April 11, 1944. J. STUART, 2D., ET AL 2,346,336

FOLDING MACHINE

Filed Jan. 23, 1942 5 Sheets-Sheet 1

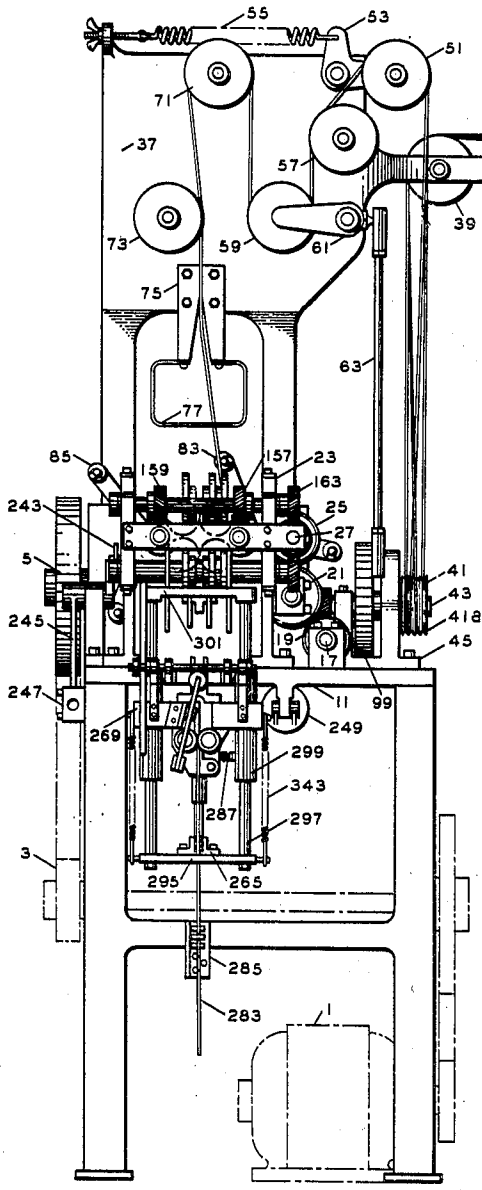


FIG. 1

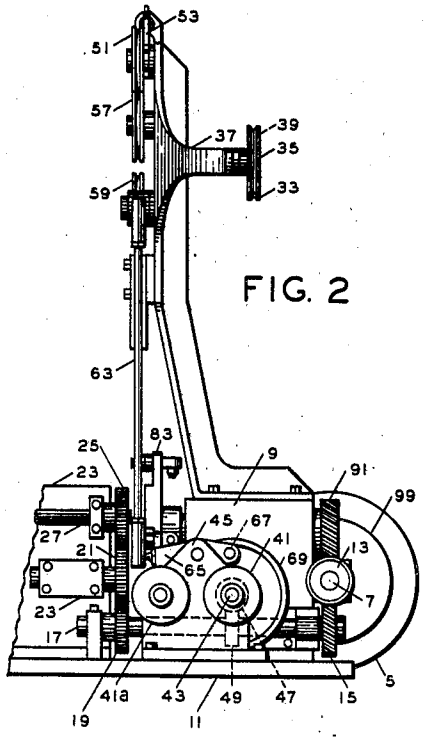


FIG. 2

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FOLDING MACHINE

Filed Jan. 23, 1942 5 Sheets-Sheet 2

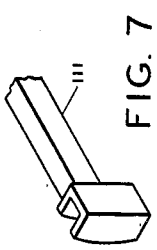


FIG. 7

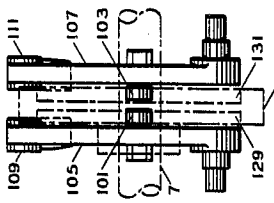


FIG. 6

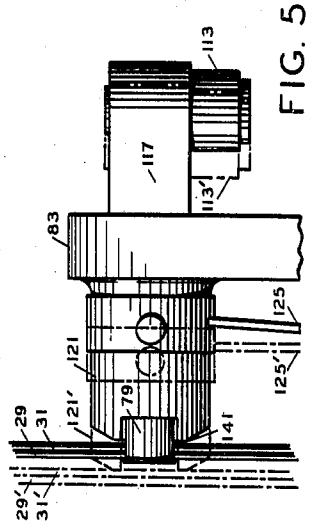


FIG. 5

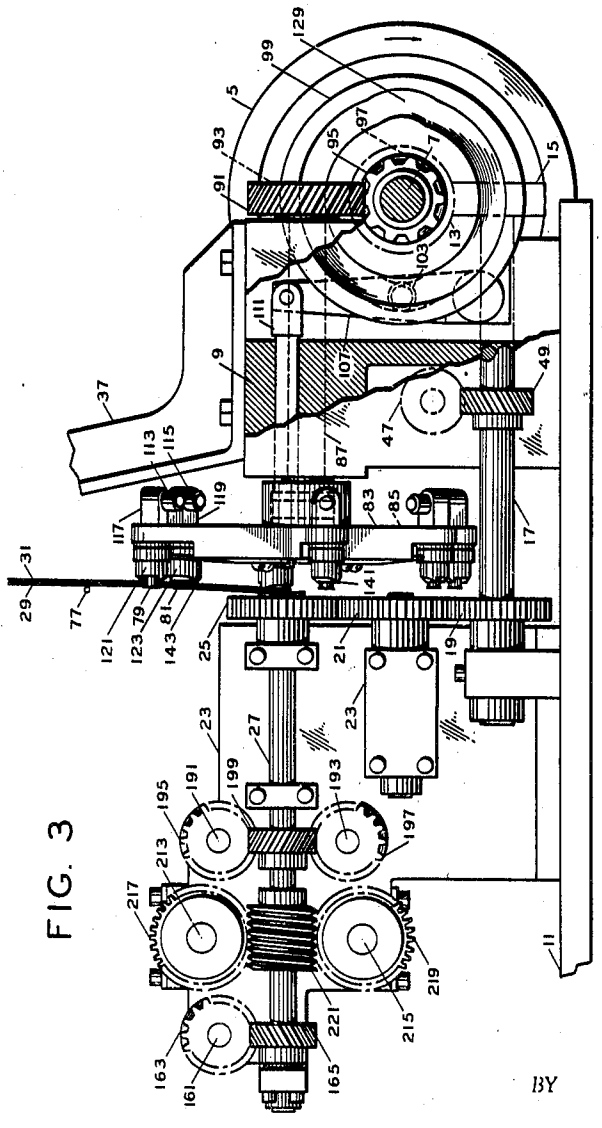


