March 27, 1956 R. W. WINBERG 2,739,367

BUCKLE-FORMING MACHINE

Filed June 4, 1954 3 Sheets-Sheet 1

FIG. 1.

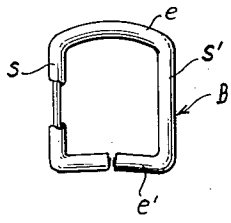


FIG. 2.

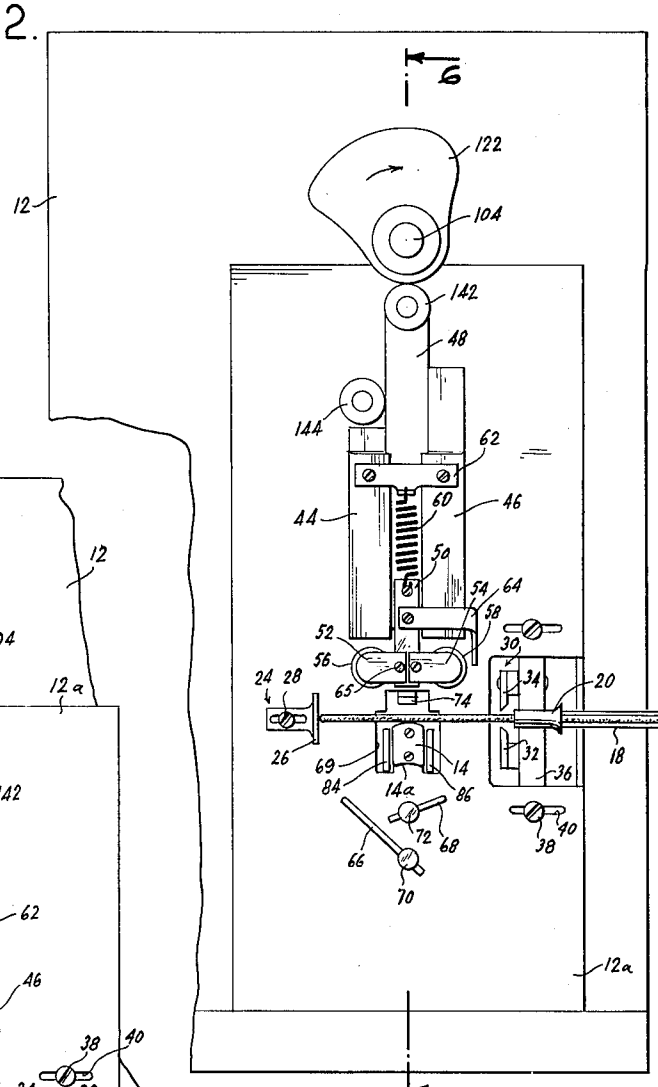


FIG. 3.

FIG. 11.

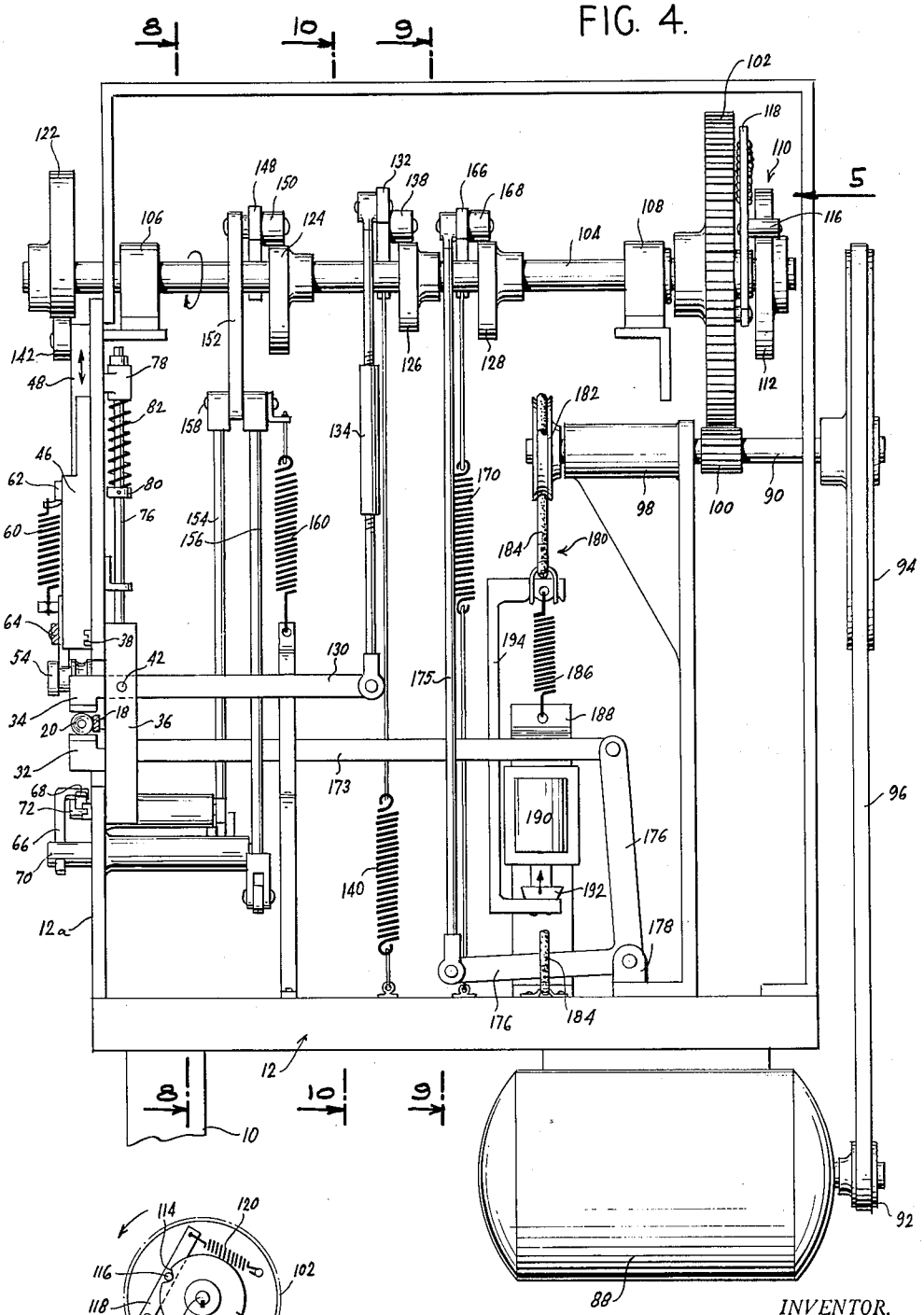
INVENTOR.
RAGNAR W. WINBERG
BY Morton Amster
ATTORNEY

