United States Patent [19]

Watkin

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[54] **METHOD FOR CLIPPING FOLDED ARTICLES OF CLOTHING AND THE LIKE**

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[22] Filed: **July 1, 1971**

[21] Appl. No.: **158,772**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 53,409, July 9, 1970, abandoned.

[52] **U.S. Cl.** ..... **29/429**, 29/211 D, 29/453

[51] **Int. Cl.** **B23p 19/00**, B23q 7/10

[58] **Field of Search** ..... 29/429, 211 R, 453, 29/225, 211 D, 308 C

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Attorney—George Gottlieb et al.

[57] **ABSTRACT**

A method is provided for placing spring clips over the edges of folded articles and the like in an automated manner. The method operates through an apparatus which generally includes a slide for properly orienting the clips and loading them into a supply chute, a drive for taking the clips one at a time from the supply chute and transporting each clip toward and over the edge of the folded article and a ramp cooperating with the drive, for opening the mouth of each clip as the clip approaches the edge of the folded article and then releasing the clip mouth when the clip is properly positioned over said edge.

3 Claims, 16 Drawing Figures

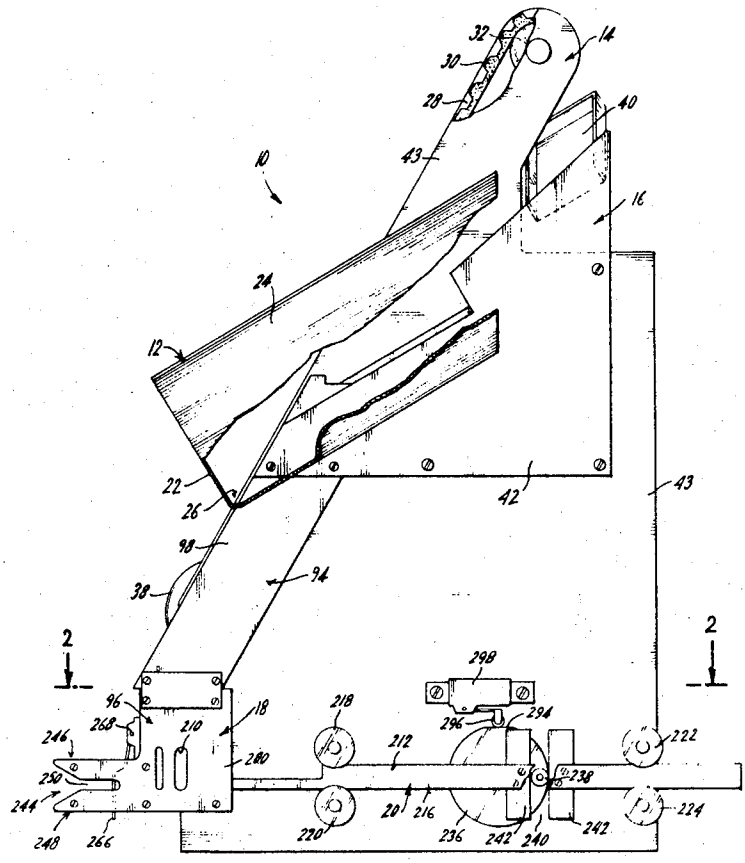
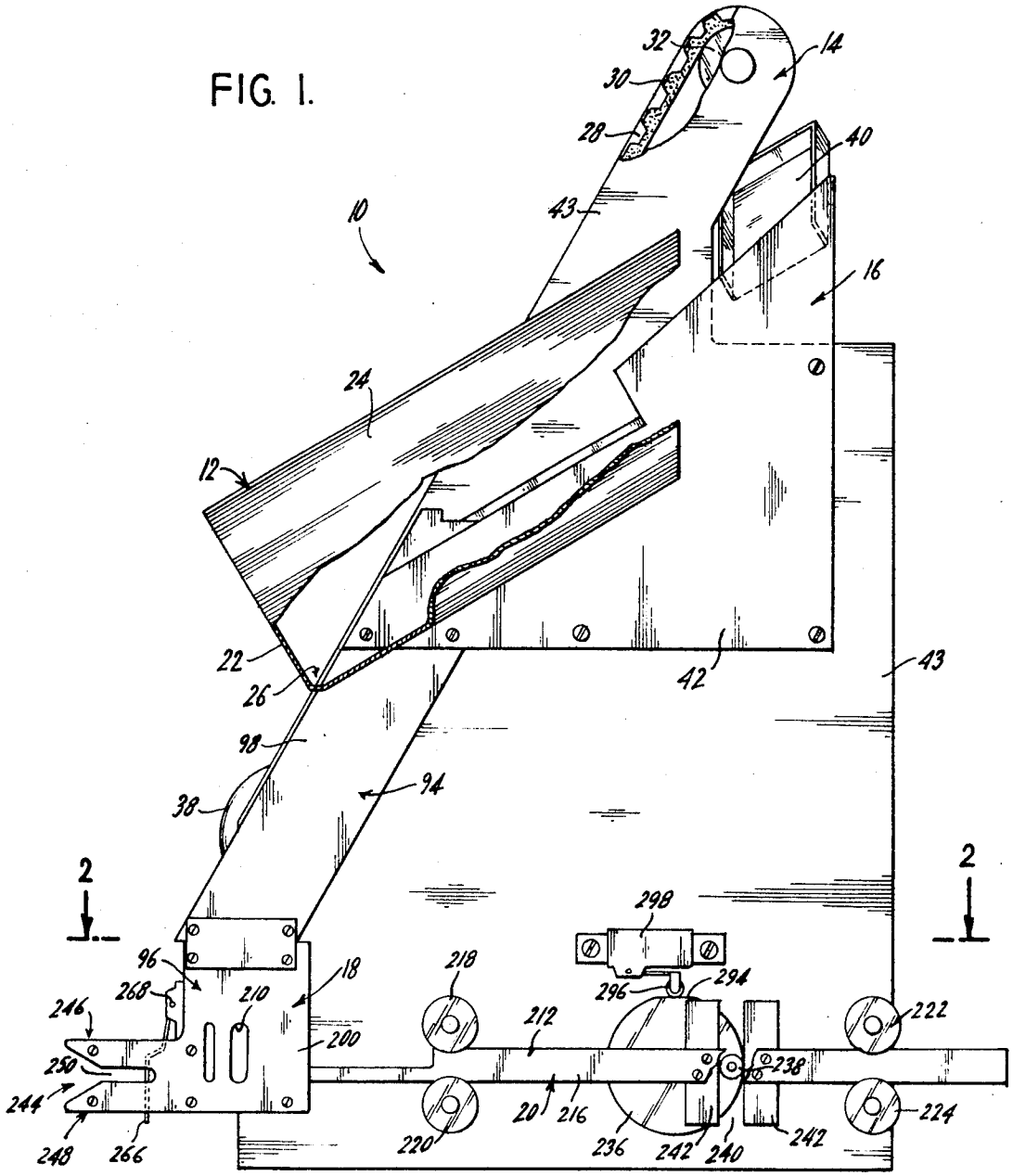


FIG. 1.