FIG. 3

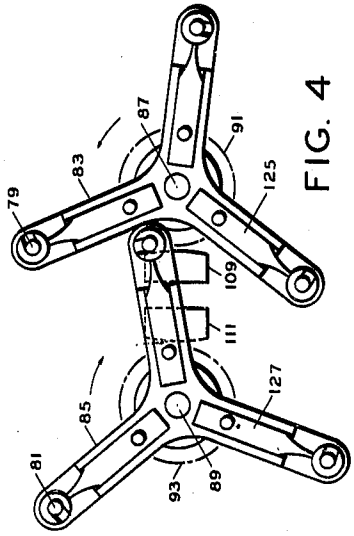


FIG. 4

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FOLDING MACHINE

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FIG. 9

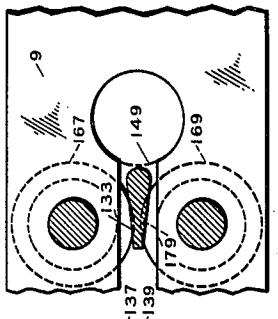


FIG. 11

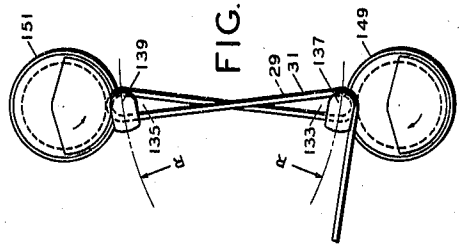


FIG. 8

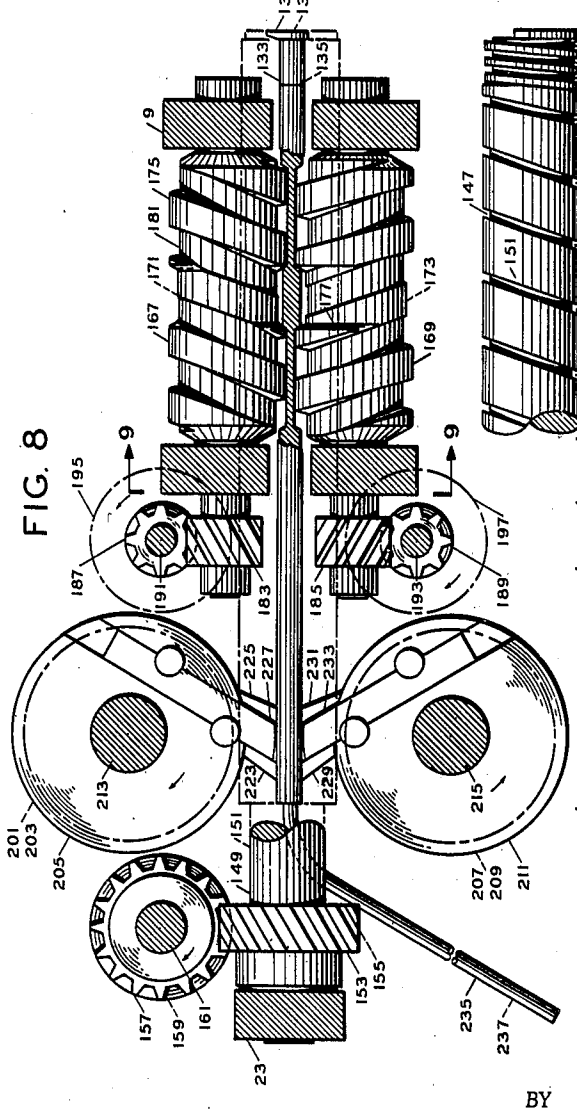
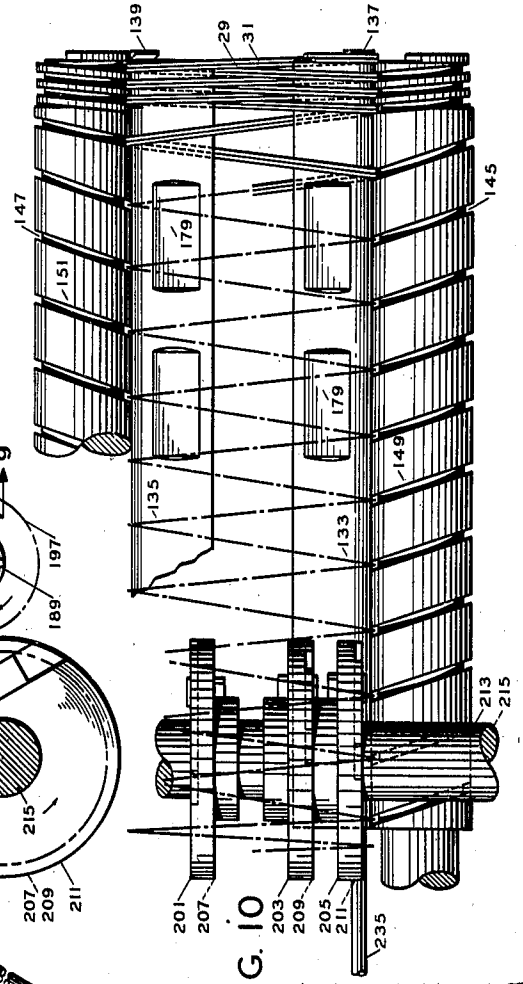


FIG. 10



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Filed Jan. 23, 1942 5 Sheets-Sheet 4

