

Oct. 16, 1962

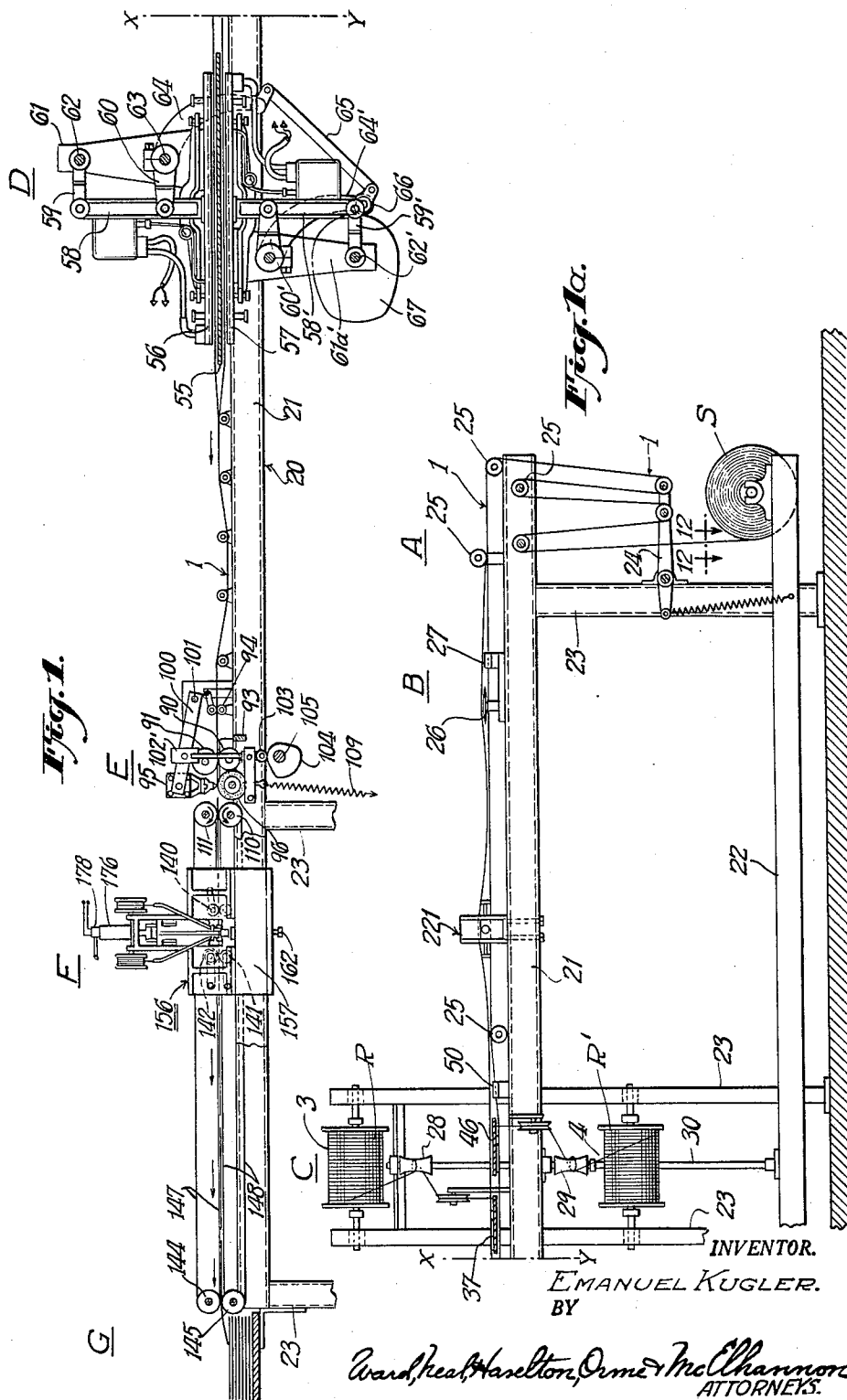
E. KUGLER

3,058,403

METHOD AND APPARATUS FOR THE MANUFACTURE OF DRAW STRING BAGS

Filed Dec. 10, 1959

8 Sheets-Sheet 1



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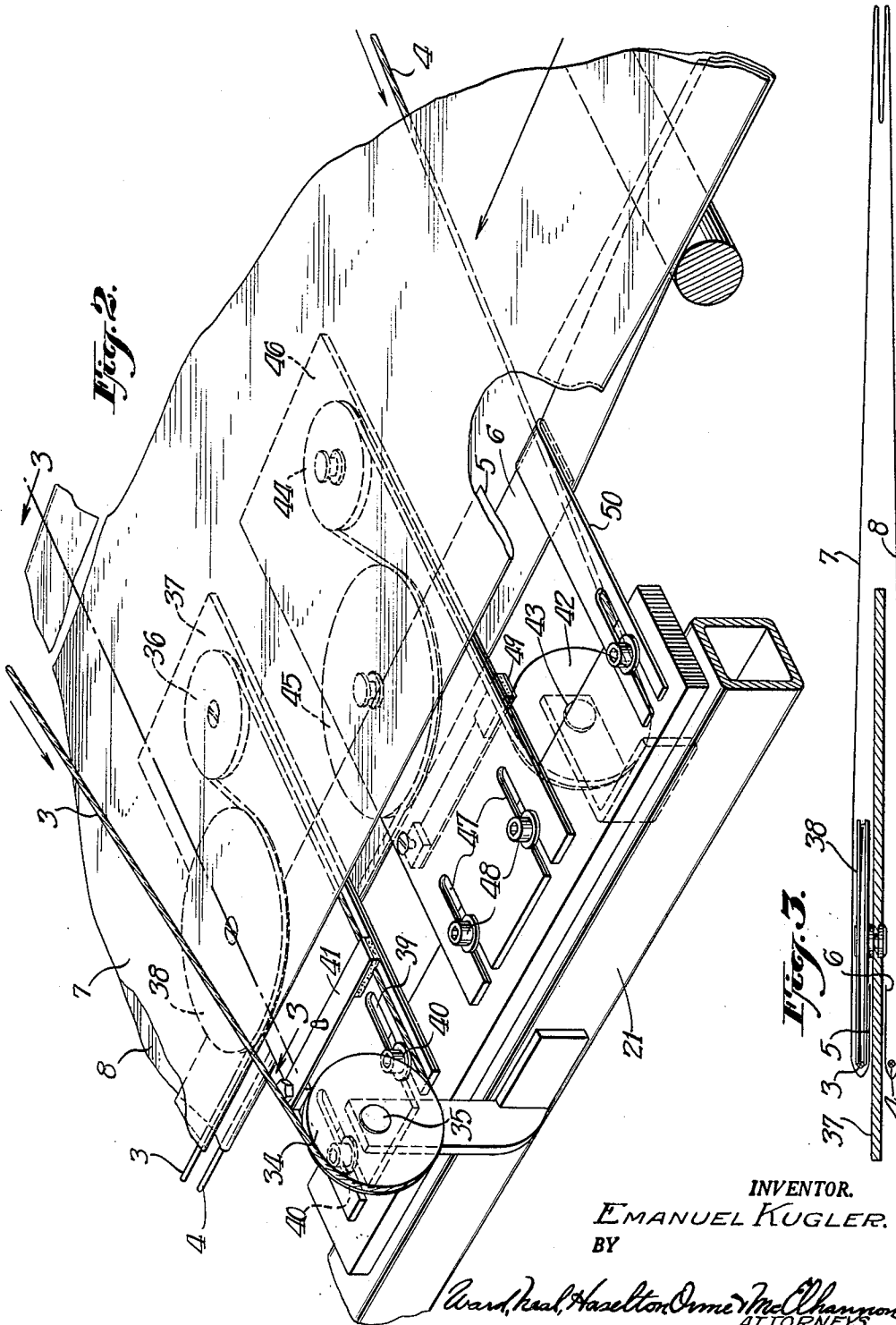
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METHOD AND APPARATUS FOR THE MANUFACTURE OF DRAW STRING BAGS

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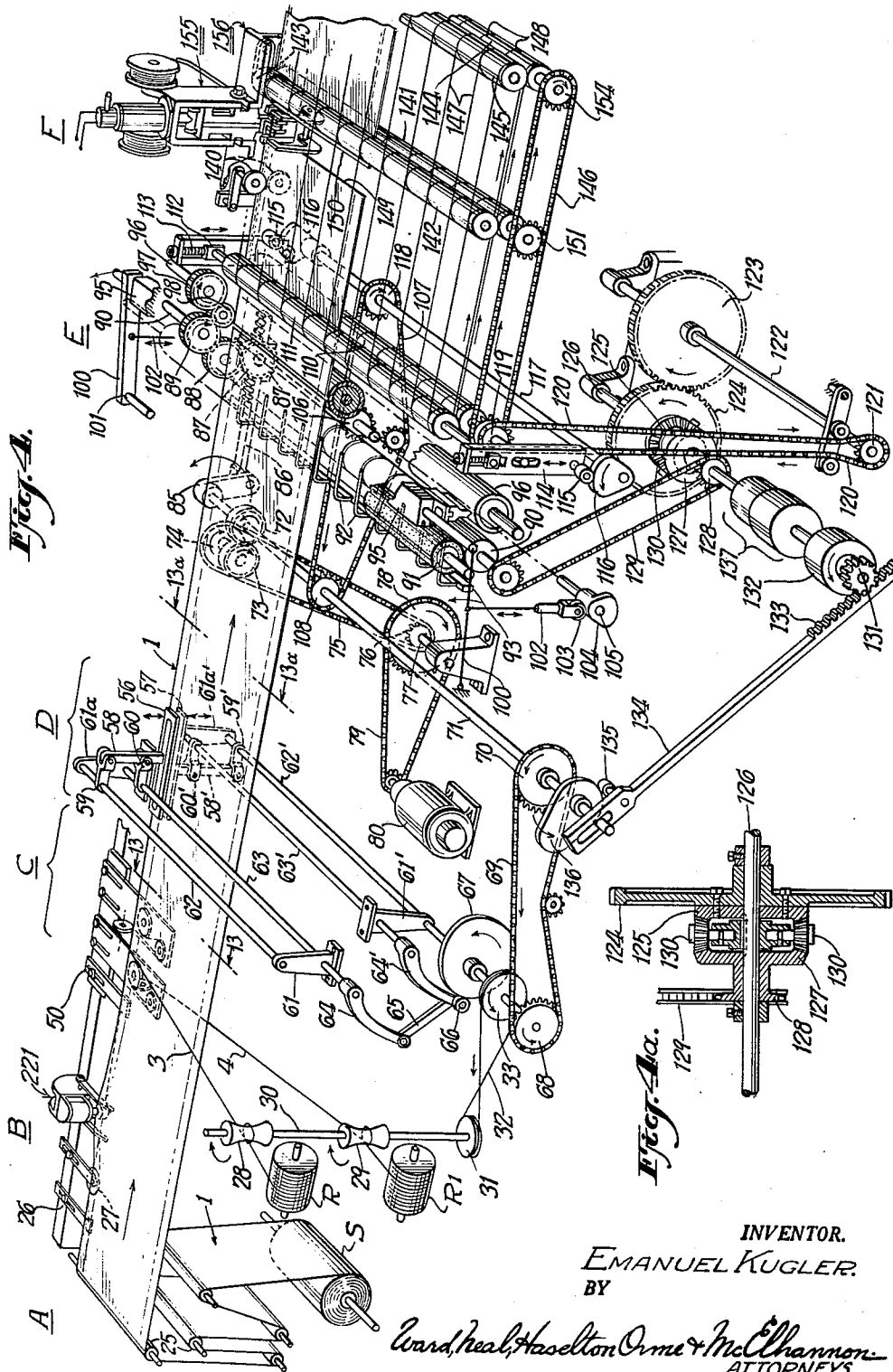
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METHOD AND APPARATUS FOR THE MANUFACTURE OF DRAW STRING BAGS

