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METHOD AND APPARATUS FOR FORMING VALVES IN BAGS

Filed Jan. 28, 1929

10 Sheets-Sheet 1

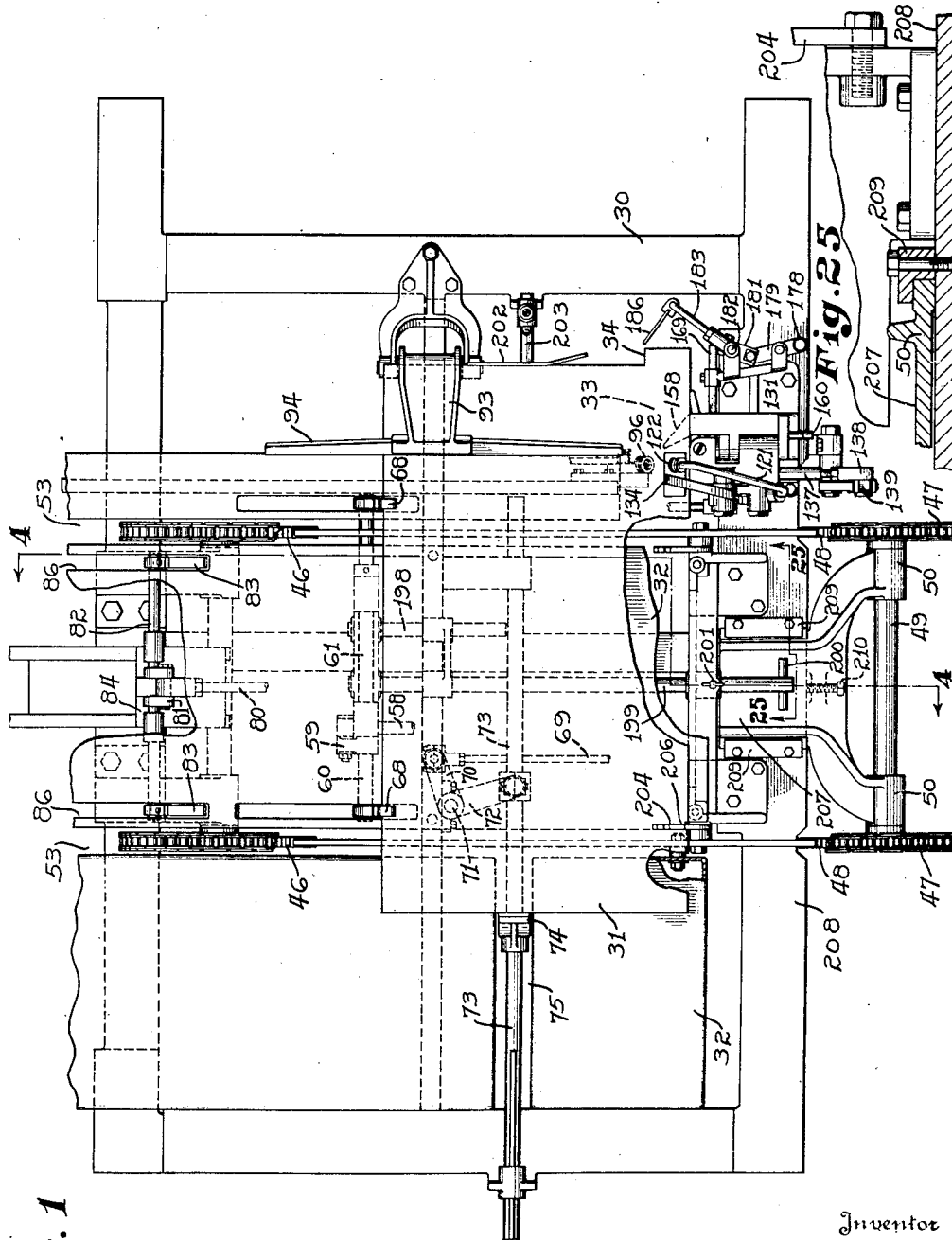


Fig. 1

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10 Sheets-Sheet 2

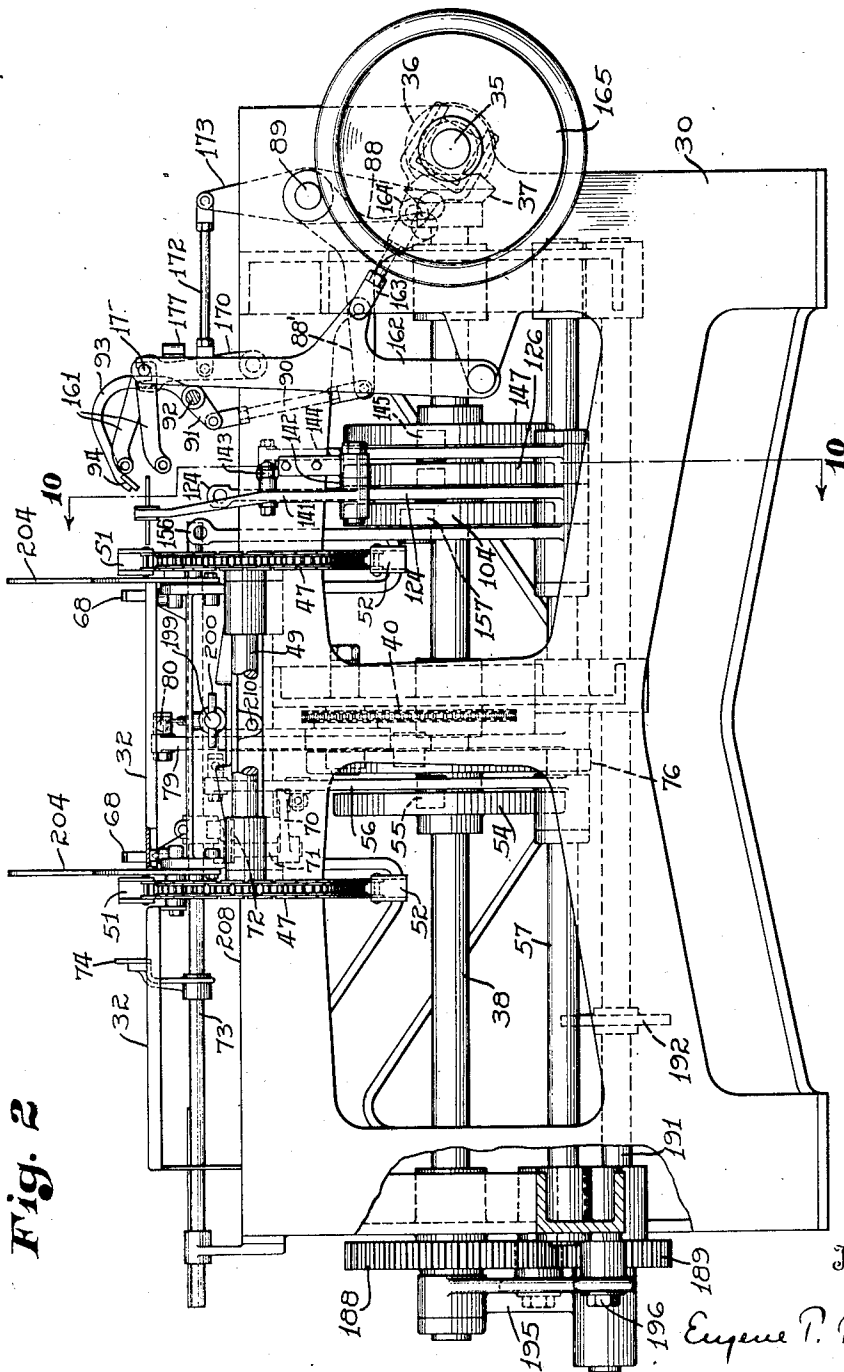


Fig. 2

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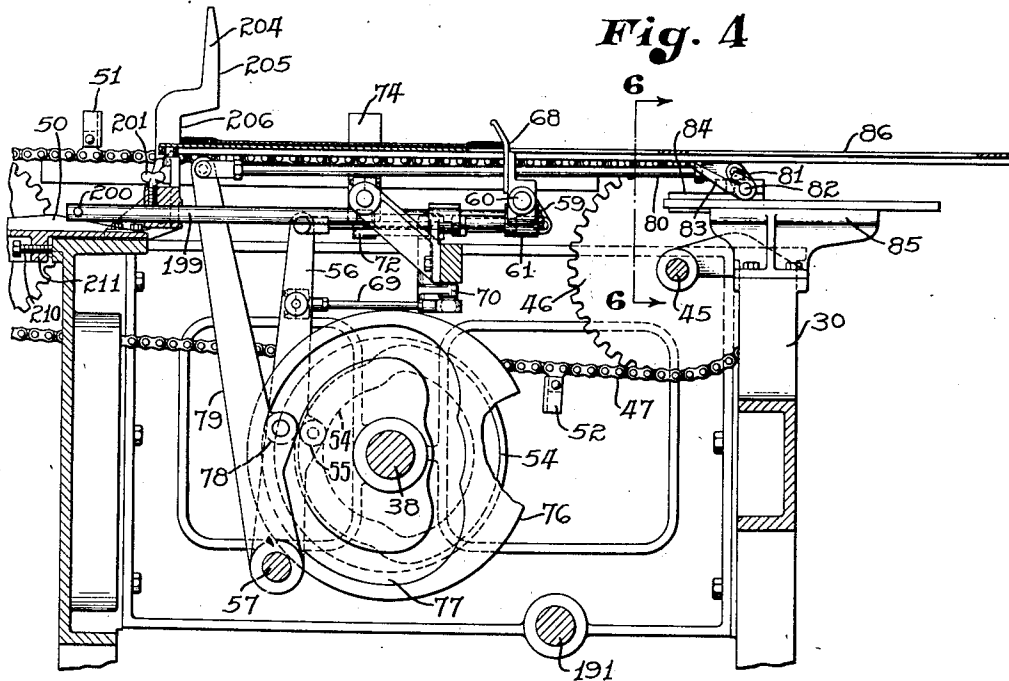
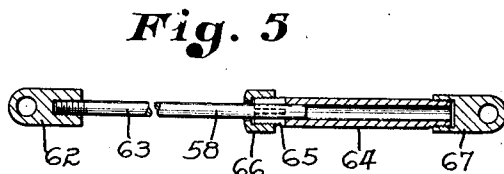