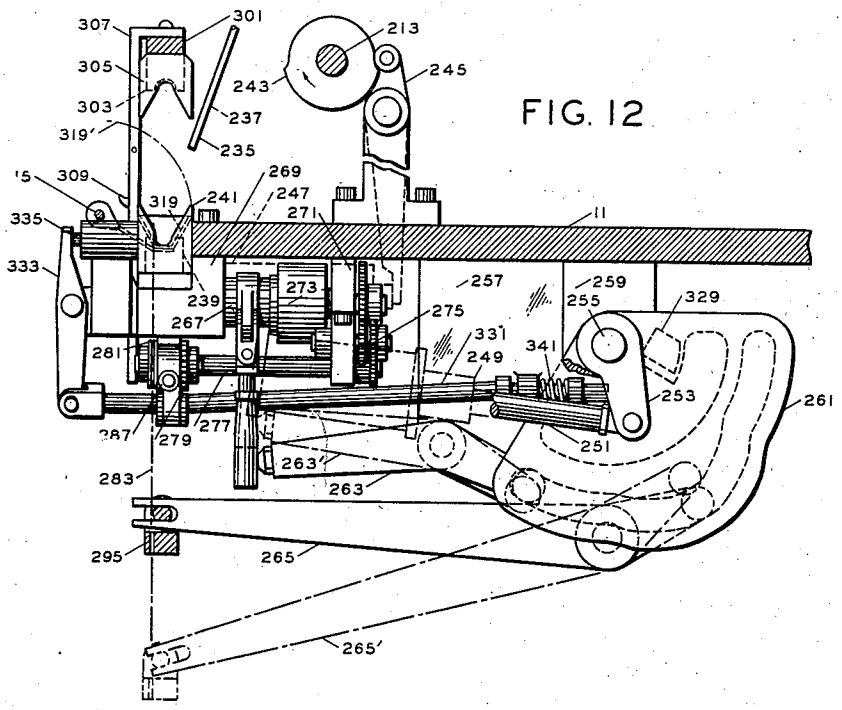
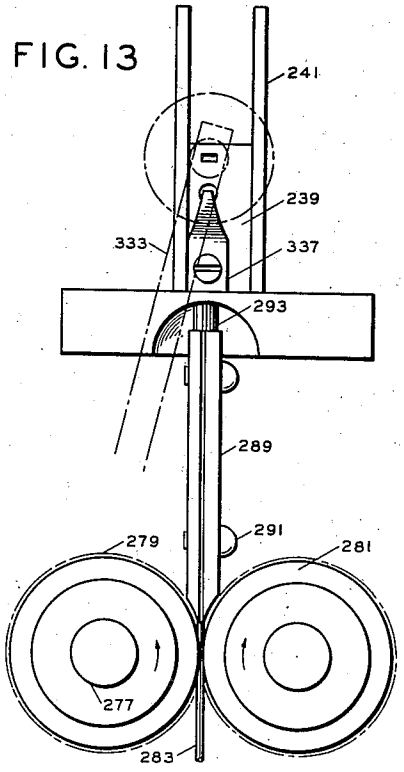


FIG. 12

FIG. 13



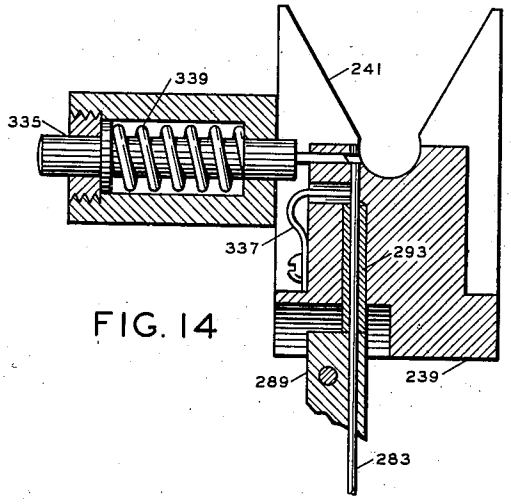


FIG. 14

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FOLDING MACHINE

Filed Jan. 23, 1942 5 Sheets-Sheet 5

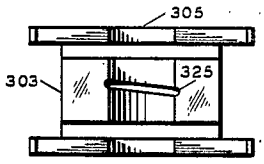


FIG. 15

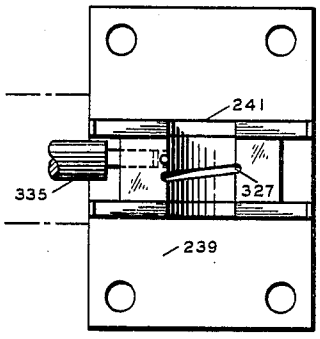


FIG. 16

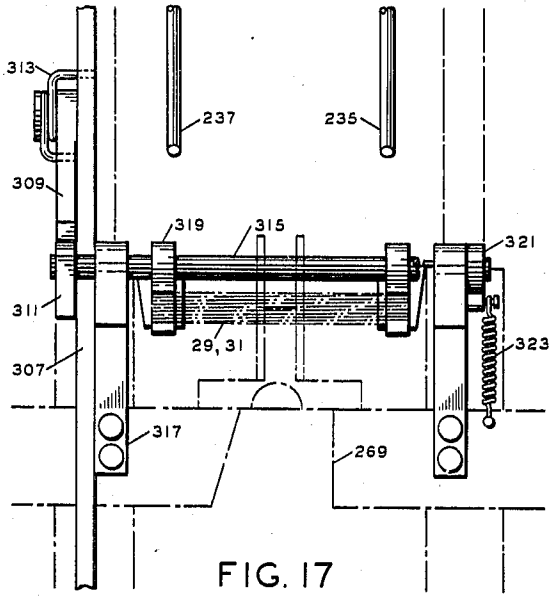


FIG. 17

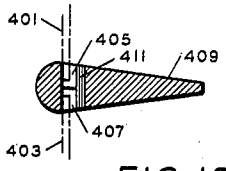


FIG. 19

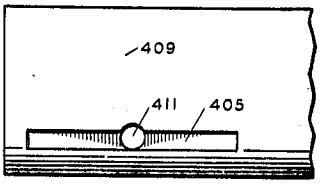


FIG. 20

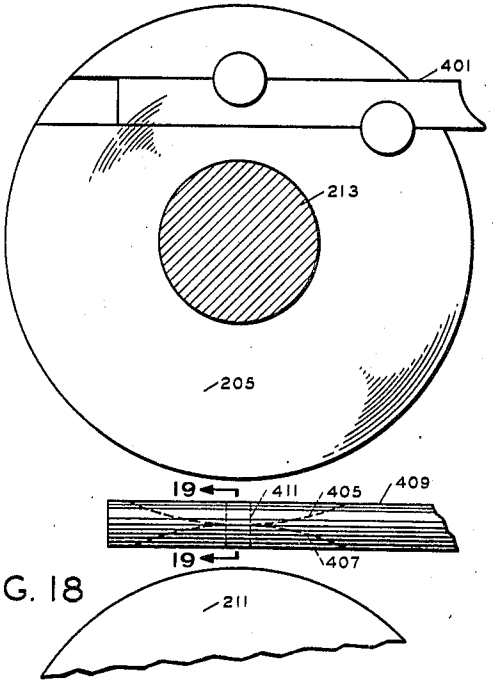


FIG. 18

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Patented Apr. 11, 1944

2,346,336

UNITED STATES PATENT OFFICE

2,346,336

FOLDING MACHINE

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Application January 23, 1942, Serial No. 427,932

21 Claims. (Cl. 28—21)

This invention relates to a device for folding wire and more particularly to a machine for automatically folding, crushing a portion of the insulation, cutting, and tying the leg wires for electric blasting caps.