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BUCKLE-FORMING MACHINE

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FIG. 4.



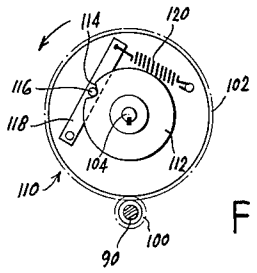


FIG. 5.

INVENTOR.
RAGNAR W. WINBERG
BY
Morton Amster
ATTORNEY

March 27, 1956 R. W. WINBERG 2,739,367

BUCKLE-FORMING MACHINE

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FIG. 6.

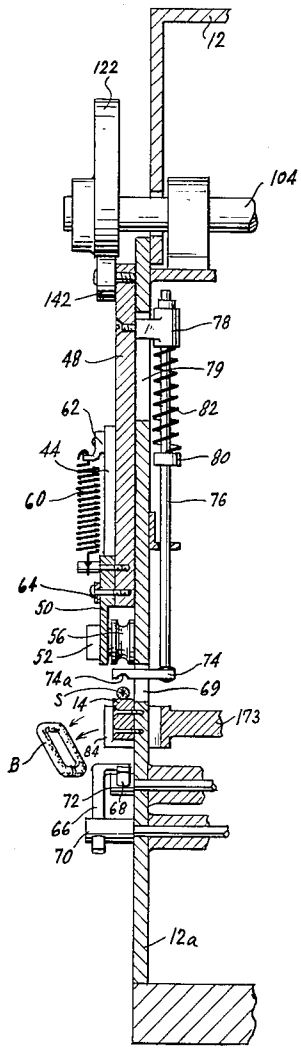


FIG. 7.

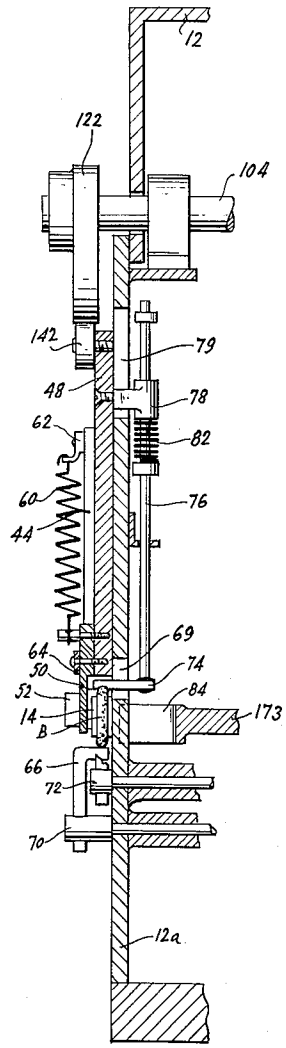


FIG. 8.

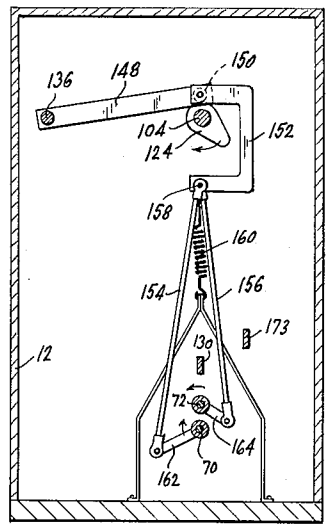


FIG. 9.

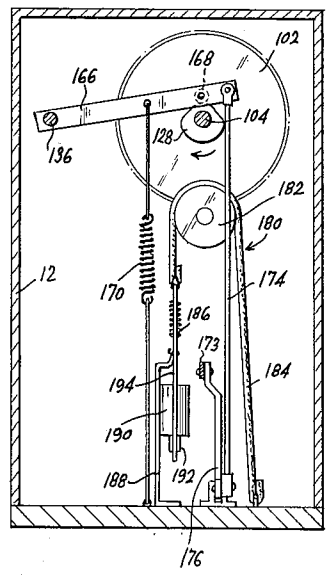
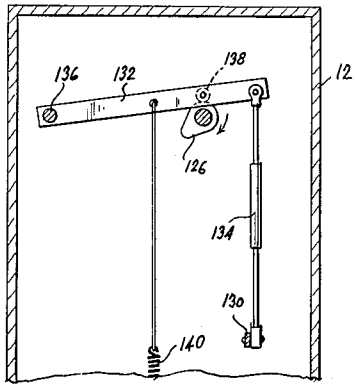


FIG. 10.



INVENTOR.
RAGNAR W. WINBERG
BY
Morton Amster
ATTORNEY

United States Patent Office 2,739,367
Patented Mar. 27, 1956

2,739,367

BUCKLE-FORMING MACHINE

Ragnar W. Winberg, Floral Park, N. Y., assignor to O & W Sewing Machine Attachments Inc., New York, N. Y., a corporation of New York

Application June 4, 1954, Serial No. 434,486

15 Claims. (Cl. 29—3)

The present invention relates to a machine for shaping elongated deformable material, in particular to automatic mechanisms for forming covered wire stock into buckles.