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ATTORNEYS

FIG. 2.

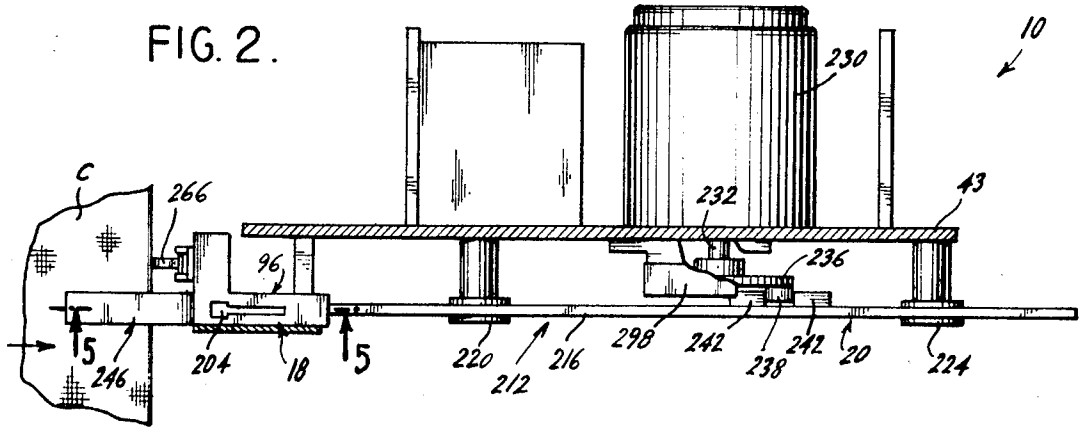


FIG. 3.

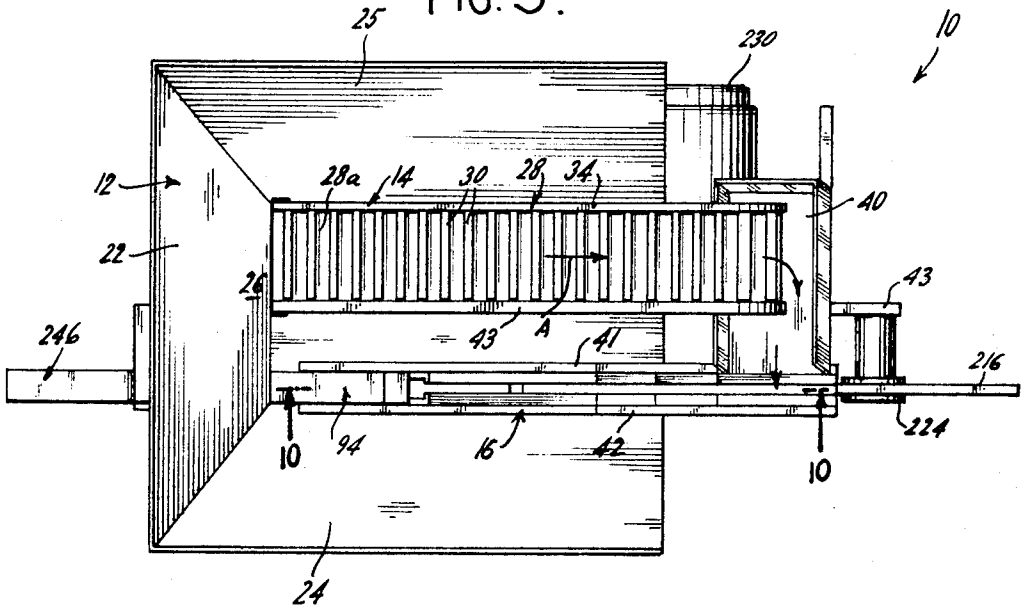


FIG. 4.

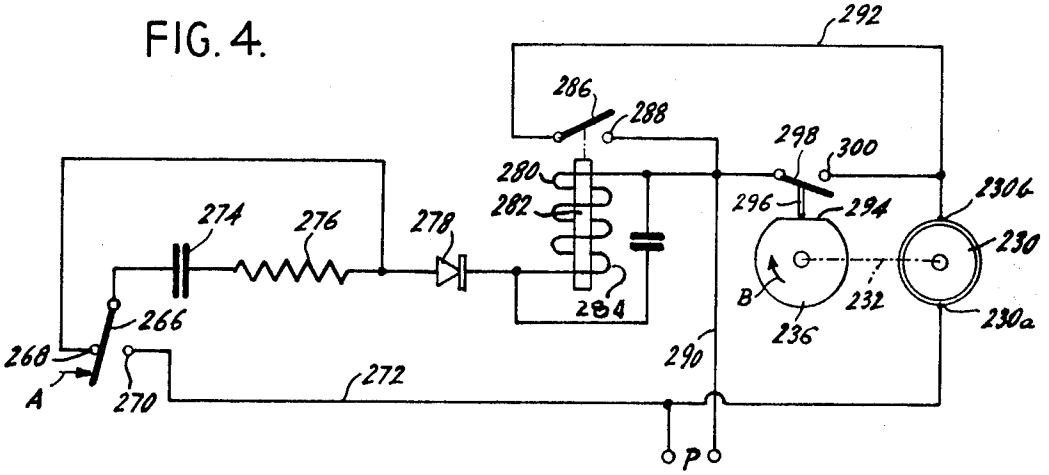


FIG. 5.

