Aug. 29, 1961 R. W. WINBERG 2,998,119

PRONG SORTING APPARATUS

Original Filed May 2, 1956 3 Sheets-Sheet 1

FIG. 2.

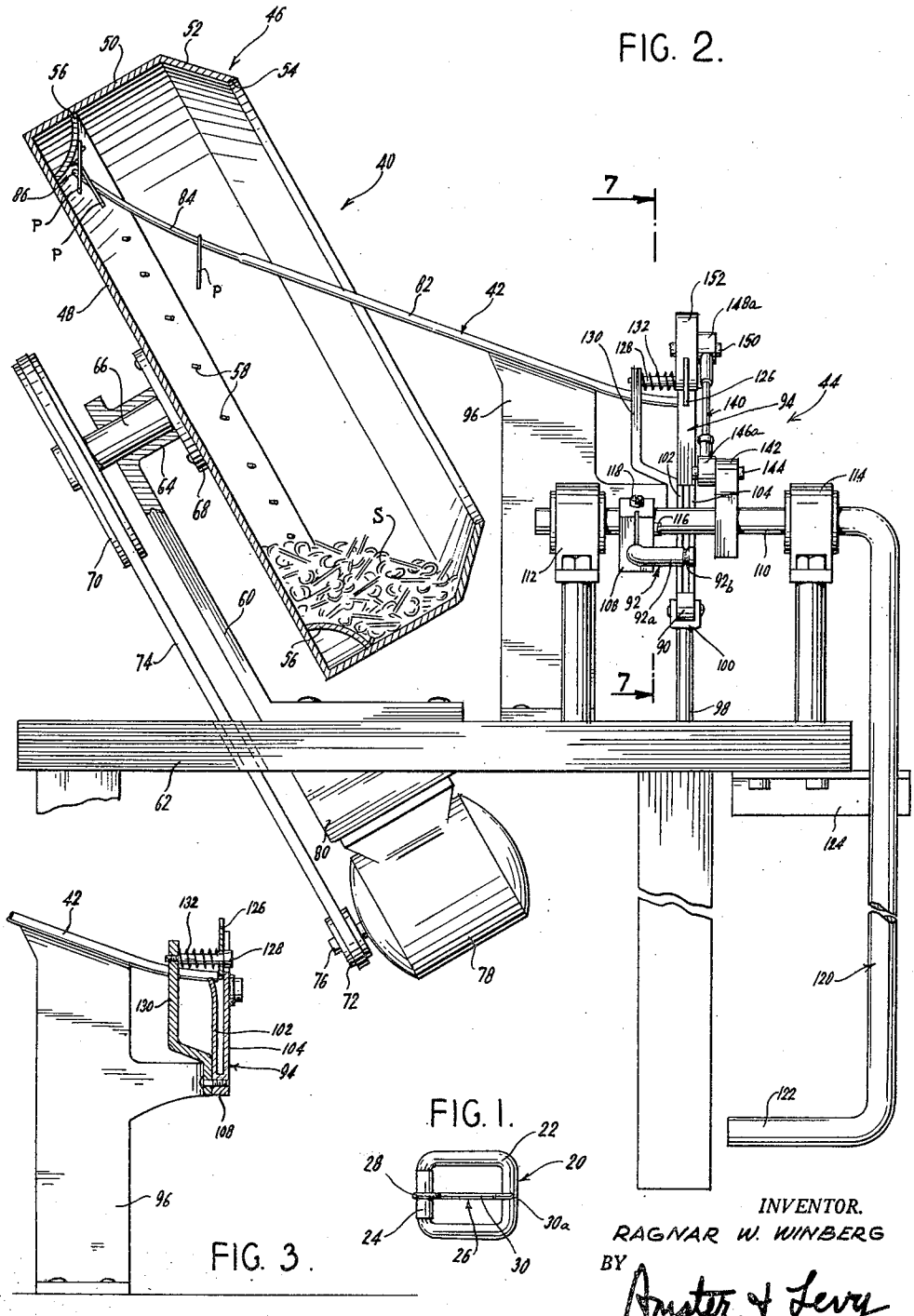


FIG. 3.

FIG. 1.

INVENTOR.
RAGNAR W. WINBERG
BY
Auster & Levy
ATTORNEY

Aug. 29, 1961 R. W. WINBERG 2,998,119

PRONG SORTING APPARATUS

Original Filed May 2. 1956 3 Sheets-Sheet 2

FIG. 4.