Forming and shaping apparatus are known for working plain or covered wire stock into a wide variety of closed buckle shapes or configurations. Such apparatus, usually manually operated and controlled, employs a guide having forming surfaces in association with bending tools which shape a length of stock into close conformity with the forming surfaces. From the production standpoint, most of these machines exhibit the serious drawback that they are not adapted to substantially continuous operation. On the other hand, completely automatic operation is not possible in that joints or connections occur between successive lengths of stock which should not be formed into a buckle. For example, it may be necessary to cut away a section of the stock between formation of successive buckles to avoid manufacture of a buckle which would ultimately have to be scrapped. In addition, it is not uncommon to employ relatively short lengths of stock, in the vicinity of three to four feet, thus making completely automatic operation unpractical.

Accordingly, it is an object of the present invention to provide buckle-forming or shaping apparatus obviating one or more of the above difficulties. Specifically, it is within the contemplation of the present invention to provide wire-working mechanisms for forming buckles rendered automatic as far as practical, with suitable control for reducing manufacturing waste and shrinkage.

It is a further object of the present invention to provide buckle-forming mechanisms facilitating manufacture at relatively low unit cost and at increased production speeds.

It is a still further object of the present invention to provide mechanisms for working covered wire stock into various buckle configurations which is basically compatible with basic requirements for low cost, such as ease of operation, elimination of highly skilled personnel and requiring minimum checking and handling of the formed buckles.

It is a still further object of the present invention to provide buckle-forming and shaping means which may be readily adapted to form buckles of varying configurations by replacement of readily accessible parts.

In accordance with one practical embodiment demonstrating features of the present invention, a machine for forming buckles is provided which includes a die, and cutting, forming and stripping tools in operative relation to the die. Appropriate actuating means having individual operative connections to the cutting, forming and stripping tools are provided and coordinated for sequentially effecting cutting, forming and stripping of a length of covered wire stock.

As a feature of the invention, a control system is provided which may be attended by an operator for periodically interrupting the substantially continuous operation

of the machine in forming successive lengths of wire into buckle shapes, as and for example, when it is necessary to cut away a portion of the stock surrounding or adjacent a joint. When such interruption of normal operation is necessitated, the cutting tools normally used in a buckle-forming operation may be employed for the trimming operation.

The above and still further objects, advantages and features of the present invention will be best appreciated by reference to the following detailed description of a presently preferred illustrative embodiment, when taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a plan view, with parts broken away, showing a typical buckle shape obtainable in accordance with the apparatus of the present invention;

Fig. 2 is an elevational view of the present apparatus showing the relationship between the stock-forming or working tools at the beginning of a buckle-forming cycle;

Fig. 3 is an elevational view similar to Fig. 2, but showing the tools at the end of a buckle-forming cycle;

Fig. 4 is a side view of the shaping and forming apparatus of the present invention, with parts removed to illustrate the operating or actuating mechanisms for the various tools;

Fig. 5 is an elevational view taken substantially along the line 5—5 of Fig. 4 and looking in the direction of the arrows, showing the details of a clutching mechanism;

Fig. 6 is a sectional view taken substantially along the line 6—6 of Fig. 2 and looking in the direction of the arrows;

Fig. 7 is a sectional view taken substantially along the line 7—7 of Fig. 3 and looking in the direction of the arrows;

Fig. 8 is a sectional view taken substantially along the line 8—8 of Fig. 4 and looking in the direction of the arrows;

Fig. 9 is a sectional view taken substantially along the line 9—9 of Fig. 4 and looking in the direction of the arrows, showing the details of the stripper operating mechanisms and of the quick-release brake;

Fig. 10 is a fragmentary sectional view taken along the line 10—10 of Fig. 4 and showing the details of the cutter operating mechanisms; and

Fig. 11 is a schematic showing of the electrical control circuit for the forming and shaping apparatus.

Referring now specifically to the drawings, there is shown in Fig. 1 a buckle B of closed generally rectangular configuration which is fabricated of a deformable wire stock having a soft metal core, and an appropriate covering of fabric, plastic, leather or the like. The buckle B, purely illustrative of the many forms readily obtainable with the apparatus to be described, includes opposed ends *e*, *e'* and opposed sides *s*, *s'*, the end *e'* being formed by end adjacent portions of the length of the stock turned into aligned relation. Although the invention will be described in conjunction with the manufacture of a buckle of the type illustrated in Fig. 1, it is to be appreciated that many and varied forms are within the contemplation of this disclosure.

Referring now specifically to Figs. 2 to 4 inclusive, there is shown an illustrative shaping and forming apparatus in accordance with the present invention which includes a support or pedestal 10 on which is mounted a housing 12 having a front wall or panel 12*a*.

Detachably mounted on the front wall is a forming die 14 which is removably supported in place by screws or the like. The die 14 includes forming surfaces 14*a* extending at right angles to the plane of the front wall 12*a* and of a desired configuration, as complementary to the inner boundaries of the buckle B illustrated in Fig. 1.

At one side of the forming die 14 means are provided

for feeding the covered wire stock S along a linear feed path into straddling relation with the upper end surface of the forming die **14**. The feed means, generally designated by the reference numeral **16** includes a support or base plate **18** extending laterally of the forming die which carries two aligned funnel-like sleeves **20**, **22** through which the stock S is manually fed toward the die, as indicated by the arrow in Fig. 3. The illustrated arrangement of the feed means **16** permits the operator to observe substantially all of the stock S throughout its length during manual feed to the forming die **14**.