Electric blasting caps are provided with leg wires varying in length from four feet on up to any desired length. In the manufacturing of these caps, it is customary to cut the leg wires to length, crush or burn a portion of the insulation adjacent each end and remove the insulation. A blasting cap consisting of a fine platinum wire bridge imbedded in an ignition charge is fitted to one end of the leg wires and the other end is provided with a suitable shunt which is removed when the blasting cap is to be used and the leg wires are attached to a suitable source for imparting electric current to ignite the ignition charge. The electric blasting caps are suitably bundled and packed in protective boxes from which they are usually individually removed for use. The above steps including folding, cutting and crushing or burning a portion of the insulation adjacent each end of the leg wires, and bundling, necessitates manual handling of the wires in such a manner that the procedure is fatiguing, time consuming and expensive.

It is an object of the present invention to provide a machine which automatically, expeditiously, and efficiently accomplishes the folding of a wire or a plurality of wires.

It is a further object of this invention to provide a machine which automatically, continuously, and simultaneously removes individual wires from spools or other source of supply, folds the wires into a series of longitudinal folds, crushes a portion of the insulation for subsequent removal, cuts the wires into specified lengths, encircles the wires with a tie wire to form a bundle, and then discharges the bundle into any suitable receptacle or on a conveyor belt.

A further object of this invention is to provide means for properly tensioning the wires as they are being fed to the folding mechanism.

Another object of this invention is to provide novel means for continuously folding wire into a plurality of folds, conveying the folded wire, cutting the conveyed wire into a length corresponding to a plurality of folds and discharging the plurality of folds to a bundling device.

A further object of this invention is to provide an improved cutting device which shears the wire.

A further object of this invention is the provision of mechanism for gathering the plurality of folds into a compact bundle and encircling the bundle with a tie wire, to facilitate subsequent handling and to prevent entanglement with other bundles, and then ejecting the individual bundles.

A still further object of the invention is to provide an improved mechanism in a machine of the character described.

Other objects of the invention will appear hereinafter, the novel features and combinations being set forth in the appended claims.

Generally described, the present invention comprises an automatic mechanism for processing insulated wire which includes feeding, folding, modified crushing, cutting, bundling and ejecting the bundled wire. More specifically, the invention is directed toward the manufacture of leg wires for electric blasting caps wherein means are provided for: properly tensioning the wire as it is being fed; placing the wire automatically on spaced, oppositely positioned mandrels and folding the wire in alternate directions, whereby the continuous alternate folds define a figure eight; conveying the folded wire longitudinally on the mandrels to a position where the insulation is suitably crushed, and cutting the wire to a length predetermined by the number of folds conveyed between cuts; conveying the wire further to disengage the mandrels and engage glide rods affixed to said mandrels, whereby the glide rods guide the folded wire into the nest of a bundling device; compressing and tying the folded wire into a bundle; and ejecting the bundle into a receptacle or on a conveyor belt.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings forming a part of the specification wherein reference symbols refer to like parts wherever they occur;

Fig. 1 is a front elevational view of the apparatus.

Fig. 2 is a side elevational view of the wire tensioning mechanism illustrated in Fig. 1. The wire being fed is not shown for purpose of clarity.

Fig. 3 is an enlarged side elevational view, partly in section of the feeding unit and the forming, crushing and cutting unit.

Fig. 4 is a front elevational view of the spider members that feed the leg wire to the forming unit as shown in Fig. 3.

Fig. 5 is an enlarged side elevational view of one of the sleeve operating pins and push off sleeves shown in Fig. 3.

Fig. 6 is a rear elevational view of the cam and push rod arrangement shown in part in Fig. 3.

Fig. 7 is an isometric view of the end of a push rod as shown in Fig. 3, Fig. 4, and Fig. 6.

Fig. 8 is a side elevational view partly in section showing the interior of the forming, crushing and cutting assembly.

Fig. 9 is a fragmentary sectional view taken on line 9—9 of Fig. 8.

Fig. 10 is a fragmentary plan view showing the folded wire on the mandrels, the conveying screws, and the crushing and cutting assembly.

Fig. 11 is an end view of the mandrels and conveying screws as shown in Fig. 10.

Fig. 12 is a side elevational view of the bundle tying and ejecting mechanism.

Fig. 13 is an enlarged front elevational view of the tie wire feed wheels and lower tie wire former.

Fig. 14 is an enlarged sectional elevational view of the lower former and the shear pin for cutting the tie wire.

Fig. 15 is a plan view looking upwardly into the upper former.

Fig. 16 is a plan view looking downwardly into the lower former.

Fig. 17 is a front elevational view of the mechanism for ejecting the bundled leg wires.

Fig. 18 is a side elevational view of a modified form of cutter.

Fig. 19 is a sectional view taken on line 19—19 of Fig. 18.

Fig. 20 is a fragmentary plan view of the mandrel shown in Fig. 18 and Fig. 19.

In Fig. 1 and Fig. 2 a motor, represented by 1 through appurtenant driving means, represented by 3, drives a drive wheel 5, having a transverse drive shaft 7 secured thereto. The drive shaft 7 is journaled to a body member 9 of a feeding assembly which is affixed to a bench 11. A spiral gear 13 secured to the shaft 7 engages a spiral gear 15, secured to a longitudinal drive shaft 17 which at one end is journaled to the body member 9 and at the other end is journaled to the bench 11. The longitudinal drive shaft 17 has a spur gear 19 secured thereto which engages a spur gear 21 journaled to a body member 23 of a folding assembly which is affixed to the bench 11. The spur gear 21 engages a spur gear 25 having a multiple drive shaft 27 secured thereto and journaled to the body member 23. The function and appurtenant members of the multiple drive shaft will be described, infra.

