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## HANDLE ATTACHING APPARATUS

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Introduction
The present invention relates to the manufacture and attaching of handles to paper bags.

Many forms of paper bags used to convey groceries or the like and particularly larger bags of this nature used as shopping bags are provided with a pair of substantially $U$-shaped string handles that are attached, one at each side to the upper margins of the bag. Various expedients are used to secure the string handles to the bags, for example, the handles are sometimes glued or stapled directly to the bag or the handles are first attached to a strain distributing member of cardboard or the like and the member and handles are then secured to the bag.

As mass production methods are necessary in the manufacturing of articles of this nature various machines have been devised for the continuous production of handles and handle attachments for example, the apparatus disclosed in United States patent $2,332,530$.

Other apparatus has been devised to automatically attach handles to paper bags but in general all equipment of this nature at present available presents certain disadvantages from the manufacturing viewpoint. For example, machines of this nature are usually designed to accommodate one size of bag and if a manufacturer intends placing the handles on several sizes of bags he requires several machines. Further, prior art apparatus of this nature attaches the handles on one side only in one operation, the bag having to be reversed and sent through the machine again to complete the assembly.

The present invention recognizes these and other disadvantages and aims to furnish a solution for them by providing a handle manufacturing and attaching apparatus that is designed to automatically form the handles and strain distributing strips and attach the handles and strips to both sides of a paper bag simultaneously. Further, the present apparatus is sufficiently flexible to accommodate almost any size and style of paper bag that requires handles so that a manufacturer can utilize one machine to meet all his requirements rather than having to use a separate machine for each size of bag.

## Applicant's development

Accordingly, the invention consists of an apparatus adapted to continuously form U-shaped
string handles and reinforcing strips and then adhesively attach the handles and strips simultaneously to both sides of a paper bag as it is fed through the machine.
More specifically, a preferred construction of this apparatus includes a frame on which is rotatably mounted a pair of cylindrical drums which are arranged one above the other and driven in opposite directions so that paper bags can be fed between their opposed peripheral surfaces by means of a suitable conveyor. Mechanism is provided that intermittently feeds a continuous strip of paper to each of the drums and pasting and cutting attachments apply adhesive to the strip and cut the strip into the portions necessary to form the reinforcing strips. Strip retaining means are provided on each drum so that as the drum rotates the strip is carried on the outer periphery of the drum towards one of a pair of string forming dies that are mounted so as to have their lower ends projecting into the path of the outer periphery of the drum.
Means are provided to intermittently feed lengths of string into each of the string forming dies which are actuated in time related sequence so as to form the string lengths into substantially U-shaped handles which are advanced into the paths of the drums. String engaging fingers are provided on each drum that are adapted to engage with the $U$-shaped string handles so as to withdraw them from the forming dies and retain them in contact with the adhesive coated surface of the paper strips. Pasting means are also provided that are adapted to apply adhesive to each side of the paper bags prior to their feeding between the counter rotating drums and on the continued rotation of the drums the $U$-shaped string handles and adhesively coated surface of the strips are brought into contact with the adhesively covered portions of the bag simultaneously at each side. This places the $U$-shaped string handles directly on the adhesive on the bag with the previously adhesively prepared reinforcing strip over the string and in contact with the bag between and at both sides of the string. As this contact is made between the nip of the drums the handles and strip are pressed firmly into contact with the bag at each side.
The string engaging fingers and reinforcing strip retaining means of the drum are automatically withdrawn as this contact is made and as the drum continues to rotate these members are moved into proper position for the next cycle.

## Detailed description

Having thus generally described the nature of the invention particular reference will be made to the accompanying drawings, and in which:

Figure 1 is a plan view of a preferred apparatus constructed in accordance with the invention.