On the side opposite the forming die **14** from the feed means **16**, is an adjustable stop **24** including an abutment plate **26** which is adjustable through provision of a slot and bolt arrangement **28** for movement laterally toward and away from the forming die **14**. Disposed along the linear feed path defined by the aligned sleeves **20**, **22** is a cutting mechanism, generally designated by the reference numeral **30** which includes opposed fixed and movable cutting tools **32**, **34** which cooperate for severing the stock S into predetermined lengths. The cutting tools **32**, **34** are mounted on a common bracket **36** with the feed means **16** such as to be laterally adjustable toward and away from the forming die **14**. The bracket or supporting block **36** is adjustably mounted through provision of bolts **38** extending into horizontally disposed slots **40** formed in the front wall **12***a* of the housing **12**. The supporting bracket or block **36** is arranged against the inner face of the front wall **14**, as seen best in Fig. 4, the lower cutting tool **32** being fixed on the bracket **36**, and the upper cutting tool **34** being pivotally mounted on a pin **42**.

The laterally adjustable arrangement of the stop **24** and the cutting mechanisms **30** facilitate severing of the stock S into varying lengths, each of the lengths being disposable symmetrically relative to the forming die **14**. That is, the abutment plate **26** and the cooperating cutting tools **32**, **34** may be disposed at points equidistant from the longitudinal center line of the forming die **14**.

Located above the forming die **14** are a pair of guide elements, **44**, **46** which are undercut and define a track or guideway for slidably receiving a tool-supporting member **48**. Adjacent the lower end of the tool-supporting member **48** is a plate **50** which carries laterally extending supporting arms **52**, **54** upon which are pivotally mounted a first set of forming tools or rollers **56**, **58**. The forming tools or rollers **56**, **58** are journaled on the respective supporting arms **52**, **54** in spaced relation relative to each other such that their respective peripheries cooperate with the adjacent opposed sides of the forming die **14** to urge portions of the stock S into engagement with the forming die **14** in response to movement of the tools through predetermined linear strokes. Upon progressively inspecting Figs. 2 and 3, the required orientation and function of the forming tools **56**, **58** will be best appreciated. In Fig. 2, the forming tools **56**, **58** are shown in a retracted position relative to the forming die, while in Fig. 3 the forming tools **56**, **58** are shown after movement through a predetermined linear thrust and having urged portions of the stock into engagement with the die **14**.

The forming tools **56**, **58** are normally biased to the retracted or inoperative position of Fig. 2 through provision of a coil spring **60**, placed in tension in response to movement of the forming tools to the position of Fig. 3 and operatively connected between the supporting plate **50** and a cross-bar **62**.

The supporting plate **50** carries a depending stop **64** which is normally spaced above the feed path of the stock, as seen in Fig. 2, but is movable into blocking relation to the feed path in response to the forming tools **56**, **58** being movable through the downward thrust to the position of Fig. 3. Thus, the stop or blocking member **64** precludes feed of further stock to the die **14** until the completion of a buckle-forming cycle. To facilitate interchangeability of the die **14**, the supporting arms **52**, **54** for the forming tools **56**, **58** are removably mounted on the supporting plate **50** by the screws **65**. Accordingly, it is possible to employ the die of a different configuration and a set of forming tools appropriate to the die.

Disposed below the die **14** is a further set of forming tools **66**, **68** respectively mounted for rocking movement about pivots **70**, **72**. The forming tools **66**, **68** are normally in the spread or inoperative position of Fig. 2 and are movable toward each other and the adjacent under surface of the forming die **14**. The tools **66**, **68** turn end adjacent portions of the length of stock S into engagement with the undersurface of the forming die, as seen in Fig. 3.

As seen best in Figs. 2 and 3, the front panel or wall **12***a* is formed with a cut out **69** in the region surrounding the forming die **14** through which a transversely-extending hold-down tool **74** is extended and rendered periodically effective. The hold-down tool **74**, seen best in Figs. 6 and 7 is formed with an arcuate cutout or seat **74***a* and is adapted to conformably engage the stock S and urge same against the upper surface of the forming die **14**. The transversely-extending hold-down tool **74** is movable through a limited vertical thrust in advance of movement of the forming tools **56**, **58** such that the stock is confined against the forming tool preliminary to operation of the tools **56**, **58**. The hold-down tool **74** is supported on a vertically reciprocable rod **76** slidably supported in a sleeve **78** which extends through an appropriate longitudinal slot **79** formed in the front wall **12***a* and is secured on the tool carriage or supporting member **48**. A stop collar **80** is secured to the rod **76** and a coil spring **82** is arranged between the collar **80** and the undersurface of the bearing or sleeve **78** such that the hold-down tool **74** may be rendered effective yet not interfere with continued movement of the forming tools **56**, **58**. That is, during a first portion of the downward thrust of the forming tools **56**, **58** the hold-down tool **74** likewise moves downward to clamp the stock in place. Thereafter, the forming tools **56**, **58** continue to move, relative movement between the hold-down tool **74** and the supporting member **48** being permitted through compression of the spring **82**, as seen in Fig. 7.

A further set of tools **84**, **86** are effective through the cutout **69** adjacent the die **14** for the purpose of stripping a completed buckle B from conformable engagement about the die **14**. The buckle-stripping tools **84**, **86** are arranged for movement along opposite sides of the forming die **14** in paths parallel to each other and at a substantially right angle to the feed path of the stock S. As seen in Fig. 7, the stripping tools **84**, **86** may be supported on a single rearwardly-extending operating element and may take the form of a bifurcated member which is movable through a predetermined linear thrust transverse of the forming die **14** to effect the stripping operation.