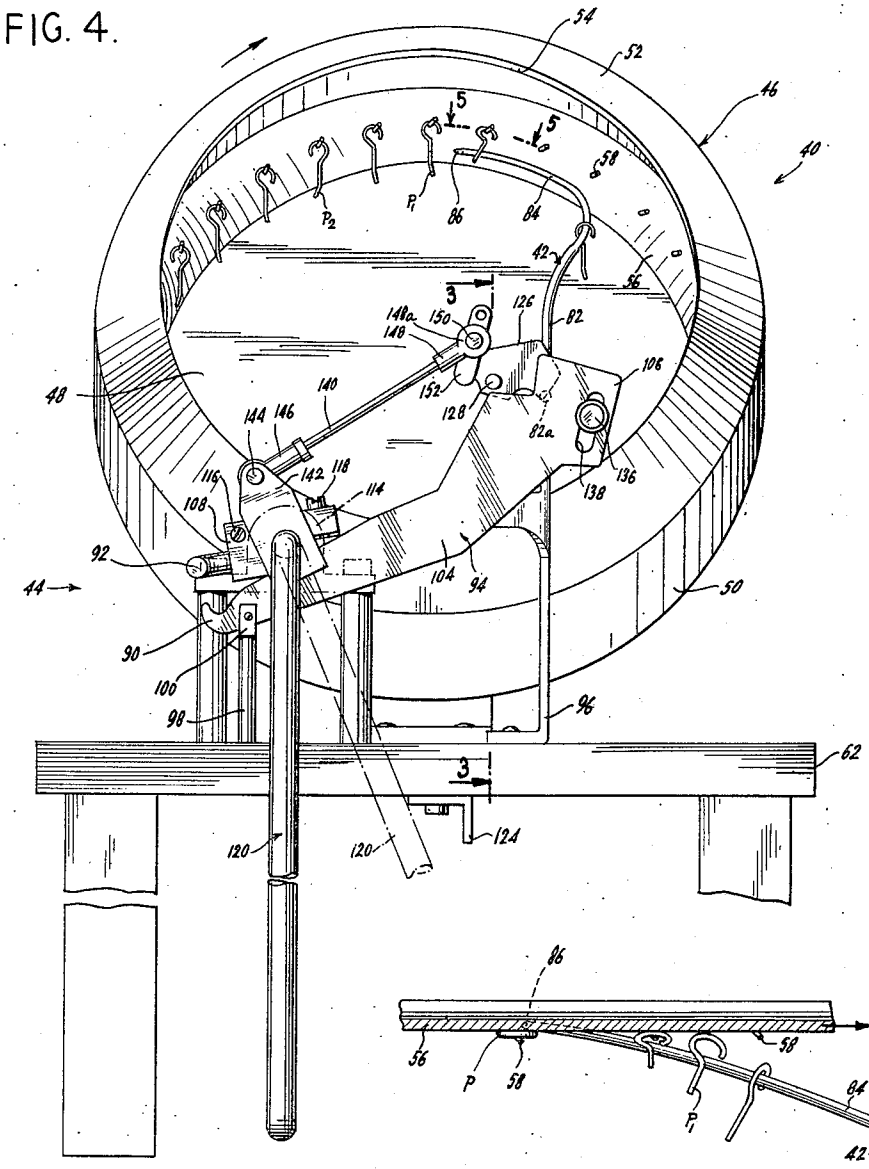


FIG. 5.

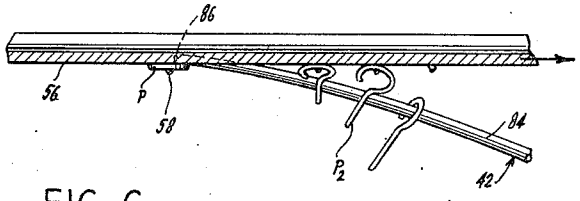


FIG. 6.

INVENTOR.
RAGNAR W. WINBERG
BY
Amster & Levy
ATTORNEY

Aug. 29, 1961 R. W. WINBERG 2,998,119

PRONG SORTING APPARATUS

Original Filed May 2, 1956 3 Sheets-Sheet 3

FIG. 7.

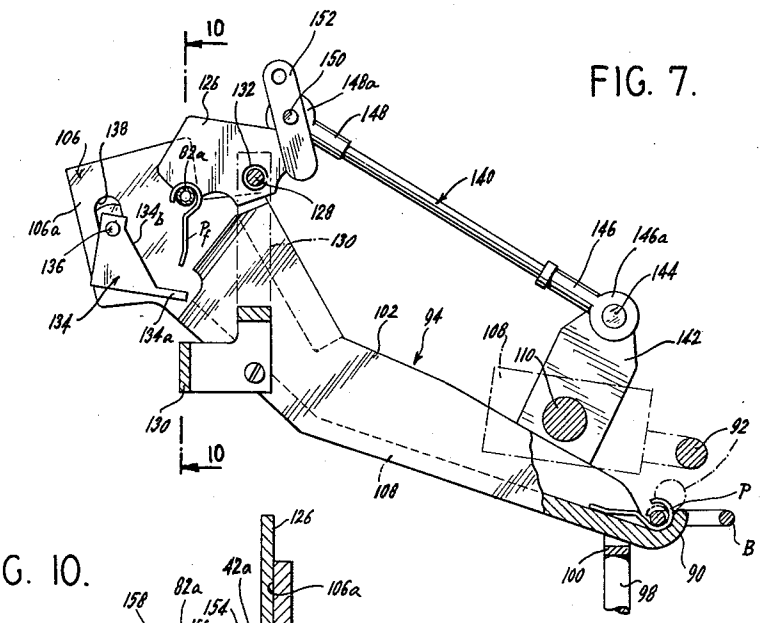


FIG. 10.