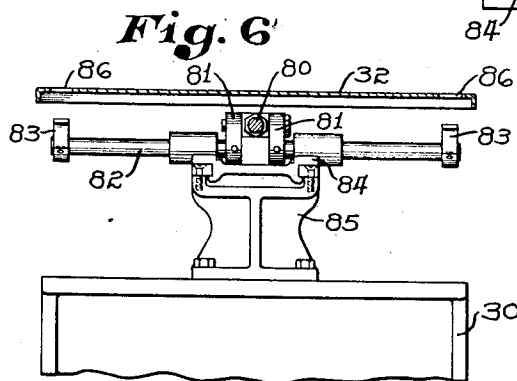
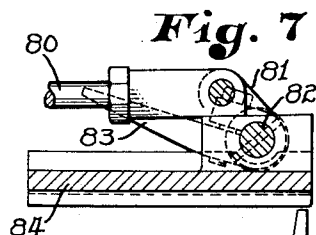
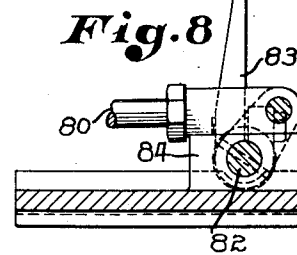
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METHOD AND APPARATUS FOR FORMING VALVES IN BAGS

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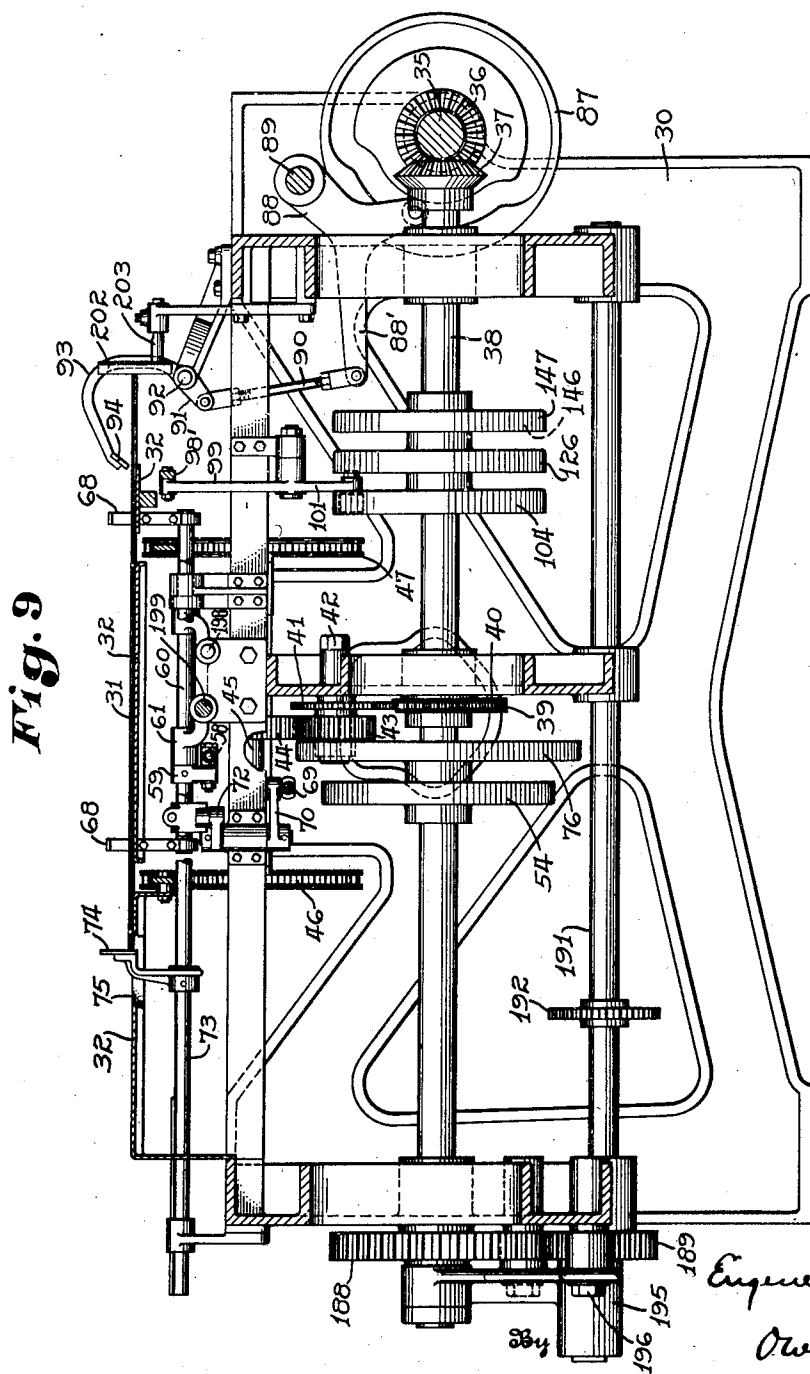
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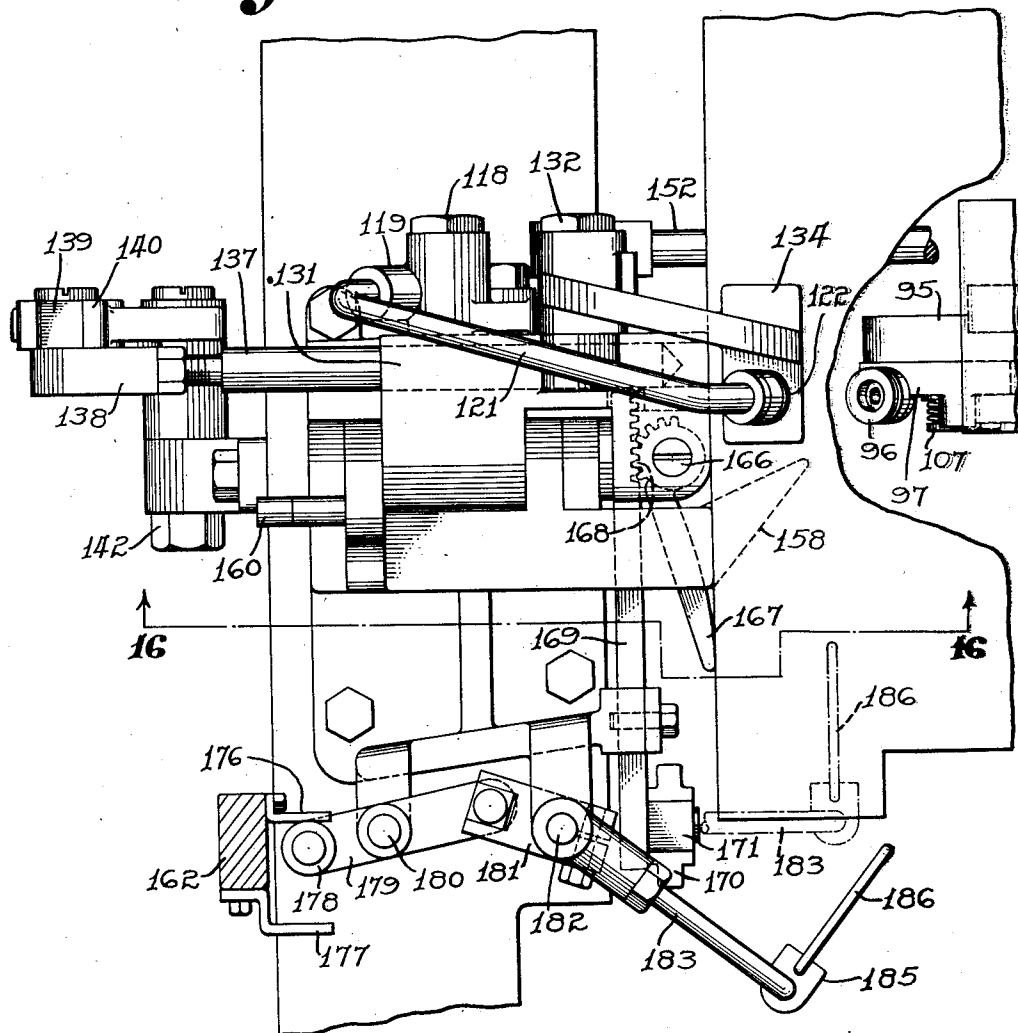
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Fig. 15