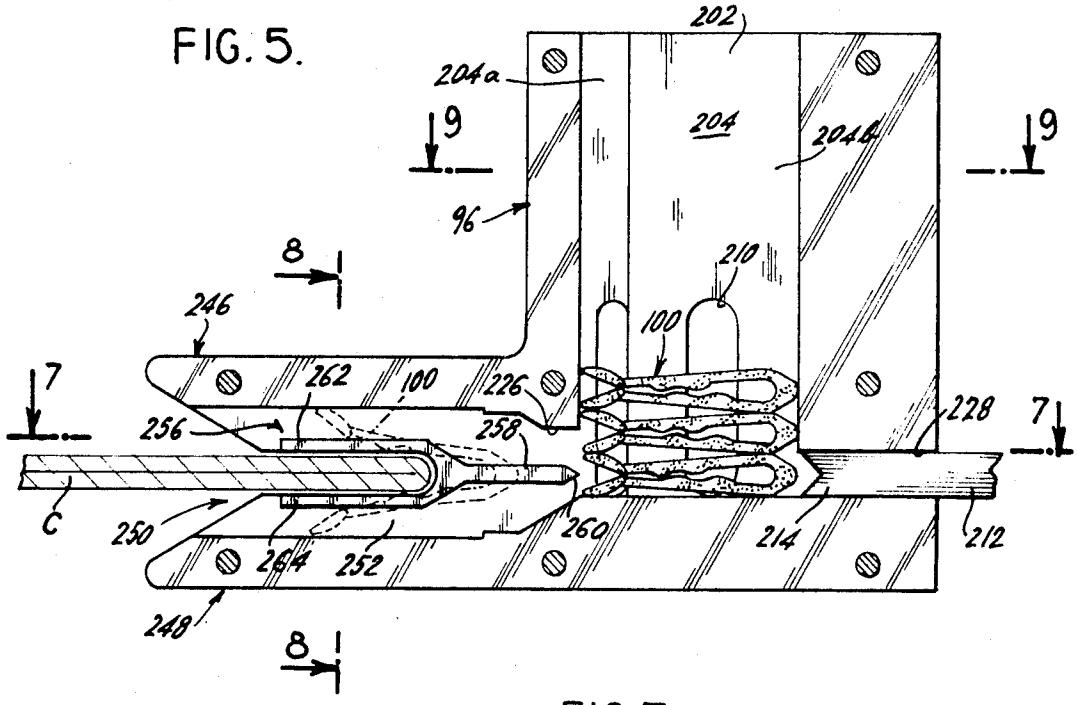
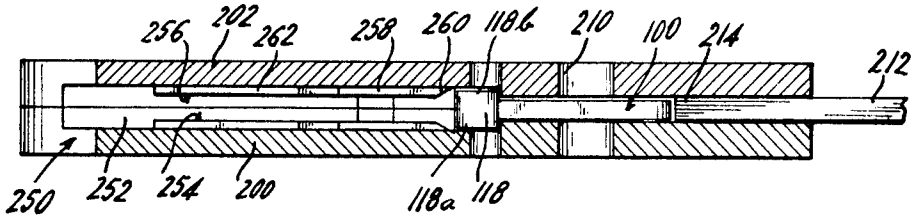


FIG. 7.



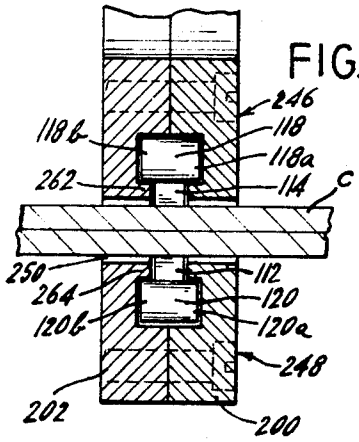
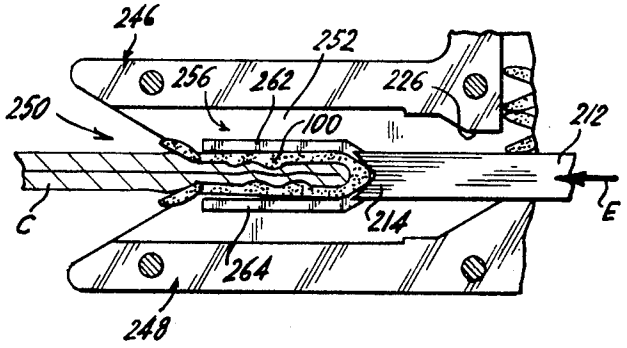


FIG. 8.

FIG. 6.



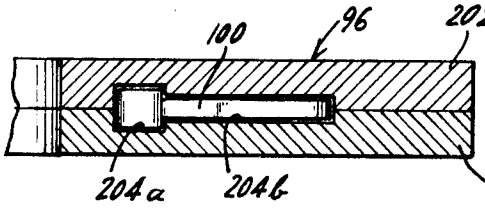


FIG. 9.