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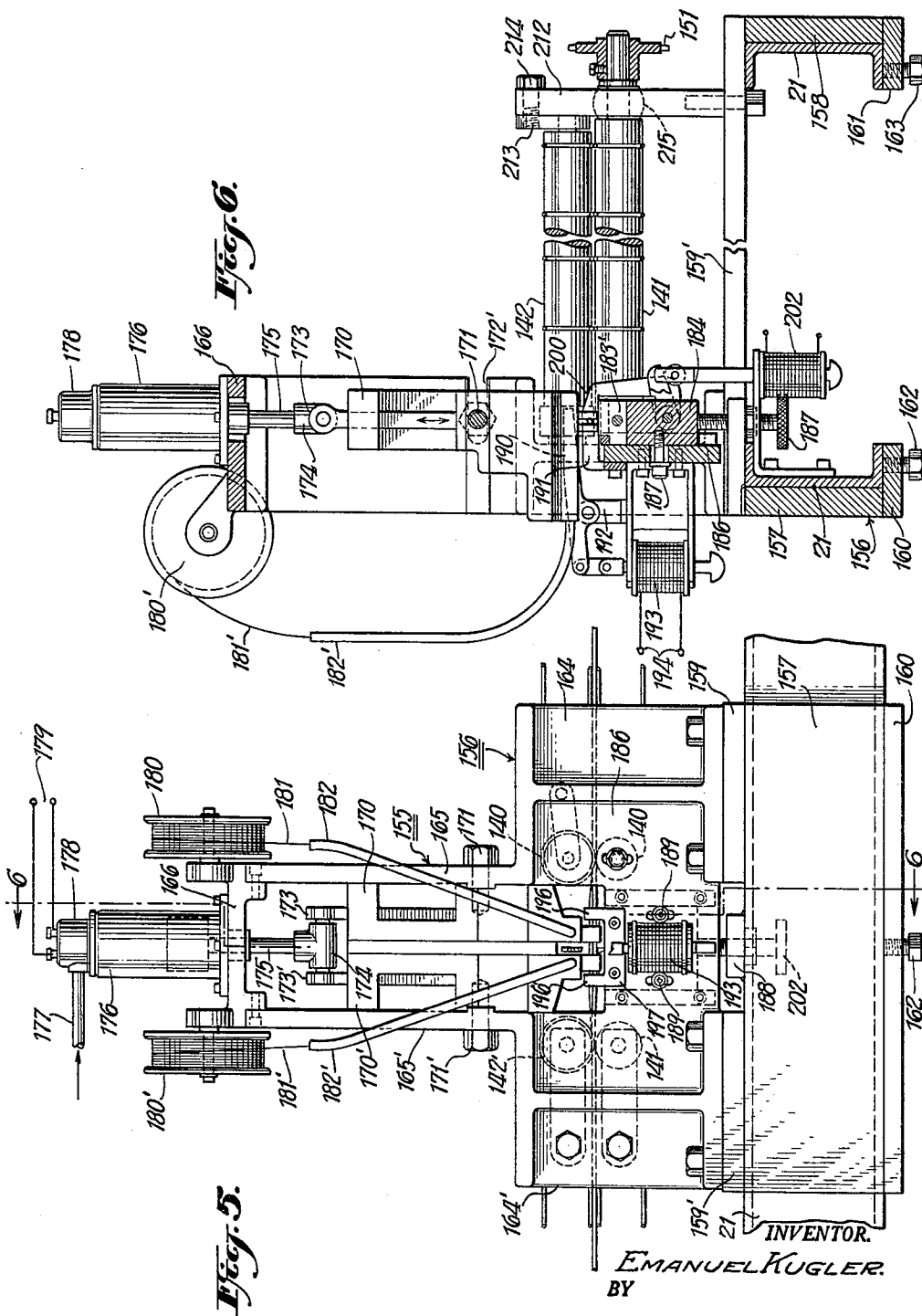
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METHOD AND APPARATUS FOR THE MANUFACTURE OF DRAW STRING BAGS

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8 Sheets-Sheet 4



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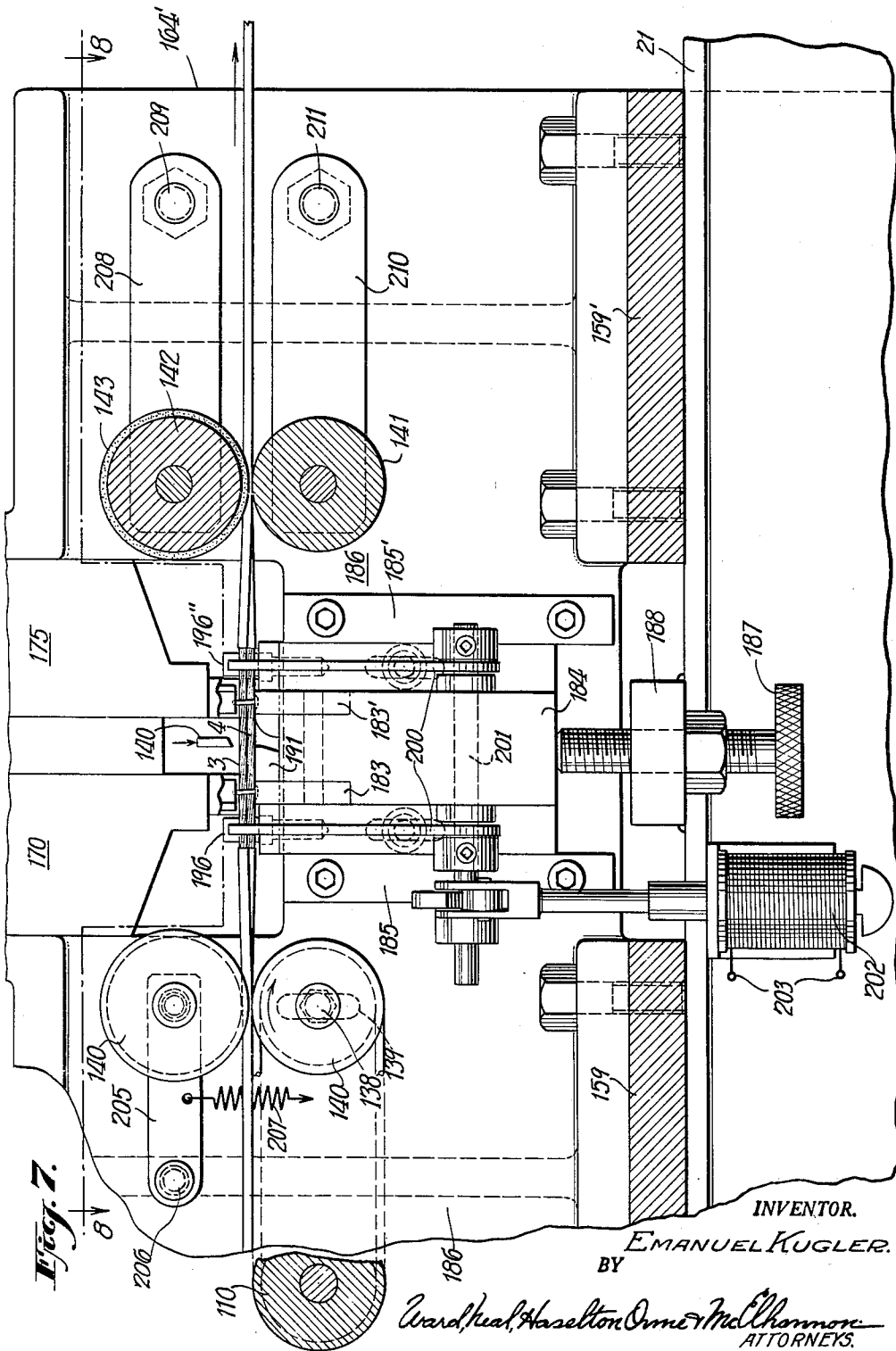
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METHOD AND APPARATUS FOR THE MANUFACTURE OF DRAW STRING BAGS