Figure 2 is an enlarged detail view of the rack and gear arrangement of the string feeding mechanism.
Figure 3 is a sectional view in side elevation of the apparatus of Figure 1 along the line 3-3.
Figure 4 is an enlarged detail view of a portion of Figure 3 along the line 4-4 to illustrate the string forming block in more detail.
Figure 5 is an enlarged diagrammatic view of the paper strip retaining rollers illustrating the cam and pawl arrangement.
Figure 6 is a front end elevation of the apparatus of Figure 1 with the pasting rollers and feeding mechanism removed to show the relative positions of the string feed, handle forming and handle attaching mechanism more clearly.
Figure 7 is a front view in perspective ố a paper 'bag with handles attached in accordance with the invention.
Figure 8 is a diagrammatic view of the upper portion of the bag shown in Figure 7 to illustrate the construction more clearly.
Figure 9 is a section of Figure 7 along the line 9-9.
Figure 10 is a diagrammatic view of a top portion of a shopping bag before the handles are attached showing the location of the first patches of adhesive.
Figure 11 is an enlarged fragmentary view partially in section of the front portion of the apparatus illustrating the relative positions of the pasting rolls and handle attaching cylinders to show the internal mechanism in more detail.
Figure 12 is a section of Figure 10 along the line 12-12.
Figures 13, 14, and 15 are enlarged detail views partially in section of the upper drum of the apparatus illustrating in sequence the motion of the handle forming and attaching mechanism at the start of the handle forming cycle.
'Figure 16 is an enlarged detail view partially in section of a portion of the upper and lower drums illustrating the handle attaching mechanism at the end of a cycle.

Figure 17 is an enlarged detail view of the internal mechanism of one of the drums to show the cam actuating the string retaining fingers and the cam actuating the paper strip retaining pins in more detail.

Figure 18 is an enlarged side view of one of the handle attaching drums in operative position to show the relative position of the string retaining finger in the sequence step shown in Figure 15.

Figure 19 is an enlarged detail plan view partially in section of a portion of the front of the apparatus to illustrate in more detail the string feeding mechanism.

Figure 20 is a detail view partially in section along the line $20-20$ of Figure 19 illustrating the gear train driving the cut-off knife cam and the gear train driving the string feeding rollers.

Figure 21 is a diagrammatic view partially in section of the string feeding arrangement showing the string as it is fed into one of the string forming dies.

Figure 22 is a diagrammatic view of the string entire length of the U-shaped string handles are held against the outer periphery of the drum with the legs being impressed, together with the 75 paper strip, into the grooves 68 , producing an
effect as shown in the section of a paper bag illustrated in Figure 9.
The paper bags on which the handles are to be attached are intermittently fed into the machine by means of a conveyor belt 80 having spaced apart stops 82 . Pasting rollers 84,86 positioned on the frame adjacent the end of the conveyor belt 80 and supplied from paste containing pans 88, 90 are adapted to place dabs of adhesive on each side of the bag as it is fed into the machine as is shown in Figure 10. The bags are then fed forward into the nip between the drums 10, 12 and on the continued rotation of the drums the legs of the U-shaped string handles and paper strip are placed into contact with the adhesively coated portions of the bag at each side. The clearance or nip between the drums 10, 12 is calculated so as to exert sufficient pressure on the paper strips and bag to firmly bring them into close contact with the legs of the Ushaped handle fitting into the grooves 68 of the drums in the manner shown in detail in Figure 9. A conveyor belt 92 is provided to carry the assembled bags from the machine as is shown in Figures 1 and 5.

With particular reference to Figures 7, 8, and 9 illustrating a paper shopping bag A having string handles $\mathbf{B}$ attached in accordance with the invention, this provides a strong joint between handles and bag, the legs of the U-handle B being adhesively attached to the reinforcing strips $C$ and bag $A$ and being covered by the reinforcing strips C which are adhesively secured to the bag along the entire length. In order that the construction of the apparatus may be more clearly understood, I shall now describe the various portions in more detail.

## Strip feeding and cutting mechanism

The paper supply rolls 16 , 18 are mounted on shafts 100 supported by brackets 102 extending in spaced apart relationship from the frame 14 so that the rolls can rotate on withdrawal of the paper strip which I shall designate as "D." The strip $D$ is threaded over the idler rolls 104, 106 and then passed between the retaining rolls 108, 110 which have their outer surfaces knurled or roughened. Each of the rolls 108, 110 include a gear and pawl arrangement (see Figure 5) so that the paper strip $D$ can move freely in one direction but cannot slip back. The paper strip D is moved forward intermittently by means of the paper advancing rolls 20, 22. These are formed so that one of each pair of rolls has a segmental paper engaging surface 21 , and the other a smaller segmental paper engaging surface 23. As the rolls 20,22 are adjustable on the shafts 25 on which they are mounted, the opposed surfaces 21,23 of each pair of rolls can be adjusted so that any portion or all of the surfaces 21 can meet in opposed relationship with the surfaces 23 so as to advance the paper strip $D$ for a distance equivalent to the entire circumferential length of the surface 21 or any portion thereof. Accordingly, on each revolution of the rolls 20 , 22 the paper strip D is advanced a distance equivalent to the amount of the surfaces 21 overlapped by the surface 23 of the opposed rolls.