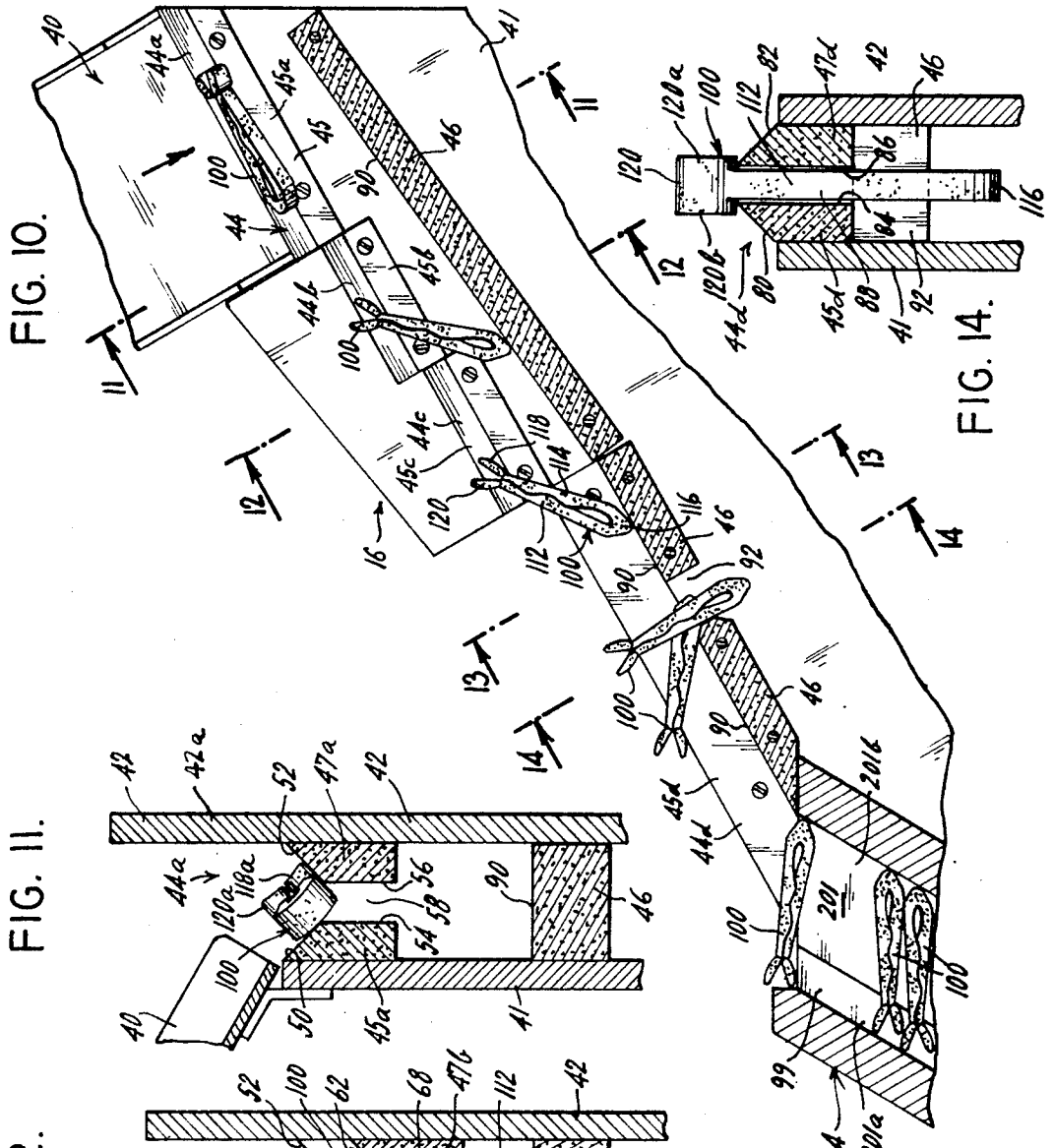


FIG. 10.

FIG. 14.

FIG. 11.

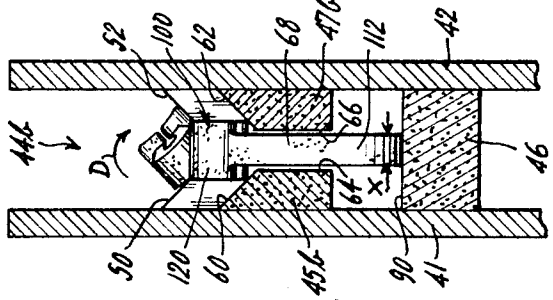


FIG. 12.

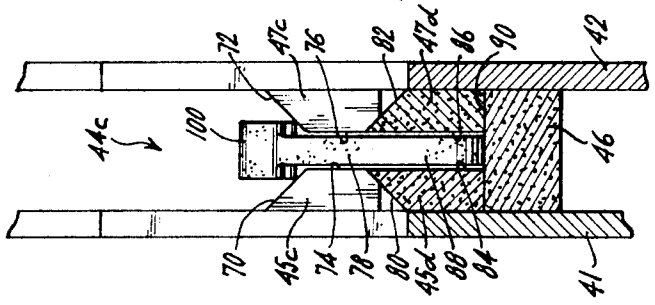


FIG. 13.

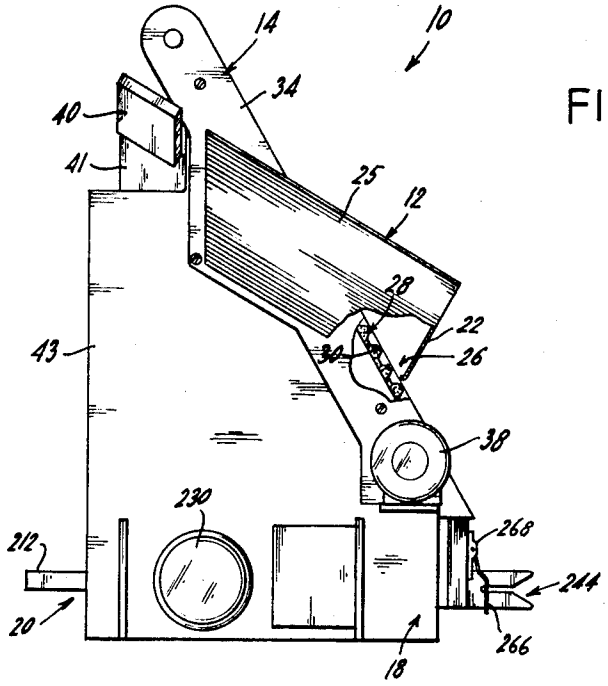

14
10
34
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26
43
30
38
230
268
212
244
20
266
18

FIG. 15.

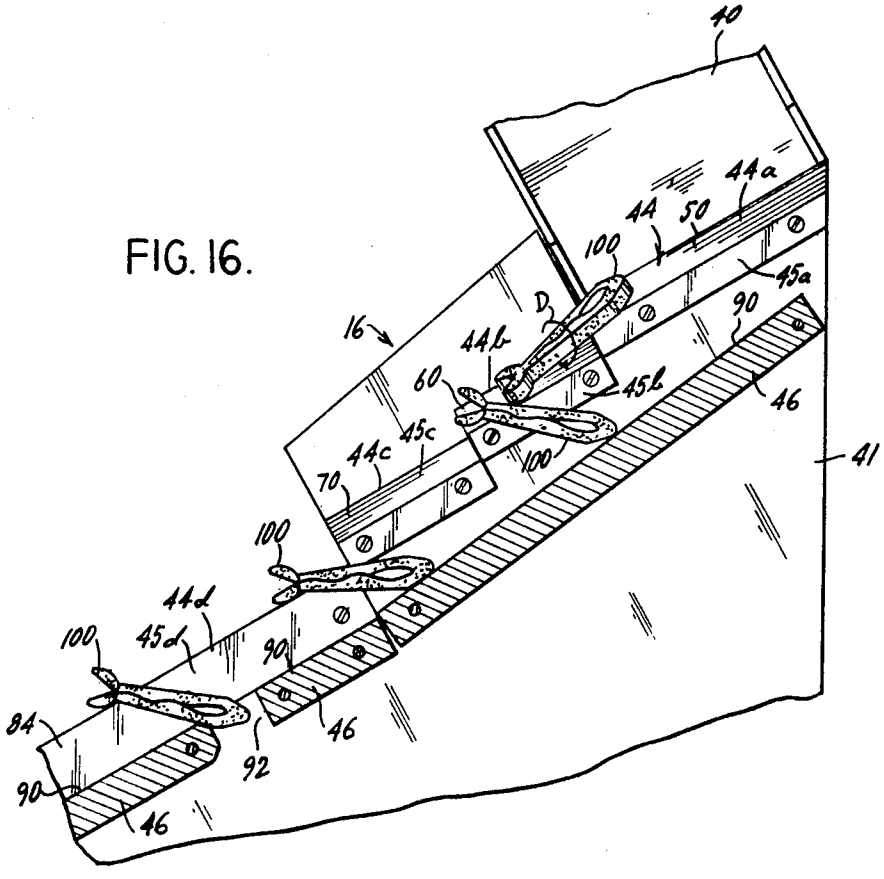

40
44a
44
50
100
45a
90
D
16
44b
60
45b
46
45c
44c
70
41
100
44d
45d
100
90
46
84
92
90
46

FIG. 16.