Filed Dec. 10, 1959

8 Sheets-Sheet 6

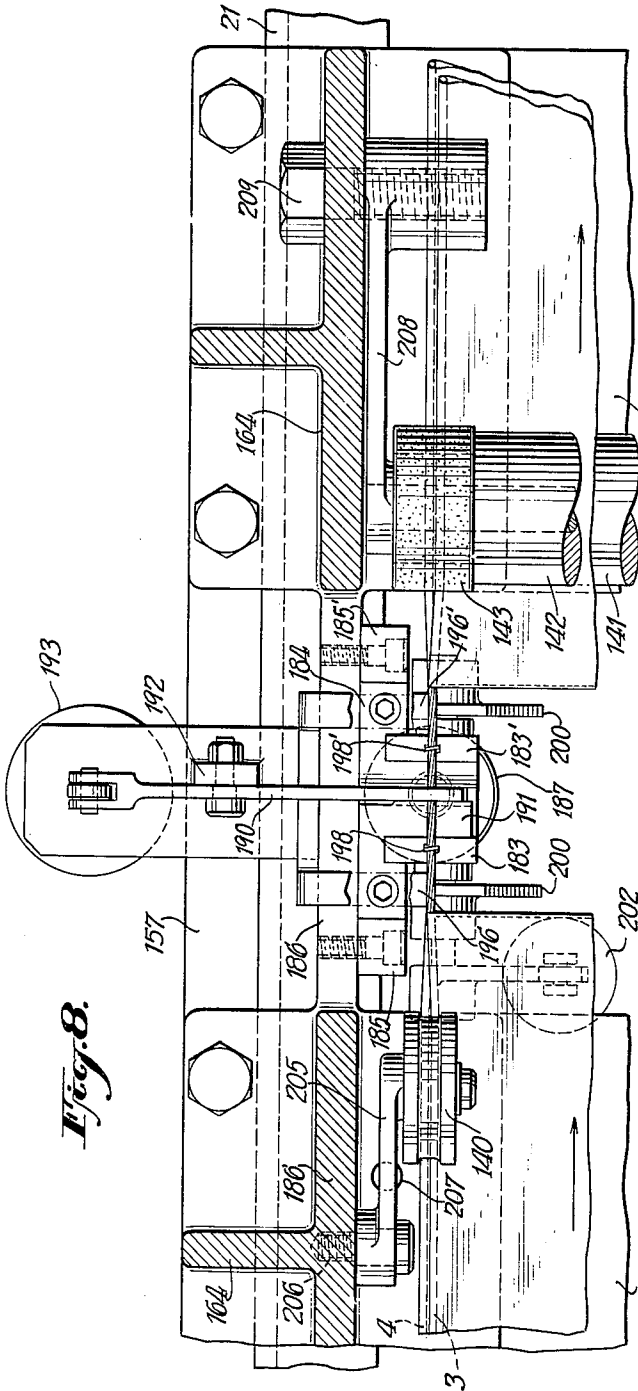


Fig. 8.

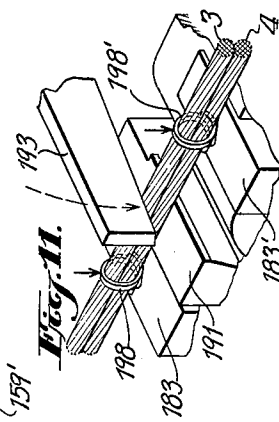


Fig. 11.

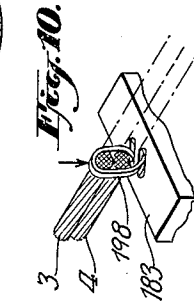


Fig. 10.

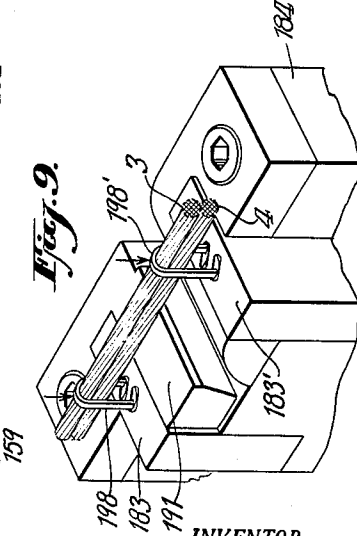


Fig. 9.

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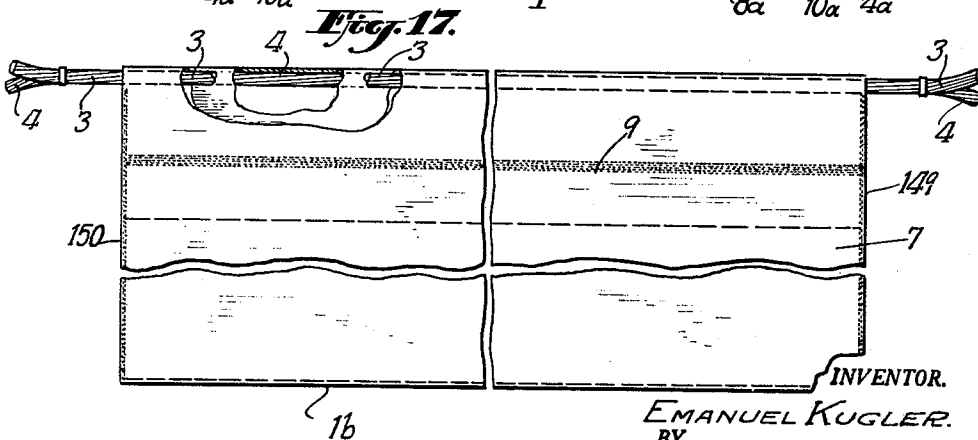
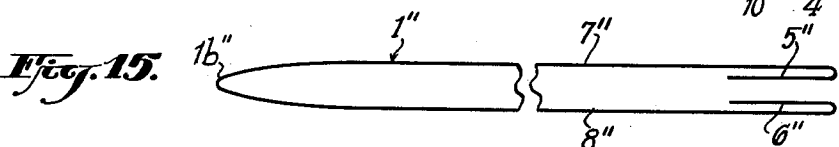
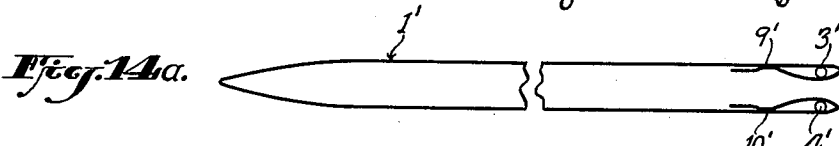
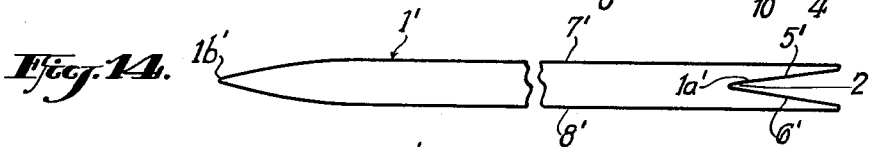
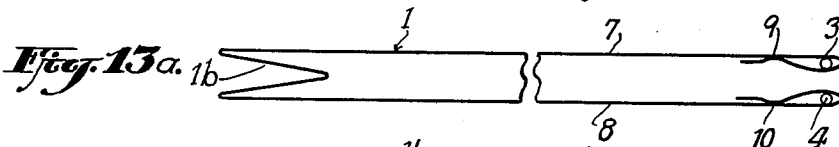
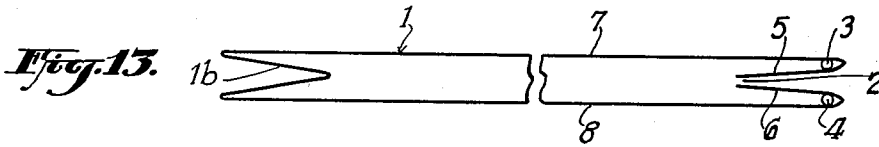
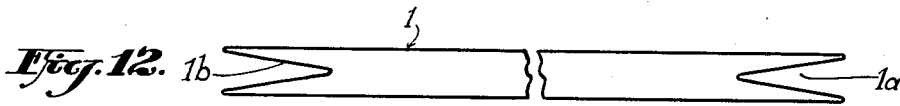
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8 Sheets-Sheet 7



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METHOD AND APPARATUS FOR THE MANUFACTURE OF DRAW STRING BAGS

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8 Sheets-Sheet 8

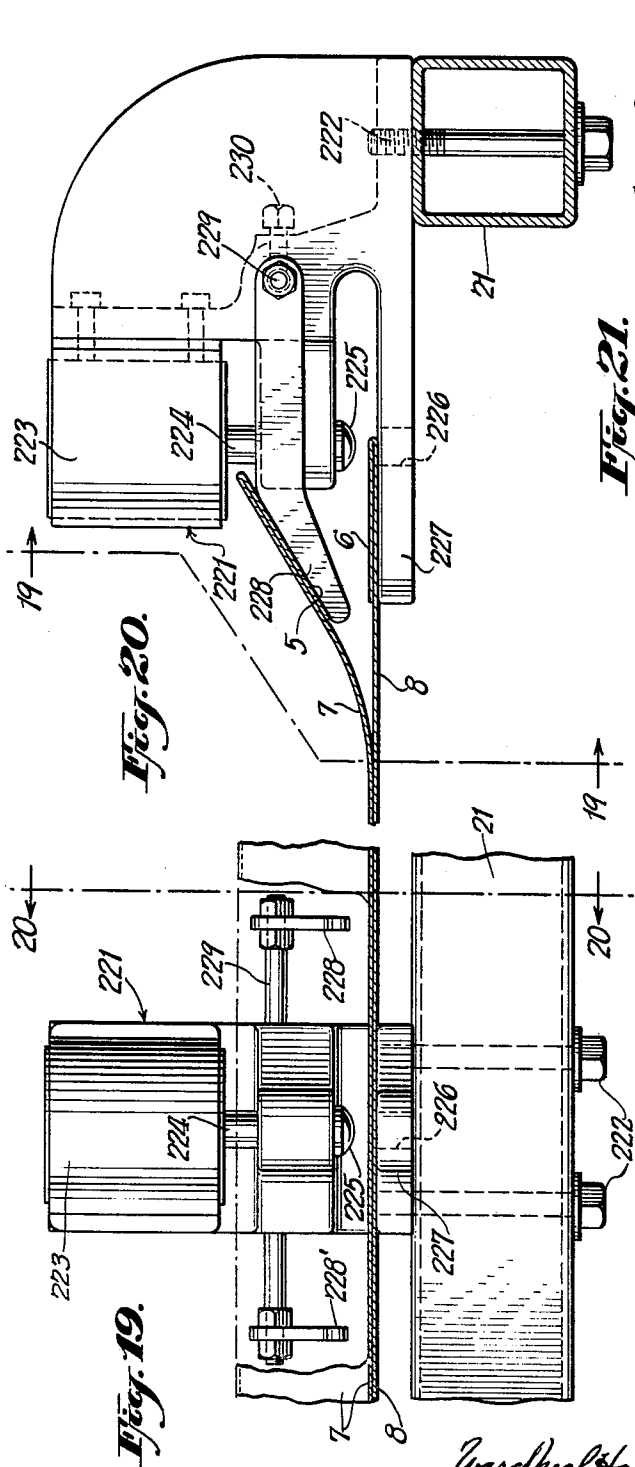


Fig. 21.