A wire 29 and a wire 31, from a suitable source of supply (not shown), respectively engages a sheave 33 and a sheave 35 which are affixed to a support member 37 which is mounted on body member 9 of the feeding assembly. The wires 29 and 31 engage a sheave 39 and pass downwardly to engage a multiple groove drive sheave 41 secured to a shaft 43 which is journaled to a body member 45 of a wire equalizing and tensioning assembly. A spiral gear 47 secured to the shaft 43 engages a spiral gear 49 which is secured to the drive shaft 17 thereby driving the drive sheave 41. The wires 29 and 31 pass from the drive sheave 41 to a multiple groove idler sheave 41*a*, which is journaled to the body member 45, thence back to the drive sheave 41 and thence back to the idler sheave 41*a* from which the wires 29 and 31 pass upwardly to engage a tension sheave 51 which is affixed to a lever arm 53 which is pivotally affixed to the support member 37. A tension spring 55 has one end connected to the lever arm 53 and the other end adjustably secured to the support member 37. The wires 29 and 31 pass from the tension sheave 51 downwardly to a sheave 57 which is affixed to support member 37 and thence to an equalizer sheave 59 which is affixed to an equalizer lever 61 which is pivotally affixed to the support member 37. The equalizer lever 61 has a connector rod 63 which has one end universally connected to the lever 61 and the other end universally connected to a cam follower lever 65 which is pivotally affixed to body member 45. The cam follower lever 65 has a cam roller 67 which engages the cam 69 and thereby imparts a reciprocating movement to the push rod 63 which in conjunction with equalizer sheave 59 properly tensions the wires 29 and 31 in synchronized movement with the folding mechanism which will be described, infra. The wires 29 and 31 pass from equalizer sheave 59 upwardly to sheave 71, thence downwardly to sheave 73, both of which are affixed to support member 37, and thence between guide members 75 which are rigidly affixed to the support member 37. A guide wire 77 is affixed to the guide members 75 and serves to maintain the wires 29 and 31 in a vertically aligned plane as they oscillate due to engagement with the folding assembly described, infra.

Referring now more particularly to the folding assembly illustrated in Figs. 3, 4, 5, 6 and 7, the wires 29 and 31 engage a plurality of pins, 79 and 81, respectively, which are rigidly secured to rotating spiders 83 and 85, respectively. The direction of rotation of the spiders is such that the wires 29 and 31 are folded inwardly and downwardly in one direction when engaged by pins 79 and inwardly and downwardly in the other direction when engaged by pins 81, thereby forming a continuous incurvate configuration or figure eight. The spiders 83 and 85 are secured to drive shafts 87 and 89, respectively, which have spiral gears 91 and 93, respectively, secured thereto. The spiral gears 91 and 93 engage mating pinions 95 and 97, respectively, which are secured to transverse drive shaft 7 and driven thereby. A double cam 99 secured to drive shaft 7 engages a cam roller 101 and a cam roller 103 which are affixed to cam levers 105 and 107 respectively. The cam levers 105 and 107 are journaled at their lower ends to the body member 9 and have pivotally connected to their upper ends a push rod 109 and a push rod 111, respectively, which push rods extend through and are supported by a portion of the body member 9. The push rods 111 and 109 engage a plurality of sleeve pin rollers 113 and 115, respectively, which are affixed to a plurality of sleeve pins 117 and 119, respectively. The sleeve pins 117 and 119 are slidably secured to the spiders 83 and 85, respectively. The sleeve pins 117 and 119 have slidable push off sleeves 121 and 123, respectively, connected thereto, and the push off sleeves 121 and 123 have springs 125 and 127, respectively, engaged therewith. The springs 125 and 127 are secured to the spiders 83 and 85, respectively, at one end while at the other end they engage the push off sleeves 121 and 123, respectively, to return the push off sleeves to their inoperative position, when not actuated by the push rods (Fig. 4 and Fig. 5). The wires 29 and 31 having engaged one of the pins 79 are folded downwardly and inwardly as the spider 83 rotates as described, supra, and one of the pins 81 having previously engaged the wires 29 and 31 is in the push off position, wherein the sleeve pin roller 115 engages the push rod 111, which when actuated by the cam 99 advances the sleeve pin roller 115 and, in association therewith the push off sleeve 123 is advanced and the wires 29 and 31 are pushed off the pin 81. Similarly, as the spider 83 rotates, the elements 113, 121 assume the position indicated by 113' and 121', respectively, and the wires 29 and 31 are pushed off as indicated by

29' and 31', respectively (Fig. 5). The arms of spiders 83 and 85 are disposed radially at one hundred twenty degree angles and the gearing between the double cam 99 and the spiders is such that the cam makes three revolutions to one of the spiders. The cam follower grooves 129 and 131 are cut so that the reciprocating movements of the push rods 109 and 111, respectively, are synchronized to properly dispose the wires 29 and 31 in the folding assembly.