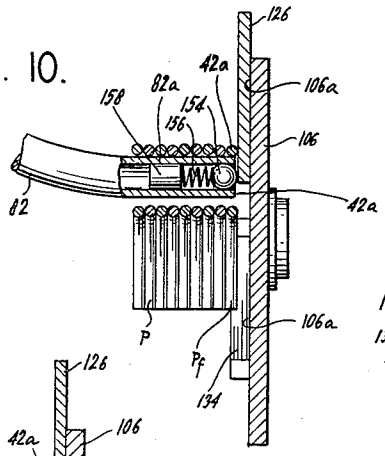


FIG. 11.

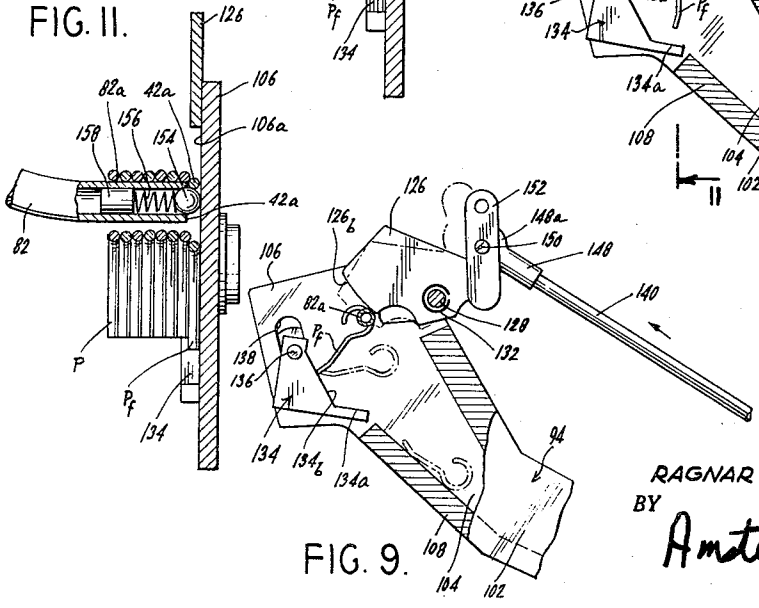


FIG. 8.

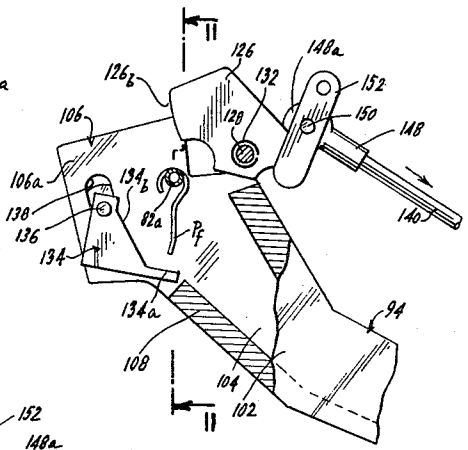


FIG. 9.

INVENTOR.
RAGNAR W. WINBERG
BY
Amster + Levy
ATTORNEY.

United States Patent Office 2,998,119 Patented Aug. 29, 1961

2,998,119

PRONG SORTING APPARATUS

Ragnar W. Winberg, 115 W. Elder Ave., Floral Park, N.Y.

Original application May 2, 1956, Ser. No. 582,164. Divided and this application Jan. 23, 1958, Ser. No. 710,686

7 Claims. (Cl. 198—33)

The present invention relates to sorting and clinching mechanisms, and in particular to a machine for the semi-automatic clinching of prongs of the type having an open eye and a projecting elongated body or stem. Advantageously, the present machine finds application in the manufacture of a wide variety of buckles. This is a division of copending application Serial No. 582,164 entitled, "Prong Sorting and Clinching Apparatus."

In the manufacture of buckles having a body or frame part and a prong mounted thereon, it has heretofore been the practice to manually assemble the prong with the buckle and to close the eye of the prong with the aid of a conventional kick press. The buckle body, which may be of plain or covered wire stock, or a covered metal frame is formed in a preliminary operation, for example by the machine described in my United States Patent No. 2,739,376 of March 27, 1956. Following the formation of the buckle in any of the ways known to the prior art, the prong is placed in the kick press with its eye opening upwardly, the supporting portion of the buckle body is inserted into the open eye, and the kick press is pedally operated to close the eye thereby swingably mounting the prong on the supporting portion of the buckle body. It will of course, be appreciated that this approach to assembling the prongs on the buckles is rather time consuming and requires that the operator handle each and every prong. The prongs tend to interleave and interengage when in bulk, making the techniques described rather inefficient, slow, and often presenting a manufacturing bottle neck.

In accordance with said copending application, a machine is provided for clinching prongs which includes sorting and transfer means which are engageable with successive prongs for supporting a supply of prongs in side by side relation. Clinching mechanisms are arranged to receive the prongs one at a time from the supply. Provision is made whereby an operator can actuate the clinching mechanisms to close the eye of the prong about the supporting portion of the buckle body which is held in position for clinching. The actuation of the clinching mechanisms are effective to deliver successive prongs to the clinching location. Thus, the operator is merely required to place successive buckles into the machine and actuate the clinching mechanisms.