METHOD FOR CLIPPING FOLDED ARTICLES OF CLOTHING AND THE LIKE

The present application is a continuation-in-part of application Ser. No. 53,409, filed July 9, 1970, entitled "Spring Clip" now abandoned.

This invention relates generally to a method and an apparatus for clipping folded articles of clothing and the like and more specifically to an apparatus for placing spring clips over the edges of folded articles and the like in an automated manner.

A spring clip of the type intended to be used with the present apparatus is fully described in my patent application entitled "Spring Clip for Folded Garments and the Like" filed simultaneously with the filing of the present application.

As described in greater detail in the aforesaid application, such spring clips are preferably formed of plastic and function to grasp and hold folded articles of wearing apparel such as folded shirts, blouses, underwear and like articles of clothing as well as other soft goods such as folded piece goods, folded paper materials and the like. Spring clips of this general type are well known in the prior art and are in wide use throughout the clothing industry. Such spring clips are continuing to gain acceptance among clothing contractors, sub-contractors and manufactures and are displacing the more conventional straight pins.

All of the spring clips previously know, regardless of their specific configuration, are intended to and are capable of being placed over the edge of a folded garment only manually by a worker. It will be appreciated that in this day of high labor costs, it would be advantageous to provide an automated apparatus which would take one clip after another and place it on any folded article of clothing presented to the apparatus in an automated manner. Accordingly, it is the primary object of the present invention to provide an apparatus for clipping folded articles of clothing and the like in an automated manner so as to eliminate the prior practice of manually placing such clips over the edges of clothing.

It is another object of the present invention to provide a method and an apparatus of the charater described which operates upon one spring clip at a time, and in so doing opens the mouth of the spring clip, places it over the edge of a folded article and then releases the clip, whereupon the spring clip grasps the folded article of clothing and retains it in its folded condition.

It is still a further object of the present invention to provide a method and an apparatus of the character described which includes a detector to sense the presence of the edge of a folded article of clothing and which upon detecting such presence, places a clip on such presented articl of clothing without further effort or manipulation by the machine operator.

It is still another object of the present invention to provide a method and an apparatus of the character described which includes a slide to feed the clips into a supply chute, and which in so doing properly orients each spring clip regardless of the random manner in which the clip may be placed on the slide as by a conveyor.

It is still another object of the present invention to provide a method and an apparatus of the character described which is simple in construction and few in its number of parts so that such apparatus can be marketed at a relatively modest cost.

In general, and in accordance with the present invention, there is provided an apparatus for placing spring clips over the edges of folded articles of clothing and the like in an automated manner. The apparatus includes a hopper in which a large quantity of spring clips are dumped. A conveyor passes through the hopper and brings one spring clip after another to the top of a clip slide. The slide is configured so that regardless of the orientation which a clip has when it first lands on the slide, the slide orients each clip to an attitude in which the clip is descending under the influence of gravity along the slide "head first", with the head of the clip riding on the way of the slide. The clips descend from the slide and are fed into a supply chute in which they are stacked one upon the other in head-first horizontal orientation.

The apparatus further includes an article receptacle into which an edge of a folded article is placed, when it is desired to have it clipped. When the folded article is placed in this location, a detector signals the spring clip drive to operate. The spring clip drive includes a reciprocating ram which drives one clip at a time out of the bottom of the supply chute. The ram forces the clip along an operational path toward and then over the edge of the folded article. At a point along the path, the sides of the lips of the mouth of the clip contact side ramps carried by the apparatus in the path which cam the lips wide apart and thereby open the arms of the clip. Further driving by the spring clip ram causes the spring clip to move into place over the folded article of clothing and at another point along the path, the lips of the mouth clear the side ramps and are released, permitting the clip to firmly grasp the folded article of clothing and thereby retain such folded article in its folded condition.

Other objects, features, and embodiments of the invention are contemplated and will be apparent from the following more detailed description with reference to the accompanying drawings, wherein:

FIG. 1 is a right side elevational view of the apparatus for clipping folded articles of clothing and the like;

FIG. 2 is a horizontal cross-sectional view mainly of the spring clip drive mechanism, taken substantially along the line 2—2 of FIG. 1;

FIG. 3 is a top plan view of the apparatus particularly showing the conveyor, the hopper and the clip slide;

FIG. 4 is a schematic of the circuit for the present apparatus;

FIG. 5 is an enlarged sectional view showing the supply chute and side ramps of the apparatus taken substantially along the line 5—5 of FIG. 2;

FIG. 6 is a view taken similarly to FIG. 5, and showing the clip ram having brought a clip to the end of its path of travel and over the edge of a folded garment;

FIGS. 7, 8 and 9 are detailed cross-sectional views taken substantially along the lines 7—7, 8—8 and 9—9 of FIG. 5, respectively;

FIG. 10 is a side sectional view of the clip slide and the upper portion of the clip supply chute taken substantially along the line 10—10 of FIG. 3, and also illustrating the progress of a spring clip down the slide;

FIGS. 11 through 14 are cross-sectional views of the clip slide, taken substantially along the lines 11—11, 12—12, 13—13 and 14—14 of FIG. 10, respectively;

FIG. 15 is left side elevational view of the apparatus; and

FIG. 16 is a view of the clip slide similar to FIG. 10 but showing the descent of a clip which has landed on the slide "head-first".

Referring now in detail to the drawings, and initially to FIGS. 1–3 and 15, there is shown an apparatus 10 for clipping folded articles of clothing and the like and which includes as its main components, a hoppr 12, a clip conveyor 14, a clip slide 16, a clip supply chute 18, and a spring clip drive 20.

The apparatus 10 operates upon a spring clip fully described in my simultaneously-filed copending patent application and which is incorporated by reference herein. The clips are shown in some detail in FIGS. 10 through 14. Each clip 100 includes a pair of similar, opposed arms, namely arms 112 and 114. A spring yoke 116 joins adjacent ends of the arms, and the clip has an open mouth at its leading end which comprises a pair of similar, opposed camming lips 118, 120. As best seen in FIGS. 11–14, the lips 118, 120 are wider than the arms 112, 114 or the yoke 116 of the clip, the portions of the lip 118 extending beyond the arms and yoke being designated 118*a*, 118*b* and similar portions of the other lip 120 being designated 120*a*, 120*b*. The clip is preferably made of resilient material, desirably plastic, so that while the lips 118, 120 normally are in contact with one another, the arms 112, 114 may be pulled apart, whereupon they tend to spring back together.