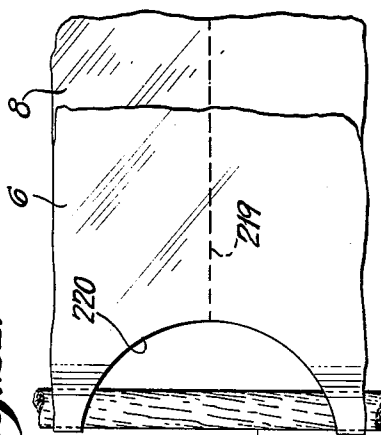
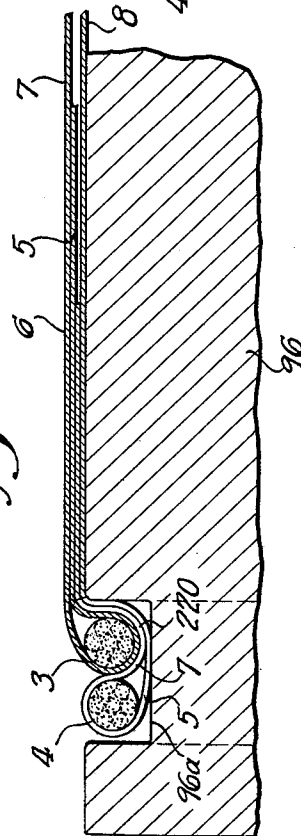


Fig. 18.



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3,058,403

METHOD AND APPARATUS FOR THE MANUFACTURE OF DRAW STRING BAGS

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Filed Dec. 10, 1959, Ser. No. 858,659

19 Claims. (Cl. 93—8)

This invention relates to a method and apparatus for the manufacture of draw string bags. The invention is particularly useful in the manufacture of such bags from a continuous strip of heat sealable plastic material such as polyethylene.

An object of the invention is to provide an improved method of continuous operation for quantity production of such bags.

Another object is to provide improved apparatus for carrying out such method.

A further object is to provide a method and apparatus for making an improved bag.

An important feature of the invention is the provision of a method and apparatus for making draw string bags having tubular passageways extending the full width of the bag throughout the entire extent of the tubular passageways in the direction of the bag length, having draw strings disposed in said tubular passageways respectively.

This application is a continuation-in-part of my copending application Ser. No. 773,029 filed November 10, 1958, for Making Draw String Bags From Heat Sealable Material, and in certain respects the present invention is an improvement over that set forth in said copending application.

Further features and objects of the invention will be more particularly understood from the following description taken in connection with the accompanying drawings, in which:

SHEET I

FIGS. 1 and 1a taken collectively comprise a side elevational view, looking from the operator's side, of apparatus embodying the invention, with certain parts omitted for the sake of clarity;

SHEET II

FIG. 2 is a somewhat enlarged perspective view showing further details of the cord feeding means shown in FIG. 1a;

FIG. 3 is a cross-sectional view taken along line 3—3 of FIG. 2;

SHEET III

FIG. 4 is a perspective view showing further structural details of the apparatus shown in FIGS. 1—1a, viewed from the side opposite the operator's side, with certain parts omitted for clarity;

FIG. 4a is a somewhat enlarged sectional view taken along the axis of shaft 126 of FIG. 4 showing further details of the differential drive therefor;

SHEET IV

FIG. 5 is a side elevational view, as seen from the operator's side of the machine, showing further details of the string fastening and severing mechanism shown in FIG. 1;

FIG. 6 is a cross-sectional view, taken at line 6—6 of FIG. 5, looking toward the delivery end of the machine;

SHEET V

FIG. 7 is an enlarged side elevational view of part of the structure shown in FIG. 5, as seen from the opposite side, showing further details of the mechanism shown in FIGS. 5 and 6;

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SHEET VI

FIG. 8 is a cross-sectional view taken at line 8—8 of FIG. 7;

FIGS. 9, 10 and 11 are fragmentary views showing successive operating positions of certain parts of the mechanism shown in FIGS. 5—8;

SHEET VII

FIG. 12 is a cross-sectional view taken at line 12—12 of FIG. 1, showing a tubular strip having opposed gusseted edges utilized in carrying out one embodiment of applicant's method;

FIG. 13 is a similar view taken at line 13—13 of FIG. 4, showing succeeding steps in the carrying out of applicant's method by the use of the tube strip shown in FIG. 12;

FIG. 13a is a similar view taken at line 13a—13a of FIG. 4, showing a further step in operations upon the strip shown in FIG. 13;

FIG. 14 shows a modified form of a tubular strip which may be utilized in accordance with this invention;

FIG. 14a shows a further step in operations upon the tube shown in FIG. 14;

FIG. 15 shows a cross-sectional view of a folded strip of bag material made from a flat sheet of material, illustrating a further form of strip useful in the carrying out of this invention;

FIG. 16 is a cross-sectional view illustrating the manner in which tubular strips such as shown in FIG. 13 may be utilized in making pairs of bags extending in series crosswise of the tubular strip;

FIG. 17 is a side view of a completed bag.

SHEET VIII

FIG. 18 is a sectional view showing an enlarged detail of the cutting roller shown in FIGS. 1 and 4;

FIG. 19 is an enlarged side elevation of a hem punch, shown in FIGS. 1 and 4, as viewed toward the operator's side of the machine;

FIG. 20 is an end elevation of the punch shown in FIG. 19; and

FIG. 21 is a segmented plan view of the bag strip showing the cut-out formed in a hem portion by the punch shown in FIGS. 19 and 20, after a draw string has been inserted therein.

The apparatus illustrated in FIGS. 1—11 shows the present preferred embodiment of apparatus utilized in carrying out applicant's method which contemplates the use of a continuous folded strip of bag material having a bag bottom fold adjacent one marginal edge of the strip and opposed separate bag lip folds adjacent the other marginal edge of the strip. This folded strip may be entirely preformed, or in the alternative, a tubular strip may be fed to the machine and split as a part of the continuous operation. In the alternative, the folded strip of bag material may be preformed from a flat sheet, for example, as disclosed in my said copending application. In instances where no printing is desired on the bags to be formed, or printing only on one side is desired, a tubular blank is preferred as a matter of economy and for other reasons. However, where printing is desired on both sides and/or on the bottom of the bags to be made, the use of a folded strip made of sheet material is preferable.

In order to facilitate an understanding of the invention, a brief résumé of the method will be given with reference to FIGS. 1—1a of the drawings before the apparatus is described in detail.

A continuous strip such as 1 is introduced at the input end of the machine, as from a supply roll S of such strip positioned at Station A. In one embodiment this

strip is in the form of a tube of polyethylene gusseted at both edges 1a and 1b as shown in FIG. 12, and at Station B the valley of one gusseted edge, such as 1a, is slit as indicated in FIG. 13 at 2. At Station C, draw strings, such as cords 3 and 4 (FIGS. 1a, 2 and 13), are laterally fed into the creased hem folds 5 and 6 from supply rolls such as R and R₁ respectively. At Station D the free edges of the hem folds 5 and 6 are secured as by heat to the interior face of the adjacent upper and lower bag wall panels 7 and 8 respectively, to provide seams 9 and 10 (FIG. 13a). At Station E the continuous bag strip 1 is severed at spaced intervals corresponding to the desired bag width, without, however, severing the draw strings 3 and 4. Simultaneously with the severing, the contiguous side wall panels 7 and 8 are secured together to form bag edge seams. Then the severed bag segment and the continuous draw string cords are advanced, or their rate of feed accelerated, with respect to the remaining length of the strip so as to provide a space of desired width between the forward end of the continuous strip and the adjacent ends of the severed bag segment. The space thus provided is bridged by the continuous length of cords 3 and 4 and may be regulated to leave any desired length of cords exposed. This serves two purposes, first to facilitate securing the cords together in the line of cord travel and, second to provide any desired length of cords extending beyond the bag edges when long tie cords are desired. The severed bag segment and the continuous cords are moved into register with Station F where the cords are secured together, in the line of cord travel, at two spaced points between which the cords are severed. The substantial space between the bag segments and resulting length of cords intervening also makes it possible to space the fastening of the cords together, such as by wire stitching a suitable distance from the point of severance to prevent the cords from pulling apart after they are fastened. From Station F the finished bags are successively delivered to a suitable table or receptacle at the output end of the machine, designated Station G.

Modified Form of Bag Strip

Instead of a strip as shown in FIG. 1 having both edges gusseted, a strip as shown in FIG. 14 may be used having one edge 1a' gusseted and the other edge 1b' plain so as to provide bags having a single fold bottom as shown in FIG. 14a.

Alternatively, a bag strip 1" (FIG. 15) may be formed from sheet material so as to provide at one edge a closed end 1b" and at the other edge oppositely disposed open hem folds 5" and 6". In the embodiment shown, these folds are directed inwardly of the side panels 7" and 8", but if desired they may be directed outwardly of the side panels.

FIG. 16 shows the manner of utilizing strips such as shown in FIG. 12 in making pairs of bags extending crosswise of the strip with their bottoms disposed adjacent each other and their mouths oppositely disposed. In this embodiment, both of the edge gussets are slit, cords 3a—4a and 3a'—4a' introduced into the open hems thus provided, and the hems sealed at 9a—10a and 9a'—10a'. Further, the side walls or panels 7a and 8a are sealed together and severed longitudinally at I—I intermediate the oppositely disposed hem edges so as to provide bag bottom seams.

Apparatus

The mechanism is supported on a suitable frame designated in general as 20 comprising upper and lower horizontal sections designated 21 and 22, respectively, and a plurality of verticals such as 23. The supply roll S is mounted on the lower section 22 and a suitable butterfly roller set 24 is mounted on a vertical 23 and from this the strip 1 passes over suitably arranged guide rolls or bars such as 25. An opener finger 26 is positioned so as

to enter into the gusset valley at one edge and a disc splitter 27 is positioned slightly beyond to slit in the gusset V and provide hem folds 5 and 6 (FIGS. 13 and 2). This opener finger and disc splitter may be omitted when preformed strips are utilized in which the hem folds such as 5 and 6 are already formed.