Referring now more particularly to Figs. 8, 9, 10 and 11, the wires 29 and 31 are folded over the mandrels 133 and 135 by the pins 79 and 81 respectively, as described, supra. Guide elements 137 and 139 are affixed to the ends of mandrels 133 and 135, respectively, to eliminate any possibility of the wires 29 and 31 slipping from the mandrels. The guide elements 137 and 139 have curved surfaces congruous with the radius of spiders 83 and 85, respectively, so that the protrusions 141 and 143 (Figs. 3 and 5) on sleeves 121 and 123, respectively, straddle the guide elements when the sleeves are in their advanced push off position. The wires 29 and 31 having been folded on the mandrels 133 and 135 are engaged by threadlike grooves 145 and 147 on right-hand and left-hand screw conveyors 149 and 151, respectively, whereupon the wires 29 and 31 are advanced along the mandrels 133, 135 in frictional engagement therewith. The pickup end of conveyors 149 and 151 is supported by body member 9 and the discharge end is journaled to body member 23. A spiral gear 153 and a spiral gear 155 are secured to conveyors 149 and 151, respectively, and engage a spiral gear 157 and a spiral gear 159 secured to a transverse drive shaft 161. The drive shaft 161 has a spiral gear 163 secured thereto which engages a spiral gear 165 which is secured to the multiple drive shaft 27 thereby driving the conveyors 149 and 151. The mandrels 133 and 135 are maintained in alignment and positioning by the conveyors 149 and 151, in the former instance, and by a top retainer 167 and a bottom retainer 169 for mandrel 133 and a top retainer 171 and a bottom retainer 173 for mandrel 135, in the latter instance. These retainers have bearing surfaces 175 and oblique engaging surfaces 177 which engage concavities 179 in the top and bottom sides of mandrels 133 and 135, thereby maintaining the mandrels in their respective positions. The retainers also have threadlike grooves 181 adapted to by-pass the wires 29 and 31 as they are being conveyed along the mandrels 133 and 135. A pair of spiral gears 183 and a pair of spiral gears 185 are secured to the top retatiners 167, 171 and the bottom retainers 169, 173, respectively, and engage a pair of top spiral gears 187 and a pair of bottom spiral gears 189, respectively, which are secured to drive shafts 191 and 193, respectively. Drive shafts 191 and 193 have gears 195 and 197, respectively, secured thereto, which gears engage a gear 199 secured to the multiple drive shaft 27 thereby driving the retainers 167, 169, 171 and 173 in synchronized movement to by-pass the wires 29 and 31 as they are being advanced by the conveyors 149 and 151. The wires 29 and 31 are further advanced along the mandrels 133 and 135 by the conveyors 149 and 151 into the crushing and cutting zone, wherein upper rotating crushers 201, 203 and upper rotating cutter 205 and lower rotating anvils 207, 209 and lower rotating cutter 211 are operating. The upper crushers 201, 203 and upper cutter 205 and the lower anvils 207, 209 and lower cutter 211 are secured to drive shafts 213 and 215, respectively, which have gears 217 and 219 secured thereto, which gears engage a worm gear 221 secured to the multiple drive shaft 27 thereby driving said crushers, anvils and cutters. Upper crushers 201, 203 and upper cutter 205 have crushing blades 223, 225 adjustably affixed thereto and cutting blade 227 adjustably affixed thereto, respectively. Likewise, lower anvils 207, 209 and lower cutter 211 has anvil blades 229, 231 adjustably affixed thereto and cutting blade 233, adjustably affixed thereto, respectively. The wires 29 and 31 having entered the crushing zone are crushed by the rotating crushing blades 223, 225 with the rotating anvil blades 229, 231 striking simultaneously the mandrels 135, 133, respectively, thereby giving support to the mandrels, concurrently, the rotating cutter blades 227, 233 cut the wires top and bottom on the mandrel 133 (Figs. 8 and 10). The length of leg wire being predetermined by the number of folds conveyed through the crushing and cutting zone between cutting and crushing cycles. The small arcuate portions of the wires formed by the double cutting operation is conveyed from the mandrel 133 by the conveyor 149 from whence they drop on the machine bench or into a suitable receptacle. The folded wires 29, 31 after crushing and cutting are conveyed until they slip off the mandrels and descend on glide rods 235 and 237 which are affixed to the mandrels 133, 135, respectively.

Referring now more particularly to Figs. 1, 12, 13, 14, 15, 16 and 17. The folded wires 29 and 31 descend on the glide wires 235, 237 from which they drop into a lower former 239 which has forked members 241 affixed thereto on each side. Immediately (Fig. 12), a valve cam 243, secured to upper tool shaft 213, actuates valve lever 245 which controls a motive fluid valve 247, which in turn operates a fluid cylinder 249. The cylinder 249 has a piston rod 251 pivotally connected to a rocker lever 253 which is secured to rocker shaft 255 which shaft is journaled in support members 257 and 259 which are integral with the bench 11. A compound cam 261 secured to rocker shaft 255 has a tie wire advance lever 263 and a bundle lever 265 engaged therewith, said levers being pivotally affixed to support member 257. The tie wire lever 263 is universally connected to ratchet shaft 267 which is journaled in lower former support 269 and support member 271 which is affixed to the bench 11. The ratchet shaft 267 actuates ratchet 273 which in turn actuates a plurality of gears 275 which through feed shaft 277, journaled to members 269, 271, actuates feed gears 279 which have feed wheels 281 connected thereto. A tie wire 283 supplied from a suitable source (not shown) passes up through straightener assembly 285 to engage feed wheels 281 which wheels maintain uniform compression on the tie wire 283 by pivoted connection of one of the feed wheels and compression spring 287, said wheel being pivoted to the former support 269. The tie wire 283 passes from the feed wheels 281 into a split slide member 289 which is held together with screws 291 and the wire passes from the slide member into a guide tube 293 which is secured in the lower former 239. The bundle lever 265 slidably connects to lower cross head 295 which has slide rods 297 affixed thereto which rods pass through and extend from sleeves 299 mounted in lower former support 269. An upper cross head 301 which supports upper former 303 is affixed to the slide rods 297. The upper former 303 has

forked members 305 affixed thereto on each side, which members are so spaced that the upper forked members 305 slide past the lower forked members 241. A lift rod 307 having a lift hook 309 is affixed to cross head 301, said lift hook being maintained in position to engage a trip 311, by torsion spring 313. The trip 311 is secured to ejector shaft 315 which is supported by bearing members 317 which are affixed to lower former support 269. Ejectors 319, adjacent each end of the folded wires, are secured to ejector shaft 315. A collar 321, secured to shaft 315, has a tension spring 323 connected thereto which tension spring has its other end connected to the lower former support 269 thereby returning the ejectors 319 to their original position when the trip 311 is released.

When the piston rod 251 rotates the compound cam 261 a certain distance, bundle lever 265 moves to the position 265' and, accordingly, in association therewith the upper former 303 descends to tightly compact the folded wires 29 and 31. When the compound cam 261 rotates a further distance, tie wire lever 263 moves to the position 263' and, accordingly, in association therewith the tie wire 283 is advanced a measured distance in engagement with a groove 325 in the upper former 303 and a groove 327 in the lower former 239, thereby curling the tie wire 283 about the folded wires 29 and 31. When the compound cam 261 attains substantially its full stroke, a hammer block 329 affixed to said cam strikes a striker rod 331, which operates a lever 333, which strikes a shear pin 335, whereby the tie wire 283 is cut, and the length of tie wire encircling the wires 29, 31 is slightly in excess of one complete turn. A spring 337 extending into lower former 239 is provided to hold the tie wire 283 securely against the shearing surface of said lower former so that a positive cut is obtained. A compression spring 339 returns the shear pin 335 to its normal position and a compression spring 341 returns the striker rod 331 to its normal position. Tension springs 343 assist in lightening the weight of the cross head assembly as transmitted to the bundle lever 265. When the compound cam makes its return stroke the lever arms 263 and 265 are returned to their normal position but in so doing the lift hook 309 engages the trip 311 whereupon the ejectors 319 eject the bundle of leg wire as represented by 319' in Fig. 12. When the hook 309 has cleared the trip 311, the tension spring 323 causes the ejectors 319 to return to their respective seats and the cam 243, in synchronized association with the other mechanism, is ready to initiate another cycle.