Coordinated operating mechanisms are provided for the cutting mechanism **30**, the linear moving forming tools **56**, **58**, the swingable forming tools **66**, **68** and the stripping mechanism **84**, **86**. In sequence the stock S is cut into a predetermined length, which length straddles and is symmetrically of the forming die **14**, the forming rollers **56**, **58** bring portions of the length of stock into engagement with sides of the die **14**, the bending tools **66**, **68** turn end adjacent portions of the length of stock into engagement with the other surface of the die, and the stripping tools **84**, **86** remove the completed buckle configuration. The coordinated mechanisms include an electric motor **88** dependingly supported from the housing **12**, and coupled to an intermediate drive shaft **90** through pulleys **92**, **94** and a belt **96** trained over the pulleys. The intermediate shaft **90** is supported on an appropriate sleeve bearing **98** and carries a drive gear **100** in meshing engagement with a driven gear **102**. As is well understood, appropriate speed reduction of the motor may be obtained through the reduction coupling described, including the

pulleys 92, 94 of different diameters and the gearing 100, 102 of different diameters. The driven gear 102 is loosely supported on a control or cam shaft 104 which in turn is journaled on bearings 106, 108 and extends at right angles to the front wall 12*a* of the housing 12. The driven gear 102 is coupled to the control or cam shaft 104 through a releasable clutch mechanism, generally designated by the reference numeral 110 which serves as a safety device. As seen best in Figs. 4 and 5, the releasable clutch mechanism 110 includes a circular clutch plate 112 formed with a seating groove or notch 114 in its periphery. A coupling pin 116 is supported on a pivoted rocker arm 118 carried by the driven gear 102, the coupling pin 116 being normally biased into the seat or notch 114 through provision of a spring 120. As the driven gear 102 is rotated, coupling will normally be provided between the driven gear 102 and the cam shaft 104 through the pin 116 engaged within the notch 114 of the clutch plate 112. However, when movement of the cam shaft 104 is obstructed, as for example upon fouling of any of the operating mechanisms individually actuated thereby, the pin 116 will ride out of the notch 114 onto the continuous peripheral surfaces of the clutch plate 112 to release the driving connection between the driven gear 102 and the cam shaft 104.

The cam shaft 104 serves to coordinate the required sequential operation of the cutting, forming and stripping mechanisms of the present apparatus, and carries cam 122 for operating the forming tools or rollers 56, 58, cam 124 for operating the turning tools 66, 68, cam 126 for operating the cutting mechanism 30, and cam 128 for operating the stripping tools 84, 86. The individual actuating mechanisms for the various tools will now be detailed.

The cutting mechanism 30 which operates first in a buckle forming cycle under control of the cam 126 is arranged such that the pivoted cutting tool 32 is movable in a counterclockwise direction about the pivot pin 42 of Fig. 4 to effect the required severing operation. The pivoted cutting tool 32 has a rearwardly extending extension 130 of a length selected such that a relatively short throw will complete the required cutting operation. The end of the extension 130 is coupled to a cam follower supporting lever 132, seen best in Fig. 10, through provision of an adjustable length linkage 134. The lever 132 is pivoted on the housing by a supporting shaft 136 at the end remote from the connection to the adjustable length linkage 134 and carries a cam follower 138 which is biased into engagement with the cam 126 through provision of an appropriate spring 140 anchored to the bottom wall of the housing 12. The adjustable length linkage 134 is provided such that the cutting mechanism 30 may be laterally displaced in relation to the forming die 14 when different lengths of stock are to be used in conjunction with dies of different sizes.

The forming tools 56, 58, next operative in a buckle forming cycle, are driven from the cam 122 which is engaged by a follower 142 held against the cam through the spring 60. In conjunction with the cam 122, rotating in a clockwise direction as seen in Fig. 2 about the cam shaft 104, a balancing roller 144 is provided at one side of the tool-supporting element to take up sidewise thrust developed by the cam operation of the supporting member 48. This precludes uneven wearing of the guideway formed by the elements 44, 46.

The end turning tools 66, 68 which are next operative in the cycle, are controlled from the cam 124 through mechanisms seen best in Figs. 4 and 8. Specifically, a cam-follower supporting lever 148 is pivoted on the shaft 136 and carries the cam follower 150 engaging the driving surfaces of the cam 124. A depending C-shaped bracket 152 is pivotally connected to the cam follower at its upper end, the lower end being connected to a pair of operating rods 154, 156. As seen, the operating rods 154, 156 are joined to the C-shaped bracket 152 by a common pin 158 and appropriate biasing spring 160 is likewise connected to the pin to maintain the follower 150 in engagement with the cam 124. The lower ends of the operating rods 154, 156 are coupled through arms 162, 164 to the tools 66, 68, such that the tools are swung in the direction indicated in response to clockwise rotation of the cam 124 about the cam shaft 104.

The final operation in a typical buckle-forming cycle is the stripping of a completed buckle from the forming die through movement of the stripping tools 84, 86 from the retracted position of Fig. 7 through a predetermined linear thrust at right angles to the feed path and in the direction indicated by the arrows to the position of Fig. 6.

As seen in Fig. 9, a further cam supporting lever 166 is supported on the shaft 136 at one end thereof and carries the cam follower 168 turning the cam 128. The cam follower 168 is biased into engagement with the cam 128 by an appropriate spring 170 anchored to the bottom wall of the housing. The lever 166 is coupled at the end remote from the shaft 136 to the rearward extension 173 of the stripping tool through a coupling rod 174, and a bell crank lever 175. The bell crank lever is pivoted intermediate its legs on a bracket 178 and has one leg pivotally connected to the extension 172 and has its other leg pivotally connected to the operating rod 174. Accordingly, in response to clockwise movement of the cam 128, as viewed in Fig. 9, the stripping tools will be moved through the predetermined forward thrust relative to the forming die 14.