As the paper strip "D" is advanced by the rolls 20, 22 it is passed between the idler rolls 110,112, and the pasting rolls 28, 30. Each of the pasting rolls 28, 30 includes a segmental pasting pad 113 that is adapted on each revolution to contact the rollers 29, 31 of the paste containing pans 24, 26 and then to apply the adhesive so collected to
the upper surface of the paper strip "D." The continued advancement of the strip "D" brings it it into contact with th outer surfaces of the drums 10 or 12 and between the drums and the paper cutting rollers 32, 34 mounted on shafts 29,21 journalled in the frame 14. Each of the paper cutting rollers 32, 34 include a paper cutting knife 114 mounted on and extending from its outer peripheral surface and each of the drums 10, 12 includes a pair of corresponding slotted knife receiving bars 116 in its outer peripheral surface With this arrangement, on each revolution of the cutting rollers 32, 34, the cutting knives 114 mesh with one of the bars 116 in the drums 10, 12 so that a portion is cut from the end of the paper strip " D ," the width of the portion corresponding to the amount the strip " D " is advanced by the paper feed rolls 20, 22.

## Handle and strip attaching drums

The cylindrical drums 10,12 are rotatably mounted on the frame 14 on shafts 120,122 respectively that extend across and are journalled at each side of the frame 14. The shafts 120 , 122 are driven by gears positioned at one side of the machine and in mesh with the main driving gear train.
Each of the cylindrical drums 10,12 includes an outer shell 124 with webs 126 at each end. Preferably, the drums are made of cast iron with the shell and webs cast integrally and then bored and suitably bushed for mounting on the shafts 120, 122. The outer shell 124 of each drum is grooved about its outer periphery to provide the string retaining grooves 68 as well as being slotted axially in diametrically opposed relationship to accommodate the cutting knife engaging bars 116, and suitable openings are provided to accommodate the paper strip retaining pins 36 and the string engaging fingers 65 .
The paper engaging pins 36 are mounted within each of the drums 10, 12 so that as the drums rotate the ends of the pins protrude from the outer surface of the drum to engage the cut portion " $C$ " of the paper strip " $D$ " and then retract to release the paper strip " $C$ " on the completion of the cycle.

This is accomplished by having each pair of pins 36 mounted on arms 128 rigidly secured in spaced apart relationship to a shaft 130 extending across the driven end and being mounted in and extending through suitable bearings provided in the drum webs 126 . A crank arm 132 is rigidily secured to the end of each shaft 130 extending beyond the web 126 and a roller 134 mounted on the arm 132 is adapted to engage the surface of a cam plate 140 secured to the frame 14 exteriorly of the drum. The cam plate 140 is formed to have a cam surface 142 that is adapted to raise the crank arms 132 and consequently the pin supporting arms 128 when the cirum is in the correct position for cutting the paper strip, and to lower the crank arms 132 when the paper strip "C" has been engaged with the bag surface "A." Springs 125 are provided that are connected between the pin supporting arms 128 and the web 126 so as to normally hold the pins 36 beneath the surface of the drums. As there are two sets of pins 36 on each drum, diametrically opposed, the cam surface 142 is set to engage one set and simultaneously release the other, the cam plate 140 preferably having elongated slots at its attachment point to the frame 14 so that angular adjustment can be made to synchronize this action with the rotation of the drums.