The hopper 12 of the apparatus may be of any conventional design, and typically includes a front wall 22 and a pair of upstanding upwardly and outwardly slanting side walls 24, 25, all the walls being oriented and configured to slant towards a holding area 26. This slanting causes any spring clips 100 which have been dropped into the hopper 12 to be directed towards and slide by gravity into the holding area 26.

The clip conveyor 14 of the apparatus comprises an endless belt 28, desirably formed of rubber, on which a number of equally spaced steps 30 are formed. The steps 30 protrude sufficiently from the main body of the belt 28 so as to be capable of each lifting at least one clip, as the belt is driven. A lower portion of the forward reach 28*a* of the belt passes diagonally through the holding area 26, (see FIG. 3) and in so doing picks up on each of its steps 30, one or more clips 100. The endless belt 28 is trained about a pair of rollers, namely an upper roller 32 and a lower roller (not shown), both of the rollers being mounted in a conventional manner for rotation between a belt guide 34 and wall 43. The lower roller is driven by a motor 38, in a manner such that the belt moves in the direction indicated by arrow A, FIG. 3.

Below the upper roller 32, and located so as to divert a clip 100 dropping behind the roller 32 to the slide 16, is a walled clip guide 40. It may be mentioned at this point that the components referred to, namely the hopper 12, the slide 16 and the conveyer 14 are fixed to one another in a conventional manner and are held in their relative positions through a central support wall 43.

Reference is now made to FIGS. 10 through 14 wherein the configuration of the clip slide 16 is shown in greater detail. The slide 16 has a retaining wall extension 42*a*, against which the clips 100 are thrown, as they leave the guide 40. The clip slide 16 further includes an elongated way 44 along which portions of the clips slide, and a floor 46. The way consists of a pair of parallel interrupted rails 45, 47 and is divided into a number of descending "waterfall" segments, namely way segments 44*a*, 44*b*, 44*c* and 44*d*. The way segment 44*a* is generally of V configuration (see FIG. 11) and is downwardly sloped. The segment 44*a* includes rail lengths 45*a*, 47*a*, the length 45*a* being fixed to the retaining wall 41, and the length 47*a* being fixed to the opposed retaining wall 42. The length 45*a* has an upper inclined surface 50 and the length 47*a* has an upper inclined surface 52, the surfaces 50, 52 being opposed to one another at an angle of approximately 90° to form V configuration. Further, the rail length 45*a* has an interior facing surface 54 and the rail length 47*a* has an interior facing surface 56, the surfaces 54, 56 being parallel and being spaced apart to define a channel 58. The channel has a width sufficient to accept the arms 112, 114 and yoke 116 of a spring clip 100, in their side-to-side dimension, (dimension X, FIG. 12) but is smaller than the side-to-side dimension of the lips 118, 120 of the spring clip, and is smaller than the top-to-bottom dimension of the arms 112, 114 of the clip. The clip can thus ride in the channel 58 only as shown in FIGS. 12–14.

The next-lower segment, segment 44*b* (FIG. 12) also includes a pair of rail lengths namely lengths 45*b*, 47*b*, these lengths being mirror-images of one another. The lengths 45*b*, 47*b* include upper inclined surfaces 60, 62, respectively, which again meet each other at an angle of approximately 90° in a V configuration. The lengths 45*b*, 47*b* further include interior facing surfaces, surfaces 64, 66 respectively. These surfaces are parallel to one another, and define therebetween a channel 68 of the same dimensions as the channel 58. As can best be seen in FIG. 10, the way segment 44*b* is parallel to and "stepped" below way segment 44*a*.

The segment 44*c* includes a pair of rail lengths, lengths 45*c*, 47*c*. The lengths 45*c*, 47*c* have upper inclined surfaces 70, 72, respectively, the surfaces 70, 72 being at an approximately 90° angle to one another to form a V configuration (see FIG. 13). The lengths 45*c*, 47*c* have interior facing surfaces, 74, 76 respectively, these faces being parallel to one another and being spaced apart to form channel 78, the channel 78 having the same dimensions as the channels 58 and 68. As best seen in FIG. 10, the way segment 44*c* is parallel to and "stepped" below way segment 44*b*.

The way 44 includes another and a longer segment, segment 44*d*. The segment 44*d* (see FIGS. 13 and 14) includes rail lengths 45*d*, 47*d*, having upper inclined surfaces 80, 82 respectively, which meet at an approximately 90° angle to one another to form an inverted V configuration. The lengths 45*d*, 47*d* also include interior facing surfaces 84, 86, respectively, these facing surfaces being parallel to one another and spaced apart to form a channel 88 of generally the same dimensions as the channels 58, 68 and 78. The way segment 44*d* is parallel to and "stepped" below way segment 44*c* (see FIG. 10).

The floor 46 is situated below the way segments 44*a* through 44*d*, and has a downwardly inclined upper face 90, this face being spaced from the point at which the upper inclined surfaces of the rail lengths meet their corresponding interior facing surfaces, a distance which is less than the length of the clip from the yoke 116 to where the ends of the arms 112, 114 meet the lips 118, 120. The floor 46 at its portion adjacent and below the way segment 44*d*, is discontinuous at a trap

92, the trap being located approximately midway between the ends of the way segment 44*d*.

The apparatus 10 further includes, as previously mentioned, an elongated supply chute 18, including an upper inclined chute portion 94, seen in FIGS. 1 and 10, and a lower vertical chute portion 96, seen in FIGS. 1 and 5. The upper chute portion 94 is made up of a pair of mating plates 98, 99, which are internally configured to form a passageway 201 to enable one clip at a time to slide down it. The lower chute portion 96 also is made up of a pair of mating plates 200, 202, which are internally configured to form a passageway 204. The passageways 201, 204 are of identical shape and each includes an enlarged head portion 201*a*, 204*a*, respectively, (see FIGS. 5, 9 and 10) to accommodate the lips of the clip, and an elongated tail portion 201*b*, 204*b*, respectively, to accommodate the arms and the yoke of each spring clip. The spring clips, as described in greater detail in my aforementioned copending patent application, have a "parallel" or rectangular-in-elevation configuration, whereby they stack one upon the other in generally horizontal and ordered relationship as seen in FIG. 5. The plates 200, 202 have vertically oriented apertures 210 formed therein to permit access to the bottom of the chute should a jam-up of clips occur.