Further, I have found that conventional sorting mechanisms are not suitable for feeding the prongs one at a time from the supply. The prongs have a marked tendency to interengage, interleave, and interlock, due in part to their configuration. This tendency makes it impractical, if not impossible, to sort out the prongs with conventional mechanisms.

Still further, the problem is complicated by the fact that the prongs must be fed to the clinching mechanisms in a prescribed orientation, that is with the open eyes all facing in the same direction. If the sorting device is not effective to feed the prongs with their open eyes properly oriented, it would result in improper operation of the clinching mechanisms. It will, of course, be appreciated that it is impractical to attempt the manual loading of the prong supply since this would require one operator to continuously feed prongs to the machine and another operator to actuate the clinching mechanisms.

In accordance with the present invention, a sorting device is provided for use with prongs of the type having an open eye which is constructed to pick the prongs up from a supply and feed the picked-up prongs one at a time, and in proper orientation, to a transfer mechanism for delivery to clinching mechanisms. In general, the sorting device includes an inclined rotary hopper having a plurality of prong-supporting pegs at spaced locations about its periphery. The dimensions support, and location of the prong-supporting pegs are such that each prong is delicately balanced on its supporting peg. Any accumulations or nests of prongs resulting from the tendency of the prongs to interleave, cross over or "piggy-back" one upon the other is thus eliminated. The pegs are only capable of supporting a single prong and any of the enumerated conditions will cause unwanted prongs to fall from the peg. In that the device for sorting and pick-up of the prongs may be operated at a rate much faster than the speed of operation of the clinching mechanisms, an adequate supply of prongs to the clinching mechanisms is assured. The transfer means is arranged in relation to the prong-supporting pegs to receive only those prongs which are initially picked up in the properly oriented position for transfer; all other prongs are either oriented during transfer or fall from the pegs and return to the supply.

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

FIG. 1 is a plan view of a typical covered wire buckle having a prong swingably mounted thereon;

FIG. 2 is a front elevational view of a typical sorting and clinching machine embodying features of the present invention, parts being broken away and in section for the sake of clarity;

FIG. 3 is a sectional view taken along the lines 3—3 of FIG. 4 and looking in the direction of the arrows;

FIG. 4 is a side elevational view, partially in perspective, taken from the right of FIG. 2;

FIG. 5 is an enlarged sectional view taken substantially along the lines 5—5 of FIG. 4 and diagrammatically showing the transfer of successive prongs from the sorting hopper onto the pick-off or transfer bar;

FIG. 6 is a sectional view similar to FIG. 5 diagrammatically showing a further typical sequence of pick-off of prongs;

FIG. 7 is a sectional view taken substantially along the lines 7—7 of FIG. 2, with parts broken away for clarity, showing the clinching mechanisms in its normal or inoperative position, with a prong and buckle in position for assembly;

FIG. 8 is a fragmentary elevation view, with parts broken away, showing the kicker mechanism, which urges the prongs one at a time into position for clinching, in its retracted position;

FIG. 9 is a view similar to FIG. 8 showing the kicker mechanism in a position of its forward or operative stroke during which a prong is urged toward the clinching location;

FIG. 10 is a sectional view taken substantially along the lines 10—10 of FIG. 7; and

FIG. 11 is an enlarged sectional view taken substantially along the lines 11—11 of FIG. 8.

Although the detailed description which is to follow is concerned specifically with the manufacture of buckles wherein prongs are clinched onto a supporting bar or portion of a buckle, it should be appreciated that the present invention finds application in other and related fields wherein it is necessary to pick up pieces having an open

eye and which have a tendency to interleave and to assemble said pieces by clinching.

Referring now specifically to FIG. 1, there is shown a buckle **20**, which is illustrated as a covered wire shape **22** having a metal clip or ferrule **24** wrapped thereabout and a prong **26** swingably supported on the clip. The prong **26** includes an eye **28** which is adapted to be clinched about the clip **24** and an elongated body or stem **30** which terminates in a hooked end **30***a* adapted to bear against the buckle body **22**. The buckle body, which may be fabricated of deformable wire stock having an appropriate covering of fabric, plastic, leather or the like may be manufactured on an automatic basis by mechanisms described in the mentioned patent.

In FIGS. 2 and 4, there is illustrated a preferred form of sorting and clinching machine demonstrating features of the present invention, which machine includes a sorting device **40**, a pick-off or transfer member **42**, and pedally-operated clinching mechanisms **44**. The sorting device **40** is effective to deliver the prongs, a typical one being designated by the letter P, from a supply S to the pick-off or transfer member **42**; while the clinching mechanisms **44** are arranged to receive the prongs one at a time for clinching under control of the operator.