Draw String Feeding and Insertion

STATION C

The upper string 3 (FIGS. 1a and 4) is fed from its supply roll R by a driven spool 28 and the lower string is fed from its supply roll R₁ by a driven spool 29, both of which spools are carried on a vertical drive shaft 30 which is rotated by means of a pulley 31 fixed at its lower end and driven by a belt 32 engaging a driving pulley 33. From the spool 28 the string 3 passes over the strip 1, toward the operator's side, around a vertical pulley (FIG. 2) 34 rigidly supported from frame section 21 for rotation about a horizontal axis 35. From the pulley 34 the string passes in the opposite direction and around a horizontal pulley 36, pivotally mounted on a support plate 37, positioned between the upper panel 7 and lower panel 8 of the strip 1, and thence toward the operator's side of the machine and over an insertion pulley 38 which is also pivotally mounted on plate 37 and is horizontally disposed and extends between the upper panel 7 and hem fold 5 to thereby laterally introduce the string into the upper lip or hem fold. The plate 37 is preferably adjustable laterally as by means of slots such as 39 and clamp bolts such as 40 serving to adjustably secure the plate to the frame section 21 to provide for accurately positioning the string 3 in the hem fold 5; and a friction spring finger 41 is preferably provided to adjust the feed tension on the string 3.

The lower string 4 passes from its drive spool 29 (FIG. 4) beneath the strip 1 toward the operator's side, around a vertical pulley 42 rigidly supported from frame section 21 for rotation about a pivotal axis 43 and thence in a reverse direction and around horizontal pulleys 44 and 45 pivotally journaled on a plate 46 disposed between the upper panel 7 and lower panel 8 of strip 1 with the pulley 45 extending between the lower panel 8 and hem fold 6 to thereby laterally introduce the string into the lower lip or hem fold. The plate 46 is similarly adjustable by means of slots such as 47 and clamp bolts 48 to provide for accurately positioning the string 4 in the hem fold 6; and a friction finger 49 is preferably provided, for reasons above stated relative to finger 41. A spreader 50 is preferably provided to hold the lip fold 6 spaced upwardly from the lower panel 8.

Hem Seaming

STATION D

After the strings have been inserted into the lip folds 5 and 6 tubular lip hems are completed by suitably formed seams. In the present embodiment where the strip 1 is made of polyethylene the seams are provided by heat sealing in a known manner and since the heat sealers are of more or less conventional construction they will only be described generally with reference to FIGS. 1 and 4.

A plate 55 (FIG. 1) is rigidly supported from the frame section 21 so as to lie between the open lip folds of the strip 1 and upper and lower heat sealing elements 56 and 57, respectively, are oppositely disposed above and below said plate and in register with the portions of the hem folds 5 and 6 (FIG. 13a) so as to effect the hem seams 9 and 10 (FIG. 13b). The heat sealing seaming element 56 has an upwardly extending stem portion 58 pivotally attached to the outer ends of a pair of arms 59 and 60 whose other ends are pivotally supported on a pair of brackets such as 61 and 61a (see also FIG. 4) by means of shafts 62 and 63, respectively. The shaft 63 is a torque shaft journaled in brackets 61 and 61a and one end is rigidly secured to the arm 60 while the other end is rigidly secured to the inner end of an arm

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64 whose outer end is pivotally connected by a link 65 to a corresponding torque arm 64' fixed to a second torque shaft 63' and whose outer end carries a cam roller 66 in engagement with a cam 67 fixed on a shaft 62' which is journaled in a pair of brackets 61' and 61a'. Similarly, the heat sealing element 57 is provided with a downwardly extending arm 58' attached to the outer ends of a pair of arms 59' and 60' pivotally supported on the pair of brackets 61' and 61a' by means of the torque shaft 63' and the cam shaft 62' on which the arm 59' is freely mounted.

It will thus be seen that upon rotation of the cam 67 the heat sealing elements 56 and 57 are moved toward each other so as to engage and seal the respective hems at 9 and 10 (FIG. 13b). The sealing elements 56 and 57 may be adjusted laterally along the shafts 62 and 63 and 62' and 63' so as to effect the hem seal at the desired lateral position of the bag strip. The length of the shafts 62 and 63 and 62' and 63' also provide for the mounting of additional sealing elements for the purposes to be hereinafter pointed out.

The shaft 62' also carries fixed near its outer end the pulley 33 (FIG. 4) previously referred to, and carries fixed at its outer end a sprocket 68 driven by a chain 69 which in turn is driven by a sprocket 70 fixed to a constant rotation drive shaft 71 near one end.

Main Drive

The shaft 71 is rotated by a gear 72 in driven engagement with a gear 73, rotatably connected to a sprocket 74 which is interconnected by means of a chain 75 and sprocket 76 to a jack shaft 77 driven through a pulley 78 and belt 79 from a source of power such as a motor 80. The shaft 71, at its end near the operator's side of the machine, carries an eccentric arm 85 (FIG. 4) operatively connected to a gear rack bar 86 in mesh with a one-way clutch gear 87 so as to impart intermittent rotation to the gear in a clockwise direction. The crank throw of arm 85 is suitably adjustable to provide for various widths of bags.

Draw Rolls

The gear 87 is in mesh with an idle gear 88 in driving engagement with a gear 89 fixed to a shaft end of a lower draw roll 90 journaled in fixed bearings. A companion upper draw roll 91 is journaled in vertically floating bearings and urged toward the lower roll in the customary manner, so that it is frictionally driven thereby. The pair of rolls 90 and 91 thus serve to intermittently feed the bag strip 1 and draw it from the supply roll at Station A and past draw string inserting Station C and hem sealing Station D. Each intermittent feed cycle serves to feed an increment length of the bag strip 1 equal to a selected bag width. One of the draw rolls, such as the upper roll 91, has a flexible body, such as rubber, and the other is preferably metal. A plurality of fingers, such as 92, are mounted on a bar 93 and extend forwardly between the rolls 90 and 91 and lie in grooves provided in the lower roll 90 in the conventional manner to direct the strip 1 forwardly and prevent it from moving downwardly around the roll 90.

A pair of relatively narrow cord aligning rollers 94 (FIG. 1) are positioned between the hem seaming Station D and the web severing Station E, preferably nearer to the draw rolls 90 and 91 of Station E. The upper one of the pair of rollers 94 is grooved so as to engage opposite sealed hems and hold the draw strings 3 and 4 in proper side by side alignment within the hems. The rollers 94 are constructed and mounted in the same manner as more particularly shown and described hereinafter with reference to corresponding rollers 140.

Strip Severing Means

The strip severing means comprises in general an electrically heated cutting and sealing knife 95 (FIGS. 1 and 4) of a conventional type and a backing roll 96 of

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suitable material, such as Teflon. The backing roll 96 is provided with a groove 96a (FIG. 18, Sheet VIII) in register with the cords 3 and 4 provided in the lower feed roll 91. This groove preferably is slightly wider than the distance across the side by side cords and of a depth slightly greater than the cord diameter so that the knife 95 is moved downwardly to sever the strip 1, including the side panels and the major portions of the hems without damaging the cords 3 and 4. The remaining extremely small section of the hems which is not severed is readily snapped or broken as the severed segment is advanced in the manner to be more particularly pointed out below. In the alternative, means of facilitating the severance of these hem sections will be referred to hereinafter. The roll 96 is intermittently rotated in synchronism with the draw rolls by means of a gear 97, carried on the roller shaft, in driven engagement with an idle gear 98 in driven engagement with the draw roll driving gear 89. The knife 95 is moved up and down in timed relationship so as to sever the strip 1 and seal the opposite panels together on each side of the line of severance; the knife engagement taking place while the backing roll 96 is not rotating.

The heated blade 95 is mounted on the forward ends of a pair of arms, somewhat schematically shown as 100, pivoted at their rear ends as at 101 (FIG. 1) and raised upwardly to position the knife in inoperative position by means of a pair of links such as 102, which carry on their lower ends cam rollers such as 103 engaging cooperating cams such as 104, which serve to move the knife in the timed sequence above indicated. The knife 95 is constantly urged downwardly by a helical tension spring 109. The cams such as 104 are carried on respectively opposite ends of a cam shaft 105 (FIG. 4) which is rotated by means of a sprocket 106 carried thereon and in driven engagement with chain drive 107, which in turn is driven by a sprocket 108 carried on the drive shaft 71.

Accelerator Rolls

A pair of accelerator rolls 110 and 111 (FIGS. 4 and 1) are positioned on the side of the knife 95 opposite the feed rolls 90, and the body of the lower roll 110 is preferably made of resilient material, such as rubber, and is mounted for rotation in fixed bearings, while the upper roll 111 may be of metal and is mounted in vertically floating journals, such as 112, which are urged downwardly by compression springs such as 113; the journals and springs being carried in yokes such as 114. Secured at the lower end of the yokes are cam rollers such as 115 engaging correspondingly cooperating cams such as 116 carried on a cam shaft 117, which is driven by a sprocket 118 secured thereto and in driven engagement with the sprocket chain 107. The cams are so timed that the upper roller is moved upwardly from driving engagement with the lower roller immediately prior to the time when the knife 95 comes into severing engagement with the bag strip 1. The lower roll 110 is rotated by means of a sprocket 119 in driven engagement with a chain 120, which in turn is driven by a sprocket 121 carried on a shaft 122 which carries fixed thereto a gear wheel 123 in driven engagement with a gear wheel 124 fixed to a bevel gear 125 (FIG. 4a) and together therewith is freely rotatably mounted on a shaft 126. The bevel gear 125 forms a part of a differential which also comprises an oppositely disposed bevel gear 127 which is fixed to a sprocket 128, and together therewith is freely rotatably mounted on the shaft 126. The sprocket 128 is driven from the lower roll 90, as by means of a chain drive 129. Driving force is transmitted from the bevel gear 127 to the bevel gear 125 by means of a plurality of intervening planet gears, which together with their carrying frame, are designated 130. If the planet gears are not revolved about the axis of shaft 126, accelerator rolls 110 and 111 would have a rate of feed equal to that of the feed rolls 90 and 91. However, in accordance with

an important feature of the present invention, the accelerator rolls 110 and 111 are speeded up substantially beyond the rate at which the feed rolls 90 and 91 feed the bag strip 1; so that when a segment of the strip is severed by the knife 95 the accelerator rolls 110 and 111 move the severed segment and string away from the then advancing forward end of the remaining strip 1, for purposes to be pointed out hereinafter. This accelerated action is effected by the mechanism now to be described.