Operatively associated with the intermediate drive shaft 90 is a braking mechanism, generally designated by the reference numeral 180 which includes a brake drum 182 fixed to the shaft 90 and a frictionally engaged strap or band 184. The band 184 has one end anchored to the bottom wall of the housing, as seen best in Fig. 9 and has its other end operatively connected to an appropriate spring 186 anchored on the upstanding bracket 188. The tension exerted by the spring 186 is selected such that the brake band 184 is normally in the "on" or engaged position relative to the brake drum 182 that is that the brake is effective to hold the shaft 90 against movement by the friction drive 92, 94, 96. The upstanding bracket 188 carries a solenoid 190 having a plunger 192 to which is fixed a coupling member 194. The coupling member 194, seen best in Fig. 4 is fixed adjacent its upper end to the brake band 184, the spring 186 being operatively connected to the band 184 through the coupling member 194. The solenoid 190 is arranged such that when it is energized, the plunger 192 is pulled upwardly in the direction indicated by the arrows in Fig. 4 to move the coupling member 194 upwardly. This action relieves the tension exerted by the spring 186 on the belt 184 and allows the latter to assume a slack position relative to the brake drum. That is, the brake is normally on and is only rendered inoperative in response to energization of the solenoid 190. Thus, there is provided a quick-acting brake mechanism which becomes effective in response to deenergization of the solenoid 190.

Referring now to Fig. 11, there is shown a schematic diagram illustrating the electrical control for the described forming and shaping apparatus. Specifically, the motor 88 includes energizing connections or lines 198, 200 which are extended to a source of line potential or the like 202 through a series connected foot switch 204. The foot switch 204, conveniently placed for actuating by an operator, is of well-known construction and is arranged to interrupt the motor circuit at the will of the operator to discontinue drive to the forming apparatus. The solenoid 190 is energized during periods of motor operation. Upon discontinuance of the motor operation the solenoid is deenergized, causing the brake mechanism 180 to become instantaneously effective. Thus, when the operator trips the foot switch 204 to interrupt operation, the machine is instantaneously stopped.

A typical sequence of operation will now be detailed:

Upon closing of the foot switch 204, the motor 80 is

energized to cause clockwise rotation of the cam shaft **104**, as viewed in Figs. 2 and 3.

During a first interval of the forming cycle, after manual feed of a length of stock into the position illustrated in Fig. 2, the cam **126** is effective to pivot the movable cutting tool **34** toward the stationary cutting tool **32** to sever the stock S at a point equidistant from the longitudinal center line of the die in relation to the abutment plate **26** of the adjustable stop **24**. The cutting mechanisms are effective, as seen in Fig. 10 in that the rise portion of the cam **126** pivots the lever **132** in a counterclockwise direction about the shaft **136** thus pulling up the adjustable length linkage **134** and moving the pivoted cutting tool **34** down toward the stationary cutting tool **32**.

At a time later in the forming cycle, dependent upon the relative disposition of the cams on the control shaft **104**, the cam **122** is effective to displace the tool supporting member **48** through a predetermined linear and downward thrust to the fully depressed or operative position illustrated in Fig. 3. During a first portion of this downward stroke, the hold-down tool **74** is engaged against the length of stock to hold the same against the forming die, this being followed by continued travel of the tools **56**, **58** to form the opposite sides *s*, *s'* of the buckle B. When the forming tools or rollers **56**, **58** are in the operative position of Fig. 3, it is to be noted that further manual feed of stock S to the forming apparatus is precluded by the stop **64**.

At a time still later in the forming cycle, and following formation of the opposite sides of the buckle B, the turning tools **66**, **68** are moved from the position illustrated in Fig. 2 to the closed position of Fig. 3, wherein end adjacent portions of the length of stock are turned to substantial end-to-end alignment and against the adjacent undersurface of the forming guide to form the end *e'* of the buckle B. The end turning or bending tools **66**, **68** are effective in that the cam **124** as seen in Fig. 8, raises the lever **148** which in turn raises the frame **152** and exerts an upward pull on the control or operating rods **154**, **156**. The operating rod **154** pivots the tool **66** in a clockwise direction, while the operating rod **156** pivots the forming tool **68** in the counterclockwise direction. This completes the forming operation of the buckle B.

Thereupon, and during the last interval of the forming cycle, the stripping tools **84**, **86** are advanced to remove the formed buckle B from the die **14**. This is accomplished as seen in Fig. 9, by counterclockwise movement of the lever **166** which rocks the bell crank lever **176** in an appropriate direction to provide a short forward thrust or throw to the extension **172** of the tools **84**, **86**.

Successive forming cycles are the same, and in each instance the operator merely feeds the stock S through the guide means **16** and observes the operation of the machine. If a joint is presented in the leading end of the stock or an imperfection in the covering is noted, the operator merely cuts away portions of the stock to remove the imperfection, waits until the cycle is completed, and thereafter feeds the stock up against the abutment plate **26** to take advantage of the next forming cycle.

If for any reason operation is to be disrupted, the operator merely depresses the foot switch **204** corresponding to opening the switch, which deenergizes the motor **88** and causes the quick-acting braking mechanism **180** to become effective.

In response to deenergization of the solenoid **190**, the coupling member **194** moves downwardly, thus allowing the brake band **184** to move into frictional engagement with the drum under the tension exerted by the spring **186**.

The safety mechanism **110** previously detailed, is only operative in the contingency that the machine becomes fouled, as and for example, when the wire stock S disrupts normal operation of the forming tools. In the event that any stress is placed on the cam or control shaft **104** which might ordinarily seriously damage the machine in the event that the drive is not interrupted, there will be a tendency of the clutch pin **116** to ride upwardly out of the seat **114** of the clutch plate **112** to discontinue drive. After the trouble is cleared up, it is merely necessary to cause the clutch pin **116** to once again become seated and the clutching mechanism will be effective to couple the driven gear **102** to the cam shaft **104**. In the event that the obstruction is not removed, the clutch pin **116** will continue riding in and out of the seat **114** until such time as the obstruction is clear. Thereafter, normal operation will be restored.

Numerous modifications of the apparatus of the present invention will occur to those skilled in the art, and accordingly the appended claims should be given a latitude of interpretation consistent with the disclosure and at times certain features of the invention will be used without a corresponding use of other features.