Detailed reference will now be made to the structure of the sorting device **40** which includes a rotary hopper **46** arranged at an angle inclined with respect to the horizontal and adapted to be driven about its axis. Specifically, the hopper **46** includes a flat bottom **48**, a cylindrical body **50** extending from the flat bottom **48**, and an inwardly extending frustral conical retaining flange **52** which terminates in a circular hopper mouth **54**. Extending about the periphery of the hopper contiguous to the bottom wall **48** is a curved annular skirt **56**. The skirt **56** is secured to the bottom wall **48** at a location inwardly of cylindrical body **50** and curves upwardly and outwardly toward its uppermost end which is secured to the body **50** at a location spaced above the bottom wall **48**. At spaced locations about the skirt **56** are a plurality of prong-supporting pegs, each designated by the reference numeral **58**. The pegs **58** extend upwardly from the skirt **56** and are inclined in the direction of rotation of the hopper **46**, as seen in FIG. 4. The skirt **56** provides curved surfaces in proximity to the respective mounting pegs **58** for a purpose which will be subsequently enlarged upon. The hopper **46** is mounted for rotation through provision of a bracket **60** which is fixed to the frame proper **62**. The bracket is provided with a sleeve bearing **64** which receives a shaft **66** fixed coaxially of the hopper **46** by a mounting plate **68**. The shaft **66** extends through the bearing **64** and carries a large diameter driven pulley **70** which is coupled to a drive pulley **72** by a V-belt **74** trained about the pulleys **70**, **72**. The drive pulley **72** is carried on the output shaft **76** of a motor **78** which is mounted beneath the frame **62** by an appropriate bracket **80**. Thus, in response to the energization of the motor **78**, from a line source (not shown), the hopper **46** is rotated about its axis or axle **66**. The direction of drive is selected to be clockwise, as shown by the arrow in FIG. 4.

As the hopper **46** rotates successive pegs **58** sweep through the supply S of prongs P. As the pegs pass through the supply there is a tendency for the pegs to pick up the prongs. The overall height of each peg is selected so that it can engage within the eye of and support only one prong. This coupled with the fact that the surfaces immediately contiguous to the prongs are somewhat relieved assures that only a single prong will be picked up by each peg. There are no surfaces adjacent the peg which are capable of supporting more than one peg; and the region immediately behind the peg itself and against which the eye portion of the prong bears is occupied by the supported prong.

Further, and as can be seen best in FIG. 2, the pegs are dependingly supported from the prongs; thus any additional prongs which may have interleaved with the supported prong during pick-up are free to fall off of the supported prong. The pick-up action may best be illustrated in connection with FIG. 4 by considering the successive positions of the pegs during a typical cycle of operation and drawing the analogy to a clock face. The pegs near the 12 o'clock position are seen to dependingly support prongs and are directed upwardly and to the right. As the pegs move toward the three o'clock position, they begin to face downwardly. When the pegs move through the 6 o'clock position, they begin their sweep upwardly and to the left through the supply and engage and support prongs at their open eyes. Finally, when the pegs move from the 6 o'clock position to the 12 o'clock position, they have completed the pick-up of prongs which are then in random orientation. For example, and as seen in FIG. 4, prong P_1, has its eye facing to the right; while prong P_2 has its eye facing to the left. As will be described hereinafter, the pick-off finger or member **42** is effective to correct the orientation of prongs which face to the left or to return these prongs to the supply S. It will be appreciated that the illustrated system for pick-up of successive prongs is structurally characterized by the provision for support of only one prong at a given location, thus doing away with any tendency which the prongs may have to bunch, nest or interengage.

Reference will now be made to FIGS. 2, 4, 5 and 6 for a description of the operation of the pick-off or transfer member **42** which receives successive prongs P from pegs **58** with the prongs in but a single orientation. The transfer member **42** includes a main body section **82** for the storage thereon of oriented prongs and a curved pick-off section **84** which extends upwardly into the hopper **46** and terminates at a somewhat pointed end **86** located to engage behind successive prongs arriving at the 12 o'clock position. As seen best in FIGS. 5 and 6, the pick-off section **84** is flattened out and extends adjacent to the skirt **56** for a distance approximately equal to the spacing between two of the pegs **58**. Accordingly, in response to the rotation of the hopper in the clockwise direction the depending body portions of the successive prongs pass in front of the pick-off section **84**. The pick-off section **84** is spaced below the general level of the pegs **58** and located such that it may support successive prongs P as they fall from their supporting pegs.

Referring now to FIG. 5, which is a fragmentary plan view, the action of the pick-off or transfer member **42** will be further described with respect to prongs P_1 which have their eyes directed toward the right and are considered to be in proper oriented position for pick-off by the leading section **84** of the member **42**. The prongs **58** are moving toward the right, corresponding to clockwise rotation in FIG. 4. As the leading pointed end **86** of the pick-off section **84** passes behind successive prongs arriving at the 12 o'clock location there is a tendency for the successive prongs to be cammed away from the adjacent curved surfaces **56**. Due to the curvature of the pick-off section **84** this camming action is continued while the prongs hang on their supporting pegs **58**. This camming action manifests itself in rotation of the open eye to face toward the curved surfaces **56** (away from the viewer in FIG. 5). Thus, the prongs P_1 fall from their supporting pegs in a position which virtually assures pick-up by the leading section **84** of the pick-off or transfer member **42**.

References will now be made to FIG. 6, which is a view similar to FIG. 5, illustrating the action of the transfer member **42** in relation to prongs P_2 which are improperly oriented when initially picked up by the prong supporting pegs **58**. For such prongs, the tendency of the prongs to pivot about their own axes so that their respective eyes are directed rearwardly is not quite as great as that for prongs which have the orientation P. Perhaps this may be attributed to the fact that the open eyes of the prongs P_2 are faced in a direction opposite to the direction of rotation. In any event, the prongs P_2 are either knocked-off of the supporting pegs **58** and returned to the supply

S; or if the open eye is cammed to a position overlying the pick-off section **84** when the prongs fall from the supporting pegs, such prongs will be picked up by the leading section **84** with the required orientation.