The string engaging fingers 85 are also mounted in pairs in each drum 10, 12 in diametrically opposed relationship with each finger 65 mounted in a split finger retaining block 104 rigidly secured to a shaft 146 extending between and journalled in the drum webs 126. Each of the shafts 146 include an end portion 147 that extends beyond the web 126 at the opposite side of the drum from the pin actuating cam plate 140 and a crank arm 150 including a roller 152 is rigidly mounted on the shaft end 147. These crank arms 150 are intermittently actuated during the rotation of the drum by the contact of the rollers 152 with the projecting cam surfaces 154 and 155 of a cam plate 156. Each of the finger supporting blocks 144 includes a projecting angle 193 and a spring 145 is secured between the angle 143 and the web 126 so as to return the fingers 65 to their normal position beneath the outer peripheral surface of the drum.
Each of the cam plates 156 is mounted on the opposite side of the frame 14 from the cam plates 140 by means of a collar 160 having a flange 16.2 that is secured directly to the frame is the shafts 120, 122 being a slide fit through the collar 160.
The projecting cam surface 154 is adjustably secured to the cam plate 156 by means of slots 106 and bolts 168 so that the position of the cam surface 154 can be adjusted angularly to the re-quired position. The cam surface TE4 is adapted to raise and lower the string engaging fingers 65 quite rapidly as is required when the string engaging fingers are rotated adjacent the string forming dies 80, 42. The cam surface 155 is adapted to raise the fingers 53 so as to release the U-shaped string handle when the drum has reached the bag engaging position and maintain the fingers in this position for a short portion or the return cycle after which they are released to drop beneath the suriace of the drum as it again rotates to the beginning of a new cycle.

## The string forming dies

The string forming dies 60 , 42 each consists of a main slide frame 170 that is secured to a bracket 172 extending from the frame 14 with a string forming plunger 60 slidably mounted in each of the side frames. Each of the plungers 80 includes an extension el projecting from the rear face and a crank arm 84 is pivotally connected to each extension 6i. The crank arms 64 are pivotally connected to and are reciprocated by the crank wheels 65 mounted on shaft ITA extending across and being journalled in the sides of the frame 14. A suitable gear 171 is secured to one end of each of the shafts 17 H so that the crankwheels are rotated in time related sequence by the gear train driving the apparatus. A string receiving slide 180 is attached to each of the slide frames 170 by slidable engagement with a nair of guide plates 182 projecting rearwardly from the slide frame.

The upper guide plate 182 includes spaced apart slots adapted to allow restricted movement of pins 184 projecting from the slide 180 and springs 186 are connected between the pins 184 and pins 185 mounted on the plate 182 to normally urge the slide 180 away from the stide frame 170 so as to allow the string portion that is to be formed into a $U$-shaped handle to pass between the slide plate 180 and the frame 170 as indicated at 188 (see Figure 13). The outward movement of the slide 180 is restricted by the engagement of a roller 190 mounted on the outer end of this plate with a pusher cam 192 mounted on a shaft 193
that is also driven exteriorly of the frame 14 by a gear 189 meshed with the main gear train. The cam 192 includes a projecting cam surface 194 that is adapted to engage with and push the slide plate roller 190 -inwardly so as to force the string portion into the slide of the slide frame 410. As the plunger 60 descends the string is formed between the walls of the slide frame 10 and the plunger 60 into a substantially $U$-shaped form with the loop of the $U$ extending across the end of the plunger 60 and is moved down the exterior of the slide frame 170 into the path of the string engaging fingers 65 as they are carried past by the rotating drum. As the end of each of the plungers 60 include a hemispherical cut-out 59, and the lower end of the slide frame 170 between the slide members also includes a corresponding cut-out 61, the fingers 165 on actuation by the finger cams are closed down on the loop of the $U$-shaped string portions and they are withdrawn from the slide frame 170 and retained on the outer surface of the drum. A pair of resilient members 70 are secured in spaced apart reiationship corresponding to the grooves 68 in the drums to each of the slide frames 170 so that on continued rotation of the drum the legs of the U-shaped string mentbers are pressed into the drum grooves 68 in engagement with the adhesively coated paper strip.