What I claim is:

1. A machine for forming covered wire stock into a buckle comprising a buckle-forming die having upper and lower surfaces and side surfaces, means for guiding stock along a horizontal feed path into straddling and contacting relation with said upper end surface of said forming die, a cutting mechanism having operating means and arranged along said horizontal feed path for severing said stock into predetermined lengths, a first set of forming tools mounted for vertical movement along said opposite side surfaces of said forming die for urging portions of said stock against said opposite side surfaces of said forming die, operating means for moving said first set of forming tools through predetermined vertical strokes, a second set of forming tools mounted for movement relative to said lower end surfaces of said forming die for urging further portions of said stock against said lower end surface, operating means for moving said second set of forming tools through a predetermined path, stripping mechanisms having operating means and movable horizontally and transversely of said forming die for removing a formed length of stock from about said forming die, the operating means for said cutting mechanisms, first and second sets of forming tools and stripping mechanisms being coordinated to effect cutting, forming and stripping of said stock in sequence.

2. A machine for forming wire stock into a buckle comprising a buckle-forming die having upper and lower end surfaces and side surfaces, means for guiding stock along a horizontal feed path into straddling and contacting relation with said upper end surface of said forming die, a cutting mechanism having operating means and arranged along said horizontal feed path for severing said stock into predetermined lengths, a first set of forming tools mounted for vertical movement along said opposite side surfaces of said forming die for urging portions of said stock against said opposite side surfaces of said forming die, operating means for moving said first set of forming tools through predetermined vertical strokes, a second set of forming tools pivotally mounted for movement relative to said lower end surface of said forming die for urging further portions of said stock against said lower end surface, operating means for rocking said second set of forming tools through a predetermined arc, stripping mechanisms having operating means and movable horizontally and transversely of said forming die for removing a formed length of stock from said forming die, the operating means for said cutting mechanisms, first and second sets of forming tools and stripping mechanisms being coordinated to effect cutting, forming and stripping of said stock in sequence, an electric drive for said operating means having energizing connections, a switch in circuit with said energizing connections, releasable brake means for said operating mechanisms, and a solenoid control being operated in response to closing of said switch for releasing said brake means and allowing return of said brake means to a normally engaged position in response to opening of said switch.

3. A machine for forming covered wire stock into a buckle comprising a main shaft, drive means operatively connected to said shaft, a buckle-forming die having upper and lower surfaces and side surfaces, means for guiding stock along a horizontal feed path into straddling and contacting relation with said upper end surface of said forming die, a cutting mechanism arranged along said horizontal feed path for severing said stock into predetermined lengths, operating means for said cutting mechanism including a cam on said main shaft, a first set of forming tools mounted for vertical movement along said opposite side surfaces of said forming die for urging portions of said stock against said opposite side surfaces of said forming die, operating means for said first set of forming tools including a cam on said main shaft and moving said first set of forming tools through predetermined vertical strokes, a second set of forming tools mounted for movement relative to said lower end surface of said forming die for urging further portions of said stock against said other end surface, operating means for said second set of forming tools including a cam on said main shaft and moving said second set of forming tools through a predetermined path, stripping mechanisms movable horizontally and transversely of said forming die for removing a formed length of stock from said forming die, operating means for said stripping mechanisms including a cam on said main shaft, the cams for the respective operating means for said cutting mechanisms, first and second sets of forming tools and stripping mechanisms being arranged on said main shaft to effect cutting, forming and stripping of said stock in sequence.

4. A machine according to claim 3 including releasable brake means operatively connected to said main shaft and effective when engaged to assure substantially instantaneous braking of said main shaft, a solenoid control operatively connected to said brake means and arranged to disengage said brake means upon energization, a switch, and means for energizing said solenoid control in response to closing of said switch.

5. A machine according to claim 4 including releasable coupling means operatively connecting said drive means to said main shaft, said releasable coupling including a pin seated within a notch in a clutch plate, said pin riding out of said notch upon excessive loading of said main shaft.

6. In a machine for shaping covered wire stock into buckles, a forming die including opposed upper and lower surfaces and opposed side surfaces, a guide arranged at one side of said forming die and substantially at the same level as said upper surface through which said stock is fed along a horizontal feed path into straddling relation with said upper surface, cutting mechanisms arranged along said feed path including cutting tools disposed at opposite sides of said feed path at a location spaced from said forming die, operating means for said cutting mechanism for successively severing said stock into lengths, a first set of forming tools mounted for movement in relation to said opposed side surfaces of said forming die for urging portions of successive lengths of stock against said opposed side surfaces, a hold-down tool operatively connected to and movable with said first set of forming tools for clamping a length of stock against said upper surface of said forming die during a first portion of the movement of said first set of forming tools, a yieldable connection between said hold-down tool and said first set of forming tools for permitting relative motion between said hold-down tool and said first set of forming tools during a further portion of the movement of said first set of forming tools, operating means for moving said first set of forming tools in relation to said forming die, a second set of forming tools mounted for movement in relation to said lower surfaces of said forming die for urging further portions of said stock against said lower surface, and operating means for moving said second set of forming tools in relation to said forming die.

7. In a machine according to claim 6, a blocking member arranged at a location intermediate said cutting mechanism and said forming die, and means connecting said blocking member to said first set of forming tools for movement into blocking relation to said horizontal feed path in response to movement of said first set of forming tools.