Reference will now be made to the several figures for a detailed description of the construction and operation of the clinching mechanisms **44**. Specifically, the clinching mechanisms **44** include a fixed clinching tool or anvil **90** and a movable clinching tool **92** which may be pivoted into operative relation to the fixed clinching tool. The fixed clinching tool **90** forms part of a gravity transfer chute **94**. This assembly is supported by an upstanding bracket **96** adjacent the rearward end of the gravity transfer chute **94** and an upstanding post **98** connected by a U-shaped bracket **100** adjacent the foremost end of the chute **94**. The transfer chute **94** includes upstanding side walls **102, 104** which are spaced apart at a distance slightly in excess of the width of the prongs P. The wall **104** includes an integral extension **106** adjacent its rearmost end which serves as an abutment plate, as will subsequently be described. The wall **102, 104** are connected by a bottom wall **108** which terminates in the fixed clinching anvil, seen in FIG. 7 to be a continuation of the bottom wall **108** and curved to conform to the eye section of the prongs.

As seen best in FIG. 1, the movable clinching tool **92** is supported on a split clamping block **108** which is mounted on shaft **110** journaled in bearings **112, 114** disposed at opposite sides of the chute **94**. The movable clinching tool is L-shaped and includes a horizontal leg **92***a* which extends over the stationary anvil **90** and is formed with an annular groove which is adapted to accommodate the eye section of the prong during the clinching operation. The movable clinching tool **92** is adjustable in relation to the split clamping block through provision of a set screw **116**. In initially setting up the machine, the movable tool **92** is positioned relative to the supporting block **108** so that the tool **92** properly cooperates with the clinching anvil upon rocking of the tool **92** through its prescribed arcuate thrust in the counterclockwise direction, as viewed in FIG. 4. Provision is made for arcuate adjustment of the split clamping block **108** about the shaft **110** by set screw **118**.

Integral with the shaft **110** is a foot lever **120** which has a treadle **122** which is engaged by the foot of the operator who stands in front of the machine, that is to the left in FIG. 4. It will be appreciated that in response to the pivoting of the foot lever away from the operator, that is counterclockwise in FIG. 4 from the full line to the broken line position, the movable clinching tool **92** will be moved into its clinching position relative to the anvil **90**. By proper adjustment of the full-line retracted position of the clinching tool **92**, as illustrated in FIG. 4, a prescribed clinching pressure may be obtained. The limit position of the lever **120** under actuation is illustrated by the broken lines in FIG. 4 and is determined by a fixed stop **124** secured to the under side of the machine frame in position to limit the counterclockwise pivoting of the lever **120**. For example, to decrease the clinching pressure for the prescribed arcuate thrust of the foot lever, the supporting block is translated in a counterclockwise direction in FIG. 4 to displace the movable clinching tool **92** further from the clinching anvil **90**. Conversely greater pressure may be applied for the given arcuate thrust by having the clinching tool **92** closer to the anvil in the normal position. The clinching pressure required is determined by the type of prongs and buckles being worked with the machine.

The prongs P are delivered one at a time from the transfer member **42** to the gravity feed chute **94** as a result of the pedal operation of the movable clinching tool **92**. The structure to be described is effective during the return stroke of the clinching tool to its normal position in FIG. 4 (movement of the foot lever **120** in the clockwise direction from the broken line position to the full line position) to feed the next prong into the chute for delivery to the clinching position, as illustrated in FIG. 7. Thus after the clinching pressure is applied, the operator manually removes the assembly of the buckle and the prong and the next prong is automatically fed into position for clinching. As seen best in FIGS. 3 and 10, the transfer finger or member **42** includes a terminal end **42***a* arranged at a level well below the pick-off section **84** and the major portion of the storage section **82**. The portion of the storage section **82** adjacent the terminal and **42***a* extends horizontally and is designated in FIGS. 10 and 11 by the reference character **82***a*. As the prongs are picked off by the section **84** they travel by gravity toward the terminal end **42***a* and are stacked up in side by side relation with their elongated stems depending and with their open eyes all facing in the same direction, that is rearwardly as illustrated in FIGS. 7 and 8. The terminal end **42***a* of the transfer member terminates at a location spaced from the adjacent confronting face **106***a* of the abutment plate **106**. This spacing is selected to be of a width slightly in excess of the width of the individual prongs, as seen in FIGS. 10 and 11. The foremost prong which is urged toward the abutment plate **106** by the prongs stacked up behind it is maintained on the horizontal extension **82***a* of the transfer member due to a kicker member **126** which lies against the inner face **106***a* of the abutment plate **106** and is seen in FIGS. 7 and 10 to at least partially bridge the space between the terminal end **42***a* and the confronting face **106***a* of the abutment plate **106**. The kicker member **126** is mounted, as seen best in FIG. 3, for pivotal movement on a bolt **128** which is supported on a bracket **130** fixed to the frame of the machine at a location spaced inwardly of and generally parallel to the transfer chute **94**. The kicker member **126** is biased into contact with the inner face **106***a* of the abutment plate by a spring **132** which surrounds the bolt **128** and urges the kicker member to the right in FIG. 3. This mounting structure supports the kicker member **126** for pivotal movement about the axis of the bolt **128**, while the kicker member is resiliently urged against the abutment plate **106**.