The shaft 126 carries on its outer end a pinion gear 131 connected thereto through the intermediary of a one-way clutch 132 and in driven engagement with a gear rack 133 provided on an arm 134 carrying on its opposite end a cam roller 135 in operative engagement with a cam 136 mounted on the continuously rotating drive shaft 71, so that upon rotation of shaft 71 the gear rack 133 will be caused to reciprocate and on its down stroke the pinion gear 131 will give the shaft 126 an increment of rotation which will be imparted to the planetary gear unit 130 and will, by means of the mechanism previously described, accelerate the rate of feed of the rolls 110 and 111. By suitable selection of the cam 136 the stroke of the gear rack may be varied to effect the extent of acceleration of the rolls 110 and 111. The shaft 126 is separated between the one-way clutch 132 and the sprocket 128 and is interconnected through the intermediary of a pair of oppositely actuating ratchets 137 which serve to prevent retrogression of the moving parts and provide a smooth operation.

A pair of guide rollers 140 are disposed on opposite sides of the bag segment positioned so as to hold the draw strings 3 and 4 in side by side relationship toward the outer edge of their respective hems. As in the case of the rollers 94, the upper one of the rollers 140 is grooved to hold the strings 3 and 4 in proper aligned position. The lower of the rollers 140 is preferably driven as from the roll 110 by a belt 140a, as best seen in FIG. 7. Mounted in advance of accelerator rolls 110 and 111 are a pair of driven feed rolls 141 and 142, the upper roll 142 being provided at the end on the operator's side with a flexible sleeve 143 and beyond the rolls 141 and 142 are a pair of bag discharge driven rolls 144 and 145, and these respective pairs of rolls are driven from the lower accelerator roll 110 by a chain drive designated in general as 146, which is in driving engagement with a sprocket 151 carried on roll 141 and a sprocket 154 carried on roll 144. Cord belts such as 147 pass around the upper series of rolls 111 and 145 and straddle the roll 143, being disposed in recesses provided in said rolls, and a second series of cord belts such as 148 similarly pass around the lower series of rolls 110 and 144 and straddle the roll 142. These serve to convey the severed segments from the accelerator rolls to the fastening Station F and the finished bags from Station F to discharge. The forward edge of the severed segment leaving the accelerator rolls 110 and 111 is designated as 149 and the rear edge of the severed bag segment is designated as 150. This severed bag segment is a finished bag body in which the strings are still continuous. The space between the edges 149 and 150 is a space which is bridged by the continuous strings 3 and 4 prior to the time when the strings are fastened together at spaced intervals and severed in between the fastening points at Station F so as to complete the draw string bag, at which time the edges 149 and 150 will then become the front and rear edges respectively of a completed draw string bag (FIG. 17), which is then ejected by the rolls 144 and 145. The mechanism for effecting the fastening and severing of the strings will now be described. The space between the edges 149 and 150 may be varied by means of changing the cam 136, as previously described.

Securing Cords Together and Severing

STATION F

In a preferred embodiment of the invention the cords 75

are secured together by what is known as wire stitching, and in order to obtain the full benefits of applicant's invention, the cords are stitched together at spaced points and severed between the points of stitching while the cords are disposed in a substantially straight line corresponding to the path followed by the strings disposed in the continuous strip. In order to accomplish this I have devised a combined stitching and cutting unit shown somewhat schematically in FIGS. 1a and 4, designated in general as 155, and now to be described more particularly with reference to FIGS. 5-11 inclusive.

Referring more particularly to FIGS. 5 and 6: The unit 155 is carried on a subframe designated in general as 156 having side rails 157 and 158 closely disposed in opposite sides of the upper section 21 of the main frame and rigidly interconnected by cross plates 159 and 159' respectively slidably resting on the frame section 21. The side rails 157 and 158 are provided along their lower edges with clamping flanges 160 and 161 respectively provided with clamp screws such as 162 and 163 threaded therethrough and in clamping engagement with the frame section 21 to lock the subframe in adjusted position on the section 21. The plates 159 and 159' carry rigidly secured thereto and extending upwardly therefrom a pair of standards 164 and 164' respectively, which are provided with vertically upwardly extending side frame portions 165 and 165' rigidly connected together at their upper ends by a cross piece 166.

A pair of stitcher heads 170 and 170' are rigidly secured to side frames 165 and 165'. The structural details of these heads will not be described per se since in the present embodiment they are standard units designated and known in the trade as "Bostitch No. 35 Stitcher Head." These heads are mounted in opposed face to face relationship so that the stapes formed thereby are ejected therefrom in closely disposed relationship spaced about 1/8" apart. These stitcher heads 170 and 170' are rigidly secured in position by means of screws 171 and 171' which are in threaded engagement with the stitcher heads and pass through the side frames 165 and 165', preferably being disposed in slots such as 172' to provide for ready removal of the heads for the purpose of servicing or replacement. The stitcher heads 170 and 170' are actuated by means of connecting rods 173 and 173' and in the present embodiment are interconnected by a common cross head 174 which is driven in a suitable manner such as by a piston 175 actuated by a compressed air motor 176 supplied with compressed air through a pipe 177 connected to a suitable source (not shown). The motor 176 is controlled in proper timed sequence by solenoid actuated valve means 178 supplied with a source of energy through a pair of wires 179. The solenoid is energized in suitable timed relationship in the cycle to be hereinafter described, such for example, as by a cam switch (not shown) actuated from a constantly rotating shaft such as 71 (FIG. 4). Two spools 180 and 180' are rotatably mounted to the side frames 165 and 165' and serve to supply wires 181 and 181' to the stitcher through suitable guide tubes 182 and 182' in a manner well known in the stitcher art. A pair of staple crimping anvils 183 and 183' (FIGS. 6, 7 and 8) are disposed in vertical register with the staples formed and driven by the stitcher heads 170 and 171 respectively. In order to provide for the desired vertical adjustment of the anvil blocks with respect to the stitcher heads, the anvil blocks 183 and 183' are mounted on a carrier 184 disposed between vertical guide rails 185 and 185' rigidly secured to a plate 186 constituting an integral part of an interconnecting the standards 164 and 164'. The carrier 184 rests on adjusting screw 187 which is threadedly engaged in a flange 188 provided on the side rail 157 and the carrier 184 is held in adjusted position by screws such as 189 and 189' (FIG. 5) threadedly engaged in the plate 186 and passing through cooperating slots in the carrier 184.

Cord Shearing

The shearing of the draw strings 3 and 4 is provided by a movable shear blade 190 (FIGS. 6, 7 and 8) and a cooperating fixed shear block 191 which is mounted on the carrier 184 for movement therewith. The movable shear blade 190 is pivotally mounted intermediate its ends on a bracket 192 fixed on the plate 186 and the outwardly extending end of the blade 190 is pivotally connected to the armature of a solenoid 193 supplied with current from a suitable source by means of a pair of wires 194. The actuating circuit is closed in proper time relation by means of a cam switch (not shown) actuated by a cam carried on a constantly rotating shaft such as the shaft 71 (FIG. 4). Fixed abutments 196 and 196' (FIGS. 7 and 8) are disposed on opposite sides of the anvil blocks 183 and 183' and are provided on a block 197 (FIG. 5) which is mounted on the outer face of the plate 186, for the purpose of aligning the cords 3 and 4 in position to be fastened together. As a feature of my invention, means is provided for moving the cords 3 and 4 from the side by side relationship as they pass between rollers 140 (FIG. 8) to a superimposed relationship against the abutments 196 and 196' (FIG. 9) so that they are disposed in tandem arrangement for engagement by staples such as 198 and 198', so that when the staples are clinched (FIG. 11) they will firmly and permanently fasten the cords together, preferably while the cords are compressed. A pair of fingers 200 (FIGS. 7 and 8) are fixed to a shaft 201 which is journaled in the carrier 184. The fingers are normally held in open position, i.e. away from the abutments 196 and 196', by a helical tension spring (not shown) and are moved to closed position as shown in FIGS. 7 and 8 by suitable means such as the solenoid actuator 202, which serves to move the strings into position more clearly shown in FIGS. 8 and 9. The solenoid is connected to a suitable source of power through wires 203 and is energized in timed relation to the rest of the mechanism by a suitable cam switch (not shown) actuated in the manner above described with reference to the shear blade solenoid 193 and the valve control solenoid 178 serving to actuate the dual stitcher heads. As will be noted in FIGS. 7 and 8 the cords 3 and 4 are disposed in side by side position between the rolls 141 and 142, friction sleeve 143 serving to assure positive engagement, and these rolls, in combination with the pair of guide rollers 140, serve to hold the cords in alignment while they are being moved into superimposed position, at which time the strings are held under tension between the rolls 141 and 142 and the accelerator rolls 110 and 111 (FIGS. 1 and 4). During the clinching of the staples (FIGS. 9-11) and severing of the strings, the strings are firmly held in superimposed relationship between the fingers 200 and abutments 196 and 196'.

The guide rollers 140 and the rolls 141 and 142 are mounted on the adjustable subframe 156 in the manner now to be described with reference to FIGS. 5, 6, 7 and 8. The lowermost of the pair of rollers 140 is adjustably fixed on the plate 186, such as by means of a screw and slot arrangement designated in general as 138 and 139. The upper one of the rollers 140 is pivotally mounted on one end of an arm 205 which is adjustably secured in position by a screw 206 passing freely through the other end of the arm 205 and in threaded engagement with the standard 164. A helical spring 207 has one end attached to the arm 205 and the other to a relatively fixed member such as the plate 186 to urge the upper roller toward the lower roller. The rolls 141 and 142 are mounted for adjustment toward each other to provide the proper driving engagement with the particular materials being operated upon and also to place them in horizontal alignment with the guide rollers 140 and the intervening stitching and severing mechanism. This is accomplished in the following manner: On the operator's side of the machine the roll 142 is journaled in the

outer end of an arm 208, whose other end is adjustably fixed to the standard 164 by means of a screw 209 and the corresponding end of the roll 141 is similarly mounted on an arm 210 adjustably fixed to the standard 164' by a screw 211. The opposite ends of the rolls 141 and 142 (FIG. 6) are supported on an upright 212 seated on and firmly secured to the plate 159'; roll 142 being journaled in the outer end of an arm 213 which is adjustably fixed to the upright 212 by a screw 214 and the lower roll 141 is journaled in a floating bearing 215 mounted in the upright 212 in such manner as to permit the slight degree of angular movement of roll 141 due to the angular adjustment of its opposite end carried by the arm 210. The slight angular movement of the roll 141 is not sufficient to interfere with the engagement of the sprocket 151 by its drive chain 146.

It will thus be seen that the subframe 156 may be adjusted along the upper frame section 21 in order to make bags of various widths; the stitching and cutting unit 155 and the associated rollers 140 and rolls 141 and 142 being moved as an assembly.