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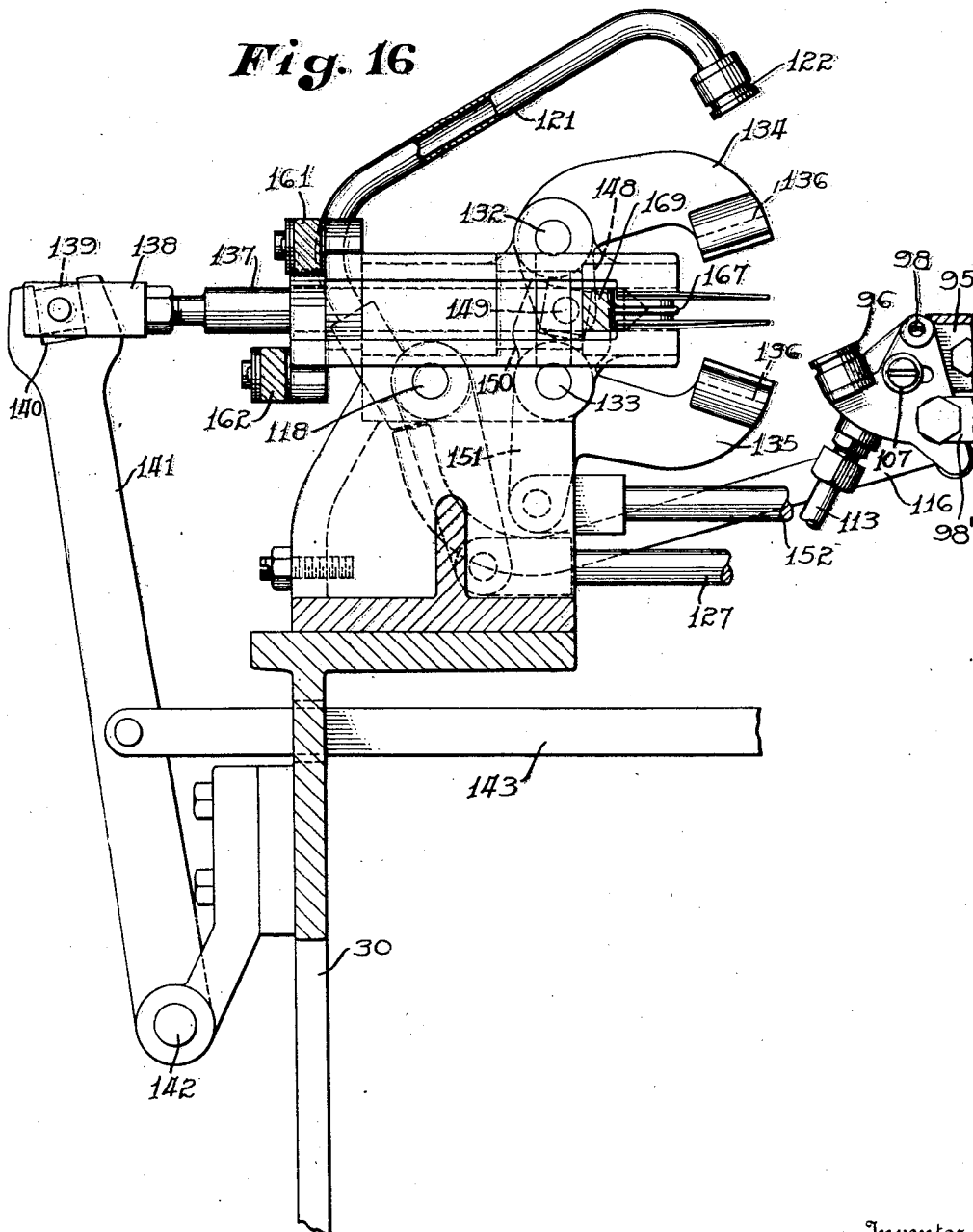
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METHOD AND APPARATUS FOR FORMING VALVES IN BAGS