## String feeding and cutting mechanism

The string " $B$ " used for the $U$-shaped handles is drawn from the pair of supply spools 53, 54 rotatably mounted on the standard 56 and intermittentiy fed into the string forming dies 40, 42 in the following manner as shown in detail in Figures 19 through 23.
The shait mounting the lower paper feeding rolls 22 is extended to the exterior of the frame 14 where a crank arm 202 is secured as is shown in Figure 2. A driving arm 204 having a rack toothed end 209 is pivotally connected to the crank arm 202 so that rotation of the shaft causes reciprocal motion of the driving arm 204 . A shaft 203 is journalled in the frame 14 adjacent the end of the driving arm 204, and a ratchet wheel 210 and a pinion gear 203 are respectively rotatably and fixedly mounted on this shaft. The rack portion 205 of the driving arm 204 is meshed with the ratchet wheel. 810 and is maintained in alignment by means of a guide plate 242 slidably mounted over a hub portion of the ratchet wheel 210 so that reciprocation of the arm 203 couses intermittent free rotation of the ratchet wheel 210 on the shaft 206 . This movement is transferred to the pinion gear 208 by means of a pawl 216 pivotally mounted on a pawl carrier 2.7 rigidly secured to the gear 284 so that the pinion 208 and the shaft 206 are rotated intermittently in one direction. A sprocket gear 218 is fixedly mounted on the shaft 206 adjacent the fyame 14 and a second shaft 201 journalled in the frame 14 above the first shaft 206 and having a sprocket gear 220 fixedly mounted thereon is driven by a sprocket chain 222 connecting the sprockets 218, 220.
A bevel gear 22A is fixedly mounted on the end of the shaft 206 extending interiorly of the frame 14 and is in meshed engagement with a second bevel gear 226 fixedly mounted on a shaft 228 journalled between a pair of plates 230, 231 secured to the frame 14 adjacent the slide frame 170. A toothed gear 234 is fixedly mounted on the other end of the shaft 228 and is adapted to drive through a train of gears 235, 236, 237, a
pair of string advancing rollers 240, 242 mounted in opposed relationship on shafts 243, 244 journalled between the plates 230, 231. With this arrangement rotation of the shaft 206 is adapted to intermittently rotate in opposite directions the rolls 240,242 , and so advance a 'ength of string between the opposed faces of the rolls.
With particular reference to Figure 21 of the drawings a pair of string aligning and locating tubes 246 are mounted in and extend from the frame 14 so as to keep the string in alignment with the rolls 240,242 and feed the string into a bell mouthed string guide 249 mounted in the string receiving passage of the string forming slide frame 170.

As the required amount of string is advanced into the slide frame 170 by the intermittent motion of the rolls 240,242 it is severed by means of a string cutting knife 245 slidably mounted in knife support member 241 secured to a support bracket 248 extending from the plates 230 , 231. The string cutting knife 245 is intermittently reciprocated across the string by means of a cam 250 mounted on a shaft 241 journalled in the support 248 and driven by a gear 254 through idler gears 256, 251 in meshed engagement with a gear 258 fixedly mounted on the shaft 21 of the cutting roller 34. With this arrangement a predetermined length of string is fed into the string forming dies 40,42 with each revolution of the paper cutting rollers and paper advancing rollers, these being geared to rotate twice for each rotation of the drums.

While the foregoing description deals mainly with the string feeding and cutting apparatus positioned adjacent the lower 42 of the string forming dies the shaft 207 carries a bevel gear 224' which is adapted to drive an identical string feeding arrangement positioned adjacent the upper string forming die 40. The second string cutting arrangement similar to that previously described is positioned adjacent the upper string forming die 40 and is driven through a train of gears from the shaft 29 to the cutting roller 32.

It will be understood that the train of gears driving the machine are arranged so that each of the working elements are rotated in time related sequence. A handwheel 260 is provided that is mounted on the opposite side of the machine to the gear train and connected to a main driving gear so that the machine can be actuated manually for setting purposes. While a power source is not illustrated, it is contemplated that the machine will be powered by an electric motor connected by a suitable pulley arrangement to the gear train adjacent the lower portion of the frame.

When the machine is in operation the paper bags on which the handles are to be attached are individually fed forward by the feeding conveyor which is driven in synchronization by a gearing arrangement from the driving gear train of the apparatus (illustrated diagrammatically). Strips of paper are fed forward from the supply rolls by the paper advancing rolls and paste is applied by the pasting rolls. The continued advancement of the strips brings them into line with the opposed drums and between the outer surfaces of the drums and the paper cutting rollers. The continued rotation of the drums in co-operation with the paper cutting rollers cuts the adhesively coated portion of the paper strips off at the desired length to form the han-
dle reinforcing patches. At the same time the paper retaining fingers co-operating with the drums come into operation to hold the adhesively coated patches onto the outer surfaces of the drums as they continue to rotate.