Modifications

Instead of using a cam such as 136 for reciprocating the gear rack 133 and cam roller 135 (FIG. 4), the cam and roller may be omitted. I may use instead an adjustable eccentric arm secured to the outer extremity of the shaft 70 and connected to the rod 134 in a manner similar to the adjustable eccentric arm 85 and rod 86. By adjusting the eccentric arm the stroke of the rack 133 may be varied without the necessity of changing the cam, thereby facilitating the variation in the degree of acceleration of the rolls 110 and 111.

As heretofore pointed out, when the heated knife 95 presses the bag strip against the Teflon roll 96 the strip is severed except for a small portion of each tubular hem partially surrounding the strings disposed in the groove 96a (FIG. 18, Sheet VIII) in the roll 96. The uppermost hem, formed by the panel 7 and fold 5, is in more intimate contact with the edge of the heated knife 95 and therefore there is a tendency to sever more of the upper tubular hem surrounding the string 3 than is the case with the lower hem, formed by the panel 8 and fold 6, surrounding the string 4. This sometimes tends to cause a slight distortion of the heated material when the small unsevered increments are snapped by the relative advance movement of the severed segment relative to the remaining bag strip. Also when the bag strip 1 is made of tougher material such as Du Pont "Mylar" polyester, the even snapping of both unsevered hem portions is difficult. This may be avoided by punching or otherwise cutting a small opening in the lower tubular hem so as to provide a cut-out portion extending inwardly beyond the string in register with each line of severance. Then, when the heated knife severs the strip, it will pass through the inner edge of the cut-out portion and no tubular hem will be left around the lower string 4 at the line of severance. Such cut-out is designated at 220 (FIG. 21, Sheet VIII) and may be effected, before the string 4 has been inserted at Station C, in the manner now to be described with reference to FIGS. 19 and 20 (Sheet VIII).

A punch of a well known type is designated in general as 221 and is secured to the upper frame 21 on the operator's side (FIGS. 1a and 4, Sheets I and III) between Stations B and C by suitable means such as screws 222. The punch 221 comprises a solenoid 223 actuating a rod 224 carrying at its lower end a punch ball 225 adapted, when the solenoid is energized, to move into operative engagement with a die opening 226 provided in a die plate 227 whose upper face is in the horizontal feed line of the strip 1. Fingers 228-228' are rigidly mounted on a rod 229 rigidly secured to the punch unit 221 as by a set screw 230. The fingers 228-228' serve to hold the hem of the upper panel 7 upwardly while the hem of the lower panel 8 is disposed between the punch 225 and die opening 226.

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The solenoid is controlled in proper timed sequence as by means of a cam switch (not shown) actuated from a constantly rotating shaft such as 71 (FIG. 4) so as to punch an arcuate cut-out opening 220 through the outer edge of the hem formed by the lower panel 8 and fold 6, in timed sequence so as to register with the lines of severance designated as 219. The extent of the cut-out is approximately three times the diameter of the string 4. It will be seen from FIG. 18 that when the heated knife 95 (FIGS. 1 and 4) comes down against the Teflon roll 96 it will meet the cut-out 220 so that the hem loop passing around the string 4 and beneath the string 3 and its hem loop formed by the lower panel 8 and its hem fold 6 will be completely severed. Also the upper panel hem formed by the upper panel 7 and its hem fold 5 will be severed by the knife 95, except for the small increment surrounding a little more than half the circumference of the string 3.

Operation

The machine is first adjusted in the particulars above indicated for the particular bag desired. In the present embodiment the strip of material 1 supplied on the roller S (FIGS. 1a and 4) is of tubular form provided with gussets on both edges and the slitting disc 27 will serve to slit the gusset on the operator's side of the machine to provide the hem folds 5 and 6 (FIGS. 2 and 13). The cord feeding mechanism shown in FIG. 2 will be adjusted to the desired position for feeding the cords 3 and 4 into the respective hem folds 4 and 5. The sealing mechanism at Station D will be adjusted to seal the hem folds so as to complete tubular passageways within which the cords 3 and 4 are disposed. The eccentric arm 85 (FIG. 4) is adjusted to feed a length of strip equal to the bag width desired at each intermittent period of feed. It is noted that in the present embodiment each intermittent period of feed is equivalent to the 180° rotation of the power shaft 71 and the intervening periods of rest each are equivalent to the other 180° of rotation. The cam 136 is selected for the predetermined length of strings desired between severed bag segments; or in the alternative where an adjustable eccentric is used the eccentric is adjusted. Also the subframe 156 is adjusted and secured in the desired position to bring the double stitching head into vertical alignment with the length of strings to be fastened and severed between the severed segments or edges 149 and 150 (FIG. 4); and the carrier 184 (FIG. 6) is adjusted to the desired vertical position so as to accurately place the anvils 183 and 183' at the proper height with respect to the stitching heads 170 and 170'.

With the foregoing and other usual adjustments having been made the operation is as follows:

The continuous bag strip 1 containing the continuous strings disposed in the sealed tubular passageways is fed forward in successive increments each exactly equal to the desired bag width and during the succeeding periods of rest following the respective periods of feed the knife 95 moves down to engage the strip between the knife and its backing roll 96 serving to sever a segment of the strip and simultaneously seal the panels together on opposite sides of the line of severance so as to complete bag side seams. As above pointed out, the heated knife severs the side panels of the strip including the tubular hem portions, except for very small sections at the lips of the bag; or in the case of the modification above referred to, a small section extending partly around one string only. As above pointed out, just before the knife engages the material to be severed the rolls 90 and 91 are separated so that at the time of severance the strip is not tightly gripped between the rolls 90 and 91 but is gripped by feed rolls 110 and 111. As the knife is raised the rolls 90 and 91 are moved together to firmly grip the severed segment and the continuous string and shortly

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thereafter the next increment of feed takes place during which, while the forward edge of the continuous strip is being advanced beyond the edge of the knife 95 an increment of distance equal to the bag width, the rolls 110 and 111 have been accelerated so as to move the previously cut segment forward and thus bodily advance it away from the forwardly moving continuous strip of material the predetermined desired distance. As the severed bag segment is advanced with respect to the continuous strip, the small unsevered sections of the lip are snapped; or in the case of said modification, the small remaining section of one lip is snapped. Simultaneously with the advancement of the severed segment the rolls 90 and 91 also pull the continuous strings through the tubular lips of the continuous strip, this being permitted by the groove in the draw roll 110.

Adjacent cut segments are thus moved forward in spaced apart relationship with the continuous strings bridging the gap, and at this time the bag bodies are complete but are connected together by the continuous strings and in this condition are fed forward (FIG. 4) by the rolls 110 and 111 and 141 and 142 between the cooperating cord belts such as 147, until the gap between the bag side seams 149 and 150 is in vertical alignment with the cord fastening and severing unit 155. The following operations take place during an interval of rest, i.e., when the draw rolls 90 and 91, accelerator rolls 110 and 111, as well as the pairs of rollers 140 and the pairs of rolls 141-142 and 144-145 are at rest. At this time the strings are held in lateral alignment by the rollers 140 and are tightly gripped between the accelerator rolls 110 and 111 and the rolls 141 and 142, so as to be held under tension. While so held (FIGS. 7 and 8) the fingers 200 are moved upward to engage the strings 3 and 4 so as to move them from the normal side by side feed relationship to a tandem vertical relationship in line with openings between the legs of the staples 198 and 198' delivered by the stitching heads 170 and 170', and while so held the staples move downwardly as indicated in FIG. 4, compressing the strings in a superimposed relationship, and as the staples are driven further the lower points are turned in grooves provided in the clinching anvils 183 and 183' so as to turn the points as indicated in FIG. 10 and finally crimp them while the strings are compressed to firmly secure the cords together at spaced points, as best shown in FIG. 11. At this time the cutting blade 190 is moved downwardly and in cooperation with the fixed shear block 191 severs the strings intermediate the staples 183 and 183', all of which is accomplished during the interval of rest between the feed increments. Following the severing of the strings the parts are returned to normal position and the machine is ready for the succeeding feed interval. During the succeeding feed interval the completed bag is ejected by the driven rolls 141 and 142 and 144 and 145 during the time when the next succeeding bag segments are moved forward into register with the fastening and severing unit 155.

From the foregoing it will be appreciated that an important feature of my invention resides in being able to separate the bag segments while maintaining the draw strings in the path of linear feed of the draw strings through the machine and in simultaneously fastening and cutting the strings while in this path of movement. These features of my invention make it possible to produce bags at a very high rate of production.

Having thus described my invention with particularity with reference to the preferred method and apparatus for carrying out the same and having referred to some possible modifications of the invention, it will be obvious to those skilled in the art after understanding the invention, that other changes and modifications may be made therein without departing from the scope of the invention, and it is my intention to cover in the appended

claims such changes as come within the scope of the invention.

What I claim is:

1. In apparatus for making draw string bags from a continuous strip of bag material comprising an upper panel and a lower panel connected at one edge of said strip and having tubular portions on said side panels adjacent the other edge of said strip with continuous draw strings disposed therein; the combination of means for feeding said bag strip, means for successively severing said strip along lines of severance at predetermined bag width lengths while leaving said strings continuous and seaming opposite panels of said bag strip adjacent said line of severance to provide bag side seams, means disposed beyond said strip severing means in the direction of said strip feed for advancing said severed segments and continuous strings with respect to said continuous bag strip to thereby provide a gap between said bag side seams bridged by said continuous draw strings, means beyond said advancing means in the direction of said strip feed for securing said draw strings together within said gap at spaced points, and means for severing said draw strings intermediate said secured points.

2. Apparatus as set forth in claim 1 in which a frame is mounted for adjustment in the direction of feed and the means for securing said strings together and severing them are mounted on said frame for unitary movement therewith, to provide for making bags of different widths.

3. In apparatus for making draw string bags from a continuous strip of heat sealable bag material comprising an upper panel and a lower panel connected at one edge of said strip and having tubular portions on said side panels adjacent the other edge of said strip with continuous draw strings disposed therein, the combination of means for feeding said bag strip intermittently for predetermined increments of length equal to the desired bag width, means for successively severing said strip along lines of severance at predetermined bag width lengths while leaving said strings continuous and simultaneously sealing opposite panels of said bag strip adjacent said line of severance to provide bag side seams, said severing and sealing means comprising a heated knife and a cooperating backing roll toward which said knife is relatively movable, said roll having a groove for receiving said draw strings and adjacent portions of said hems, supplemental feed means disposed beyond said strip severing means in the direction of said strip feed for advancing said severed segments and continuous strings with respect to said continuous bag strip to thereby provide a gap between said bag side seams bridged by said continuous draw strings, means disposed beyond said supplemental feed means in the direction of said strip feed for securing said draw strings together within said gap at spaced points, and means for severing said draw strings intermediate said points of fastening.