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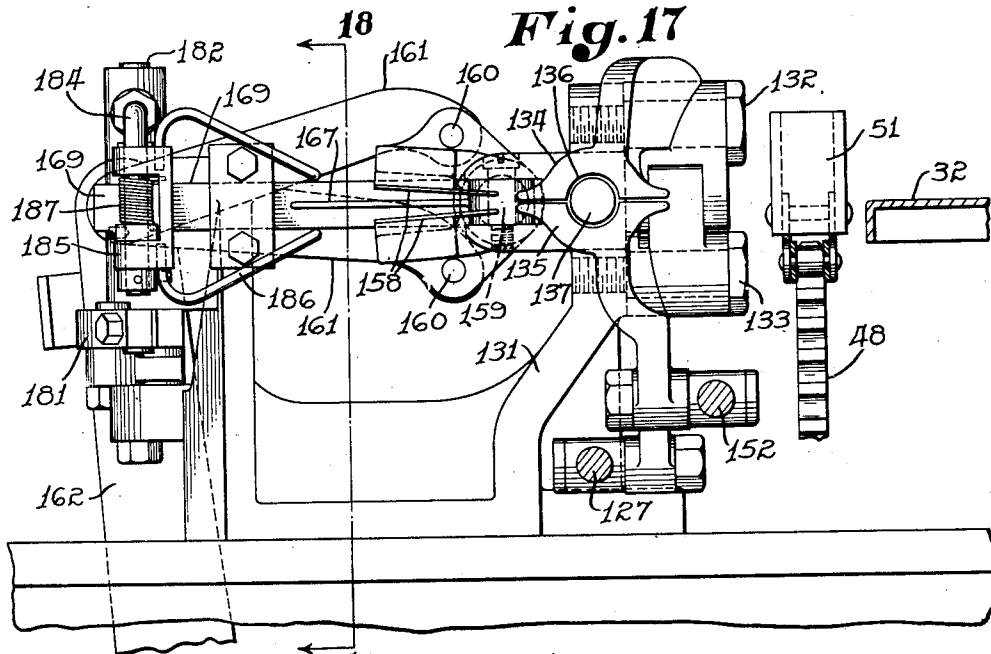
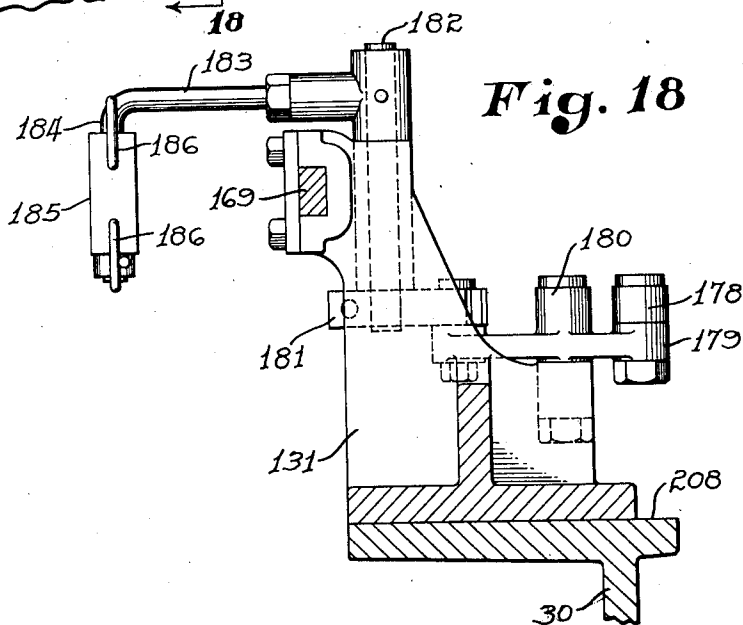
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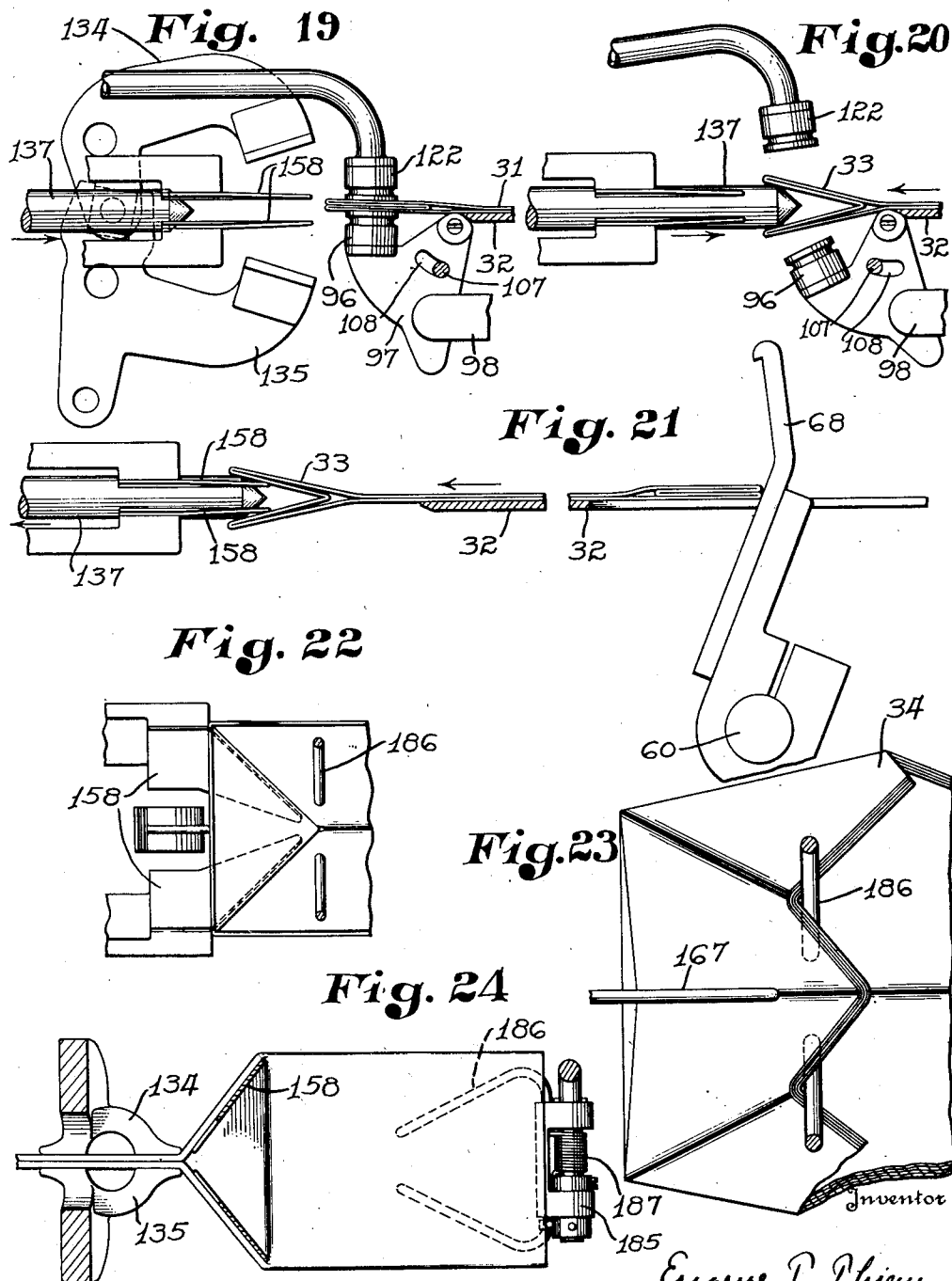
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UNITED STATES PATENT OFFICE

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METHOD AND APPARATUS FOR FORMING VALVES IN BAGS

Application filed January 28, 1929. Serial No. 335,533.

This invention relates to a method and apparatus for forming valves in bags. It is particularly directed to the tucking in of the corner of a gusseted bag to form a valve therein when the end of the bag is closed, although some features of the invention may be applied to a similar formation of the valve in bags which do not have gusseted sides.

The invention relates to a method and apparatus similar to that set forth and claimed in a patent to Bates and Dorr, No. 1,682,107, issued August 28, 1928, and is principally directed to refinements and improvements upon that method and apparatus.

The improvements particularly relate to the method and apparatus for positioning the bag length in operative relation to the valve-folding mechanism and to guide fingers which assist in directing the folds formed by the mechanism. Other features of the method and apparatus will appear as the description proceeds.

Throughout the several views of the drawings forming a part of this specification, parts are removed or broken away for purposes of illustration, and this fact may be understood in connection with the brief description of each view.