The abutment plate **106** carries an adjustable shoe **134** which cooperates with the kicker member **126** in a manner to be subsequently described. The shoe **134** is mounted on the abutment plate **106** by a machine bolt **136** which extends through an elongated slot **138** provided in the abutment plate. The shoe **134** includes a ledge **134***a* which extends generally toward the bottom wall **108** of the transfer chute **94** and an inclined contact surface **134***b* which is adapted to engage the free end of the elongated body or stem of the prong. In general the shoe **134** cooperates with the kicker member **126** to assure the delivery of the prongs to the transfer chute **94** with the open eye foremost. The details of the cooperation will be described in conjunction with the description of a typical sequence of operation.

Means are provided which coordinate the operation of the movable clinching tool **92** and the kicker member **26** whereby clinching of one prong brings about feed of the next prong into the uppermost end of the gravity feed chute **94**. This means includes an adjustable length linkage **140** which is connected to the shaft **110** and to the kicker member **126**. Specifically, an attachment yoke **142** is fixed on the shaft **110** intermediate the supporting block **108** and the bearing **114**, the yoke carrying a pin **144** on which is engaged a collar **146***a* of a connecting head **146** at one end of the adjustable linkage **140**. The other end of the adjustable linkage **140** is connected to the kicker member **126** by a further connecting head **148** having a collar **148***a* supported on a pin **150** which is carried on a link bar **152** fixed to the kicker member **126**.

From the foregoing it will be seen that the kicker member **126** is retracted to the position illustrated in FIGS. 8 and 11 in response to swinging of the clinching tool **92** toward the anvil **90**; and upon return of the clinching tool

92 to its normal position away from the anvil 90, the kicker member 126 moves to the position illustrated in FIGS. 7 and 10. The kicker member includes a nose portion 126*a* terminating in a camming edge 126*b*. In the position of FIGS. 7 and 10 of the nose portions 126*a* keeps the foremost prong P_f from entering into the space between the terminal end 42*a* of the transfer member 42 and the abutment plate 106.

Within the horizontal extension 82*a* of the transfer member 42, which is seen in FIGS. 10 and 11 to be hollow, there is arranged a ball or detent 154 which is biased toward the abutment plate 106 by a spring 156 which is urged against the ball and bears against a plug or stop 158 mounted within the tubular extension 82*a*. When the nose portion 126*a* of the kicker member 126 is in front of the terminal end 42*a* the ball 154 is urged away from the abutment plate 106 and is urged to within the confines of the extension 82*a*. When the kicker member is withdrawn as seen best in FIG. 11, the ball 154 is urged into contact with the abutment plate 106 by the spring 156. Thus despite the fact that the kicker member has been withdrawn, the foremost prong P_f does not fall into the chute 94 but rather is held in position for transfer by the ball 154. It is apparent that as the kicker member 126 moves through its return stroke the prong P_f which has entered the transfer chute and is held by the ball 154 is urged past the ball to free the same to fall into the transfer chute for delivery to the anvil. This action may be best appreciated by progressively inspecting FIGS. 8 and 9. In the position of FIG. 8, the kicker member is fully retracted. As shown by the full line position in FIG. 9 the kicker member has engaged the prong which is supported on the ball 154, such engagement occurring at the camming surface 126*b*. Continued swinging movement of the kicker member 128 in the counterclockwise direction from the full line position of FIG. 9 to the broken line position (which corresponds to the position illustrated in FIG. 7) causes the foremost prong P_f to pivot in the clockwise direction about the supporting ball and extension 82. The prong is displaced until the hooked end engages the sloping surface 134*b* of the shoe 134. Simultaneously, with this pivotal movement, the eye portion of the prong is urged past the spring biased ball 144 so that the prongs fall with the eye portion foremost, as illustrated by the successive broken line positions of the prong in FIG. 9. Thus the transfer is effectuated in a manner assuring proper delivery of the prongs to the clinching mechanisms. Other arrangements are within the contemplation of the present invention for releasing the prongs from their supporting position on the spring biased ball 154 in a manner assuring proper delivery to the transfer chute 94.

In order to facilitate a more thorough understanding of the present invention, a typical sequence of operation will now be described in detail:

A supply of prongs S is loaded into the feed hopper 46 of the sorting device 40 and the operator places the sorting device in operation by energizing the motor 78, for example by tripping a foot-operated or a hand-operated switch at some convenient location front of the machine. In a very short period of time, the sorting device builds up a supply of prongs on the transfer member 42, part of which supply is seen in FIGS. 10 and 11. The operator sitting in front of the machine actuates the foot lever 120 to cause a first prong to be delivered to the anvil 90. Thereupon, the operator assembles the buckle B with the prong P, as illustrated in FIG. 7; upon operating the foot lever again, clinching pressure is applied to the prong to close the same about the supporting portion of the buckle to complete the assembly. During the return stroke of the clinching tool 92 which is brought about by the tendency of the lever 120 to return to its normal position, the next prong is automatically delivered to the clinching anvil 90. The interval between when the clinching operation is completed and the next prong is delivered is sufficient for the operator to remove the completed assembly of the previous buckle and prong. Continued operation merely involves placing successive buckles into assembly with the prongs, and operation of the foot treadle.