4. In a draw string bag making machine in which successive bag segments are severed from a continuous length of bag strip having marginal hems containing continuous lengths of draw strings respectively; strip severing means for severing said bag segments while leaving said strings continuous between said strip and a severed segment, said severing means comprising a heated knife and a cooperating backing roll toward which said knife is relatively movable, said roll having a groove for receiving said draw strings and adjacent portions of said hems, means for advancing each successive severed segment and continuous draw strings with respect to the continuous length of bag strip to thereby provide an intervening space between the rear end of the severed segment and the forward end of said strip with the draw strings bridging the intermediate space, means for aligning said draw strings one over other, and means disposed beyond said strip severing means in the direction of said strip advance for simultaneously compressing said draw strings one against the other and stitching them together

at spaced points within said intervening space while so compressed, and severing said draw strings between said stitched points.

5. Apparatus as set forth in claim 4 in which means is provided for holding said strings under tension during said aligning, compressing and stitching.

6. In a draw string bag making machine in which successive bag segments are severed from a continuous length of bag strip having marginal hems containing continuous lengths of draw strings respectively; strip severing means for severing said bag segments while leaving said strings continuous between said strip and a severed segment, said severing means comprising a heated knife and a cooperating backing roll toward which said knife is relatively movable, said roll having a groove for receiving said draw strings and adjacent portions of said hems, means for advancing each successive severed segment and continuous draw strings with respect to the continuous length of bag strip to thereby provide an intervening space between the rear end of the severed segment and the forward end of said strip with the draw strings bridging the intermediate space, unitary means disposed beyond said segment advancing means in the direction of said strip advance for stitching said draw strings together at spaced points within said intervening space and severing said strings between said stitched points, and means for adjustably mounting said unitary means for accommodating bags of varying widths.

7. In apparatus for making draw string bags from a continuous strip of bag material comprising an upper panel and a lower panel connected at one edge of said strip and having seamed hems on said side panels at the other edge of said strip with continuous draw strings disposed in said seamed hems; the combination of a first pair of feed rolls for intermittently feeding said strip between alternate periods of rest, means for severing and sealing said opposite strip panels together during the periods of rest while leaving said continuous strings intact, said severing and sealing means comprising a heated knife and a cooperating backing roll toward which said knife is relatively movable, said roll having a groove for receiving said draw strings and adjacent portions of said hems, a second pair of feed rolls beyond said knife in the direction of feed, means for momentarily separating said second rolls during engagement of said knife with said strip, common means for operating said two pairs of feed rolls simultaneously during said intermittent feed periods and means operable conjointly with said common means for accelerating the rate of feed of said second pair of feed rolls, said first pair of feed rolls frictionally holding said strip therebetween while slidably holding said strings within the hems of said continuous strip and said second pair of feed rolls frictionally holding said severed segment and continuous strings within the hems thereof, whereby a severed segment and said continuous strings are advanced with respect to said continuous strip to provide a predetermined length of said continuous strings between said strip and a severed segment.

8. Apparatus as set forth in claim 7 wherein the common means for an operating said second pair of rolls comprises a differential having an input gear driven in synchronism with one of said first pair of feed rolls, an output gear drivingly connected to one of said second pair of feed rolls and interconnected to said input gear by a planet gear set and said conjointly operable means for accelerating the rate of feed of said second pair of feed rolls comprises means for intermittently revolving said planet gear set in the direction of rotation of said input gear.

9. In apparatus for making draw string bags from a continuous strip of heat sealable bag material comprising an upper panel and a lower panel connected at one edge and having open hem folds on said side panels at the other edge of said strip with continuous draw strings disposed within said folds; the combination of means for

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sealing said hems with said strings disposed therein, first means for drawing said strip and strings through and beyond said hem sealing means during intermittent periods of feed alternating with intermittent periods of rest, means disposed beyond said first drawing means in the direction of feed for severing and sealing bag segments from said strip during said periods of rest while leaving said strings continuous, said severing and sealing means comprising a heated knife and a cooperating backing roll toward which said knife is relatively movable, said roll having a groove for receiving said draw strings and adjacent portion of said hems, second means operable during said periods of feed for drawing each of said severed segments bodily away from said continuous strip and for simultaneously drawing said continuous strings through said first drawing means and the hems of said continuous strip a predetermined distance.

10. In apparatus for making draw string bags from a continuous folded bag strip of heat sealable material comprising an upper panel and a lower panel connected by a bottom fold along one marginal edge of said strip and having opposed separate bag lip folds adjacent the other marginal edge formed as continuations of said panels respectively; the combination of means for introducing a pair of draw strings laterally into said hem folds respectively, means for feeding said strings to said introducing means, means for drawing said strip and continuous strings beyond said introducing means, means intermediate said introducing means and drawing means for sealing said bag lip folds to provide tubular hems containing said strings, said drawing rolls comprising a first pair of draw rolls urged together in feeding engagement with said strip and one of said rolls having a groove to receive said strings and relieve pressure thereagainst, means intermediate said sealing means and said drawing means for holding said strip toward the outer edge of said tubular hems and into register with the groove in said draw roll, said drawing rolls also comprising a second pair of draw rolls urged together in feeding engagement with said strip and strings, strip severing and sealing means disposed between said two pairs of draw rolls operable to sever and seal said strip while leaving said strings continuous, means for intermittently operating said two pairs of draw rolls simultaneously and means operable to accelerate the rate of feed of said second pair of draw rolls with respect to said first pair of draw rolls, whereby a severed segment of said strip is bodily advanced a predetermined distance from said continuous strip and said continuous string is advanced a like distance.

11. Apparatus as set forth in claim 10 in which said lip folds are directed inwardly between said panels and draw string introducing means is disposed between said upper and lower panels, including members positioned between each respective panel and its inwardly folded hem.

12. The method of making draw string bags of pliable material which comprises the steps of feeding a continuous folded strip of bag material having a bag bottom fold adjacent one marginal edge and opposed separate bag lip folds adjacent the other marginal edge, introducing continuous lengths of separate draw strings into said lip folds respectively and feeding said strings with said strip, seaming said lip folds to provide tubular lip hems containing said continuous strings, severing said strip at longitudinally spaced transversely extending lines of severance to provide successive bag segments while leaving said strings continuous across said lines of severance respectively, bodily advancing each successive bag segment and said continuous lengths of strings with respect to the remaining bag strip length, securing said draw strings of respective opposite lips together at longitudinally spaced intervals between adjacent severed bag segments and severing said secured strings intermediate said secured points.

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13. The method set forth in claim 12 in which said strip is severed by a heated knife except for a small increment of material closely adjacent said strings and said increment of material is snapped by said bodily advancement of a bag segment with respect to the remaining bag strip.

14. The method of making plastic draw string bags which comprises the steps of intermittently feeding a continuous folded strip of plastic heat sealable bag material having top and bottom panels interconnected to provide a bag bottom fold adjacent one marginal edge and provided with opposed separate bag lip folds adjacent the other marginal edge, introducing continuous lengths of separate draw strings laterally between said panels and into said lip folds respectively and feeding said strings simultaneously with said strip, heat sealing said lip folds to provide tubular lip hems containing said continuous strings, heat severing said strip at longitudinally spaced transversely extending zones to provide successive bag segments while leaving said strings continuous across said severed zones respectively, advancing each successive bag segment and said continuous lengths of strings with respect to the remaining bag strip length, securing said draw strings of respective opposite lips together simultaneously at longitudinally spaced intervals between adjacent severed bag segments and concurrently severing said secured strings intermediate said secured points.

15. The method of making draw string bags of plastic heat severable material which comprises the steps of feeding a continuous bag strip having opposite panels interconnected adjacent one marginal edge to provide the bottoms of bags and opposed separate tubular portions adjacent the other marginal edge containing continuous draw strings respectively; which comprises simultaneously feeding said continuous strip and strings, severing said strip at longitudinally spaced transversely extending lines of severance to provide successive bag segments while leaving said strings continuous across said lines of severance respectively, advancing each successive bag segment and said continuous lengths of strings a predetermined distance away from the remaining strip length in the direction of strip feed, securing said draw strings of respective opposite panels together at longitudinally spaced intervals between adjacent severed bag segments and severing said secured strings intermediate said secured points.

16. The method as set forth in claim 15 in which the bag strip is heat severed commencing at the edge where the side panels are interconnected to closely adjacent said strings and the remaining increments of strip material closely adjacent said strings is snapped by the advancing bag segment away from said strip.

17. The method as set forth in claim 15 in which said strings are held taut while being secured and severed.

18. The method of making draw string bags of pliable material which comprises the steps of feeding a continuous folded strip of bag material having a bag bottom fold adjacent one marginal edge and upper and lower bag lip folds adjacent the other marginal edge, providing notches in one of said lip folds at bag width intervals, introducing continuous lengths of separate draw strings into said lip folds respectively and feeding said strings with said strip, seaming said lip folds to provide tubular lip hems containing said continuous strings, heat severing said strip at longitudinally spaced transversely extending lines of severance in register with said notches, so as to completely separate the strip except for a small increment of material in the other hem partially surrounding the string contained therein, to provide successive bag segments while leaving said strings continuous across said lines of severance respectively, bodily advancing each successive bag segment and said continuous lengths of strings with respect to the remaining bag strip length, said advancement snapping said

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remaining increment of material partially surrounding said one string, securing said draw strings of respective opposite lips together at longitudinally spaced intervals between adjacent severed bag segments and severing said secured strings intermediate said secured points.

19. The method as set forth in claim 18, in which the notches are provided in the lower lip fold.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,058,403

October 16, 1962

Emanuel Kugler

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 21, for "ends" read -- end --; line 63, for "longiutdinally" read -- longitudinally --; column 8, line 13, for "carired" read -- carried --; line 69, for "an" read -- and --; column 13, line 72, after "over" insert -- the --; column 14, line 61, strike out "an"; column 15, line 12, for "portion" read -- portions --; column 16, line 23, for "string" read -- strip --.

Signed and sealed this 26th day of February 1963.

(SEAL)

Attest:

ESTON G. JOHNSON
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Commissioner of Patents