Figure 1 is a plan view of apparatus embodying the invention; Fig. 2 is an elevation of the apparatus shown in Figure 1 viewed from the bottom of that figure; Fig. 3 is an elevation of the apparatus viewed from the right of Figs. 1 and 2; Fig. 4 is a vertical section approximately on the line 4—4 of Fig. 1; Fig. 5 is a section of a detail; Fig. 6 is a detail of the discharging pusher; Fig. 7 is an enlarged view of a detail of the discharge pusher as shown in Fig. 4; Fig. 8 is a view of the same parts shown in Fig. 7, but in a different position; Fig. 9 is a vertical section on the line 9—9 of Fig. 3; Fig. 10 is a partial section on the line 10—10 of Fig. 2; Figs. 11 and 12 are enlarged detail views showing different positions of a vacuum cup illustrated in Fig. 10; Fig. 13 is a section approximately on the line 13—13 of Fig. 12; Fig. 14 is a section of another portion of the vacuum cup connections; Fig. 15 is an enlarged plan view of the valve-folding mechanism; Fig. 16 is a partial section on the line 16—16 of Fig. 15; Fig. 17 is an enlarged detail elevation of the valver mechanism; Fig. 18 is a section on the line 18—18 of Fig. 17; Figs. 19, 20 and 21 are detail partially diagrammatic views of successive positions of the parts during the feeding of the bag into position on the valver; Figs. 22, 23 and 24 are detail diagrammatic views illustrating different stages of the operation of the guide fingers and tucking-in fingers during the folding-in of the valve; Fig. 25 is a detail sectional view on the line 25—25 of Fig. 1.

The mechanism constituting this invention may be mounted upon any suitable framework. In the drawings, it is indicated as being mounted upon a frame generally designated by 30 and providing proper supports for the various working parts. The apparatus is adapted to be fed by any suitable means such as that illustrated in my co-pending application for apparatus for feeding bags, Serial No. 307,835, filed September 24, 1928, which is adapted to drop bag blanks in succession upon a table 32. The bag blank is provided with a gusset fold 33 and, in the form illustrated, has one corner extended at 34, it being the chief purpose of this invention to tuck in this extended corner to form a valve.

Mounted at one end of the frame there is a shaft 35 having thereon a gear 36 in mesh with a gear 37 on the end of a shaft 38 mounted longitudinally of the frame. Mounted on shaft 38 midway of the frame there is a sprocket wheel 39 which drives a chain 40 running over a sprocket wheel 41 mounted on a shaft 42 which carries a spur gear 43 in mesh with a spur gear 44 on a shaft 45. Shaft 45 carries two large sprocket wheels 46 over which there run bag-pushing chains 47. The other ends of the driving chains are mounted upon sprocket wheels 48 mounted on a shaft 49 supported in brackets 50 extending from the side of the machine on which the valve-forming apparatus is mounted. In the construction shown, the pushing chains 47 carry two pairs of pushing lugs 51 and 52. The chains run in slots 53 in table 32, the pushing members 51 and 52

Mounted at one end of the frame there is a shaft 35 having thereon a gear 36 in mesh with a gear 37 on the end of a shaft 38 mounted longitudinally of the frame. Mounted on shaft 38 midway of the frame there is a sprocket wheel 39 which drives a chain 40 running over a sprocket wheel 41 mounted on a shaft 42 which carries a spur gear 43 in mesh with a spur gear 44 on a shaft 45. Shaft 45 carries two large sprocket wheels 46 over which there run bag-pushing chains 47. The other ends of the driving chains are mounted upon sprocket wheels 48 mounted on a shaft 49 supported in brackets 50 extending from the side of the machine on which the valve-forming apparatus is mounted. In the construction shown, the pushing chains 47 carry two pairs of pushing lugs 51 and 52. The chains run in slots 53 in table 32, the pushing members 51 and 52

extending above the top of the table so as to engage the bag and move it away from the valving apparatus at desired intervals.

Mounted upon shaft 38 there is a cam 54 against which there operates a cam roller 55 mounted upon a lever 56 fulcrumed upon a shaft 57 and extending upward towards table 32. The upper end of lever 56 is connected by a composite link 58, shown in detail in Figure 5, to an arm 59 on shaft 60 mounted in block 61. As shown in Fig. 5, link 58 comprises an attachment member 62 which is pivoted on lever 56 and a rod 63 screwed into member 62 and at the other end extending into a sleeve 64. Sleeve 64 has its end 65 split and threaded, the outside being shaped conically so that this end 65 may be clamped upon rod 63 by means of a nut 66 screwed on the conical thread. The other end of sleeve 64 is screwed into a member 67 pivoted to arm 59. Extending upward from shaft 60 are positioning members 68. Block 61 is mounted adjustably in a manner which will be described later.

At an intermediate point, lever 56 is connected to one end of a link 69, the other end of which is pivoted to an arm 70 of a rock shaft 71. The upper end of rock shaft 71 has an arm 72 pivoted to a slide rod 73 on the end of which there is mounted a positioning finger 74 extending upward through a slot 75 in table 32.

Mounted upon shaft 38 adjacent to cam wheel 54 there is a cam wheel 76 having a cam groove 77 in which there runs a roller 78 on lever 79 fulcrumed on rod 57 and extending upward towards table 32. The upper end of lever 79 is connected by a link 80 to an arm 81 on a rock shaft 82. Fastened on rock shaft 82 there are pushing fingers 83. Rock shaft 82 is mounted in a block 84 sliding on the upper side of a bracket 85 mounted on the frame just beneath table 32. There are slots 86 in table 32 through which fingers 83 are adapted to project and reciprocate in a manner which will be described later.

The above described parts have to do with the positioning of the bag in operative position in relation to the valver and removing the bag from the valver. While fingers 68 and 74 are positioning the bag in operative relation with the valver, there is a member that holds the end of the bag down so that it lies flatly upon the table and members which open the gusset of the bag so that valve-forming members enter the gusset. These devices will be described next.

Mounted upon shaft 35 there is a cam wheel 87 which operates a lever 88 fulcrumed on a shaft 89. The lever 88' has an arm extending to the left, as viewed in Fig. 2, and connected to the end of this arm there is a link 90 connected to an arm 91 extending from a rock shaft 92. Attached to the rock shaft 92 there is a hook-shaped member 93 having

on the end thereof an elongated member 94 adapted to press downward on the end of the bag when actuated by cam 87.

Upon a block 95 immediately beneath table 32 and adjacent the valver, there is a mounting for a vacuum cup 96. (See Figs. 10 to 16.) This vacuum cup is mounted directly upon a plate 97 pivoted at 98 to block 95 and the plate is connected by a link 98' to an arm 99 of a lever fulcrumed at 100 and having a downwardly extending arm 101 carrying a cam roller 102 in position to be engaged by a cam 103 on the periphery of a cam wheel 104 mounted on shaft 38. A spring 105 normally holds cam roller 102 in contact with the periphery of cam wheel 104 or against cam 103. Link 98' is composed of two members joined by a slot 106 and bolt connection so that it is adjustable in length.

A screw 107 passes through a slot 108 in plate 97 into support 95, and limits the oscillation of plate 97. Vacuum cup 96 is connected by a passage 109 in plate 97 to a chamber 110 which opens at the inner face of member 97 that slides against block 95. Plate 97 is held firmly against block 95 by a spring 111 between plate 97 and the head of bolt 107. Block 95 is provided with a chamber 112 with which chamber 110 registers at certain intervals. A pipe 113 leads from chamber 112 to any suitable means for exhausting air. Extending downward from chamber 110 in plate 97 there is a passage 114 to the end of which there is connected a stud pipe 115 on which there may be mounted one end of a flexible hose 116.

Mounted on a bracket 131 there is a pivot member 118 for a block 119 having therein a passage 120. Into the upper end of passage 119 there is screwed a pipe 121 which is hooked over and then downward and carries on its end a vacuum cup 122 adapted to be positioned above vacuum cup 96. The lower end of passage 120 is connected to a stud pipe 123 upon which an end of hose 116 is slipped. In this manner both vacuum cups 96 and 122 are connected to chamber 110 in plate 97.

Mounted upon shaft 57 there is a lever 124 having a cam roller 125 working in a groove 126' in cam wheel 126 mounted on shaft 38. Through the upper end of lever 124 there slides a rod 127 having thereon fixed collars 128 and 129, there being a spring 130 between the end of lever 124 and collar 129. The other end of rod 127 is pivoted at 128' to an arm 129' on shaft 118. By this means vacuum cups 96 and 122 are oscillated by the operation of the cam projection 103 and groove 126' respectively.