The apparatus in addition includes, as also previously mentioned, a spring clip drive 20, (see FIGS. 1, 5 and 6) which includes a clip ram 212 and means for reciprocating said ram through a path of travel which crosses the bottom end of the lower chute portion 96 of the clip supply chute 18. The ram 212 is an elongated member of generally rectangular configuration, and is plow-shaped at its forward tip 214, so that it can matingly engage the curved exterior rear surface of a spring yoke of a clip at the bottom of the supply chute. The ram 212 has a body 216, which is mounted for reciprocal generally horizontal movement between two pairs of guide rollers, rollers 218, 220 making up one such pair and rollers 222, 224 making up another such pair. These rollers 218 through 224 guide the ram body 216 and lead the ram 212 through an operational path wherein the ram tip 214 will engage the lowermost clip in the supply chute 18 and drive it forwardly, to the left as seen in FIG. 5. The tip 214 of ram 212 passes through aligned apertures 226, 228 in the lower chute portion 96 for this purpose.

The means for reciprocating the ram 212 includes a motor 230 which has a shaft 232 passing through the central support plate 43 to a large diameter crank disc 236. The disc carries a crank pin 238 which both turns and slides in a slot 240 defined by the bars 242 of a crank yoke fixed to the mid-portion of the ram 212. As the motor 230 rotates the disc 236, the crank pin 238 will turn on the disc and by sliding and rotating in the slot 240 of the bars 242 will cause the ram extension 216 and thus the ram 212 to reciprocate.

The apparatus 10 includes an article receptacle 244 to receive and temporarily position an article of clothing C or the like presented to it. The receptacle 244 includes a pair of jaws, namely an upper jaw 246 and a lower jaw 248. These jaws are formed by forwardly extending projections of the plates 200, 202, with the center line of the receptacle 244 being in alignment with the center line of the ram 212. The jaws 246, 248 define an article slot 250 which leads into an interior cavity 252. As best seen in FIGS. 5 and 8, a folded article of clothing C is readily inserted into the article receptacel 244 between the jaws 246, 248 into the cavity 252, the ecge of the article of clothing C finally contacting the interior end of the slot 250.

A pair of clip-opening wedges or side ramps are situated within the cavity 252 in the receptacle, the ramp 254 being carried by the plate 200 on one side of the slot 250, and the ramp 256 being carried by the other plate 202 on the other side of the slot 250. The ramps 254, 256 are of mirror-image confituration and therefore only one need be described in detail, it being understood that the description of ramp 256 (FIGS. 5 and 6) is equally applicable to the ramp 254. The ramp 256 has a configuration of a tuning fork and includes an inwardly protruding guide 258 which is cenered on the center of the path of travel of the ram 212. The guide 258 has a pointed tip 260 which faces the supply chute 18. Alternatively, the guide may have a flat end. The guide of the ramp inclines into a pair of spaced parallel arms, an upper arm 262 and a lower arm 264, the upper arm 262 being disposed immediately above the slot 250 in the receptacle 244 and the lower arm 264 being disposed directly below the slot 250. In another alternative form, the ramp may diverge continuously from its flat end to a maximum width at the arms 262, 264. The ramp 256 thus extends from its tip 260, which is situated closely adjacent to the enlarged passageway portion 204*a* of chute portion 96, substantially to the distant end of the slot 250 of the article receptacel 244. It should be noted, as best seen in FIGS. 7 and 8, that the ramps 254, 256 protrude inwardly from the plates to which they are attached, but are spaced to leave room for passage of the arms and yoke of a clip. Similarly, the ram tip 214 can pass between the guides 258 of the ramps (see FIG. 6).

A detector is provided to determine when a folded article of clothing C is placed into the slot 250 of receptacle 244. The detector includes the arm 266 of a microswitch 268, the arm being disposed vertically, transversely of the slot 250. The arm is shifted and the microswitch 268 is closed by the insertion of an article of clothing into said slot. Alternative detectors may include actuating switch 268 by indirect means, including the use of electro-optical mechanisms.

Referring now to the circuit diagram of FIG. 4, the insertion of clothing into slot 250 causes symbolic switch arm 266 (FIG. 4) to pivot in the direction of arrow A from its normal rest position in contact with terminal 268 to its activated position to the right in contact with terminal 270. This completes a circuit to energize motor 230 by supplying power to the circuit from power leads P.

Specifically, voltage is permanently suppliec to conductor 272 from the left one of power leads P, and power is therefore available at terminal 270 and also at the lower input terminal 230*a* of motor 230. The movement of switch arm 266 into contact with terminal 270 passes current from conductor 272 through switch arm 266 and via the RC charging circuit comprising compacitor 274 and resistor 276 and diode 278 to one end of the coil 280 of relay 282. It is noted that capacitor 284 is connected across the terminal of coil 280 in order to prevent armature chatter. The application of power to coil 280 energizes relay 282 and switch arm 286 is electromagnetically drawn towards relay 282. Switch arm 286, which is normally open, thereby closes and makes contact with terminal 288. Motor 230 which

up to this point had not been energized because of the absence of voltage from its upper input lead **230***b*, is now energized by the application of power from the righthand one of power leads P across conductor **290**, across switch arm **286**, conductor **292** and to the upper input lead **230***b* of motor **230**.

The energization of motor **230** causes its rotor to commence rotation, which movement is transferred to disc **236** by a shaft represented in FIG. **4** by the symbolic connecting line at **232**. The disc **236** has a flat **294** against which rides a cam follower **296**, which is linked to switch **298**. As disc **236** begins its clockwise rotation as shown by arrow B in FIG. **4**, switch arm **298** is elevated by the upward movement of follower **296**, thereby bringing switch arm **298** into contact with terminal **300**. This provides a temporary locking circuit for keeping motor **230** energized for at least one entire rotation of disc **236**, corresponding to one cycle of operation of the machine. Thus, regardless of the position of switch arms **266** and **286**, the closure of switch arm **298** will maintain the motor **230** in its energized condition because of the application of power directly to motor terminals **230***a* and **230***b* from the left and right power leads P, respectively.

Components **274** and **276** are so chosen that within a few degrees of rotation of disc **236** after switch **298** closes upon relay **300**, relay **282** opens due to no current flow through switch arm **266**. Therefore the motor **230** will make only one revolution and have fed only one clip even though the operator is slow in removing the clipped article. Upon removal of the clipped garment switch arm **266** again makes contact with terminal **268** releasing the stored energy of capacitor **274** through resistor **276**. Energy release is sufficiently fast to ensure an operator all the manual speed of article reinsertion for clipping that is possible.

The operation of the apparatus will now be briefly described. A quantity of clips **100** is dumped into the hopper **12** and is directed by the hopper walls **22, 24, 25** to the holding area **26** of the hopper. The belt **28** of the conveyor **14** is continuously driven via motor **38** and rollers **32**, so that the steps **30** of the belt pick up clips and carry them to the top of the conveyor, whereupon the clips fall onto guide **40** and are directed thereby against the projection **42***a* of retaining wall **42**. In so doing the clips, having been carried up the conveyor, now fall one after the other onto the upper end of the clip slide **16**. The clips may randomly contact the upper end of the slide either "tail-first" (FIGS. **10–14**) or "head-first" (FIG. **16**).