In Figs. 18, 19 and 20 a modified form of the cutters 205 and 211 is illustrated. In this embodiment the upper cutter blade 401 and the lower cutter blade 403 rotate through concavities 405 and 407, respectively, which are provided in a mandrel 409, which is similar to mandrel 133 described, supra. An aperture 411 is provided through the mandrel 409 and the cutting edges of the blades 401, 403 are ground to form a concave cutting surface. With this embodiment the wires 29 and 31 are directly sheared, instead of compressively sheared as described, supra, thereby giving a clean positive severance of the wires and any small metallic and/or insulation particles resulting from the cutting operation drop through the aperture 411 and do not interfere with subsequent cutting.

Since the application of the invention is of special utility in connection with the folding of leg wires for blasting caps, this particular embodiment has been selected to describe its many advantages. It will be understood, however, that this particular use is not necessarily the limit of its practical application. In this connection, mention will be made of the possibility of using the same folding mechanism for the folding of wire or other materials for purposes other than those particularly directed to the manufacture of blasting caps.

It is evident that there are numerous factors which will influence conditions for the most satisfactory operation of the invention, the actual limits of which cannot be established except by detailed study of each set of materials and the intermediate and finished products involved.

It is seen that the machine of the present invention is readily adaptable to impart any predetermined number of folds to obtain a desired length of folded material. This may be accomplished, within certain limits, by utilizing a standard chassis and having alternate sets of gearing therefor in synchronized association with the cutting and crushing tools and the tying mechanism so that a desired length of folded material is obtained and adequate tying of the folded material is effected.

What we claim and desire to protect by Letters Patent is:

1. In a folding machine having a synchronized mechanism, means for continuously folding insulated strands of material in a figure 8 configuration, guide and supporting means for the folded strands, conveying means for progressing the folled strands, means for severing the progressing strands to form a predetermined length and means for crushing a portion of the insulation adjacent the ends thus formed, further progressing the severed length of strands to discharge.

2. In a folding machine having a synchronized mechanism, means for continuously and variably tensioning insulated strands of material, means for continuously folding the tensioned strands in an incurvate configuration, guide and supporting means for the folded strands, conveying means for progressing the folded strands, means for severing the progressing strands to form a predetermined length and means for crushing a portion of the insulation adjacent the ends thus formed, further progressing the severed length of strands to discharge, means for bundling the discharged strands, and means for ejecting the bundled strands.

3. In a folding machine having a synchronized mechanism, means for continuously and variably tensioning strands of material, means for continuously folding the tensioned strands in a figure 8 configuration, guide and supporting means for the folded strands, conveying means for progressing the folded strands, means for severing the progressing strands to form a predetermined length, further progressing the severed length of strands to discharge, means for bundling the discharged strands, and means for ejecting the bundled strands, wherein the strands of material are tensioned by, single groove sheaves for the individual strands, a plurality of multiple groove sheaves to accommodate the adjacent individual strands, said plurality having at least a drive sheave, a tensioning sheave, and a reciprocating sheave for uniformly tensioning the strands in synchronized movement with the means for cotinuously folding the tensioned strands.

4. In a folding machine having a synchronized mechanism, means for continuously and variably tensioning strands of material, means for continuously folding the tensioned strands in a figure "8" configuration, guide and supporting means for the folded strands, conveying means for progressing the folded strands, means for severing the progressing strands to form a predetermined length, further progressing the severed length of strands to discharge, means for bundling the discharged strands, and means for ejecting the bundled strands, wherein, the tensioned strands of material are folded by two rotating spiders having strand engaging elements affixed thereto said spiders alternately engaging and folding the strands of material inwardly and downwardly, and reciprocating sleeves for the engaging elements, associated with the folding mechanism, adapted to push off the engaged strands sequentially.

5. In a folding machine having a synchronized mechanism, means for continuously and variably tensioning strands of material, means for continuously folding the tensioned strands in a figure "8" configuration, guide and supporting means for the folded strands, conveying means for progressing the folded strands, means for severing the progressing strands to form a predetermined length, further progressing the severed length of strands to discharge, means for bundling the discharged strands, and means for ejecting the bundled strands, wherein, the folded strands of material are guided and supported by two mandrels having a pair of rotating retainers, respectively, which engage concavities in the top and bottom surfaces of the mandrels, said retainers associated with the folding mechanism and having threadlike grooves adapted to by-pass the strands being conveyed on the mandrels.

6. In a folding machine having a synchronized mechanism, means for continuously and variably tensioning strands of material, means for continuously folding the tensioned strands in a figure "8" configuration, guide and supporting means for the folded strands, conveying means for progressing the folded strands, means for severing the progressing strands to form a predetermined length, further progressing the severed length of strands to discharge, means for bundling the discharged strands, and means for ejecting the bundled strands, wherein, the folded strands of material are conveyed by screws in juxtaposition to the guide and supporting means, said screws adapted to engage the folded strands and progress them along said guide and supporting means.

7. In a folding machine having a synchronized mechanism, means for continuously and variably tensioning strands of material, means for continuously folding the tensioned strands in a figure "8" configuration, guide and supporting means for the folded strands, conveying means for progressing the folded strands, means for severing the progressing strands to form a predetermined length, further progressing the severed length of strands to discharge, means for bundling the discharged strands, and means for ejecting the bundled strands, wherein, the progressing strands of material are severed by a rotating cutter, associated with the conveying means, and adapted to sever the progressing strands of material to form a predetermined length said rotating cutter having a concave cutting surface and rotating through a concavity in the guide and supporting means to sever said progressing strands of material by transverse shear.

8. In a folding machine having a synchronized mechanism, means for continuously and variably tensioning strands of material, means for continuously folding the tensioned strands in a figure "8" configuration, guide and supporting means for the folded strands, conveying means for progressing the folded strands, means for severing the progressing strands to form a predetermined length, further progressing the severed length of strands to discharge, means for bundling the discharged strands, and means for ejecting the bundled strands, wherein, the discharged strands are bundled by an upper former and a lower former said upper former adapted to descend and engage the lower former and compress the discharged strands, a curling cavity in the upper and lower formers adapted to curl tie wire about the compressed folded strands, and a shear pin adapted to shear the tie wire after the curling operation.