From the foregoing it will be appreciated that certain aspects of the present invention are quite readily susceptible to further automation. For example provision may be made for periodically interrupting the operation of the sorting device when a predetermined supply of prongs build up on the transfer member 42. Further in lieu of the pedal operation, provision may be made for automatically cycling the machine at intervals selected to allow for the operator to achieve the requisite manual assembly of the buckle and prong and removal of the completed assembly.

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. At certain times some features of the invention will be used without a corresponding use of other features.

What I claim is:

1. A sorting device for use with buckle prongs each having an open eye comprising a rotary hopper arranged at an angle inclined with respect to the horizontal, said hopper having a bottom wall and a cylindrical body, a plurality of spaced prong-supporting pegs at spaced locations about the periphery of said hopper and at locations spaced from said bottom wall, and means for mounting said pegs on said hopper including an annular flange having its lower edge in contact with said bottom wall and having its upper edge in contact with said cylindrical body, said flange being concavely curved between its lower and upper edges.

2. A sorting device adapted for sorting objects formed with open eyes comprising a rotatable hopper adapted to contain said objects, peg-supporting means on said hopper, peg means projecting from said peg-supporting means positioned and sized to engage said eyes for suspending said objects therefrom in response to rotation of said hopper, removal means positioned for camming said objects off said peg means in response to further rotation of said hopper, means shaped to admit said removal means behind said objects for camming said objects, and means positioned to catch said open eyes as said objects fall from said peg means in response to camming thereof.

3. A sorting device adapted for sorting objects formed with eyes open at one side comprising a rotatable hopper adapted to contain said objects, peg-supporting means on said hopper, peg means projecting from said peg-supporting means positioned and sized to engage said eyes for suspending said objects therefrom in response to rotation of said hopper, removal means positioned for camming said objects off said peg means in response to further rotation of said hopper, means shaped to admit said removal means behind said objects for camming said objects, and means positioned to catch only the open side of said eyes as said objects fall from said peg means in response to camming thereof.

4. A sorting device for use with buckle prongs, each having an open eye comprising a rotary hopper arranged at an angle inclined with respect to the horizontal, said hopper having a bottom wall and a peripheral wall, a plurality of spaced prong-supporting pegs at spaced locations about the periphery of said hopper and at locations spaced from said bottom wall, and means for mounting said pegs on said hopper including an annular flange having its lower edge in contact with said bottom wall and having its upper edge in contact with said peripheral wall, said flange being concavely curved between its lower and upper edges.

5. A sorting device for use with buckle prongs, each having an open eye, comprising a rotary hopper ar-

ranged at an angle inclined with respect to the horizontal, said hopper having a bottom wall and a peripheral wall, means to rotate said hopper about its central axis, a plurality of spaced prong-supporting pegs mounted on said hopper at spaced locations about said peripheral wall of said hopper and at locations spaced from said bottom wall, means including curved surfaces about each of said prong-supporting pegs providing a clearance space between the prongs supported on said pegs and said curved surfaces when said pegs are rotated to a pick-off location, and means for entering said clearance space at said pick-off location and to pick-off said prongs from said pegs.

6. A sorting device for use with buckle prongs, each having an open eye, comprising a rotary hopper arranged at an angle inclined with respect to the horizontal, said hopper having a bottom wall and a peripheral wall, a plurality of spaced prong-supporting pegs at spaced locations about the periphery of said hopper and at locations spaced from said bottom wall, means for mounting said pegs on said hopper including an annular flange having its lower edge in contact with said bottom wall and having its upper edge in contact with said peripheral wall, said flange being concavely curved between its lower and upper edges, and means to rotate said hopper about the central axis thereof, said pegs being inclined in the direction of rotation of said hopper.

7. A sorting device for use with buckle prongs, each having an open eye, comprising a rotary hopper arranged at an angle inclined with respect to the horizontal, said hopper having a bottom wall and a peripheral wall, a plurality of spaced prong-supporting pegs mounted on said hopper at spaced locations about the periphery of said hopper and at locations spaced from said bottom wall, said pegs being effective to engage said open eyes of said prongs, means for providing a clearance space adjacent said prongs when supported on said pegs including curved surfaces about said pegs, means to rotate said hopper about its central axis, and cam means positioned to enter said clearance space for engagement with said prongs to cam said prongs off said pegs in response to rotation of said hopper, said camming means being positioned to catch said open eyes as said buckle prongs fall from said pegs.

References Cited in the file of this patent

UNITED STATES PATENTS

1,157,306	Havener	Oct. 19, 1915
1,336,785	Matter	Apr. 13, 1920
1,756,605	Priest	Apr. 29, 1930
2,656,085	Schmied	Oct. 20, 1953