In a bracket 131 there are mounted pivots 132 and 133 for clamping members 134 and 135. See Figs. 1, 3, 15, 16 and 17. The clamping ends of these clamping members are grooved at 136 to receive a spreading rod 137. Threaded on the end of rod 137 there is a

connection 138 to which there is pivoted a block 139 sliding in the forked end 140 of a lever 141 fulcrumed at 142. A link 143 pivoted intermediate of the length of lever 141 is connected at its other end to a lever 144 mounted on shaft 57 and operated by a roller 145 running in a cam groove 146 in a cam wheel 147.

Upper clamping member 134 has a downwardly projecting arm 148 having a pin and block 149 working in the forked end of an arm 150 extending upward from the lower clamping member, so that said members are forced to move simultaneously towards or away from a bag placed between them. The lower clamping member has a downwardly extending arm 151 to which there is pivoted a link 152, the other end of which carries collars 153 and 154. A spring 155 is positioned around link 152 and against collar 154. The upper end of a lever 156 receives link 152 and is pressed against collar 153 by spring 155. Lever 156 carries a cam roller 157 running in a suitable groove in cam 104.

Adapted to enter the gusset fold of the bag are spreading wings 158 pivoted at 159 on bracket 131. Pins 160 project from the spreaders, and links 161 are pivoted to these pins and to a lever 162. A drive member 163 has one end pivoted to lever 162 and its other end forked and sliding over shaft 35. A cam roller 164 on member 163 runs in a groove in cam 165 and controls lever 162 and spreaders 158.

Mounted on a pivot 166 and adapted to swing between spreaders 158 there is a tucking finger 167. The rear end of the finger is provided with teeth 168 which mesh with the teeth of a rack bar 169. A lever 170 extending upward from the frame engages block 171 on rack bar 169. A link 172, connected to lever 170 midway of its length, is pivoted to the upper end of a lever 173 fulcrumed on shaft 89. The lower end of lever 173 is actuated by a cam 174 on shaft 35.

On lever 162, beneath pin 175 on which links 161 are mounted, there are projected stops or lugs 176 and 177 which engage alternately a roller 178 on the end of a lever 179 fulcrumed at 180. The other end of lever 179 engages an arm 181 adjustably fixed on the lower end of a rock shaft 182. The upper end of shaft 182 carries an arm 183 having a downwardly turned end 184 on which there is mounted a bracket 185 carrying guiding fingers 186. A spring 187 normally holds bracket 185 in the position in which it is shown in Figs. 1 and 15, but allows it to yield and turn on end 184 when the fingers meet resistance.

At the left end of shaft 38 as viewed in Fig. 2 there is a gear 188 meshing with a gear 189 which in turn engages a gear 190 on the end of a shaft 191 which carries a sprocket 192 driving a chain 193. By means of

chain 193 can be driven the necessary mechanism for closing the ends of bag blanks after they are discharged from the valving apparatus. A sewing head 194 is indicated diagrammatically in Fig. 3 in position to close one end of a bag blank.

Gear 189 is mounted in a frame 195 which is adjustable about shaft 38 so as to allow for the use of gears 190 of different sizes. Bolts 196 passing through slots 197 in frame 195 hold it in adjusted position. By using a gear 190 of the required size, the valving mechanism can be driven at a speed to suit the constant speed of the sewing machine which in turn will close bag blanks valved on this machine, the gear 190 being selected in accordance with the width of the blanks being valved.

When the machine is to be adjusted for bag blanks of a different width, not only is gear 190 changed, but positioning fingers 68 are relocated.

Block 61 is supported on two rods 198 and 199 slidable in suitable supports on the frame. Rod 199 extends to the side of the frame where it terminates in a handle 200. After nut 66 has been loosened, block 61 may be adjusted to the desired position by sliding rod 199 in its supports, after which set screw 201 is tightened so that link 58 operates fingers 68 correctly in their new position.

It is obvious that finger 74 may be adjusted on rod 73 to bring the desired length of bag blank into position against a stop 202 mounted upon a rod 203 adjustable on the frame so as to bring the end of the bag blank into correct relation with the valving apparatus.

With adjustments made for the size of blank to be operated upon, the apparatus operates as follows.

A bag blank may be placed upon the table in any suitable manner, but apparatus disclosed in my copending application for apparatus for feeding bags, Ser. No. 307,835, filed September 24, 1928, discloses an apparatus particularly adapted for this purpose, by which successive bag blanks can be dropped accurately in timed relation with the valving apparatus. In Fig. 4, a member 204 is illustrated having a surface 205 against which the edge of the bag may rest when it is dropped, so as to guide the bag into proper position on the table. It will be understood that similar guides may be placed on other sides of the bag, as is shown in the above-identified application.

By whatever means the blank is fed to the apparatus it is placed between finger 74 and stop plate 202 and between the valving apparatus and positioning fingers 68. With the bag in this position, cups 96 and 122 are moved against the gusset folded portion of the bag, compressing it slightly, so that the cups make good contact with the surfaces of

the bag. As plate 97 carrying cup 96 is swung into the position in which it is shown in Figs. 12 and 19, vacuum chamber 110 is brought into registry with chamber 112 in block 95 and thereby cup 96 is connected through pipe 113 to any suitable means for evacuating air therefrom. At the same time cup 122 is connected to the same evacuating means through pipe 116 and passage 114. Due to the elongation of the slot in the side of chamber 110, illustrated in Figs. 11 and 12, this connection continues until the cups have been separated far enough to open up the gusset fold. Just as the cups start to separate, finger 137 is operated to move towards the bag, and its shaped end enters between the folds of the gusset just as the vacuum cups reach the point where they are disconnected from the source of vacuum.

When rod 137 is in its forward position, which is about one half inch into the gusset fold of the bag, pushers 68 and 74 begin to move to push the bag against stops 202 and 204. This movement of the bag has a tendency to spread the gusset even wider than rod 137 spreads it, and therefore valving wings 158 readily enter the gusset of the bag as it moves against the stops. Stops 202 and 204 are so located that a bag pushed into position thereagainst is correctly located with respect to the valving mechanism, and it will be readily seen that each bag is moved to the same position with respect to the valving mechanism, so that the mechanism acts uniformly on successive bags. Finger 137 withdraws as the bag is moved towards the valving device, but remains in the gusset fold until after the edges of the gusset fold have passed respectively, above and beneath spreading wings 158.

Lever 88 is oscillated by cam 87 and moves member 94 over the end of the bag and downward so as to compel the end of the bag to lie flat upon the table, but not so as to act as a clamp.

When the bag has been moved to proper position, as described above, clamp plates 134 and 135 are brought together so as to clamp the bag firmly between them. The plates are spring mounted, so that they can press against bags of different thicknesses without the necessity of adjustment.

Immediately after the bag is clamped in position as described above, the spreading wings are spread apart as indicated in Fig. 22. Just before the spreading of the wings is completed, lug 177 encounters roller 178 and moves fingers 186 from their full line position in Fig. 15 towards their dotted line position in that figure. At the same time, cam 174 through lever 173, connecting rod 172 and lever 170, operates tucking finger 167. Tucking finger 167 operates with fingers 186, as illustrated in Fig. 23, guiding the end of the valve extension 34 so that the upper and

lower sides thereof, as viewed in Fig. 23, are folded along evenly placed fold lines. When fingers 186 are omitted, the paper sometimes slips past the end of finger 167 so that more paper is above or below the finger than is on the other side thereof, resulting in an uneven folding of the valve. Fingers 186 are to prevent this uneven folding. It will be readily understood that during this tucking in operation the fingers may yield by the operation of spring 187, which furnishes the necessary resistance to give the fingers the desired wiping action against the end of the valve flap as it is being folded in.