9. In a folding mechanism, means for continuously and variably tensioning insulated strands of material, means for continuously folding the tensioned strands in a figure 8 configuration, guide and supporting means for the folded strands, conveying means for progressing the folded strands, means for severing the progressing insulated strands to form a predetermined length and means for crushing a portion of the insulation adjacent the ends thus formed, further progressing the severed length of strands to discharge, means for bundling the discharged strands, and means for ejecting the bundled strands.

10. A folding machine for leg wires having in combination: single groove sheaves for the individual wires; a plurality of multiple groove sheaves to accommodate adjacent individual wires, said plurality having at least a drive sheave, a tensioning sheave, and a reciprocating sheave for uniformly tensioning the wires in synchronized movement with the means for continuously folding the tensioned wires; two rotating spiders having engaging elements affixed thereto, said spiders alternately engaging and folding the wires inwardly and downwardly; reciprocating sleeves for the engaging elements, associated with the folding mechanism, and adapted to push off the engaged wires sequentially; guide and supporting means for the folded wires; conveying means for progressing the folded wires; means for severing the progressing wires to form a predetermined length; further progressing the severed length of wires to discharge; means for bundling the discharged wires, and means for ejecting the bundled wires.

11. A folding machine for leg wires having in combination: single groove sheaves for the individual wires; a plurality of multiple groove sheaves to accommodate adjacent individual wires, said plurality having at least a drive sheave, a tensioning sheave, and a reciprocating sheave for uniformly tensioning the wires in synchronized movement with means for continuously folding the tensioned wires; two rotating spiders having engaging elements affixed thereto, said spiders alternately engaging and folding the wires inwardly and downwardly; reciprocating sleeves for the engaging elements, associated with the folding mechanism, adapted to push off the engaged wires sequentially; two mandrels adapted to support the pushed off wires, having a pair of rotating retainers, respectively, which engage concavities in the top and bottom surfaces of the mandrels, said retainers associated with the folding mechanism, having threadlike grooves adapt-

ed to by-pass the wires being conveyed on the mandrels; conveying screws in juxtaposition to the mandrels said screws adapted to engage the folded wires and progress them along the mandrels; means for severing the progressing wires to form a predetermined length; further progressing the severed length of wires to discharge; means for bundling the discharged wires; and means for ejecting the bundled wires.

12. In a forming mechanism for continuously folding strands of material in the form of a figure 8, a pair of mandrel members in parallel relationship, a support for each of the mandrel members comprising a pair of supported rotatable members in engaged relationship with a pair of opposed concavities in each of said mandrel members, and convolute surfaces on said rotatable members adapted to advance the strands of material along the mandrel members.

13. In a forming mechanism for continuously folding strands of material in the form of a figure 8, a pair of mandrel members in parallel relationship, a support for each of the mandrel members comprising a pair of supported rotatable members in engaged relationship with a pair of opposed concavities in each of said mandrel members, means in juxtaposition with the mandrel members to uniformly advance the strands of material along the mandrel members, and convolute surfaces on said rotatable members adapted to by-pass the strands of material uniformly advanced along the mandrel members.

14. In a forming mechanism for continuously folding strands of material in the form of a figure 8, a pair of mandrel members in parallel relationship, a support for each of the mandrel members comprising at least a pair of supported rotatable members in engaged relationship with at least a pair of opposed concavities in each of said mandrel members, means in juxtaposition with the mandrel members to uniformly advance the strands of material along the mandrel members, and convolute surfaces on said rotatable members adapted to by-pass the strands of material uniformly advanced along the mandrel members.

15. In a forming mechanism for continuously folding strands of material in the form of a figure 8, a pair of mandrel members in parallel relationship, a support for each of the mandrel members comprising a pair of supported rotatable members in engaged relationship with a pair of opposed concavities in each of said mandrel members, conveying screws in juxtaposition to the mandrel members adapted to engage the strands of material and uniformly convey them along said mandrel members, and convolute surfaces on said rotatable members adapted to by-pass the strands of material uniformly conveyed along the mandrel members.

16. In a forming mechanism for continuously folding strands of material in the form of a figure 8, two rotating members, each having radially disposed fingers with engaging elements affixed thereto, said rotating members adapted to alternately engage and fold the strands of material inwardly and downwardly, means associated with the rotating members adapted to actuate the engaging elements to disengage strands of material sequentially, and means adapted to support said disengaged strands and maintain them in a figure 8.

17. In a forming mechanism for continuously folding strands of material in the form of a figure 8, two rotating members, each having radially disposed fingers with engaging elements affixed thereto, said rotating members adapted to alternately engage and fold the strands of material inwardly and downwardly, reciprocating sleeves for the engaging elements associated with the rotating members and adapted to push off the engaged strands of material sequentially, and two mandrels adapted to support the pushed off strands of material and maintain them in a figure 8.

18. In a forming mechanism for continuously folding strands of material in the form of a figure 8, two rotating members, each having at least one radially disposed finger with an engaging element affixed thereto, said rotating members adapted to alternately engage and fold the strands of material inwardly and downwardly, means associated with the rotating members adapted to actuate the engaging elements to disengage strands of material sequentially, and means adapted to support said disengaged strands and maintain them in a figure 8.

19. In a forming mechanism for continuously folding strands of material in the form of a figure 8, two rotating members, each having at least one radially disposed finger with an engaging element affixed thereto, said rotating members adapted to alternately engage and fold the strands of material inwardly and downwardly, reciprocating sleeves for the engaging elements associated with the rotating members and adapted to push off the engaged strands of material sequentially, and two mandrels adapted to support the pushed off strands of material and maintain them in a figure 8.

20. In a forming mechanism for continuously folding strands of material in the form of a figure 8 and progressing said strands of material along a pair of mandrel members, a rotating cutter adapted to sever the progressing strands of material to form a predetermined length, said rotating cutter rotating through a concavity in one of the mandrel members to sever said progressing strands of material by transverse shear, and an aperture through the mandrel member in communication with said concavity to permit residual particles of the severed strands to discharge therethrough.

21. In a forming mechanism for continuously folding strands of material in the form of a figure 8 and progressing said strands of material along a pair of mandrel members, a pair of rotating cutters in opposed relationship adapted to sever the progressing strands of material to form a predetermined length, each of said rotating cutters having a concave cutting surface, a pair of concavities in opposed relationship in one of the mandrel members adapted to receive the concave cutting surfaces of the opposed rotating cutters, and in conjunction with said rotating cutters sever said progressing strands of material by transverse shear, and an aperture through the mandrel member in communication with the opposed concavities to permit residual particles of the severed strands to discharge therethrough.

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