said apparatus, a bag supporting structure extending forwardly from said tucking mechanism lengthwise of said apparatus substantially to said discharge mechanism, a second bag supporting structure spaced above the first mentioned supporting structure, and feeding mechanism having means for moving bags successively from the upper supporting structure, each with that edge in which the valve is to be formed foremost, delivering each bag onto the forward portion of the lower supporting structure with the edge in which the valve is to be formed facing said tucking mechanism and moving said bag rearwardly over said supporting structure to said tucking mechanism, and also having means for moving the tucked bag forwardly over the lower supporting structure and delivering the same to said discharge mechanism prior to the delivery of the next succeeding bag to said lower supporting structure.

51. In an apparatus for forming a valve in one corner of a bag, valve tucking mechanism at one end of said apparatus, a bag supporting structure arranged at a higher level than said tucking mechanism, means to withdraw a bag from said supporting structure and move the same with its valve edge foremost lengthwise of said apparatus to said tucking mechanism, a conveyor moving lengthwise of said apparatus with its receiving end spaced from said tucking mechanism, and means for withdrawing said bag from said tucking mechanism and moving the same lengthwise of said apparatus and beneath said supporting structure to said conveyor with its valve edge rearmost.

52. In an apparatus for forming a valve in one corner of a bag, valve tucking mechanism, a bag supporting structure leading to said tucking mechanism, a second bag supporting structure spaced from said tucking mechanism and from the first-mentioned supporting structure and having means for moving the bag transversely thereto to accurately position the same lengthwise with relation to said tucking mechanism, means for withdrawing a bag from said second supporting structure, moving the same over said first-mentioned supporting structure to said tucking mechanism with its valve edge foremost and maintaining the same in said lengthwise adjusted position during said movements, and means for withdrawing said bag from said tucking mechanism in a reverse direction in the same path through which it moved toward said tucking mechanism and removing the same from said path prior to the delivery of a succeeding bag to said path.

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