After the flap is thus tucked in, lever 162 is given a reverse movement, which returns the spreading wings to their horizontal position. Just before the completion of this movement, lug 176 encounters roller 178 and removes fingers 186 from the end of the bag. The spreading wings are released, so as not to press the folded in material between them, and the tucking finger is returned towards the position in which it is shown in Fig. 15, and clamps 134 and 135 are separated, so that the bag is free to move away from the valving mechanism. Then lugs 51 on chains 47 encounter the edge of the bag and move it towards the right, as viewed in Fig. 3. It will be understood that in the construction shown, chains 47 are run continuously and are so spaced that they allow a bag blank to be dropped in position on the table after one pair of lugs 51 have shoved the preceding blank away from valving position, and allow for the positioning and valving of this next blank before the other pair of lugs 51 encounter the same.

Bracket 50 in which shaft 49 is mounted has a slide member 207 resting upon the side rail 208 of frame 30 and held in place thereon by guides 209. A screw 210 operates through a lug 211 on brackets 50 and bears against the frame so that bracket 50 may be forced outward from the frame to maintain the pushing chains as tight as desired.

Pushing fingers 83 are reciprocated through such a path that when they are raised from the position in which they are shown in Figs. 1 and 7, by the movement to the right of rod 80, they encounter the edge of the bag discharged by pushers 51 and push it until it is fed to the feeding mechanism of sewing head 194. The movement of pushing fingers 51 is comparatively rapid so that the bag is removed quickly from its valving position after the valve is formed, to make room for another bag. The motion of fingers 83 is comparatively slow, being preferably substantially the same as that of the feeding means for the sewing machine, so that the bag is fed to the sewing machine at substantially the same rate that it is moved there-through, when narrow bags are being operated upon. This avoids the irregularity in the

feeding of the bag to the sewing machine which would result from a speedy movement of the bag which continued until it entered the feeding means of the sewing machine.

5 This comparatively rapid movement of the bag away from valving position and comparatively slow final movement of the bag to the sewing machine is one of the important features of this invention.

10 The parts are arranged preferably so that fingers 83 push a narrow bag just to the feeding means of the sewing head. When wider bags are valved and sewed, the gears are arranged so that fewer valves are formed for a
15 given length of seam sewed by the sewing head, and accordingly all parts of the valver, including fingers 83, move more slowly relative to the speed of the sewing head. Fingers 83 continue to move in their pushing direction
20 after such a wider bag has entered the sewing machine, but as the fingers move slower than the feeding means of the sewing head when such a bag is being sewed, said feeding means moves the bag forward away from, and
25 independently of, the fingers. Accordingly different widths of bags may be valved and sewed by substitution of gears 190 without adjustment of fingers 83.

Another important feature of this invention
30 is the arrangement for opening the gusset and placing it upon the spreading fingers of the valve-forming apparatus. It will be noted that by the construction shown, the gusset is first opened by vacuum means, then a
35 guide finger is placed in position to maintain the gusset opened and the finger is moved with the bag and maintains the gusset open to sufficient extent so that it is guided over the spreading wings. The vacuum means for
40 opening the gusset operates before the start of the movement of the bag with respect to the vacuum cups while the vacuum is being applied. The movement of the bag takes
45 place after it is thus opened by the cups and after the vacuum is broken so that it does not constitute any drag on the movement of the bag. The guide finger withdraws with the
50 bag so that after it has guided the gusset fold into position between the clamping members and outside of the spreading wings it does not interfere with the operation of the valving mechanism.

Another important feature of the invention
55 is the action of fingers 186. It will be noted that tucking finger 167 presses inward on the end of the bag substantially along the median line of the gusset fold and that fingers 186 enter the end of the bag and furnish
60 yielding resistance to the movement of the wall of the bag symmetrically placed upon opposite sides of tucking finger 167, so that the fold lines of the valve thus formed are along symmetrical lines.

55 While the invention is designed primarily for operation with gusseted bags, it will be

readily understood that various features of the bag feeding means can be utilized with non-gusseted bags, and that if there were no gusset fold in the bag, the sides of the bag
70 could be spread apart and the corner tucked in by a finger pressing inward along the median line and tucking the wall in between such fingers as 186 which would insure the symmetrical placing of the folds.

While specific details of one embodiment
75 of the invention have been disclosed, it will be readily understood that various modifications may be made within the scope of the appended claims.

What is claimed is:

80 1. A method of forming a valve in a bag, which consists in spreading apart the sides of the bag at one corner thereof and tucking in the corner between the spread-apart sides by force applied inwardly along the
85 median line of said corner while guiding the fold lines by yielding force applied symmetrically on opposite sides of said median line and urging the material of the bag outward.

90 2. A method of forming a valve in a gusseted bag which consists in spreading apart the sides of the bag near one corner so as to substantially straighten the gusset at that corner, tucking the end of the gusset in
95 between the spread-apart sides by force applied along the median line of the gusset and while so applying force guiding the fold lines by yielding force applied symmetrically on opposite sides of said median line and
100 urging the material of the bag outward.

105 3. A method of forming a valve in a gusseted bag, which consists in spreading apart the sides of the bag near one corner so as to substantially straighten the gusset at that corner, tucking the end of the gusset in between the spread-apart sides by force applied
110 along the median line of the gusset, and while so applying force restraining the movement of the sides of the gusset by yielding resistance symmetrically applied from within the bag.

115 4. In apparatus for tucking in the corner of a gusseted bag to form a valve, tucking mechanism comprising a member adapted to enter a gusset of a bag, a guide rod adjacent said member, and means to reciprocate the rod to enter the gusset of a bag approaching
120 said mechanism and guide it into position on said member.

125 5. In apparatus for tucking in the corner of a gusseted bag to form a valve, tucking mechanism comprising a member adapted to enter a gusset of a bag, means to move a bag into operative relation with the mechanism, a guide rod adjacent said member, and means
130 to reciprocate the guide rod in timed relation with said moving means to insert the rod into the gusset of a bag approaching said mechanism and to withdraw the rod while main-

taining it in guiding relation with the gusset until said member enters the gusset.

6. In apparatus for tucking in the corner of a gusseted bag to form a valve, tucking mechanism comprising a member adapted to enter the gusset of a bag, a support for a bag adjacent said mechanism, means to partially open the gusset of a bag on said support, a guide rod, means to reciprocate said guide rod to cause it to enter said partially open gusset and then withdraw towards said mechanism, and means to move the bag with the withdrawing rod until said member enters the gusset.

7. Apparatus for tucking in the corner of a gusseted bag to form a valve, comprising a member adapted to enter a gusset of a bag, means for applying vacuum to the sides of the bag to partially open the gusset, a guide, means to project the guide rod into the partially opened gusset, and means to move the bag, guided by said guide rod, into position with its gusset embracing said member.

8. Apparatus for tucking in the corner of a gusseted bag to form a valve, comprising a member adapted to enter a gusset of a bag, a support for a bag adjacent said member, a vacuum cup adjacent the position of a gusset of a bag on said support, a guide rod, bag-moving means, and mechanism operating said vacuum cup, guide rod and bag-moving means in timed relation to partially open the gusset of a bag, cause the guide rod to enter the gusset, and move the bag, guided by said rod, into position with its gusset embracing said member.

9. In apparatus for tucking in the corner of a gusseted bag to form a valve, tucking mechanism comprising a member adapted to enter a gusset of a bag, a support for a bag adjacent said mechanism, vacuum cups located on opposite sides of the gusset of a bag on said support and adjacent said mechanism, means to move said cups towards and from the bag, means applying vacuum to the cups until they have separated for a distance after contacting the bag and for then breaking the vacuum, means timed with said vacuum-applying means to move the bag into position with said member entering the gusset immediately after said vacuum has been broken, and means to maintain the gusset opened after the vacuum is broken until said member enters the gusset.