8. In a machine for shaping covered wire stock into buckles, a forming die including opposed upper and lower surfaces and opposed side surfaces, a guide arranged at one side of said forming die substantially at the same level as said upper surface through which said stock is fed along a horizontal feed path into straddling relation with said upper surface, cutting mechanisms arranged along said feed path including cutting tools disposed at opposite sides of said feed path at a location spaced from said forming die, operating means for said cutting mechanism for successively severing said stock into lengths, a stop arranged at the opposite side of said forming die substantially at the same level as said upper surface, means mounting said stop for adjustment in relation to said forming die whereby successive lengths of stock may be located symmetrically of said forming die by positioning of said stop at the same spacing relative to said forming die as the spacing of said cutting mechanism, a first set of forming tools mounted for movement in relation to said opposed side surfaces of said forming die for urging portions of successive lengths of stock against said opposed side surfaces, a hold-down tool operatively connected to and movable with said first set of forming tools for clamping a length of stock against said upper surface of said forming die during a first portion of the movement of said first set of forming tools, a yieldable connection between said hold-down tool and said first set of forming tools for permitting relative motion between said hold-down tool and said first set of forming tools during a further portion of the movement of said first set of forming tools, operating means for moving said first set of forming tools in relation to said forming die, a second set of forming tools mounted for movement in relation to said lower surfaces of said forming die for urging further portions of said stock against said lower surface and operating means for moving said second set of forming tools in relation to said forming die.

9. In a machine for shaping covered wire stock into buckles, a forming die including opposed upper and lower surfaces and opposed side surfaces, a guide arranged at one side of said forming die through which said stock is fed along a horizontal feed path into straddling relation with and contacting against said upper surface, cutting mechanisms arranged along said feed path including cutting tools disposed at opposite sides of said feed path, operating means for said cutting mechanism for successively severing said stock into lengths, a set of forming rollers mounted as a set for linear movement in parallel relation to said opposed side surfaces of said forming die for urging portions of successive lengths of stock against said opposed side surfaces, means journaling each of said rollers for rotation about an axis spaced from the adjacent side surfaces of said forming die, a hold-down tool operatively connected to and movable with said set of forming rollers for clamping a length of stock against said upper surface of said forming die during a first portion of the movement of said set of forming rollers, a connection including a compression spring between said hold-down tool and said set of forming rollers for permitting relative motion between said hold-down tool and said set of forming rollers during a further portion of the movement of said set of forming rollers, operating means for moving said set of forming rollers in relation to said forming die, a further set of forming tools mounted for movement in relation to said lower surfaces of said forming die for urging further

portions of said stock against said lower surface, and operating means for moving said further set of forming tools in relation to said forming die.

10. A machine for forming covered wire stock into a buckle comprising a buckle-forming die having upper and lower surfaces and side surfaces, means for guiding stock along a feed path into straddling relation with and contact against said upper end surface of said forming die, a cutting mechanism having operating means and arranged along said feed path at a location spaced from said forming die for severing said stock into successive lengths, a set of forming rollers mounted for movement along said opposite side surfaces of said forming die for urging portions of said stock against said opposite side surfaces of said forming die, means journaling each of said forming rollers for rotation about an axis spaced outwardly in relation to the adjacent side surface of said forming die, operating means for moving said set of forming rollers through a prescribed thrust, a further set of forming tools mounted for movement relative to said lower end surface of said forming die for urging further portions of said stock against said lower end surface, operating means for moving said further set of forming tools through a prescribed thrust, the operating means for said cutting mechanisms, forming rollers and forming tools being coordinated to effect cutting and forming of said stock in sequence.

11. A machine for forming covered wire stock into a buckle comprising a buckle-forming die having upper and lower surfaces and side surfaces, means for guiding stock along a feed path into straddling relation with and contact against said upper end surface of said forming die, a cutting mechanism having operating means and arranged along said feed path at a location spaced from said forming die for severing said stock into successive lengths, a set of forming rollers mounted for movement along said opposite side surfaces of said forming die for urging portions of said stock against said opposite side surfaces of said forming die, means journaling each of said forming rollers for rotation about an axis spaced outwardly in relation to the adjacent side surface of said forming die, operating means for moving said set of forming rollers through a prescribed thrust, a further set of forming tools mounted for movement relative to said lower end surface of said forming die for urging further portions of said stock against said lower end surface, operating means for moving said further set of forming tools through a prescribed thrust, stripping mechanisms having operating means for removing a formed length of stock from about said forming die, the operating means for said cutting mechanisms, forming rollers, forming tools and stripping mechanisms being coordinated to effect cutting, forming and stripping of said stock in sequence.

12. A machine for forming covered wire stock into a buckle comprising a buckle-forming die having upper and lower surfaces and side surfaces, means at one side of said forming die for guiding stock along a feed path into straddling relation with and contact against said upper end surface of said forming die, a cutting mechanism having operating means and arranged along said feed path at a location spaced from said forming die for severing said stock into successive lengths, an adjustable stop at the other side of said forming die and along said feed path, a set of rollers mounted for linear movement along and parallel to said opposite side surface of said forming die for urging portions of said stock by rolling contact against said opposite side surfaces of said forming die, means journaling each of said rollers for rotation about an axis spaced outwardly in relation to the adjacent side surface of said forming die, operating means for moving said first set of forming tools through a prescribed thrust, a second set of forming tools mounted for movement relative to said lower end surface of said forming die for urging further portions of said stock against said lower end surface, operating means for moving said second set of forming tools through a prescribed thrust, stripping mechanisms having operating means for removing a formed length of stock from about said forming die, the operating means for said cutting mechanisms, first and second sets of forming tools and stripping mechanisms being coordinated to effect cutting, forming and stripping of said stock in sequence.

13. A machine according to claim 1 including a stop arranged on the side of said forming die remote from said cutting mechanism, and means operatively connected to and mounting said stop for adjustment relative to said forming die.

14. A machine according to claim 1 wherein the operating means includes a common drive shaft, drive means, releasable coupling means connecting said drive means to said drive shaft, and cam and follower means individual to said cutting and forming tools.

15. A machine according to claim 1 wherein said operating means includes an electrically energized drive, a switch in circuit with said drive, releasable brake means, and a solenoid control operable in response to closing of said switch for releasing said brake means, said solenoid control being arranged to allow said brake means to return to a normally engaged position in response to opening of said switch.

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