Assuming a clip has landed "tail-first" (FIGS. **10** and **11**), it will begin to slide down way segment **44***a*. As it does so, one side of the clip will ride on inclined surface **50** of rail length **45***a* and the outer surface of one of the arms **112** or **114** of the clip will ride on opposed inclined surface **52** of rail length **47***a*. As the tail of the clip descends to a point at which it is somewhat beyond the lower end of the way segment **44***a*, i.e., the tail is suspended in air for a moment, the clip will twist about its long axis. Hence, when the clip falls onto the next-lower way segment, segment **44***b*, its yoke **116** and arms **112, 114** will fall into the channel **68** and its lips **118–120** will ride on inclined surfaces **60, 62** of rail lengths **45***b*, **47***b*, respectively (see FIGS. **10** and **12**). The described twisting action is in the direction indicated by arrow D, FIG. **12**, and takes place, because as the tail end of the clip comes off segment **44***a*, the side of the clip has a greater contact area with the surface **50** on which it is riding than has the outer surface of one of the arms **112** or **114** of the clip with the surface **52** on which it is riding. As said outer surface of the clip falls away from its adjacent surface **52**, the clip twists along its long axis through a short arc to bring its sides vertical. Should a clip land on way segment **44***a* oriented 90° clockwise from the position shown in FIG. **11**, the direction of twist will be just the opposite of that shown at D in FIG. **12**, but the clip, according to the same principles, will take the same position on way segment **44***b*. As the clip continues to descend, it assumes the same position on way segment **44***c* (see FIGS. **10** and **13**) as it had on segment **44***b*. Segment **44***c* is thus a "back-up", should the clip not be properly oriented on segment **44***b*. It will be noted that in this descent from segments **44***a* through **44***c*, the yoke **116** of the clip is dragging on the face **90** of the slide floor **46**, keeping the clip moving with its yoke ahead of its lips **118, 120**.

As the clip reaches way segment **44***d*, the yoke of the clip falls into trap **92**, (FIGS. **10** and **14**) enabling the lips **118, 120** to shift ahead of the now trailing yoke, properly orienting the clip to enter the upper end of passageway **201** in the upper portion **94** of the supply chute **18**. Should a clip still not be properly oriented by the time it reaches way segment **44***d*, it will fall off either side of the slide back into the hopper **12** to begin its cycle again. The upper inclined surfaces **80, 82** of the rail lengths **45***d*, **47***d* of segment **44***d* are outwardly, downwardly slanted and the retaining walls **41** and **42** are low at this point, all to aid improperly oriented clips to leave the slide and drop back into the hopper.

Should a clip land "head-first" on way segment **44***a* (FIG. **16**), it in a similar fashion slides downwardly and twists as indicated by arrow D in FIG. **16**, so that its yoke and arms fall into the channel **68** of segment **44***b* and so that its lips **118, 120** ride on the rail lengths **45***b*, **47***b* of segment **44***b*. In such fashion, the clips drop onto and descend down segments **44***c* and **44***d* into the clip supply chute **18**. The conveyor **14** operates at a speed to keep a quantity of clips in horizontal, parallel orientation, stacked one on the other, in the supply chute **18** (see FIGS. **5** and **10**).

When an article of clothing C is placed into the slot **250** of the article receptacle **244** between jaws **246, 248**, the detector, the arm **266** of microswitch **268**, is shifted, causing as previously explained, motor **230** to be energized and, via crank disc **236**, crank pin **238** and yoke bars **242**, the clip ram **212** to be reciprocated. As the ram is driven toward the receptacle **244** in the direction indicated by arrow E, FIG. **6**, the ram tip **214** contacts the tail end, i.e., the yoke, of the lowermost clip in the chute **18** (see FIGS. **5** and **7**) and drives the clip toward the ramps **254, 256** in the receptacle cavity **252**.

As this driving movement continues, the lip extensions **118***a*, **120***a* engage the upper and lower surfaces, respectively, of the guide **258** of ramp **256**, and lip extensions **118***b*, **120***b* engage the upper and lower surfaces of the guide of the opposed ramp **254**. This engagement moves the lips and thus the arms of the clip slightly apart, while the arms of the clip pass between the guides.

As the ram **212** continues to be thrust toward the receptacle **244**, the lip extensions **118***a*, **120***a* and **118***b*, **120***b* ride up and over the outer surfaces of the arms

262, 264 of the ramps 254, 256. The clip, in this position, is shown in dotted lines in FIG. 5 and in solid lines in FIG. 8. Again, the arms 112, 114 and the yoke 116 of the clip can pass between the arms 252, 264 of the ramps, while the lip extensions ride above and below the side ramps. At this point, the lips 118, 120 and thus the arms 112, 114 are spread quite far apart. Still further thrusting by the ram 212 causes the clip to be pushed until the lip extensions clear the ends of ramp arms 262, 264 permitting the clip arms to snap back toward one another, and over the edge of an article of clothing C which has been inserted into the slot 250 in the receptacle 244. This final position of the clip is shown in FIG. 6 and as can be readily observed, the clip retains the article in its folded condition. Then, the ram 212 withdraws to the position shown in FIG. 5, the next lowermost clip falls to the bottom of the chute 18 and the cycle is ready to begin again.

The apparatus thus enables the application of clips to folded articles of clothing in a quick and efficient manner on a mass production basis, through a machine which is simple in construction, has relatively few parts and is economical to produce.

A latitude of modification, change and substitution is intended in the foregoing disclosure and in some instances some features of the invention will be employed without a corresponding use of other features. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the spirit and scope of the invention herein.

What is claimed is:

1. A method for clipping folded articles of clothing and the like with spring clips of the type having a pair of arms, a spring yoke joining the arms, and a pair of lips, each lip being carried by a different arm, the method comprising the steps of:
   a. temporarily holding one of the folded articles,
   b. opening a clip gradually by camming the lips of the clip on an inclined surface,
   c. placing the opened clip over the edge of the article, and
   d. moving the clip relatively past the inclined surface so as to release the clip whereupon the clip grips the article and retains it in folded condition.

2. A method for clipping folded articles as set forth in claim 1 wherein step (b) is carried out by camming each of the lips on a different inclined surface and moving the arms and yoke of the clip past and out of contact with such inclined surfaces.

3. A method for clipping folded articles as set forth in claim 2, further including the step of supplying clips one at a time prior to step (b) of claim 1.

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