10. In apparatus for tucking in the corner of a gusseted bag to form a valve, tucking mechanism comprising a member adapted to enter a gusset of a bag, a support for a bag adjacent said mechanism, vacuum cups located on opposite sides of the gusset of a bag on said support and adjacent said mechanism, means to move said cups towards and from the bag, means applying vacuum to the cups until they have separated for a distance after contacting the bag and for then break-

ing the vacuum, means timed with said vacuum-applying means to move the bag into position with said member entering the gusset immediately after said vacuum has been broken, and means to guide the gusset opened by said cups into position on said member.

11. In apparatus for tucking in the corner of a gusseted bag to form a valve, tucking mechanism comprising a member adapted to enter a gusset of a bag, vacuum cups on opposite sides of the gusset of a bag approaching said mechanism, means to operate said cups to partially open the gusset and to break the vacuum in the cups to release the bag before the gusset embraces said member, and means to guide the opened gusset from the cups to said member.

12. In apparatus for tucking in the corner of a gusseted bag to form a valve, tucking mechanism comprising clamps adapted to grip a gusset of a bag and a member adapted to enter said gusset, means to partially open the gusset while it is at rest in a position adjacent said mechanism, and a guide rod adapted to enter the partially-opened gusset and guide it into position between the clamps and over said member.

13. In apparatus for tucking in the corner of a gusseted bag to form a valve, tucking mechanism comprising clamps adapted to grip a gusset of a bag and a member adapted to enter said gusset, means to partially open the gusset while it is at rest in a position adjacent said mechanism, and a guide rod adapted to enter the partially-opened gusset and guide it into position between the clamps and over said member, said guide rod being mounted reciprocally between said clamps.

14. In apparatus for tucking in the corner of a bag to form a valve, means to spread apart the sides of a bag adjacent one corner, means to tuck the corner in between the spread-apart sides, and guide means adapted to enter the corner of the bag and guide the folding of the corner as it is tucked in.

15. In apparatus for tucking in the corner of a bag to form a valve, means to spread apart the sides of a bag adjacent one corner, means to tuck the corner in between the spread-apart sides, a guide, and mechanism connected to operate in timed relation with said tucking means and adapted to insert said guide into the corner of the bag to guide the folding thereof during the operation of the tucking means.

16. In apparatus for tucking in the corner of a bag to form a valve, means to spread apart the sides of a bag adjacent one corner, a finger, means to move the finger to tuck in said corner between the spread-apart sides, spaced guides, and means to move the guides into the corner of the bag on opposite sides of the path of said finger to guide the folding of the corner while the finger is tucking it in.

17. In apparatus for tucking in the corner

of a gusset-folded bag to form a valve, means to open the gusset fold adjacent said corner, a finger, means to move the finger to contact the end of the gusset fold along its median line and tuck it in between the spread-apart sides of the bag, and a guide adapted to enter the corner of the bag and guide the folding thereof during the action of said finger.

18. In apparatus for tucking in the corner of a gusset-folded bag to form a valve, means to open the gusset fold adjacent said corner, a finger, means to move the finger to contact the end of the gusset fold along its median line and tuck it in between the spread-apart sides of the bag, a guide, and means to move the guide into the corner of the bag in timed relation with the movement of said finger to guide from within the folding in of the corner.

19. In apparatus for tucking in the corner of a gusset-folded bag to form a valve, means to open the gusset fold adjacent said corner, a finger, means to move the finger to contact the end of the gusset fold along its median line and tuck it in between the spread-apart sides of the bag, guide members, and means to move said members into the corner of the bag in timed relation with the movement of the finger and on opposite sides of the path of said finger.

20. In apparatus for tucking in the corner of a gusset-folded bag to form a valve, means to open the gusset fold adjacent said corner, a finger, means to move the finger to contact the end of the gusset fold along its median line and tuck it in between the spread-apart sides of the bag, guide members, and means to move said members into the corner of the bag in timed relation with the movement of the finger and on opposite sides of the path of said finger, said guides being yieldingly mounted so as to furnish yielding resistance from within to the tucking-in of the corner.

21. In apparatus for tucking in the corner of a bag to form a valve, means to spread apart the sides of a bag adjacent one corner, means to tuck the corner in between the spread-apart sides, and guide means adapted to enter the corner of the bag and guide the folding of the corner as it is tucked in, said guide being yieldingly mounted so as to furnish yielding resistance from within to the tucking-in of the corner.

22. In combination, mechanism for tucking in the corner of a bag to form a valve, a support for a bag adjacent said mechanism, means to move the bag over said support into operative relation with said mechanism, and a guide adapted to hold the bag flat on said support as it approaches said operative position.

23. In combination, mechanism for tucking in the corner of a bag to form a valve, a support adjacent said mechanism and adapted to receive a bag dropped from above, means

to move the bag from the position into which it is dropped to operative relation with said mechanism, a guide adapted to hold the bag flat on the support as it approaches said operative position, and means to move the guide from its guiding position to a position out of the path of a bag being dropped.

24. In combination, mechanism for tucking in the corner of a bag to form a valve, a support adjacent said mechanism and adapted to receive a bag dropped from above, means to move the bag from the position into which it is dropped to operative relation with said mechanism, a guide adapted to hold the bag flat on the support as it approaches said operative position, means to move the guide from its guiding position to a position out of the path of a bag being dropped, and means to remove the bag horizontally from said operative position to a position out of the path of a succeeding bag being dropped.

25. In combination, mechanism for tucking in the corner of a bag to form a valve, a support adjacent said mechanism and adapted to receive a bag dropped from above, means to move the bag from the position into which it is dropped to operative relation with said mechanism, and means to remove the bag horizontally from said operative position to a position out of the path of a succeeding bag being dropped.

26. In combination, mechanism for tucking in the corner of a bag to form a valve, a support adjacent said mechanism and adapted to receive a bag dropped from above, means to move the bag from the position into which it is dropped to operative relation with said mechanism, a sewing machine adjacent said support, means to move the bag at a high rate of speed from said operative position to a position out of the path of a succeeding bag being dropped and adjacent said machine, and means to move the bag at a lesser rate of speed from its last said position to and through the sewing machine.

27. In combination, mechanism for tucking in the corner of a bag to form a valve, a support for a bag in operative relation with said mechanism, a sewing machine, an endless conveyor having lugs thereon, said conveyor and lugs being positioned so as to move a bag away from said mechanism towards said machine, and a pusher moving in timed relation with said conveyor and at a slower rate of speed and adapted to move a bag from the position in which it is left by the conveyor to operative relation with said machine.

28. In combination, mechanism for tucking in the corner of a bag to form a valve, a support for a bag in operative relation with said mechanism, a sewing machine, an endless conveyor having lugs thereon, said conveyor and lugs being positioned so as to move a bag away from said mechanism towards said machine, and a pusher moving in timer rela-

tion with said conveyor and at a slower rate of speed and adapted to move a bag from the position in which it is left by the conveyor to operative relation with said machine, the machine being timed to sew a seam at a speed
5 at least as great as the speed at which said pusher moves the bag.

29. In combination, mechanism for tucking in the corner of a bag to form a valve, a support for a bag in operative relation with
10 said mechanism, a sewing machine, an endless conveyor having lugs thereon, said conveyor and lugs being positioned so as to move a bag away from said mechanism towards said machine, and a pusher moving in timed relation
15 with said conveyor and at a slower rate of speed and adapted to move a bag from the position in which it is left by the conveyor to operative relation with said machine, and
20 a change-speed device between said mechanism, conveyor and pusher and said machine, said device being adapted to move said pusher at substantially the same speed as said machine sews a seam, when adjusted for narrow
25 bags, and to move said pusher relatively slower when adjusted for wider bags.

30. In combination, mechanism for tucking in the corner of a bag to form a valve, a support for a bag in operative relation with
30 said mechanism, a sewing machine, means for conveying bags from said support to said machine, and connections between said machine and said mechanism and conveying means driving them in timed relation, said
35 connections comprising a gear which may be changed to change the speed of the mechanism and conveying means relative to the speed of the sewing machine.

In testimony whereof I have hereunto
40 signed my name to this specification.

EUGENE T. THIEM.

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