The further rotation of the drums brings the cut-off length of paper into alignment with the string cutting and forming dies and the string holding fingers extend from the drum to pull the $U$-shaped string length into contact with the outer adhesively coated surfaces of the cut paper portions so that the legs of the string $U$ are adhesively secured thereto.
The still further rotation of the drums brings the formed string handles and paper portions which are now adhesively combined and held on the outer surface of the drum towards the nip of the drum as the bag is fed therebetween by the feeding conveyor. Prior to the feeding of the bag between the nip of the drums, quantities of adhesive material have been selectively applied to each side of the bag so that as the bag is fed between the drums the u-shaped string handles are applied at each side with the paper strip portions outermost and directly over the dabs of adhesive on the bag. The nip or clearance between the drums is calculated to exert sufficient pressure on the paper strip portions and bag so as to bring them into close contact with the legs of the U-shaped handles which fit into the grooves provided in the drum. The further rotation of the drums clears the finished bag from between the drums onto the discharge conveyor belt so that it is carried out of the machine.

As will be appreciated, as there are two sets of strip retaining pins and string holding fingers disposed in diametrically opposed relationship on each drum, each full rotation of the drum is adapted to place the handles on each side of two bags. As one pair of handles are being applied between the nip of the drum, a corresponding arrangement at the diametrically opposed sides of the drums are receiving and cutting further strip portions prior to their engagement with the string forming dies so as to pick up the $\mathbf{U}$-shaped string handle. The feeding and adhesive application to the bags is in time related sequence to the rotation of the drum so that the handle applying operation is carried out in a continuous cycle.
The paper shopping bag of the gusset type shown in the drawings is illustrative only and it will be understood that the present apparatus can be adjusted so that it may be employed to attach string handles to any size or type of paper bag desired.

## I claim:

1. An apparatus for continuously forming and simultaneously attaching a pair of handles to pre-formed paper bags of the type having an open mouth bordered by opposed marginal portions, one on the outside of each of said marginal portions, said apparatus comprising, a frame, a pair of cylindrical drums mounted for counter rotation on said frame, one above the other in opposed relationship, a pair of handle forming dies, each including a pair of spaced apart opposed guide members mounted on said frame adjacent to and tangent to the outer periphery of each of said drums in opposed relationship, a handle forming plunger slidably mounted between each pair of said guide members adapted 75 to bend a length of string fed across said guide
members in a U-shaped form and advance said formed string into the path of one of said drums; a slide frame connected to each of said handle forming dies and a slide plate mounted in each of said slide frames adapted to intermittently feed out lengths of string across said guide members, means to intermittently fed a length of string into said slide frame and to cut said string into predetermined lengths, means for intermittently feeding a continuous strip of paper to each of said drums, adhesive applying means mounted on said frame adapted to apply adhesive to each of said paper strips prior to its engagement with one of said drums, paper cutting means mounted on said irame and drums adapted to intermittently sever a portion from each of said continuous paper strips, paper engaging means mounted on each of said drums, string engaging and retaining means mounted on each of said drums adapted to engage and retain said U-shaped string portions in contact with said paper portions, means for feeding a bag between said drums including a pair of opposed feed rolls mounted on said frame in alignment with the nip of and in advance of said drums, an endless conveyor member including spaced apart registering means positioned in advance of said feed rolls, each of said spaced apart conveyor registering means being adapted to engage a bag for guiding it into register with said feed rolls, said drums, feed rolls and driving means for said conveyor member being synchronized whereby each bag as engaged by said conveyor registering means is fed between said feed rolls so as to place it in proper register for the placing of the handles by the drums, the continued rotation of said drums being adapted to advance said formed string portions and paper strip portions into engagement with each side of said paper bag so fed.
2. An apparatus as claimed in claim 1 , where-
in said paper engaging means include diametrically opposed pairs of cam actuated retaining pins mounted within each of said drums adapted to retain said severed paper strip portions in engagement therewith, cam means co-operating with each of said drums adapted to extend and withdraw each pair of said pins relative to the outer surface of said drum in time related sequence to said drum rotating means, said string engaging and retaining means comprising a pair of cam actuated spring engaging retaining fingers pivotally mounted in diametrically opposed relationship within each of said drums, each of said: string engaging fingers being adapted to extend above the surface of said drum and descend beneath the surface of said drum in intermittent time related sequence to engage, withdraw, and retain one of said $U$ shaped string portions fed from one of said handle forming dies and release said $U$-shaped string portion after it is passed between the nip of said drums, and cam means co-operating with each of said drums adapted to actuate each of said string retaining fingers in said time related sequence.
3. An apparatus according to claim 1 ; including conveyor means mounted on said frame in alignment with and adjacent to the nip of said. drums adapted to remove said assembled bags and handles from said apparatus.

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